B8 DM-o 2025 RHD Sheet Metal and Painting Manual

BYD Sheet Metal and Painting Manual — PDF edition

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Statement on Trial Use of AI Translation

Statement on Trial Use of AI Translation by the Auto After-sales Service Division

Dear users:

In order to better adapt to the needs of the information era and enhance our global service support capabilities, the autom otive after-sales service division officially launched the service information automation translation pilot project in Septembe r 2024. As part of the project, we have adopted advanced AI translation tool to achieve fast and accurate translation of Chi nese service information into English and other languages.

The types of materials covered this time include but not limited to, service manual, diagnostic manual, sheet metal and pai nting manual, circuit atlas, and man-hours, etc. Through the application of AI technology, we aim to shorten the document preparation cycle, enhance the availability of technical support documents worldwide, and ensure that overseas customers can obtain the necessary repair information more promptly.

During the pilot phase, we will implement a synchronous calibration and publication process, meaning that the After-sales Technology Engineering Department will conduct a translation quality review of frequently used overseas chapters simulta neously with the release of the materials to ensure the accuracy of the related content translations. While we make every e ffort to ensure translation quality, the following disclaimer applies due to potential errors in automated translation:

Disclaimer:

- Technical limitations: Technical issues or translation errors that may occur during the automated translation process will be promptly corrected upon receiving feedback. However, due to the complex technical aspects involved in the tra nslation process, we cannot guarantee that all translated content is completely accurate and error-free.
- Usage recommendations: Users should independently determine the applicability of automated translation materials when using them. For key repair decisions, make sure to refer to the original Chinese documentation as the final refer ence. If you have any questions about the translated content, it is recommended to consult professional technical pers onnel.
- AI randomness: For the working hour name and spare part name involved in the system data upload in the materials, due to the randomness of automated translation, we cannot guarantee that the content generated by automated transl ation will be completely consistent with other maintenance materials. We will improve this situation by continuously op timizing the AI model.
- Continuous improvement: We highly value user feedback and encourage all domestic and overseas users to report a ny issues or suggestions through the dedicated feedback entry on our Technical Information System (TIS) platform. Y our feedback will help us continuously improve the quality of translation and the integrity of materials.
- Feedback channel: Log in to the TIS, and click User feedback at the lower right of the TIS.
- The automated translation materials provided by this department are for reference only and are not the final official d ocument. The department shall not bear legal responsibility for any direct or indirect loss arising from reliance on this i nformation.

Thank you for your continued support and trust!

About this manual

1. The main content of this manual is the sheet metal painting repair guide for the Fangchengbao B8 model, intended for use by service technicians.
2. This manual is provided by the manufacturer and is written for qualified professional technicians. Attempting to perfor m repair work without relevant training may pose a risk of injury to the repairer or others.
3. This manual contains various tips such as "DANGER", "WARNING" and "CAUTION". Please observe them during op eration to avoid the risk of hurting yourself, others or vehicle equipment. For details, please refer to Safety descriptio n .
4. For ease of understanding, the illustrations in this manual only show the body-in-white (without interior and exterior tri m, electrical, powertrain, chassis, and other systems). If removal and installation work beyond the body-in-white is inv olved in daily maintenance, electromechanical technicians may need to refer to the “Fangchengbao B8 service manua l" for cooperation.
5. The directory structure of this manual is mainly divided into nine parts: About This Manual, How to Use This Manual, S afety and Protection, Tools and Equipment and Auxiliary Materials, Green Maintenance, How to Body and Paint the B ody, Vehicle Identification Information, Body Data and Structural Information, and Replacing Body Sheet Metal Parts. The contents expressed are as follows:
   - **About this manual**： It covers the purpose of this manual, the target audience, safety tips, and the structural ex planation for easy understanding by panel and paint technicians.
   - **How to use this manual**: It explains the meanings of illustrations, DANGER, WARNING, CAUTION, kind remin ders and technical terms in this manual.
   - **Safety and protection**: Contains important safety information such as emergency handling during operations, p ersonnel protection, and site protection.
   - **Tools, Equipment, and Supplies**: Introduces the types and usage methods of sheet metal tools, spraying tools, sheet metal auxiliaries, and spraying auxiliaries.
   - **Green repair**: Use the most reasonable maintenance materials, methods, and processes to achieve standard m aintenance quality.
   - **How to perform sheet metal painting for vehicle body** Maintenance technicians can learn the work processe s and methods for sheet metal and painting from this content.

     Reminder

     The example drawings in this section are for reference only, and the actual operation position shall prevai l.

   - **Vehicle Identification Information**: Includes vehicle identification number description, vehicle identification num ber location, and vehicle nameplate location and description.
   - **Vehicle body data and structure information**: Contains important information such as vehicle body dimension s, body flushness, and body structure necessary for sheet metal work.
   - **Replace body panel parts**： Includes guidance methods for replacing sheet metal parts in common work scen arios to assist technicians in sheet metal work.
6. This manual is mainly used to assist sheet metal painting technicians in repair operation, so as to improve operation e fficiency and quality.

Safety description

The tips in this manual can help you make sure that the selected methods, tools or accessories will not endanger your own safety and the safety of other personnel, nor the overall performance of the vehicle/equipment and the environment before operation.

This manual categorizes four types of symbols to represent specific meanings based on severity levels and usage scenari os. Each symbol represents a specific type of prompt.

Reminder

Such content provides additional information for the completion of a specific procedure, or instructions leading to be tter results.

attentionasdf

Such content indicates that accidents and vehicle/part damage may be caused if the warning is ignored.

Warning

This content indicates that ignoring this warning may result in general personal injury, vehicle/component damage, or environmental harm.

Danger

This content indicates that ignoring this warning may result in general personal injury, vehicle/component damage, or environmental harm.

This manual contains the above tips. A symbol applying to successive steps is placed before the first step. A symbol only a pplying to one step is placed after this step.

Description of diagram

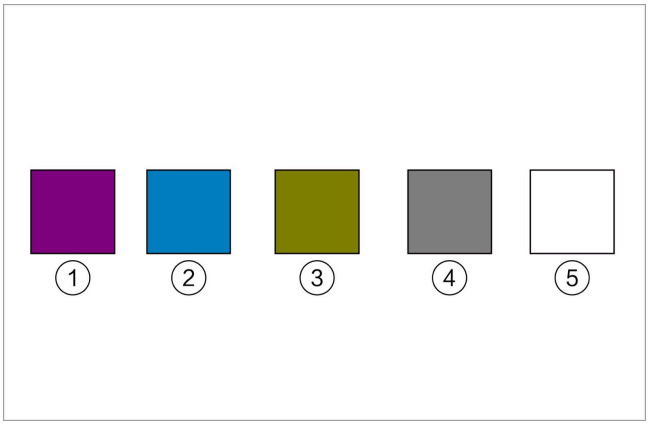
Reminder

This article uses example images of other vehicle models to introduce the meaning of various types of images in thi s manual.

This topic introduces the meaning of component color and corresponding symbols in technical illustration.

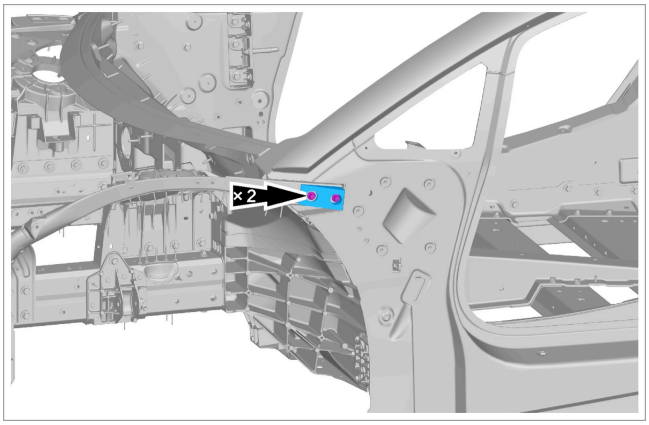
Color description

For easy understanding, the illustrations in this manual have the following 5 colors, each of which represents its correspon ding meaning.



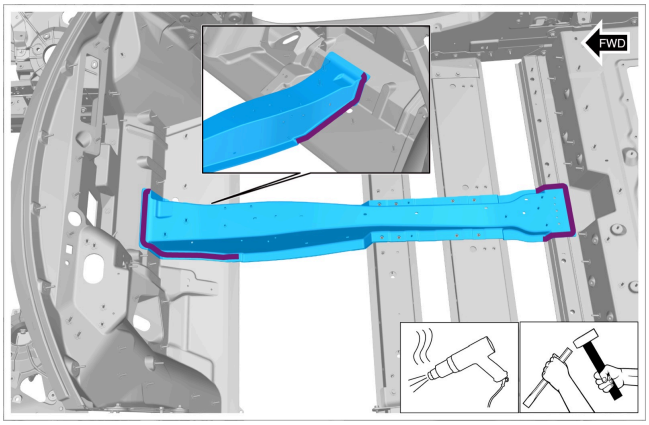
1- Purple： Indicates fixed or fastened components, such as: Connectors, pipe fittings, bolts, nuts, screws, clips, clamps, clamps, etc.

For example: The diagram below represents a fastener.



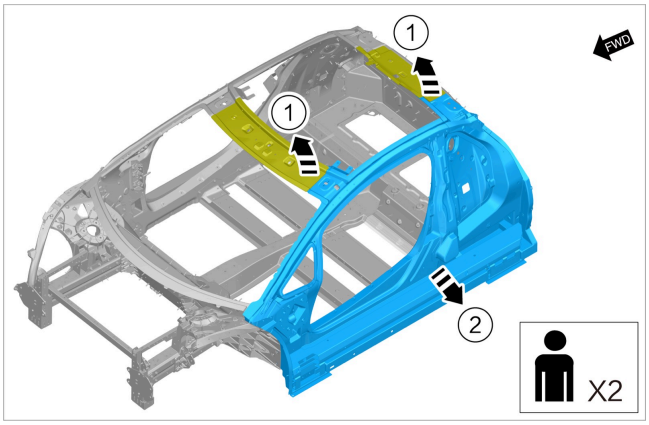
2- Blue： Indicates the main components that need to be disassembled or installed.

For example: The diagram below shows that the component to be disassembled is the central channel assembly.



3- Yellow： Indicates parts that need to be moved during the operation but do not need to be removed from the body.

For example: The diagram below shows the upward movement of the top cover beam panel.

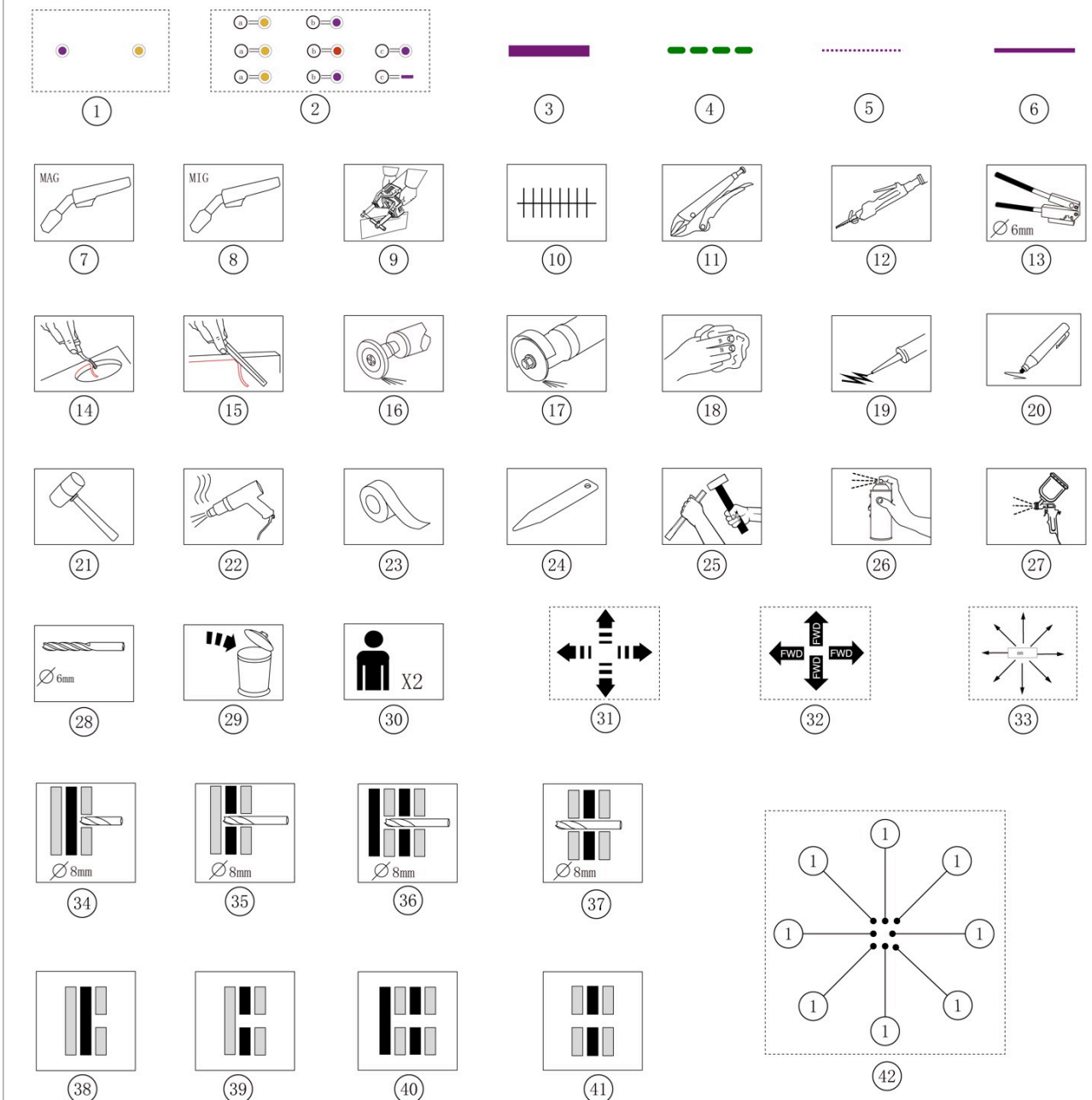


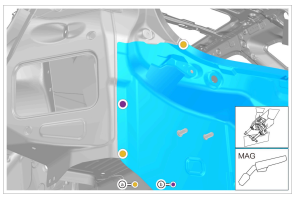
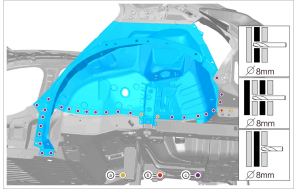
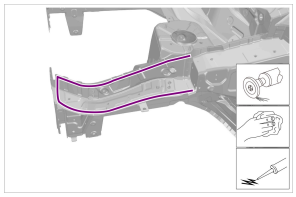
4- Gray： Background objects, which are not described or introduced as objects but are one of the elements that constitute the environment and state of the whole picture, as shown in the picture above.

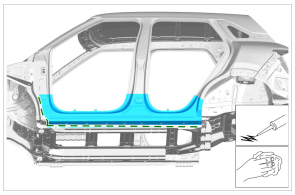
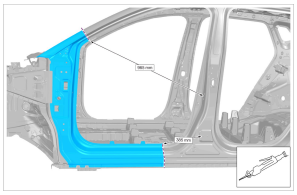
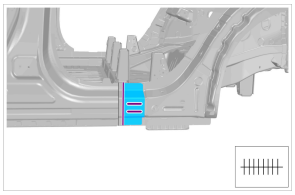
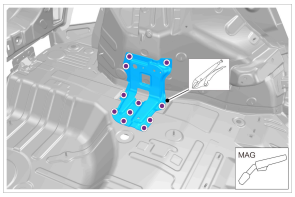
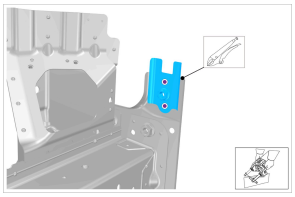
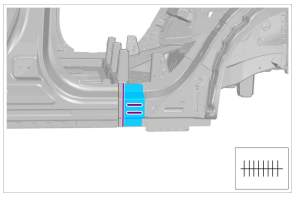
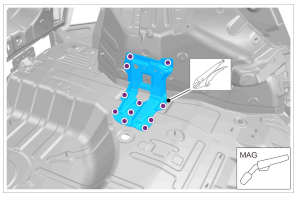
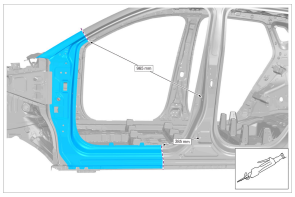
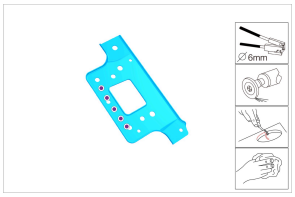
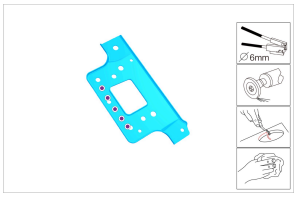
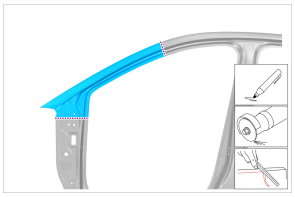
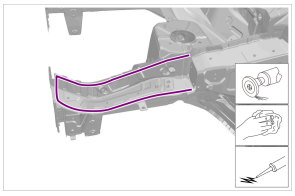
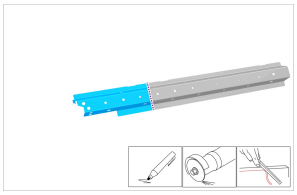
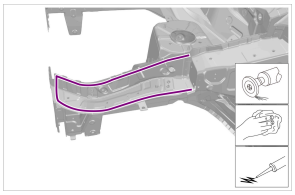
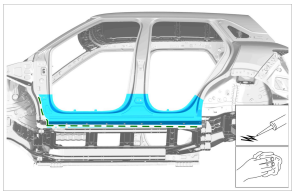
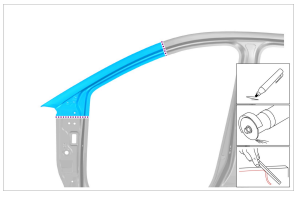
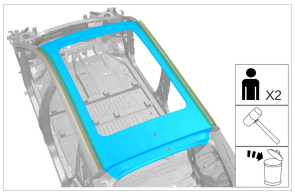
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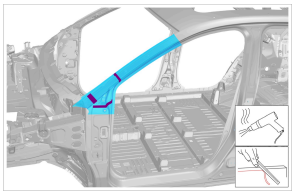
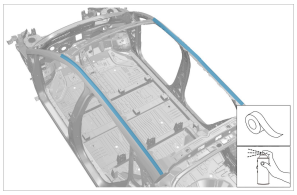
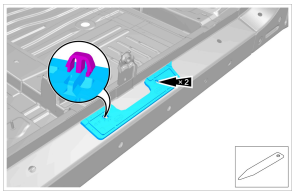
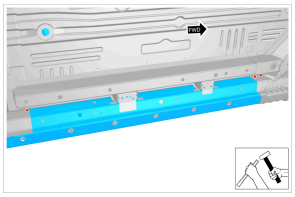
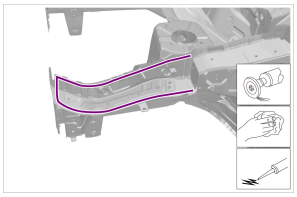
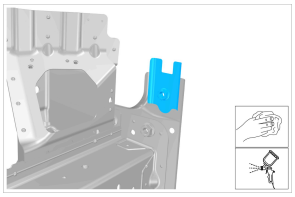
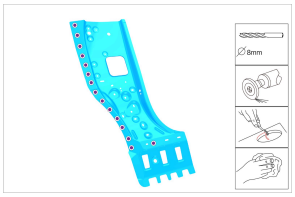
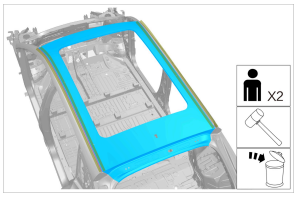
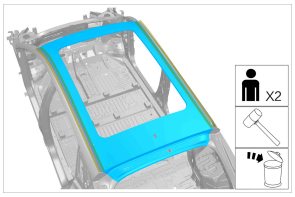
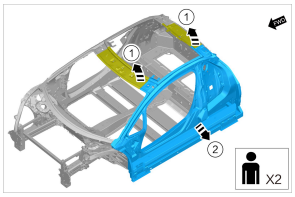
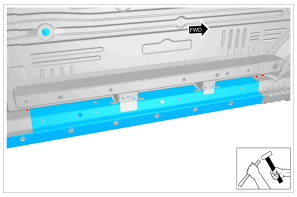
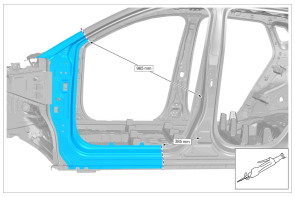
Symbol Description

For easy understanding, a total of 42 process symbols are used in this topic, and each symbol represents its corresponding meaning.



S/N	Description	S/N	Description	S/N	Description
1	It indicates the positions of different types of welding spots: a. Resistance welding spot/welding position. b. Active gas shielded welding spot/welding position. 	2	It indicates that there are multiple processes in the figure: a. Remove 1 layer of welding spots. b. Remove 2 layers of welding spots. c. Remove 3 layers of welding spots. 	3	It indicates the work area for grinding/cleaning/painting/spraying: 

S/N	Description	S/N	Description	S/N	Description
4	It indicates the area where s ealant is applied: 	5	Cutting mark: 	6	Continuous seam welding m ark: 
7	Use active gas shielded weld ing: 	8	Use inert gas shielded weldi ng.	9	Use resistance welding: 
10	Use continuous seam weldin g: 	11	Fix with fixed pliers: 	12	Cut with a pneumatic saw: 
13	Drill holes with a puncher of t he specified diameter, e.g. wi th a 6 mm diameter puncher: 	14	Remove burrs in the circular hole: 	15	Remove burrs from the cuttin g edges: 
16	Grind with abrasive wheel gri nder using abrasive disc: 	17	Cut with abrasive wheel grin der equipped with cutting dis c: 	18	Clean the operation area: 
19	Apply specified sealant or ad hesive: 	20	Mark the cutting area: 	21	Knock with a rubber hamme r: 

S/N	Description	S/N	Description	S/N	Description
22	Heat with a hot air gun: 	23	Paste adhesive tape: 	24	Use a plastic pry bar to remove/loosen parts, such as: Use a plastic pry plate to loosen the B-pillar inner lower blocking piece. 
25	Separate the components with a chisel: 	26	Spray zinc powder conductive primer: 	27	Spray the specified paint. For example, spray anti-rust primer in the corresponding area: 
28	Drill a hole using a dedicated drill bit of specified diameter, for example: Drill holes using an 8mm dedicated drill bit: 	29	Discard the corresponding components, for example: Clear and discard masking tape paper: 	30	Perform this step with the assistance of several persons: 
31	The moving arrow indicates that a component is moved in the indicated direction. For example, the outer panel of gutter channel is moved to the right side of the vehicle body. 	32	It is used to indicate the direction of vehicle body, and the direction indicated by the arrow is the direction of vehicle head. 	33	Data identifier, indicating the distance from point A to point B: 
34	Remove 1 layers of welding spots with a special drill bit with the specified diameter.	35	Remove 2 layers of welding spots with a special drill bit with the specified diameter.	36	Use a dedicated drill bit with the specified diameter to remove the weld spot until reaching the last layer of the steel plate.
37	Drill through multi-layer steel panels with a special drill bit with the specified diameter.	38	Cut 1 layer of steel plate.	39	Cut 2 layers of steel plate.

S/N	Description	S/N	Description	S/N	Description
40	Cutting 3 layers of steel plates.	41	Cut through multiple layers of steel plates.	42	Used in diagrams to mark components for identification purposes, generally in the **component overview** .

Terms

Glossary

Terms	Interpretation
Measuring system	Multiple measuring instruments which are used in combination to comprehensively measure the whole vehicle body. For exa mple, a measuring system composed of measuring appliance or laser beam and three-dimensional measuring instrument is usually used in conjunction with the vehicle body alignment sy stem.
Pneumatic spot welding gun	Tongs using compressed air pressure to open or close the spo t welder arm, independent of manual pressure, which can appl y sufficient welding pressure.
Pneumatic tools	Tools powered by compressed air come in many types and ha ve a wide range of applications in grinding, cutting, installation and removal.
Chisel	Used to separate panels or remove welded panels. It has a cu tting blade at one end and is used for hammering at the other end.
Fixture	A tool for securing objects, often used as a clamp to flatten pa nels or materials, but it can also be used as a welding fixture t o secure panels during welding
Hammer	An indispensable tool for repair of the vehicle body. Knocking t he panel with a hammer is called "hammering".
Slide hammer	A drawing tool formed by the reaction force of a sliding weight connected to the handle. The slide hammer is used for drawin g washers, or directly welded to the panel to draw.
Grinder	A general term for grinding tools, which usually refers to pneu matic grinders. There are many types of grinders, such as dis k grinder, ring grinder and double-action grinder, which shall b e selected according to specific purposes.
Belt sander	The belt sander utilizes annular band-type sandpaper to remo ve the paint layer on spot welding areas, which can be used fo r sanding in narrow spaces.
Manual tools	Wrenches, screwdrivers and other handheld tools that do not r equire compressed air or electrical energy.
Backing bar	Used for shaping the panel and placed against the back of the part to be knocked. It is a metal block, with different shapes.
Air	It refers to the atmosphere originally, but usually refers to com pressed air for repair of the vehicle body.
Carbon dioxide (CO2)	A colorless and odorless gas composed of carbon and oxyge n, with a specific gravity higher than that of air. It is used as sh ielding gas during CO2 arc welding.

Terms	Interpretation
Inert gas	Used to isolate the welding position. During steel panel weldin g, CO2 gas can be used instead, as there is no chemical com bination with other substances when it is ejected from the wel ding gun. However, argon must be used for welding aluminum alloy and stainless steel.
CO_2 gas shielded welder	Use carbon dioxide (CO2) or a mixed gas of carbon dioxide (CO2) and argon as a shielding gas to isolate the welding are a, resulting in more reliable welding equipment
Spot welder	Often used to replace welded outer panels by concentrating la rge currents on and pressing against an overlap point of a pan el. It is easy to operate and does not likely cause the panel to be deformed after welding.
Sheet metal shaping welder (dent puller machine)	Used to weld washers for leveling panels and specially shape d drawing objects and also shrink the steel panel extension.
Barometer	Used to adjust the air pressure to obtain high-pressure gas (o xygen, acetylene and carbon dioxide) from the cylinder.
Line chisel	The main part of this chisel is crescent-shaped and comes wit h a handle. It is used for correcting punching lines. When in us e, it is positioned on the back of the material and struck with a hammer
Spot weld drill	The cutting blade of the drill bit can remove welding spots for med by spot welding. The cutting blade of an ordinary drill bit has a sharp tip, while that of this drill bit has a flat head.
Locking pliers	Used to fix the panels during welding. It can be adjusted so as to fix the panels with a large force.
Welding mask	A mask worn by welders to protect them from strong light and sparks during CO2 gas arc welding.
High-strength steel panel	A type of steel plate with higher tensile strength than ordinary steel plates: Compared to ordinary steel panels, under given s trength conditions, this type of steel panel can be used with a t hinner thickness, thereby reducing weight
GOA vehicle body	A system used to prevent the driver and passengers from bein g injured in collision. This system has one or more parts easy to fold and crumple arranged on the vehicle, so as to buffer th e collision energy through the deformation of the vehicle body in case of collision. This structure is currently adopted in most vehicles.
Unibody (integral body)	A type of vehicle body structure in which various steel panels are welded together to bear forces, forming the entire body of the vehicle, without independent beams.
Sealant	A gap filler applied to the joints of welded panels during panel installation. The main sealant types are single-liquid polyureth ane sealant and silicone sealant. The sealant is stored in the r ubber cylinder and applied with a sealant gun.
Zinc powder conductive primer (spot welding paint)	A conductive rust inhibitor for spot welding, which is diluted by water and applied to the joint of panels

Terms	Interpretation
Anti-chip coating	Black anti-rust granular paint applied on the inner side of whe el housing and floor base surface. It is very effective in preven ting damage to paint layer by gravel, because it has elasticity after drying.
Cavity anti-corrosion wax	It is a liquid-type anti-rust product used on the exterior panel a fter repair or on the inner cavity side of the panels after weldin g
Aluminum alloy	Since the aluminum alloy material itself is very brittle and low i n strength, it must be mixed with iron or manganese into an all oy for application. It is used in engines, wheels, suspensions a nd vehicle body panels. Compared with engines, steel rings or bodies made of steel panels, those made of aluminum alloy m aterials have lower weight.
Laminated glass	Two layers of thin glass sheets with plastic interlayer to preve nt glass scattering in case of breakage. It is difficult for the gla ss sheets to pierce through the interlayer.
Tempered glass	It is ten times stronger than ordinary glass and less harmful be cause it will split into small round fragments when broken. Thi s kind of glass is often used as side window glass and rear wi ndow glass.
Polypropylene	PP for short, which is used for manufacturing bumpers and va rious other accessories inside and outside vehicles
Thermoplastic resin	The resin that can produce the expected deformation by softe ning through heating is used to make various plastics, such as polypropylene, ABS, polycarbonate, etc
Thermosetting resin	Thermosetting resins that become hard after heating include p olyurethane, polyester, and epoxy resin
Polyurethane	A resin made through reactions of two liquids (called polyureth ane reaction). There are several types of rigid resin used to m ake bumpers, strips, etc., while foam resin is used to make se at cushions, etc.
Vehicle body repair	The work of restoring a deformed vehicle body to its original s hape by drawing, etc. In a broader sense, it should include sh aping, panel replacement and configuration adjustment.
Body dimensions	Dimension data or publications of mass-produced vehicle bodi es issued by the vehicle manufacturer
Panel repair	A shaping mode to restore the deformed panel by knocking wi th hammer and backing bar. Drawing, as another method, is c arried out by means of washer welding, slide hammer, etc.
Warping	Used to describe the state of a panel with extension
Rigidity	A property that materials are not easily deformed under bendi ng or twisting force. Even components of the same material wi ll have different rigidity depending on processing methods.

Terms	Interpretation
Elastic deformation	Deformation of the material that can restore to its original sha pe after the force applied is released
Plastic deformation	A property that materials cannot restore to the original state af ter the force applied is released. A force greater than the elasti c limit is required to restore the material to its original state.
Unaligned hammering	A method of repairing panels by hammer and backing bar, in which the position to be hammered deviates from the backing bar position during knocking
Aligned hammering	A method of repairing panels, in which the hammer shall be ali gned with the center of the backing bar during knocking
Weld pass	Welding trace when using carbon dioxide arc welding
Brazing	A welding method of infiltration of low-melting-point metals int o the gap between base metals
Pressure welding	A welding method in which melted metal parts are bonded to e ach other under pressure, such as spot welding
Welding spot	The depression formed during spot welding, more precisely, is a welding spot of spot fusion welding, a circular concave spot on the outer surface of the material being welded, with the siz e of the welding spot being proportional to the welding strengt h
Fusion welding	A welding method that melts and joins metal plates together. Depending on the type of metal to be welded, electrodes mad e from suitable materials are required. Both carbon dioxide ga s arc welding and gas welding are types of fusion welding
Butt welding	A welding method of not overlapping the panels but welding th eir end faces together. The end faces of panels shall not be tig htly close to each other, but with a certain gap.
Plug welding	Suitable for panel structures where spot welding is not availab le. Through MIG welding, the plug welding holes on the upper panel are filled up.
Lap welding	A welding method of overlapping two or more panels together
Splashing	Mainly caused by the oxide of molten metal generated during CO2 gas arc welding. Nozzles blocked by splashings will lead to poor welding performance, so the nozzles shall be cleaned frequently.
Arc	When the relevant conditions are met, electric energy will be tr ansmitted between electrodes through air. In this case, sparks will be generated and accompanied by sound. These sparks a re arcs used as welding heat sources.

Terms	Interpretation
Shrinking	The process method for improving the strength of steel plates involves heating the steel plates, concentrating the extension amount of the steel plates on the heated area, and then using air for rapid cooling. The most common heating method is to u se the electric heat generated by a sheet metal shaping welde r
Stress concentration	In case of rapid change in the section of a material (such as s ectional area change or section drilling or bending), the stress generated relative to external force will not be uniformly distrib uted, but concentrated in a specific part. This is called "stress concentration". The part with stress concentration is prone to deformation.
Stress	Resistance generated inside the material to resist external for ce when subjected to external force
Positioning	It is the process to temporarily fix the panels before welding u sing welding fixtures or small screws, or by local welding or fa stening, and the process to secure the panels using bolts whe n replacing them.
Rough cutting	The work of cutting the panels away from welding positions du ring replacement of the panels so as to quickly remove damag ed panels
Wheel alignment	The adjustment of tires (wheels) to be not perpendicular to the road surface and vehicle body, but at a certain angle, which pl ays a significant role in improving the straight driving of the ve hicle and the maneuverability of the steering wheel. Wheel inc lination angle, kingpin caster and toe-in are terms regarding w heel alignment.
Work hardening	As panels are deformed, their hardness is greater than before. This phenomenon occurs whenever plastic deformation takes place.
Remove and install	Example of adjusting the gap and flushness between the insta lled panel and adjacent panels: Doors and fenders, etc
Clearance	The size of the gap between two mating parts
Flushness	The difference in height or position between two adjacent surf aces
Tolerance	Permissible amount of dimensional variation

First aid and emergency treatment

Emergency treatment of personnel injury

Repair workshops should be staffed with personnel trained in first aid.

The following are examples of situations where immediate action is needed during an emergency:

- If foreign matter splashes into eyes, wash them carefully with clean water for at least 10 min.
- Wash the skin contaminated by materials with soap and clean water.
- After the body is burned, rinse it with cold water immediately to cool down and observe its condition. If it does not get better, send the injured person to hospital immediately.
- In case of inhalation of smoke and dust, immediately go to a place with fresh air and observe the physical condition. I f it does not get better, send to hospital immediately.
- In case of swallowing of the liquid, give the information contained on the container or label to a doctor and consult. D o not attempt to vomit unless indicated otherwise on the label.
- If someone else is accidentally electrocuted, immediately turn off the power supply while ensuring your own safety an d organize a rescue.

First aid for electric shock

1. Your own safety is the first priority. Do not touch any person who is still in contact with voltage. If conditions permit, tak e insulation protection measures for yourself and others, and separate the victim or conductor from the voltage with n on-conductive objects (wooden boards, broom handles, etc.).
2. Immediately turn off the power supply while ensuring safety.
3. Carry out on-site rescue. **If the victim is conscious after being separated from the power supply, leave him/her t o have a quiet rest. In case of severe burns, send him/her to hospital for treatment. If the victim is in a coma b ut still has heartbeat and breathing, place him/her on his/her back and untie his/her clothes for smooth breath ing, with good ventilation. Observe closely, and quickly ask a doctor for diagnosis and treatment or send to h ospital for examination and treatment. If the victim stops breathing and heartbeating temporarily, but has not yet died, defibrillate with an automatic electronic defibrillator (AED) (if any) immediately, or perform cardiopul monary resuscitation**. The specific operation of cardiopulmonary resuscitation is as follows:
   a. Place the victim on his/her back on a wooden board or hard ground.
   b. Untie the neckline and trouser belt, and make his/her head lean back as far as possible, so that the root of tongu e will not block the airway.
   c. Then open his/her mouth with hands and remove foreign matter in the oral cavity to ensure a clear airway.
   d. With one hand supporting the chin and the other pinching the nose, perform artificial respiration for about 2 seco nds to cause the victim's chest to expand. Then, release the mouth and nose to allow the chest to naturally deflat e, exhaling for about 3 seconds.
   e. Repeat, and blow about 12 times per minute.
   f. If the victim's mouth cannot be opened, perform mouth-to-nose artificial respiration. At this time, the blowing air pr essure should be slightly higher and the duration slightly longer to facilitate air entering the lungs.
   g. If the victim is a child, only blow a small amount of air into the mouth to avoid lung damage.
4. When performing artificial respiration, apply external chest compression at a depth of about 5 cm, with about 100 com pressions per minute.

Emergency treatment for electrolyte leakage of high-voltage battery

Judgement of high-voltage battery electrolyte:

1. A large amount of leakage is visible to the naked eye.
2. For a small amount of leakage, the position concerned is wet or milky white spots are formed.
3. A pungent odor indicates a leakage.

Emergency treatment for contact with electrolyte:

- In the event of accidental contact with leaked liquid under normal circumstances, rinse immediately with plenty of cle an water for 10 to 15 minutes. If pain is present, apply 2.5% calcium gluconate ointment or soak in a 2 to 2.5% calciu m gluconate solution to relieve pain. If the pain does not relieve or symptoms of discomfort appear, seek medical atte ntion immediately.
- In case of contact with eyes, rinse the eyes with clean water for at least 15 min. If you still feel pain, seek medical atte ntion immediately.
- In case of skin contact, remove contaminated clothing, immediately wipe off the contaminants with a clean cloth, then thoroughly wash with soap and water. If you still feel pain, seek medical attention immediately.
- In case of contact with the respiratory tract, move to the area with fresh air first. If you still have difficulty in breathing or discomfort, seek medical attention immediately. In case of apnea, perform cardiopulmonary resuscitation and seek medical attention immediately.

Emergency definition

Definition: An emergency refers to an abnormal fault that suddenly occurs during the normal operation of the vehicle, witho ut predictability and corresponding preparation in advance.

Category:

- General faults that do not affect the personal and property safety of passengers and drivers.
- Serious faults affecting the personal and property safety of passengers and drivers.

Response principles:

- Troubleshooting of general faults: For common faults, you can go to the service station for regular vehicle repair.
- Troubleshooting of serious faults: The handling of serious faults adheres to the principle of 'life first', which means tha t in any emergency situation, the life safety of the personnel involved must be ensured first.

Emergency treatment of vehicle accidents

In case of a vehicle collision, fire and smoke, flooding, and other situations, please refer to the latest published New Energ y Vehicle Repair Safety Manual issued by the company for handling.

Safety instructions

Electric shock and accident consequences

- **Electric shock effect**: When the current is lower than the conduction limit, corresponding electric shock response wil l occur, which may easily cause injuries due to uncontrolled limbs and loss of balance.
- **Electric shock effect**: When the current is lower than the conduction limit, corresponding electric shock response wil l occur, which may easily cause injuries due to uncontrolled limbs and loss of balance.
- **Thermal effect**: Burns, scorching and internal burns can occur at the current lead-in/lead-out points. As a result, the kidney is overloaded and even fatal injuries occur.
- **Chemical effect**: Blood and cell sap become electrolytes and are electrolyzed. Severe poisoning occurs consequentl y. The poisoning can only be noticed after several days, with serious injury.
- **Muscle stimulation effect**: All body functions and muscle movements are controlled by the brain through electrical s timulation of the nervous system. In case of high current through the body, muscle twitch occurs and the brain cannot control the muscular tissue.
- **Thermal effect in case of static short circuit**: The sudden heating of the tool can cause the material to melt, resulti ng in burns.
- **Sparks due to short circuit**: The metal melts quickly, generating splashing sparks. The temperature of the splashing metal particles exceeds 5000 °C. May cause burns and serious eye injury.
- **Arc generated when the live high-voltage line is connected or disconnected**: Light radiation may cause electric ophthalmia.

For first aid measures for electric shock accidents, please refer to First aid and emergency treatment .

Sheet metal repair

Welding machine required:

1. Power off the vehicle.
   a. Power off the vehicle and let it sit for 5 min.
   b. Power off the low-voltage electrical system. Refer to Power-off and power-on of low-voltage electrical system
   c. Disconnect the positive and negative bus of the high-voltage battery. Refer to Power-off and power-on of high-vol tage electrical system
   d. Insulate and seal the positive and negative bus connectors of the high-voltage battery and wiring harness end co nnectors to prevent short circuit and ingress of foreign matter.

   Operators shall wear insulating shoes and insulating gloves, and lay insulating pads in steps b, c and d.
2. Remove the high-voltage battery and high-voltage components that will be stressed during sheet metal correction of t he vehicle body, safely store them and then make corrections.

Welding machine not required: Remove the high-voltage battery and high-voltage components that will be stressed duri ng sheet metal correction of the vehicle body, safely store them and then make corrections.

Surface grinding: Dry grinding must be adopted for surface grinding, and wet grinding is strictly prohibited.

Airbag

Due to high inflammability and explosibility, please observe the regulations of No Fireworks.

There is a gas generator inside the airbag. Under normal circumstances, the high-energy propellant in the gas generator is completely sealed. Do not attempt to open the generator; otherwise it may ignite and deplete the propellant, generating hig h temperature gas at 2500°C, thus resulting in personal injury. If the airbag or gas generator ruptures, full-body protective equipment (e.g., Effectively preventing high-temperature protective clothing, protective gloves, and goggles) before handlin g them.

Used airbags shall be packed in plastic bags that meet the requirements and disposed of according to local regulations. If t he human body is in direct contact with the gas generator, wash it thoroughly with clean water and seek medical advice de pending on the severity.

Dos for operation of airbags:

- Store the component in an upright position.
- Keep the component dry.
- When transporting components, the side with the protective cover should face away from the body.
- Place the component cover facing upward.
- Carefully check the component for damage.
- When connecting the airbags, stand on the side of the component.
- Calibrate and maintain all equipment.
- Be sure to wash hands after handling a deployed airbag.

Don'ts for operation of airbags:

- Do not store with highly flammable materials.
- The storage temperature shall not exceed 80 °C.
- Do not store upside down.
- Do not open the housing.
- Do not be exposed to naked flames or heat.
- Do not place anything on the surface covering.
- Do not use damaged airbags.
- Do not touch the ignited gas generator for at least 10 minutes.
- Do not use any electronic detector on its wiring harness.

Refrigerant

Due to high inflammability and explosibility, please observe the regulations of No Fireworks.

Direct contact between the refrigerant and skin may cause frostbite.

Follow the instructions provided by the manufacturer. Wear appropriate protective gloves and goggles when operating.

If refrigerant comes into direct contact with the skin or eyes, immediately rinse the affected area with clean water. In case o f contact with eyes, wash with appropriate cleaning solution. Do not wipe. Seek medical help if you feel unwell.

Don'ts for refrigerant operation:

- Do not expose the refrigerant bottle to sunlight or place it in a heat source.
- Do not place the refrigerant bottle upright. Keep the valve downward during filling.
- Do not refrigerate the refrigerant bottle.
- Do not allow the refrigerant bottle to fall off.
- Do not discharge the refrigerant into the air.
- Do not mix different refrigerants, such as R12 (freon) and R134a.

Refrigerant labeling, packaging, transportation, and storage precautions:

- The refrigerant container shall bear a solid and clear label, including the following: Product name, Trademark, Manufa cturer, Manufacturer address, Net content, Batch number, Product grade, Standard number, and the "Avoid sunlight" s ymbol as specified by GB 191.
- It shall be packed in special steel cylinders. Reusable cylinders shall be coated in aluminum white, and non-reusable cylinders shall be coated in sky blue.
- The filling coefficient during cylinder filling must not exceed 1.02 kg/L.
- The reused cylinders shall be maintained in positive pressure after use.
- During loading, unloading and transportation, safety helmets must be worn. Impact, dragging, dropping and direct ex posure are strictly prohibited. The transportation of steel cylinders must comply with the relevant regulations of the co untry or region.

– It shall be stored in a cool and dry place, kept away from heat sources, and strictly prohibited from sunlight and rain.

Coolant

Common coolants include isopropanol, ethylene glycol and methanol, which are highly inflammable.

When the coolant is heated, steam will be generated. To avoid inhaling steam and getting burned, wait until the coolant co ols down before performing any work.

The coolant will be inhaled by the skin, which is harmful if the human body absorbs too much. It is very dangerous to swall ow the coolant. In case of swallowing, seek medical advice immediately.

Do not come into contact with any public articles, food or drinking water source.

12 V battery acid

For models equipped with ordinary lead-acid 12 V batteries, the gas released during charging is flammable and explosive.

⚠ Danger

Do not use naked flames or generate sparks near 12 V batteries that are being charged or newly fully charged.

Brake fluid

Splashing the brake fluid to the skin or eyes will cause slight irritation. Therefore, avoid contact with skin and eyes as much as possible.

Corrosive to vehicle paint. Avoid dripping onto components with painted surfaces, among others. If accidental dripping occ urs, wipe it off promptly.

Observe the followings for operation of the brake system:

– For the brake line joint with two fastening nuts, use two tools to loosen or tighten the nuts at the same time to prevent the brake line from being deformed under stress.

– Ensure that the brake hose is naturally bent without distortion and deformation.

– Secure the brake pipe with fixing clips to ensure that it does not come into contact with the positions with potential we ar.

– Keep the container for brake fluid clean.

– The brake fluid shall be sealed for storage; otherwise, it will absorb the moisture in the air, resulting in the risk of braki ng failure during use.

– Do not contaminate the brake fluid with mineral oil, or store unused brake fluid in a container that has been filled with mineral oil.

– Do not reuse the brake fluid discharged from the vehicle brake system.

– Always use clean brake fluid or qualified substitutes to clean hydraulic parts.

– After disconnecting the brake line, install a suitable end cap or plug immediately to prevent debris from entering.

– Use only brake line joints with appropriate threads or vents.

– When operating hydraulic parts, keep them absolutely clean.

Fuel

It includes gasoline and diesel. For fuel vehicles, gasoline is highly volatile and flammable, so exposure to the air shall be avoided, especially in confined spaces. The naked flame and heat shall be kept away from the fuel.

Kerosene

– It is usually used as fuel for heating, solvent and detergent.

– For inflammables, please observe the regulations of No Fireworks.

- Swallowing will cause irritation to mouth and throat. This can be more dangerous if the liquid is inhaled into the lungs as a result of swallowing.
- Contact with the skin will lead to dry skin and allergy or dermatitis. Slight discomfort may occur if it splashes into eye s.
- Under normal conditions, it does not generate harmful vapors due to low volatility. Avoid exposure to high temperatur e. Avoid contact with the skin and eyes, and ensure good ventilation.

Lubricant and grease

Avoid prolonged or repeated contact of the body with the lubricant or grease. All lubricants and grease may cause irritation to the eyes and skin.

- **Used lubricating oil**： Prolonged and repeated contact with mineral oil can result in loss of natural fat from the skin, causing dryness, irritation and dermatitis. In addition, used lubricating oil contains potentially harmful contaminants th at may cause cancer. Appropriate skin protection methods and washing equipment must be provided.
- **Environmental precautions**:
  - The combustion of used lubricating oil in smaller heaters or boilers is limited to units permitted by the design. In c ase of doubt, contact the relevant local government agencies and manufacturers of licensed products.
  - Do not discharge lubricants and grease into the environment.

Acids and alkalis

- Commonly used for 12 V batteries and cleaning materials, such as corrosive sodium carbonate and sulfuric acid. Avo id splashing on the skin, eyes and clothing. Wear appropriate protective aprons, gloves and goggles during relevant o perations. Do not inhale the spray.
- It is irritating and corrosive to the skin, eyes, smell and throat, causing burns and destroying ordinary protective clothi ng.
- When in use, ensure that the eye lotion, showers and soap are available for emergency treatment in case of contact.
- There shall be danger signs in the storage place of such articles.

Solvent

- Common solvents include acetone, petroleum spirit, toluene, xylene and trichloroethane. They are used for cleaning and dewaxing of materials, paints, plastics, resins and thinner.
- Some solvents are highly flammable.
- Repeated or prolonged contact with the skin will degrease the skin and cause skin irritation and dermatitis. Some sol vents may be inhaled by the skin, resulting in increased damage to human body.
- Splashing into the eyes may cause severe irritation and blindness.
- Short exposure to high concentrations of steam or fumes may cause irritation to eyes and throat, drowsiness, dizzine ss, headache, and in severe cases, loss of consciousness.
- Repeated or prolonged exposure to excessive but lower concentrations of steam or fumes may result in more serious human injuries.
- Vomiting and inhaling solvent into the lungs can lead to severe consequences.
- Avoid splashing on the skin, eyes and clothing. Wear protective gloves, goggles and protective clothing during operat ion.
- Ensure good ventilation during use, avoid inhalation of fumes, steam and spray, and keep the container tightly seale d. Do not use in enclosed environments.
- When organic solvents such as paint, adhesive and coating are sprayed, use special ventilation equipment or person al respiratory protection equipment under poor ventilation.
- Do not heat or ignite the solvent unless specifically detailed by the manufacturer.

Adhesives and sealing materials

They are highly flammable. During use, please observe the regulations of No Fireworks, and pay attention to keeping the a rticles clean and tidy, such as covering seats with discardable paper. Use other containers with appropriate labels as far as possible, such as applicators and secondary containers.

Solvent adhesives/sealing materials

- Follow the manufacturer's instructions for use. Refer to "Solvents" in this section for solvent instructions.
- Aqueous adhesives/sealing materials
- Polymeric emulsions and rubber latex materials may contain small amounts of volatile poisonous and harmful chemic als. Avoid contact with the skin and eyes during use, and ensure ventilation.
-

Hot melt adhesive： They are harmless in solid state. They may cause burns in melted state, or inhalation of poisonous f umes presents health hazards. Wear appropriate protective clothing and ensure proper ventilation during use. The heater shall have the temperature control function such as automatic cutoff.

Resin adhesives/sealing materials

- Examples are epoxide and resin-based formaldehyde. Mixing shall be carried out in a well-ventilated place because harmful or poisonous volatile chemicals may be released.
- Direct contact of the skin with untreated resin and hardener will result in absorption of poisonous and harmful chemic als, causing allergy and dermatitis. Splashings may cause injury to eyes.
- Anaerobic cyanoacrylate adhesives (super glue) and other acrylic adhesives
- Most of them are irritating, which can cause allergy or injury to the skin and respiratory tract. Some of them are irritati ng to eyes.
- Follow the manufacturer's instructions for use to avoid contact with the skin and eyes.

Cyanoacrylate adhesives (super glue)

- They shall not be in contact with the skin or eyes. If the skin or eye tissue is adhered, cover with a clean wet towel an d seek medical advice immediately. Do not tear off the adhesion. Use in a well-ventilated area because steam can irrit ate the nose and eyes.
- For dual-combination systems, refer to "Resin adhesives/sealing materials" and "Isocyanate adhesives/sealing materi als" in this section.

Isocyanate (polyurethane) adhesives/sealing materials

- Individuals with asthma or respiratory sensitivities must avoid handling or approaching these materials to prevent alle rgic reactions.
- Prolonged exposure can cause eye and respiratory irritation. High concentration can affect nervous system, such as sleepiness. Under extreme conditions, shock due to loss of consciousness may occur. Prolonged exposure to high co ncentrations of steam can cause adverse health effects. Prolonged skin contact may cause degreasing, leading to ski n allergies and, in some cases, dermatitis. Splashings into the eyes can cause discomfort and possible damage.
- Carry out spraying preferably at the exhaust vent, keep the steam and mist droplets away from the area for breathin g, and wear appropriate gloves, goggles and respiratory protection equipment.

Foam materials

- They are generally used for noise insulation. Processed foam materials are used for seats and decorative seat cushi ons, which can enhance the comfort of carpet underfoot and also provide foot protection in the event of a collision.
- The combustion of foam materials will produce poisonous and harmful fumes. Do not smoke during operations involvi ng foam. Do not use naked flame or electrical equipment before the steam is completely eliminated. Carry out thermal cutting of any foam material or specially treated foam material with good ventilation.
- Persons who suffer from chronic respiratory disease, asthma, bronchial disease or allergies are not allowed to work i n or near untreated materials. Their parts, steam or spray can cause direct irritation or allergic reactions, and may eve n be poisonous or harmful.
- Do not inhale the steam or spray of foam materials. Such materials must be used with good ventilation and respirator y protection. Remove the respirator after the steam/spray is completely eliminated, otherwise the steam and spray will be inhaled into the human body.

Chemical materials

Chemical materials such as solvents, sealing materials, adhesives, paints, resin foam materials, 12 V battery acid, high-voltage battery electrolyte, coolant, brake fluid, lubricating oil and grease must be stored and handled carefully. They may be toxic, harmful, corrosive, irritating or highly flammable, producing harmful fume and dust.

Precautions for the operation of chemical materials:

- Please carefully read and follow the hazard warnings and protection requirements on the material container label, attached instructions or other instructions. Material health and safety data sheets are available from the manufacturer.
- After contamination, chemical materials should be immediately removed from the skin and clothing. Wash or discard seriously contaminated clothing.
- Implement work practices while wearing protective clothing to prevent skin and eye contact, avoid inhaling vapors, mists, dust, or fumes, prevent improper container labeling, and mitigate fire and explosion hazards.
- After handling chemical materials, wash hands before taking a break, eating, smoking, drinking or using toilets.
- Keep the workplace clean and tidy, free of spills.
- Store chemical materials according to relevant national and local regulations.
- Keep chemical materials out of the reach of children.

Don'ts for operation of chemical materials:

- Do not mix chemical materials without the manufacturer's instructions. Certain chemical materials can form other toxic or hazardous substances when mixed, release poisonous fumes, or become explosive.
- Do not spray chemical materials, especially solvent-based materials, in closed space, such as when someone is in the vehicle.
- Keep chemical materials away from heat sources or naked flames unless instructed by the manufacturer. Some materials are highly flammable, or may release poisonous or harmful fumes.
- Do not leave the container open. The concentration of the released smoke will accumulate to a point where it becomes poisonous, harmful or explosive. Some fumes are heavier than the air and will accumulate in confined spaces, such as wells.
- Do not put chemical materials into unmarked containers.

Anti-corrosion materials

- Due to high inflammability and explosibility, please observe the regulations of No Fireworks.
- There are wide varieties of these materials, including solvents, resins or petroleum products, which must follow the manufacturer's instructions. Avoid contact with the skin and eyes. They shall only be sprayed in well-ventilated space, rather than confined space.

Fiber isolation materials

- They are generally used for sound insulation.
- Fiber surfaces and cut edges can irritate the skin, which is usually a physical rather than chemical reaction.
- Take some measures, such as the use of gloves to avoid excessive contact with the skin.

Fluororubber

- Commonly used to manufacture parts such as O-rings, seals, or cylinder gaskets.
- Fluororubber is a fluoroelastomer, which is a kind of fluorinated synthetic rubber materials.
- Under normal conditions, fluororubber is very safe to use. However, in case of exposure to a temperature exceeding 400 °C, this material will not burn but will decompose, producing hydrofluoric acid and other substances. Hydrofluoric acid is very corrosive and can be directly absorbed into the human body by contact.
- O-rings, seals or gaskets exposed to high temperature will be charred or turn into black viscous substances. Do not touch them or their attached objects in any case.
-

Make consultations firstly to determine if the affected O-ring, seal or gasket contains fluororubber or other fluoroelastomers. Take care in case of any uncertainty, because the raw materials of such parts are likely to be fluororubber or other fluoroelastomers.

– If the parts containing fluororubber or other fluoroelastomers have been exposed to high temperature, carefully clean the potentially affected areas before working. Always wear disposable protective plastic gloves for hazards, before disposing of decomposed fluororubber residues and cleaning the area at last, neutralize the acid with steel wool and lime water (containing sodium hydroxide), and wash the affected area with clean water. Carefully dispose of waste plastic gloves.

Soldering tin

– Solder is a mixture of metals with a melting point lower than that of the structural metals (typically lead and tin). If soldering tin is heated with a gas-air flame, it typically does not produce toxic lead fumes. Do not use acetylene-oxygen flame to heat soldering tin, because the lead gas poisoning human body is easy to be produced due to high temperature.

– For use of any flame on the soldering tin surface covered with grease, some gases may be generated, and shall not be inhaled.

– Be careful when removing excess soldering tin to avoid inhaling fine lead dust. Use respiratory protective equipment when necessary.

– Collect spilled soldering tin and filings and remove immediately to avoid electrical short circuit and environmental pollution.

– After using the welding tongs, wash hands or clothes in contact with soldering tin to avoid lead intake by the body.

Dirt and dust

Powder, dirt or dust may be irritating, harmful or poisonous. Avoid inhaling powdery chemical materials, or dust caused by dryness and friction. In case of poor ventilation, wear the suitable protective equipment such as breathing mask.

Since fine dust of combustibles may cause explosion, keep them away from naked flames or sparks.

Electric shock

Electric shock may result from electric leakage of high-voltage components, use of faulty components or incorrect operation of normal equipment.

The orange cables on the vehicle are high-voltage cables, and the components labeled with "High Voltage" are high-voltage components.

When the vehicle is in a high-voltage state or when such components are damaged, they are particularly dangerous. Do not touch them at will.

Electrical safety precautions:

– Ensure that the electrical equipment is well maintained and frequently tested. Mark faulty equipment and preferably remove it.

– Ensure that the wires, cables and connectors are not worn, kinked, cut, cracked or otherwise damaged.

– Make sure that electrical equipment and cables do not come into contact with other liquids such as water and coolant.

– Ensure that electrical equipment is protected by correctly rated fuses.

– Do not misuse electrical equipment or use it in any wrong way. It may be fatal.

– Ensure that the cables of movable electrical equipment do not become entangled or damaged, such as when the vehicle is lifted.

– Ensure that relevant staff have received basic first aid training.

In case of electric shock:

– Turn off the power supply before touching the victim.

– If it is unable to turn off the power supply, push or drag the victim away from the power supply by using dry insulating materials.

– If the victim gets into a coma after being away from the power supply, perform correct cardiopulmonary resuscitation i mmediately.

– Seek medical advice as soon as possible.

For hybrid and pure electric vehicles, the following precautions should be followed for high-voltage system operations:

– The components of high-voltage system must be repaired by qualified service technicians. Improper repair may caus e injury to personnel, vehicles, or equipment.

– The high-voltage system is subject to several hundreds of volts or more. During removal and installation of high-volta ge components, wear protective articles at all times, such as insulating gloves and shoes.

– Before repair, removal and installation of high-voltage components, deactivate the high-voltage power supply of the v ehicle. Make sure that the negative cable of 12 V battery has been disconnected, and leave the vehicle standing for m ore than 5 min.

– If the repair area is close to high-voltage components, turn off the ignition switch / Start/Stop switch of the vehicle bef ore repair, and leave the vehicle standing for more than 5 min.

– Do not place the high-voltage battery pack near naked flames or heat it.

– The high-voltage battery pack contains acid electrolyte. Avoid eye, skin and clothing contact. In case of accident, rins e with clean water and seek medical advice immediately.

– In case of severe collision or waterlogging, the high-voltage battery pack may be damaged or the vehicle cannot be d riven from the flooded area. Cut off the power supply while ensuring the safety. Deactivate the high-voltage power sup ply of the vehicle as appropriate, and disconnect the negative cable of 12 V battery (lead-acid battery or starter Fe bat tery), and take rescue measures as required. Keep a safe distance with the vehicle, and place high-voltage warning si gns around the vehicle.

Charging

Electromagnetic radiation will be generated when the vehicle is charged, and the people with cardiac pacemaker or AED s hall not get close to the vehicle (including getting in the vehicle and loading/unloading articles in the trunk).

Ensure that the socket of the charging connector is dry before charging, and the charging connection is not wetted by rain water or other liquids during charging.

Fire

Many materials related to vehicle repair are highly flammable. Some materials will produce poisonous or harmful gases aft er burning.

For storage and disposal of flammable and explosive materials or solvents, strictly observe safety regulations, especially w hen near electrical equipment or during welding operations.

Provide corresponding fire extinguishers for use of welding or heating equipment.

In case of a fire in the vehicle, carry out the following operations while ensuring the personnel safety:

– Turn off the ignition switch or Start/Stop switch of the vehicle, and look for a dry powder fire extinguisher nearby to pu t out the naked flame.

– Immediately call the local rescue center for rescue.

– Deactivate the high-voltage power supply of the vehicle as appropriate, and disconnect the negative cable of 12 V ba ttery (lead-acid battery or starter Fe battery).

– If the fire is serious, keep away from the vehicle.

Fire extinguisher

– The vehicle is equipped with a dry powder fire extinguisher, which is suitable for extinguishing initial fires involving oil, flammable gases, electrical equipment, and other items.

– For highly diffusive gases such as hydrogen and acetylene, the gases throughout the entire space are difficult to be d iluted after a dry powder extinguisher is used. Additionally, they leave powder residues on precision instruments and meters, making the extinguisher unsuitable for such scenarios.

– Follow the instructions on the fire extinguisher for use. Do not use the fire extinguisher improperly.

Noise

Certain operations may generate high noise levels. Appropriate hearing protection must be worn to prevent potential heari ng damage.

General repair shop tools and equipment

- It is important that all tools and equipment are well maintained and safety equipment is correctly equipped as specifie d.
- Never use tools or equipment for purposes other than their intended design function. Do not overload equipment suc h as cranes, jacks, axles and chassis or lifting ropes. Damage due to overload is not perceptible in a short term, but it may cause fatal injury after long-term use.
- Wear an appropriate breathing mask when using sand blasting equipment, handling asbestos-based materials or usi ng spraying equipment.
- Ensure adequate ventilation to control the dust, fumes and gases.
- Do not use damaged or faulty tools or equipment, especially high-speed equipment such as grinders. A damaged grin der may disassemble at any time and cause serious injury.
- Wear goggles when using grinders, chisels or sand blasting equipment.

Suspended load

- Do not use non-special equipment to lift the vehicle, so as to avoid injury caused by sliding of the vehicle.
- There is always a risk when the load is lifted or suspended. Do not work under a load without support or suspension or under lifted load, such as a hoisted powertrain.
- Ensure that lifting equipment such as lifts, jacks, cranes, axle seats and slings are suitable for the type of work and th at they are in good condition and properly maintained.

Warning signs for vehicles, equipment or places

There are warning labels on the surface of some vehicle parts, equipment surfaces and in the display area in some places.

Do not move these warning labels, and make sure that contents on their surfaces are legible and unobstructed. These war ning labels are used to remind relevant personnel. If they cannot be seen, these warnings may be ignored, resulting in saf ety hazards.

Some common marks and their meanings are listed below. Other marks not listed should also be noted.

1. Prohibited measures.



2. No naked flames



3. No smoking



4. No touching



5. No switching allowed.



6. Hazardous voltage/Electrical shock/Electrocution



7. Fire hazard or highly flammable.



8. Burn hazard/Hot surface



9. Automatic startup



10. Toxic



11. Explosive



12. Battery hazard



13. Corrosive



Electrical safety

Hazardous current

- AC over 25V and DC over 60V are both hazardous.
- The maximum locally allowable contact voltage (according to VDE standard) is 50 V AC and 120 V DC.
- A current of about 5 mA flowing through the human body can be regarded as an "electrical accident". In this case, the person feels numb, but can still conduct away the current.
- When the current of about 10 mA flows through the human body, it reaches the limit for conducting current outward. T he human body starts to contract and is unable to conduct away the current any further, resulting in a corresponding l onger current retention.
- Prolonged duration of 30 to 50 mA AC can cause respiratory arrest and ventricular fibrillation.
- A current of about 80 mA flowing through the human body is considered "lethal".
- AC voltage produces AC in the human body, which will cause the muscle tissue and heart to fibrillate.
- The lower the frequency of AC voltage, the higher the risk.

– AC can trigger ventricular fibrillation, which can quickly become fatal without first aid.

Internal resistance of human body

– For high current caused by high voltage, as the corresponding resistance in human body is very low, and the blood in all blood vessels acts as good conductor, different contact points in electrical accidents have different influences on hu man body.

– The skin resistance varies greatly (depending on skin hardness, humidity, conductivity, etc.). However, for voltages a bove 100 V, the skin resistance is almost 0 Ω! The skin may be completely punctured.

– For AC, if the current dwells in the heart for approximately 10-15ms, it can be fatal! (Ventricular fibrillation).

Sheet metal protection

⚠ Caution

Personal protection is the last barrier to protect the safety of operators and prevent them from injury. Proper use of protection articles, as an auxiliary preventive measure, can prevent or reduce the occurrence of industrial accidents and prevent hazards such as occupational diseases and poisoning.

Occupational disease prevention

In the process of vehicle repair, repair personnel need to use various tools and equipment, contact with various toxic and h armful substances, and there are various potential risks. If protective measures are not taken, industrial accidents and occ upational diseases may be caused. This content introduces the factors of occupational diseases and preventive measures in sheet metal painting operation.

Causes of occupational diseases:

- Inhalation of harmful dust particles without safety protection.
- Long-term stay in radioactive environment without safety protection.
- Exposure to hazardous chemicals without safety protection.

Preventive measures:

- For more details, refer to Safety instructions for an in-depth understanding of the scenarios and hazardous substanc es that may pose harm to the human body during operations.
- Use protective equipment in accordance with the operating specifications. Please refer to Sheet metal protection tool s for details .

Welding protection

This part describes the possible hazards to operators during welding and the corresponding avoidance methods.

Hazards during welding:

- Strong light and radiation hazards
- Smoke and toxic gas hazards.
- High temperature and splashing

Body parts damaged:

- Ultraviolet radiation to eyes
- Damage to respiratory system by smoke
- Scalds and burns to skin by splashing

Avoidance methods:

Wear the following protective equipment properly:

- Workwear
- Welding mask.
- Long sleeved welding gloves
- Smoke mask
- Safety shoes



Manual shaping protection

This section describes the hazards that may be caused to operators during manual shaping and the corresponding avoida nce methods.

Hazards during manual shaping:

- A cut on the hand.
- Sharp noise.
- Foreign matter enter the eyes.

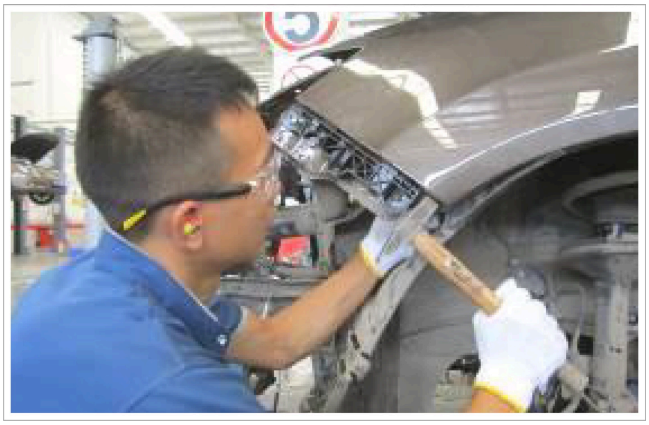
Body parts damaged:

- Damage to the operator's skin
- Damage to the operator's hearing.
- Injury to the operator's eyes

Avoidance methods:

Wear the following protective equipment properly:

- Workwear
- Safety shoes
- Goggles
- Protective earplugs
- Cotton gloves.



Grinding protection

This part describes the possible hazards to operators during grinding and the corresponding avoidance methods.

Hazards during grinding:

- Paint dust is inhaled into the lungs.

– Inhalation of metal particles into the lungs.
– Sharp noise is generated.

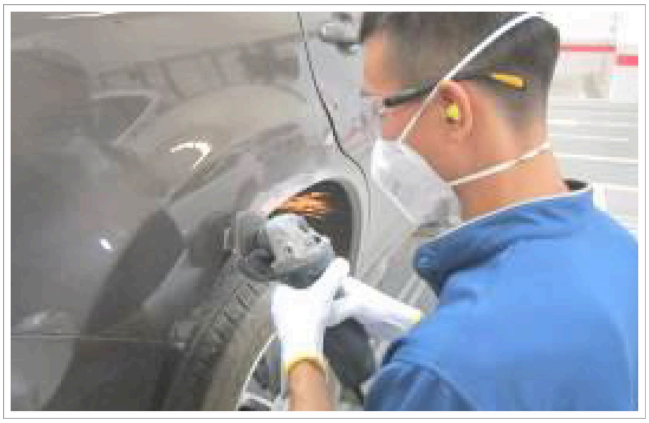
Body parts damaged:

– Damage to the operator's respiratory system
– Damage to the operator's hearing
– Injury to the operator's eyes

Avoidance methods:

Wear the following protective equipment properly:

– Workwear
– Safety shoes
– Goggles
– Protective earplugs
– Dust mask
– Cotton gloves.



Drawing protection

This section describes the hazards that may be caused to operators during the drawing process and the corresponding av oidance methods.

Hazards during process:

– A cut on the hand.
– Sharp noise.
– Foreign matter enter the eyes.

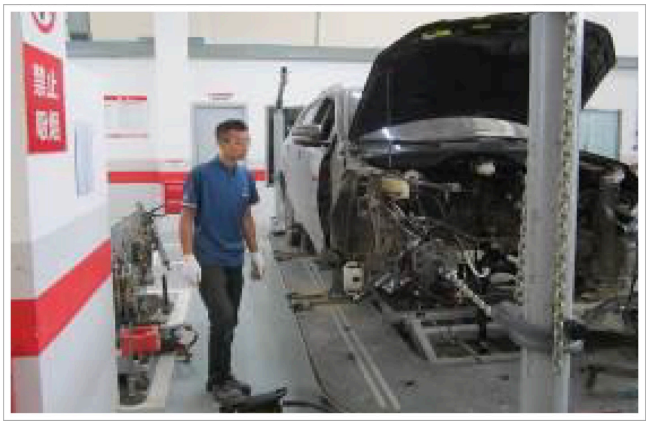
Body parts damaged:

– Damage to the operator's skin
– Damage to the operator's hearing.
– Injury to the operator's eyes

Avoidance methods:

Wear the following protective equipment properly:

– Workwear
– Safety shoes
– Goggles
– Protective earplugs
– Cotton gloves.



Cutting protection

This part describes the hazards that may be caused to operators during cutting and the corresponding avoidance method s.

Hazards during process:

- A cut on the hand.
- Sharp noise.
- Foreign matter enter the eyes.

Body parts damaged:

- Damage to the operator's skin
- Damage to the operator's hearing.
- Injury to the operator's eyes

Avoidance methods:

Wear the following protective equipment properly:

- Workwear
- Safety shoes
- Goggles
- Protective earplugs
- Leather gloves



Spraying protection

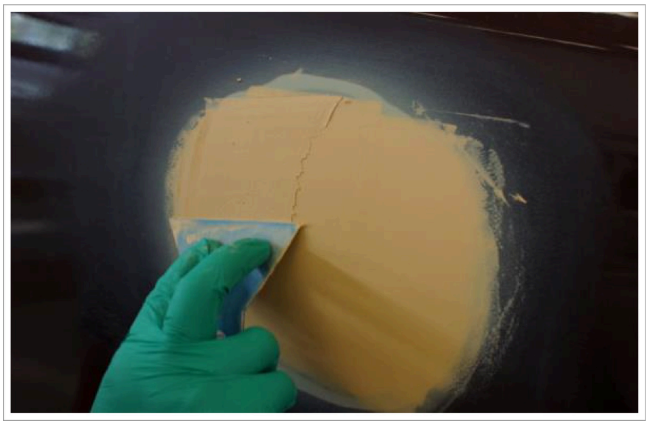
Cleaning and degreasing process

- **Hazardous ingredients**: Organic solvent.
- **Existing hazards**: Respiration, skin, and eyes
- **Personal prevention and protection**:
  - Reasonably wear the anti-organic gas mask, solvent-resistant gloves and protective goggles. Refer to Tools for s praying protection .
  - Operate in the well-ventilated environment and an operation room equipped with an exhaust system.



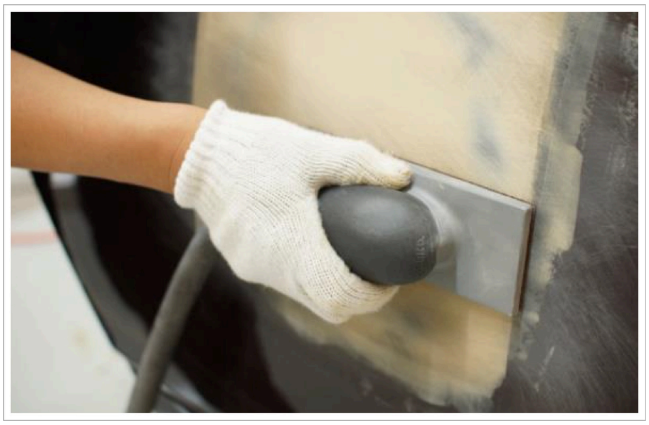
Poly-putty application process

- **Hazardous ingredients**: Styrene, peroxide
- **Existing hazards**: Inhalation of harmful dust or particles, skin and eyes.
- **Personal prevention and protection**:
  - Reasonably wear the anti-organic gas mask, solvent-resistant gloves and protective goggles. Refer to Tools for s praying protection .
  - Operate in the well-ventilated environment and an operation room equipped with an exhaust system.



Grinding process

- **Hazardous ingredients**: Dust and particles
- **Existing hazards**: Inhalation of harmful dust or particles, skin and eyes.
- **Personal prevention and protection**:
  - Reasonably wear the dust mask, cotton gloves and protective goggles. Refer to Tools for spraying protection .
  - Operate in the well-ventilated environment and an operation room equipped with an exhaust system.



Paint Mixing and Blending Process

- **Hazardous ingredients**： Organic solvents, isocyanate, and synthetic resin
- **Existing hazards**: Inhalation of harmful gases, splashing onto skin or into eyes.
- **Personal prevention and protection**:
  - Reasonably wear the anti-organic gas mask, solvent-resistant gloves and protective goggles. Refer to Tools for s praying protection .
  - Operate in the well-ventilated environment and an operation room equipped with an exhaust system.



Spraying processes

- **Hazardous ingredients**: Heavy metals, organic solvents, isocyanates, synthetic resins contained in paint mist.
- **Existing hazards**: Inhalation of harmful gases, splashing onto skin or into eyes.
- **Personal prevention and protection**:
  - Reasonably wear the anti-organic gas mask, air supply mask, solvent-resistant gloves, protective goggles, and a nti-static workwear. Refer to Tools for spraying protection .
  - Operate in an operation room equipped with an exhaust system.



Cleaning of spray gun

- **Hazardous ingredients**: Organic solvents, isocyanate, and synthetic resin
- **Existing hazards**: Inhalation of harmful gases, splashing onto skin or into eyes.
- **Personal prevention and protection**:
  - Reasonably wear the anti-organic gas mask, solvent-resistant gloves and protective goggles. Refer to Tools for s praying protection .
  - Operate in the well-ventilated environment and an operation room equipped with an exhaust system.



Polishing and waxing

- **Hazardous ingredients**: Organosilicone compounds, dust, and particles
- **Existing hazards**: Inhalation of harmful gases, splashing onto skin or into eyes.
- **Personal prevention and protection**:
  - Reasonably wear the dust mask, cotton gloves and protective glasses. Refer to Tools for spraying protection .
  - Operate in the well-ventilated environment and an operation room equipped with an exhaust system.



Site safety and vehicle protection

Site safety

⚠ Caution

- Before entering the workshop, service technicians must know the location of exit passageway and emergency e xit to ensure safe evacuation in case of an emergency.
- When working in the workshop, service technicians must maintain a good working environment to ensure safe and orderly work. If they work in a dirty and messy environment, there will be uncertain hazards at any time.
- The staff shall drive the vehicle in strict accordance with the driving requirements of the plant, and shall not drive in violation of regulations such as speeding or reversing.

To ensure safety, they shall follow the following operation signs when working at the operation site.

Indicative signs

- **Blue:** Protection symbol, this symbol indicates that a protective face shield must be worn.



- **Yellow:** Warning sign, the sub-sign indicates caution against mechanical injury and attention to safety.



Prohibition signs

Violation of prohibition signs may result in serious personal injury and property damage.

- **No smoking**: Smoking should be prohibited in areas marked with the corresponding identification.



– **Do not touch**: If this symbol is present in the corresponding area or on the device, do not touch the corresponding area or device.



Fire safety

In case of a fire, follow the signs to locate the fire extinguisher for emergency handling.

> **Caution**
>
> Before using the fire extinguisher, make sure that you have mastered how to use all kinds of fire extinguishing equipment.

– **Sign I:**



– **Sign II**:

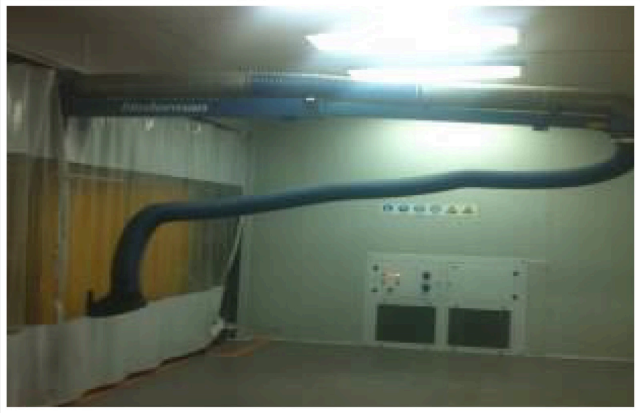


Pumping and drainage facilities

⚠ Caution

- When performing work that generates pollution, harmful gases, or dust, workshop extraction equipment must b e turned on, and protective equipment such as masks must be worn.
- When repairing the aluminum alloy vehicle body, be sure to use special explosion-proof and anti-static pumping and drainage systems. Otherwise, there will be a risk of combustion and explosion.

- The pumping and drainage facilities are mainly used to circulate the air between the workshop and outdoors and pum p the harmful fume, dust, and harmful gases.



Site operation requirements

To ensure safety, technicians shall observe the following requirements during operation:

- The sheet metal technicians shall wear specified protective equipment, especially workwear and safety shoes when e ntering the workshop.
- Sheet metal technicians should carefully check the integrity of tools and equipment before maintenance. Before using electrical equipment, they must check the power supply circuits to ensure there are no short circuits or electrical leak s. If any problems are found, they should be reported to the workshop management personnel promptly.
- The sheet metal technicians shall adopt the correct repair methods in their work, read the safety specifications and o peration methods before operating the equipment, and operate in strict accordance with the specifications during use.
- The sheet metal technicians shall wear correct special protective equipment during special operations, such as weldi ng and shaping. For details, please refer toSheet metal protection .
- The working environment shall be cleaned and tidied up in time in strict accordance with the "6S" standard of the wor kshop. Its interpretation is as follows:
  - **Seiri**: Distinguish between essentials and non-essentials, remove non-essentials from the work area, reduce was te, and only keep necessary items, laying the foundation for other 5S activities.
  - **Seiton**: Organize and label essentials in an orderly manner to ensure that anyone can quickly find the required it ems and return them to their original position immediately, thereby improving work efficiency.

- **Seiso**: Regularly clean the work environment, including machines, tools, and workbenches, to remove trash, dust, and dirt, prevent equipment failure and deterioration of the work environment, and simultaneously inspect and identify potential issues.
- **Seiketsu**: Maintain the state of organizing, tidying, and cleaning, establish standards and systems to ensure the continuous implementation of the first three "S" and constantly check to keep the workplace tidy.
- **Shitsuke**: Cultivate the habit of employees following rules and continuously implementing the first four "S", enhancing employees' initiative and self-discipline, and forming a good work culture and habits.
- **Safety**: Based on all the above activities, emphasize the importance of safety, prevent accidents, protect the health and safety of employees, and create a safe working environment. Although "safety" was not initially included in the original 5S, it was later widely added, forming the current 6S management system.

– The sheet metal technicians shall clearly know where the fire extinguisher is placed, and use it correctly.

– New employees shall receive pre-job training before working in the workshop.

– **Correct case:**

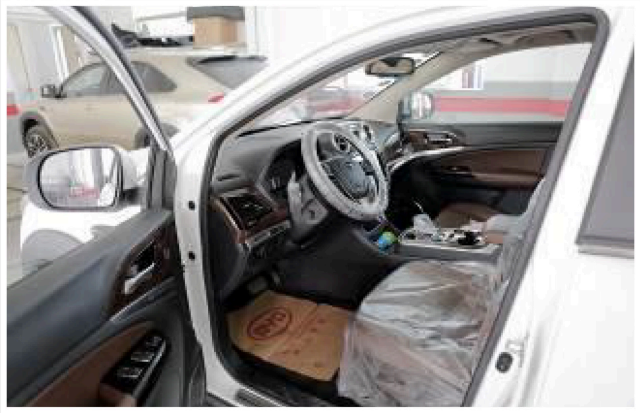


Vehicle protection

Take the following protections before the vehicle is repaired:

– Protect the interior trims of the vehicle with a three-piece set for repair.

– Protect the side of the vehicle and the fender with a fender cover. (Provide this protection according to actual needs during sheet metal painting)



– Protect the front of the vehicle with the bumper sheath. (Provide this protection according to actual needs during sheet metal painting)



– Use a welding fire blanket during welding.

Content guidelines

- The catalogue of tools, equipment and auxiliary materials mainly introduces the commonly used tools, equipment and auxiliary materials on the market. You can purchase them by yourself if necessary.
- The auxiliary materials in the catalogue involved in the OEM shall be subject to the actual situation.

Sheet metal protection

Reminder

- This topic mainly introduces the personal protective equipment (PPE) required in the sheet metal repair proces s.
- Tools in this topic are general-purpose ones and can be purchased as required.

Workwear

- **Introduction**: It refers to a kind of protective clothing worn in work and production, and features various protective fu nctions, such as waterproof, dustproof and oilproof. Correct wearing can effectively prevent harmful dust, chemicals a nd harmful radioactive light from contacting the body, thus reducing the probability of occupational diseases.



Goggles

- **Introduction**: Goggles are protective devices with transparent lenses that allow operators to clearly observe the work ing surface while protecting their eyes.
- **Purpose**:
  - Prevent the splatters from entering the eyes during grinding.
  - Prevent solvent-based liquids from coming into contact with eyes.
  - Avoid the harm of small particles to the eyes when using an air gun.



Protective mask

– **Introduction**: It is used to protect eyes and faces from the frontal damage by harmful substances such as dust, che micals, hot gases and chips.

– **Purpose**:

  • It is suitable for grinding with heavy dust and splashings, which can provide overall protection for the face.

  • Prevent the splatters from entering the eyes during grinding.

  • It can prevent metal sparks from splashing and hurting the face skin during grinding.

  • It can prevent small particles from damage to eyes when using an air gun.



Welding mask

– **Introduction**: It is a protective equipment that can free the operator's hands, ensuring high-quality welding while prot ecting the welder's eyes and facial skin from radiation or burns.

– **Purpose**:

  • During operation, while protecting the operator's eyes, it allows the operator to clearly observe the welding area a nd improve the welding quality.

  • There is no need to repeat shielding upon welding arc striking, thus improving the working efficiency.



Dust mask

– **Purpose**: It is a type of protective device used to filter dust, particles floating in the air, and some harmful gases and dust mist, and can effectively prevent toxic and harmful substances from being inhaled into the human body, thus redu cing the probability of occupational diseases.

– **Instructions for use**:

  • It is a disposable item. Please replace it in time if it is dirty.

  • Not all protective masks have comprehensive protective functions, and each type of mask is marked with its spec ific function.

- It is necessary to select the most suitable type of mask according to the type of contamination. Please check the product manual of the mask when using the mask.



Smoke mask

⚠ Caution

It is a disposable item. Please replace it in time if it is dirty.

– **Purpose**: A protective device used to filter fumes generated during welding and simultaneously filter dust particles flo ating in the air, effectively preventing toxic and harmful substances from being inhaled into the human body, thereby r educing the probability of occupational diseases.

– **Usage:**

- When wearing, wrap the bungee cord around the back of the head and neck.
- It covers the upper part of the nose, and the upper metal strip is pinched to make the mask in close fit with the bri dge of the nose.



Gas mask

– **Purpose**: It is a type of protective device used to filter the poisonous gas volatilized from paint products, and dust par ticles floating in the air, thus reducing the probability of occupational diseases.

– **Instructions for use**:

- Tighten the adjustable bungee cord behind the head.
- It covers the nose and mouth to be in close fit with the adjacent parts.

– **Maintenance**： Regularly inspect and replace the activated carbon and the rubber seal in contact with the face.



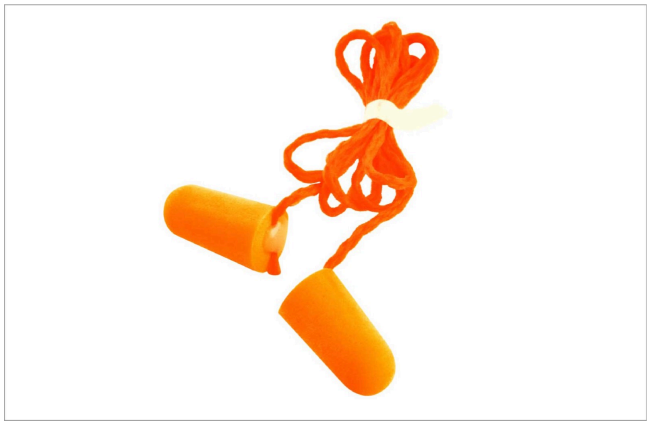
Protective earplugs

Warning

- Frequent exposure to loud noise may cause severe hearing impairment.
- Do not use protective earplugs in conditions where it is necessary to know the repair situation through sound (e.g., Welding and operation calibration bench).

– **Introduction**: It is a protective device made of silicone or low-pressure foam material, high-elasticity polyester materi al, which is used to protect the hearing system of workers by closely contacting the outer ear after being inserted into t he ear canal to achieve sound insulation.

– **Purpose**:
  - Reduce the sharp noise generated during grinding.
  - Reduce knocking noise.
  - Reduce the impact of other noises during work.



Protective earmuffs

Warning

- Frequent exposure to loud noise may cause severe hearing impairment.
- Do not use protective earplugs in conditions where it is necessary to know the repair situation through sound (e.g., Welding and operation calibration bench).

Reminder

The earmuffs have a better protection function than the earplugs.

- **Introduction**: A protective item that can reduce noise exceeding the human body's tolerance (above 64 decibels) to protect the auditory system of workers.
- **Purpose**: Reduce the sharp noise generated during tapping and grinding work



Safety shoes

⚠ Caution

- Technicians must wear qualified safety shoes when entering the workshop.
- Ensure the size fits properly.
- Do not leave shoe laces excessively long.

- **Purpose**: They are equipped with protective steel panels in the front to prevent smashing and pressing. The bottom of the shoes is made of insulating rubber to avoid electric shock. The shoes have good anti-skid function.



Protective gloves

⚠ Warning

Do not use cotton gloves for sharp tools or objects to prevent finger injury after glove penetration.

- **Purpose**:
  - Protect the operator's hands when vehicle body parts are handled.
  - Protect the hands of operators when using basic operating tools.
  - Protect the operator's hands when grasping hard objects.



Solvent-resistant gloves

⚠ Warning

They are made of disposable rubber. Before use, check whether they are damaged, and replace them with new on es immediately in case of any abnormality.

– **Purpose**: Prevent operators' hands from contacting corrosive liquids.
  - They are used to prevent contact with corrosive liquids which can cause skin damage.
  - Protect the skin from solvent invasion during cleaning agent application.
  - Protect the skin from solvent invasion during sealant application.
  - Protect the skin from the infiltration of the solvent when in contact with liquids containing corrosive components.



Long sleeved welding gloves

– **Introduction**: A specialized glove for welding work, which provides safety protection and comfort for welders. It is suit able for cutting, welding, handling, and other purposes.

– **Purpose**:
  - Used to isolate high temperatures and ultraviolet rays.
  - They can be used in the working environment with strong light, welding slag and sparks.



Leather gloves

⚠ Caution

Each type of leather gloves serves a specific purpose and should not be interchanged or worn casually.

– **Introduction**: Leather gloves are a type of protective equipment used when operating air drills, electric drills, and ben ch drills.

– **Purpose**:

  • They can be used to grasp sharp objects to avoid scratching and pricking fingers.

  • They can provide protection during grinding or high-temperature operation.



Spraying protection

Reminder

- This topic mainly introduces the personal protective equipment (PPE) required in the spraying process.
- Tools in this topic are general-purpose ones and can be purchased as required.

Gas mask

- **Purpose**: It is a type of protective device used to filter the poisonous gas volatilized from paint products, and dust par ticles floating in the air, thus reducing the probability of occupational diseases.
- **Instructions for use**:
  - Tighten the adjustable bungee cord behind the head.
  - It covers the nose and mouth to be in close fit with the adjacent parts.
- **Maintenance**: Regularly inspect and replace the activated carbon and the rubber seal in contact with the face.



Supplied air respirator

- **Purpose**: Prevent inhaling mailed solvent vapors.
- **Instructions for use**:
  - When wearing respirators filled with the compressed air, install a filter that can filter oil and water and a freeze dr yer to ensure the air quality.
  - Supplied air respirators are mainly used during extensive and prolonged spraying, or in enclosed or poorly ventil ated environments, such as: Paint booth, sealing chamber, oil tank, etc.
- **Types**: It is divided into full-face type and half-face type.



Spraying workwear

– **Purpose**: Prevent the dust, paint mist, and organic solvent generated during the spraying operation from harming yo ur body.

– **Instructions for use**:

  • Workwear made of conductive materials can prevent static electricity.

  • Wear anti-static workwear throughout the spraying operation in the spray booth.

– **Types**: It is divided into full-face type and half-face type.



Goggles

– **Introduction**: Goggles are protective devices with transparent lenses that allow operators to clearly observe the work ing surface while protecting their eyes.

– **Purpose**:

  • Prevent the splatters from entering the eyes during grinding.

  • Prevent solvent-based liquids from coming into contact with eyes.

  • Avoid the harm of small particles to the eyes when using an air gun.



Dust mask

– **Purpose**: It is a type of protective device used to filter dust, particles floating in the air, and some harmful gases and dust mist, and can effectively prevent toxic and harmful substances from being inhaled into the human body, thus redu cing the probability of occupational diseases.

– **Instructions for use**:

  • It is a disposable item. Please replace it in time if it is dirty.

  • Not all protective masks have comprehensive protective functions, and each type of mask is marked with its spec ific function.

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Safety shoes

⚠ Caution

– Technicians must wear qualified safety shoes when entering the workshop.
– Ensure the size fits properly.
– Do not leave shoe laces excessively long.

– **Purpose**: They are equipped with protective steel panels in the front to prevent smashing and pressing. The bottom of the shoes is made of insulating rubber to avoid electric shock. The shoes have good anti-skid function.



Protective gloves

Warning

Do not use cotton gloves for sharp tools or objects to prevent finger injury after glove penetration.

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- Protect the operator's hands when vehicle body parts are handled.
- Protect the hands of operators when using basic operating tools.
- Protect the operator's hands when grasping hard objects.



Repair tools for plastic parts

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Hot air gun

– **Purpose**:
  - Heat the damaged part of the plastic part for repair.
  - Assist in dismantling panels that are glued together.



Pneumatic drill

Caution

Take care when using the pneumatic drill. Never touch the revolving bit directly by hand.

– **Purpose**: It is mainly used for drilling plastic parts to prevent further expansion of fracture.



Heating lamp

Caution

Keep the heating lamp away from combustibles and explosives due to high temperature during use.

– **Purpose**:

- It is used for heating the poly-putty or primer coating on panel surface.
- It is used for heating repair after damage and deformation of large-area plastic panels.



Grinder

– **Introduction**: Grinders are generally divided into three types: Single-action sander, dual-action sander, orbital sande r.

– **Purpose**:

- **Single-action sander**: Primarily used for removing old paint films.
- **Dual-action sander**: Can be used for sanding feather edges, poly-putty, and paint surfaces.
- **Orbital sander**: Primarily used for sanding poly-putty.



Vehicle body measurement

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Measuring tape

– **Purpose**: The measuring tape is a simple measuring tool, which is small in size and portable. It is mainly suitable for measurement of the straight lines and plane of the vehicle body.



Universal measuring rule

– **Purpose**: It is mainly used to measure the vehicle body curve and the distance between two points with obstacles.

– **Operation instructions**: Before use, it is necessary to perform dimensional verification, and handle with care.



Electronic measurement

– **Purpose**: Measure multiple three-dimensional size data among the upper body, lower body, and components of the v ehicle.

– **Characteristics**:

- Simple and fast operation, utilizes Bluetooth and other functions for timely output and recording of measurement dimensions, and makes accurate judgments on data changes.
- It has a large database to store the body data of various models, and accurate measured data, with very small er ror.



Vehicle body alignment

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

The vehicle suffered severe impact causing deformation to both the outer panels and internal structures. It requires the us e of body correction and measurement tools and equipment to perform pulling correction, measurement, and cut-and-repla ce on the accident vehicle to restore its original appearance and quality.

Lift alignment rack

– **Purpose**: It can measure multiple three-dimensional size data between the upper part, lower part and components of the vehicle body.

– **Characteristics**:

  • It is easy and simple to operate, usually in conjunction with an electronic measuring system.

  • Utilize the Bluetooth function to achieve timely output and recording of measurements, and make accurate judgm ents on data changes.

  • It has a large database to store the vehicle body data of various models, with high accuracy and minimal errors.

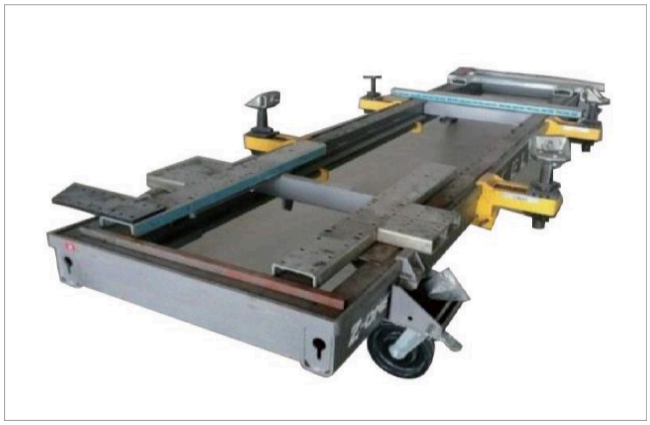


Mobile alignment rack

– **Characteristics**:

  • It can be moved as required to repair the vehicle.

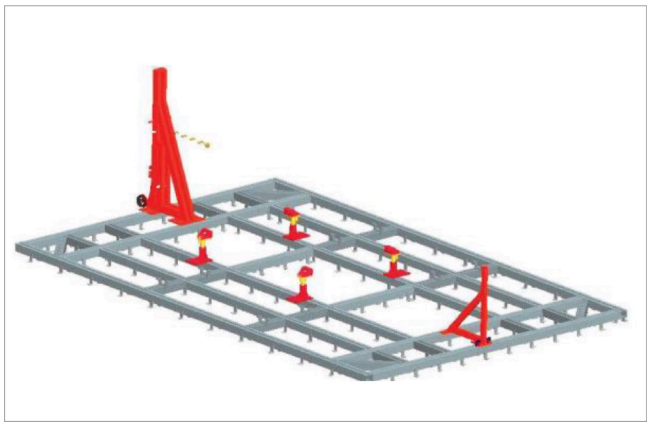
  • It is convenient for alignment and repair of the vehicle body side damage.



Minor damage repair alignment rack

It can also be called the ground trigram bench, which are buried below the ground and have a surface flush with the groun d.

– **Characteristics**: With the movable pull tower, it is convenient and quick to repair the affected vehicle with small dam age.



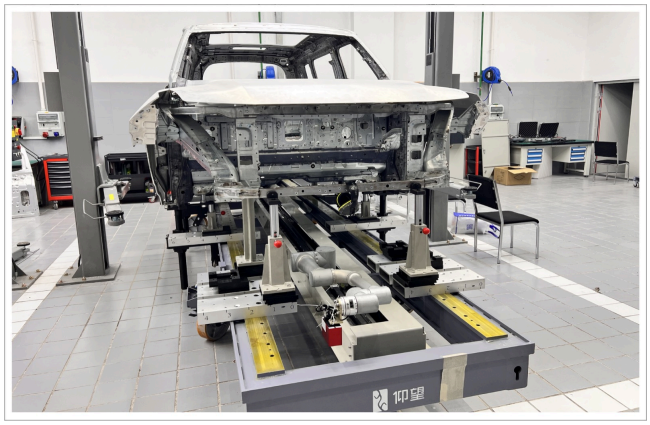
Platform alignment rack

– **Characteristics**: It is convenient and quick to install the underbody fixtures in multiple positions at the same time.



Car Body Precision Repair Platform

– **Features**： Provides stable support for the vehicle body, precise measurement and positioning, and multi-directional stretching correction functions.



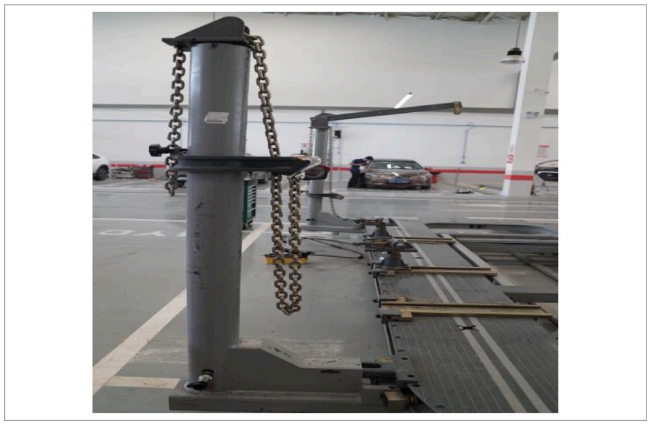
Ground-cage alignment rack

– **Characteristics**: The accident vehicle can undergo comprehensive correction and pulling operations.



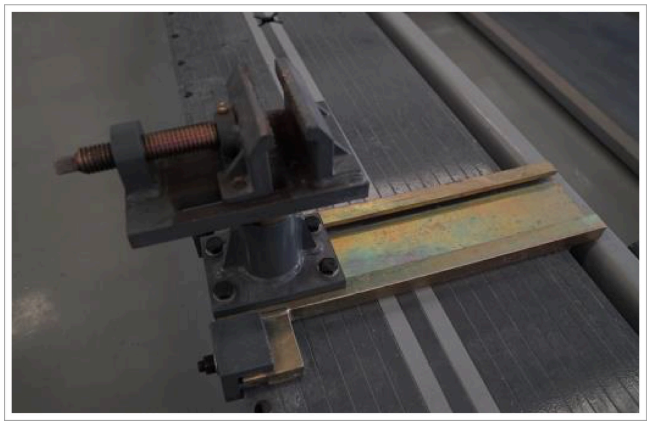
Pull tower

- **Characteristics**:
  - It is fixed on the side of the alignment rack.
  - It can draw the vehicle body with damage and deformation at different positions and angles.



Fixtures

- **Purpose**: It is used to fix the bottom of the middle section of the vehicle body, providing a fixed support for drawing al ignment.
- **Instructions for use**:
  - There are usually four fixtures.
  - Check the clearance between the vehicle body and fixture at any time during drawing alignment.
  - In case of any abnormality, reinstall and fix it and tighten the bolts.

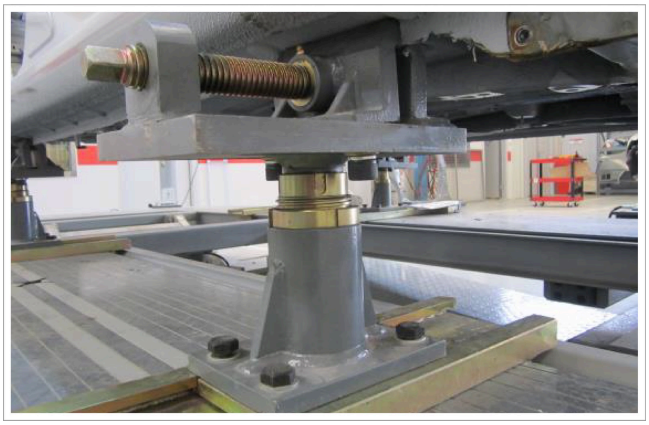


Vehicle chassis fixing bracket

- **Purpose**: Used for body fixation, adjusting height.

– **Characteristics**: It can adjust the positions of front, rear, left, and right supports for flexible use.

– **Instructions for use**: It is used in conjunction with fixtures.

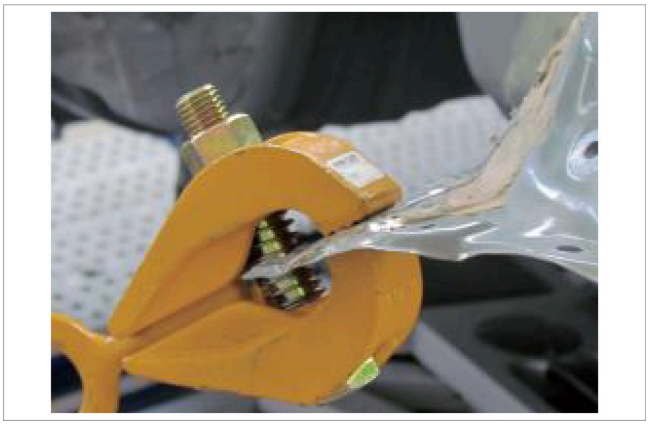


Pulling clamp

– **Description:** It is necessary for drawing alignment.

– **Instructions for use**: Select the correct fixture based on the type and location of the damage and use it correctly bef ore the operation

- **Edge pulling clamp**: It is mainly used for clamping the edge of vehicle body.



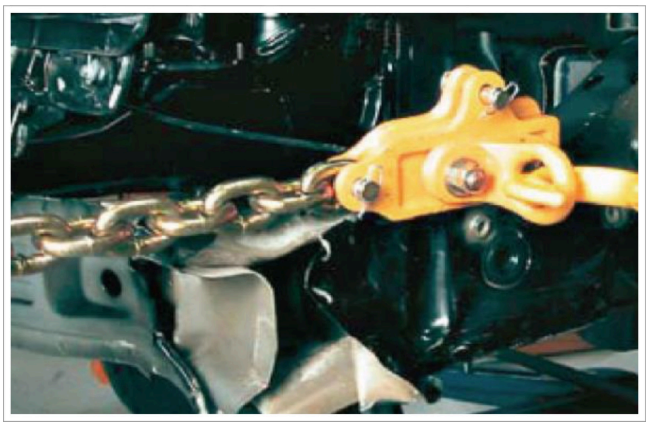
- **Planar pulling clamp**: It is mainly used for clamping the barrier-free edge of the vehicle body.



- **Hook pulling clamp**: It is mainly used for clamping the edge of vehicle body.



- **Two-way pulling clamp**: Mainly used to install two drawing chains, pulling at two angles simultaneously.



Safety cable

Danger

It must be installed before drawing alignment to prevent potential safety hazards caused by fixture slipping and chai n breakage during drawing.

– **Purpose**: Prevent personal injury caused by the fixtures falling off or breaking during vehicle body alignment.



Shaping tool

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Sheet metal hammer

– **Purpose**: Used for correcting and smoothing the surface of steel plates and basic contour lines.

– **Characteristics**:

  • Some hammers have a curved head surface, while others have a horizontal head surface.

  • It usually features a wooden handle.



Curved Claw Hammer

– **Purpose**: Used for correcting wrinkles or high points on panels.

– **Characteristics**: The two ends have different shapes, with one end featuring a conical blunt chisel and the other a cir cular striking face.



Shrinking hammer

– **Purpose**: Correct the slightly stretched metal parts.



Rubber hammer

- **Purpose**: Used for repairing materials with relatively large areas or softer textures.
- **Characteristics**: Made of soft rubber, lightweight, and easy to handle.



Backing bar

- **Purpose**: Used in conjunction with a sheet metal hammer, straighten the sheet metal to its original surface
- **How to use**: After securing the backing bar to the deformed area, use a sheet metal hammer to strike the other side.



Line chisel

- **Purpose**: Trim body lines of different lengths and shapes.
- **Instructions for use**:
  - Used in conjunction with a hand hammer for striking.
  - It is used for the deformed parts that need to be repaired at edges and corners, and body lines.
-



Crowbar

⚠ Caution

During use, pay attention to the position of the supporting point to avoid secondary damage to the vehicle.

- **Purpose**: Used for correcting hard-to-reach narrow areas.
- **Instructions for use**:
  - The crowbar, available in different forms, can be selected according to the shapes of steel panels.
-



Profile gauge

- **Purpose**: Outer panel used for auxiliary inspection and repair.
  - For measurement of the panel before repair.
  - For measurement of the panel during repair.
  - For measurement of the panel after repair.
- **Structure**: Retractable needle structure.



Vehicle body file

⚠ Caution

When repairing the panel after operating the dent puller machine, do not use excessive force, as this may cause th e panel to become thinner and reduce its strength.

– **Purpose**:
  - It is used to repair tools such as sheet metal hammer, backing bar and key-shaped block.
  - It can be used according to the dent of the repaired area in the panel, and also can assist in measurement.
– **Instructions for use**: When using, try to maintain 30 - 45 °, and avoid using excessive force.



Dent puller machine

⚠ Danger

Check for electric leakage before use.

⚠ Caution

– Remove the battery negative terminal before operation.
– Carry out trial welding before operation. Otherwise, the panel will be broken down.

Dent puller machine is used to repair the vehicle body panel. With low voltage and instantaneous large current, it enables t he washer to adhere to the metal outer panel of the vehicle body, so as to carry out drawing and shaping.

– **Characteristics**:

- Easy operation
- During operation, there is no need to disassemble too many accessories, improving efficiency.
- Small heat affected area and high repair quality

– **Accessories**:
  - Pulling hammer
  - Suction cup
  - Corrugated wires
  - Washer (round or triangular)
  - Drawing hook
  - Carbon rod
  - Copper rod



Cutting tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Pneumatic saw

– **Purpose**: Depending on the assembly of different saw blades:
  - **32-tooth saw blade**: Used for cutting single or multiple steel panels with a thickness of ≤1mm.
  - **24-tooth saw blade**: Used for cutting steel panels with a thickness of ≤4mm.
  - **18-tooth saw blade**: Steel panel used for curved cutting of softer materials.
  - **14-tooth saw blade**: Used for cutting aluminum or plastic components.



Pneumatic shear

– **Purpose**: For rough cutting of exterior body panels.

– **Characteristics**:
  - Fast cutting speed, suitable for cutting thin panels.
  - No cutting debris and sparks will be produced.
  - Different cutting operations can be completed with different accessories.

– **Disadvantages**: The sheet metal deforms significantly during cutting.



Aviation snip

– **Purpose**: Used for precise or small trimming jobs.

– **Operation instructions**: Select the appropriate aviation snip for cutting according to the tool shape.

- **Straight cut aviation snip**： It is used for cutting straight lines and large arc curves.
- **Outer curved cut aviation snip**： It is used for cutting outer arc curves.
- **Inner curved cut aviation snip**： It is used for cutting inner circular curves.



Abrasive wheel grinder

– **Purpose**: Can be used for cutting or grinding, equipped with different accessories, each with a different function.
  - **Equipped with grinding disc**: Can be used to grind welding spots, paint surfaces and continuously welded sea ms.
  - **Equipped with cutting disc**: It can be used to cut the vehicle body panels.

> **Danger**
>
> To prevent the grinding wheel from breaking, do not apply too much force when cutting.



Plasma cutting machine

– **Cutting principle**: Ionize the gas into an ion state, and cut by blowing away the molten metal with the compressed g as ejected from the cutting torch.

– **Operation instructions**:
  - **Contact cutting**: Generally used for cutting thin plates, the method involves contacting the plasma cutting torch nozzle with the cutting plate, igniting the plasma arc, and then cutting forward steadily.
  - **Non-contact cutting**: There is a certain gap between the nozzle and the plate, which moves at a uniform speed and cuts through the plate. The general gap is 3 - 5 mm.



Removal of welding spots

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Belt grinder

– **Purpose**: The function of installing different abrasive belts varies:
  • **Install Cubitron abrasive belt**: It can be used for removal of welding spots.
  • **Installation of abrasive belt**:
    • Used for grinding steel panels.
    • Used for grinding the old paint coating.
    • Used for grinding welding spots.
    • Used for grinding narrow spaces.



Spot welding removal drill

– **Purpose**: It is used to drill the welding spots of the vehicle body and has the function of fixing the drilling position.
– **Characteristics**: Fast operation speed, improving the efficiency of steel plate disassembly.
– **Disadvantages**: Easily affected by the space for operation during use.



Special drill bit

– **Purpose**: Can be used for operations on high-hardness parts.
– **Characteristics**: Easily affected by the space for operation during use.
  • Two or three cutting edges.

- High operation efficiency.
- Made of super hard materials.



Pneumatic drill

– **Characteristics**:
  - Used in different scenarios according to the specifications of drill bits.
  - Gun-type shape, high operation efficiency.



Welding tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Resistance spot welder

– **Purpose**: By using low voltage and high current to generate heat through resistance, the clamped area is melted whil e maintaining applied pressure to weld metal plates.

– **Characteristics**:

  • When it is necessary to join the vehicle body panels, resistance spot welding is the most reliable method, which i s the same as the original manufacturing process.

  • Filler metals such as welding wires and welding rods, as well as welding materials such as oxygen, acetylene an d hydrogen are not required, so the welding cost is low.

  • There will be no residual internal stress and deformation at the welding position.

  • The heat penetrated into the steel panel during welding is low, the thermal deformation is small, and the unwelde d areas will not harden.

  • It has high productivity and is free of noise and harmful gases, but sometimes sparks splashing may occur, which calls for isolation.

– **How to use**:

  • Apply anti-rust primer after sheet metal repair.

  • Remove water, grease, and other affected substances.

  • Spray or brush on exposed metal panels.

  • When in use, it is necessary to select the appropriate electrode arm according to the welding position of the car b ody. The longer the electrode arm, the larger the operating space, but the more difficult the control.





Gas shielded welder

– **Introduction**: The arc welding that uses the mixture of carbon dioxide and argon as the shielding gas, which protects the arc and the welding area against environmental influence, is called carbon dioxide gas shielded arc welding, or ga s shielded welding for short.

– **Characteristics**:

  • The welding operation is easy, without or with little welding slag, and there is basically no need for slag removal a fter welding.

  • Under the compression of the shielding gas flow, the arc features concentrated heat, faster welding speed, and s maller molten pools. This results in narrow heat-affected zones and minimal deformation of the welded compone nts after welding.

- Magnesium, aluminum, and their alloys, which are highly chemically active and easily form high melting point oxide films, can be welded.
- It can be used to weld sheets.
- When working outdoors, windshield devices shall be set up; otherwise, the effect of gas shielded welding is not good or even poor.
- The light radiation of the arc is strong.
- The welding equipment is relatively complex and more expensive than the shielded metal arc welding equipment.

– **Operation instructions:**
  - The welding wire is sent out through the electric motor.
  - The gas shielded welding ensures good visibility of the arc and weld pool, and the welding parameters can be adjusted according to the conditions of the weld pool during operation.
  - The tightness of the pinch roller of the wire feed motor shall be adjusted moderately.
  - Choose different grooves for the pinch roller according to the size of welding wire.



Conduit

⚠ Caution

Never bend the conduit during welding, otherwise, the uniform output of welding wire may be affected.

– **Introduction**: Conduit metal spiral construction

– **Purpose**: Ensure the welding wire reaches the nozzle position smoothly.



Conductive nozzle and welding gun nozzle

⚠ Caution

Once the welding wire is heated, it will expand. The diameter of the contact nozzle will be slightly larger than that of the welding wire. However, if the gap is too large, it will lead to wire output and unstable arc.

– **Purpose**: As one end of the electrode, the conductive nozzle is used to conduct current to the welding wire, so the inner wall of the conductive nozzle must be kept in contact with the welding wire.

– **Operation instructions**:

  • The inside of the welding gun nozzle must be kept clean and free from excessive welding slag.

  • Conductive nozzles are available in three models: 0.6 mm, 0.8 mm, and 1.0 mm. For replacement, it is important to choose a model that matches with the welding wire.



Grinding tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Abrasive wheel grinder

– **Purpose**: Can be used for cutting or grinding, equipped with different accessories, each with a different function.
  - **Equipped with grinding disc**: Can be used to grind welding spots, paint surfaces and continuously welded sea ms.
  - **Equipped with cutting disc**: It can be used to cut the vehicle body panels.

Danger

To prevent the grinding wheel from breaking and causing personal injury, the cutting force shall not be too large.



Adhesive removal grinder

– **Characteristics**:
  - The grinding head is made of rubber, and will not damage the panel surface.
  - No sparks, debris, toxic gases, and smoke are generated during operation.



Belt grinder

– **Purpose**: The function of installing different abrasive belts varies:
  - **Install Cubitron abrasive belt**: It can be used for removal of welding spots.

- **Install non-woven tape**: Can be used to remove old glue.
- **Installation of abrasive belt**:
  - Used for grinding steel panels.
  - Used for grinding the old paint coating.
  - Used for grinding welding spots.
  - Used for grinding narrow spaces.



Pneumatic Grinding Pen

– **Purpose**: Using compressed air as power, it performs operations such as scribing, grinding, and polishing on compo nent surfaces by controlling the pressure, flow, and speed of the airflow.

– **Characteristics:** Powerful, clean and environmentally friendly, flexible in operation, safe and reliable.



Anti-corrosion tools

Reminder

Tools in this topic are general-purpose ones and can be purchased as required.

Spray gun

– **Purpose**: It is used to spray anti-corrosive paint.

– **Characteristics:**

  • It is suitable for large-area spraying operations.

  • The spraying effect is relatively uniform.



Glue gun

Caution

The glue gun is divided into pneumatic, manual, and electric types. If using a pneumatic or electric glue gun, the pr essure should not be too high. It should be gradually adjusted from low to high.

– **Purpose**: As a special tool for applying cylindrical glue, it is used to apply various sheet metal sealants.



Cavity anti-corrosive spray gun

Caution

The spray gun with a hose has a large spraying angle, which can be changed to cover the surface of the inner cavit

y in almost all positions.

– **Purpose**:
  - Corrosion and rust prevention treatment shall be carried out for inaccessible positions.
  - Spraying for wax-oil internal rust inhibitor.
  - It is used for the anti-corrosion treatment of the inner cavities of door pillars and door sills.
  - Damage areas used for other sheet metal repairs (areas where internal painting is not possible).



Brush

⚠ Caution

Soak and wash after use.

– **Purpose**: Apply liquid primer and sealant.



Auxiliary tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Chisel

Caution

– Pay attention to the knocking position to avoid hand injuries.

– **Purpose**: Separate panels.

– **Operation instructions**: Pay attention to the sharpness of the chisel to improve efficiency.



Pneumatic shovel

– **Purpose**: Separate panels.

– **Operation instructions**: Check that the air source connection is stable before use, there is no leakage in the air tub e, and check whether the shovel head is worn or cracked.



Locking plier

– **Purpose**: Fix the panels and assist in adjusting the gap between the panels.



Puncher

- **Purpose**: Used for drilling holes on the panels.
- **Characteristics**:
  - Able to punch holes in plates quickly and accurately.
  - The panel is resistant to deformation during use.
  - There are few or no burrs in the hole after operation.
  - 6 mm and 8 mm hole diameters are available.



Shovel

- **Purpose**: Remove the body structural adhesive.



Riveting tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Rivet Gun

– SPR Rivet Gun
The rivet is inserted through two or more layers of plates with a certain pressure and speed using a riveting die, formi ng an interlocking connection between the rivet and the plates.



– Rivet Gun
By applying tensile force to the rivet, the rivet deforms between the connected components to achieve the purpose of fastening the connection.

There are three types of rivet guns: manual, electric, and pneumatic.



Hydraulic tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Hydraulic jack

– **Purpose**: Transmit pressure through a liquid medium to achieve the lifting of heavy objects.



Flanging Tool

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Bending Machine

– **Purpose**: The edges of metal plates (such as steel plates, aluminum alloys, etc.) are precisely bent through mechani cal pressure to form specific angles or shapes (such as U-shaped, L-shaped, etc.), ensuring the flatness and sealing of the fender edges.



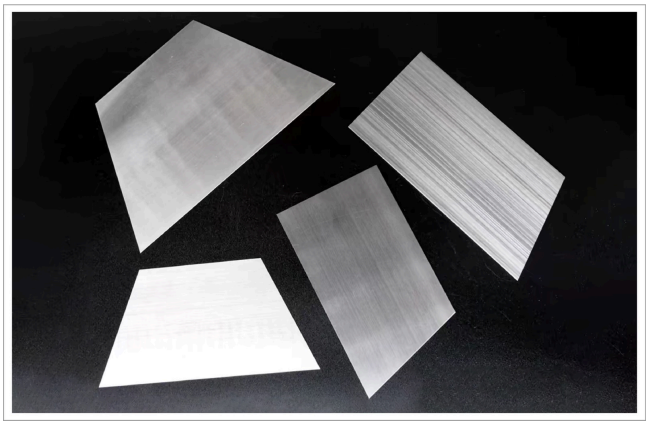
Scraping tool

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Putty scraper

– **Purpose**: It is used to apply poly-putty on the surface of vehicle body and carry out preliminary leveling treatment. Th e scrapers are available in different widths and shapes to accommodate surfaces of different sizes and shapes.



Grinding tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Dust-free dry grinding system

– **Introduction**: The dust-free dry grinding system is composed of grinding tools, air supply and suction pipes, suction equipment, grinding pad sandpaper and auxiliary systems. It is mainly used to grind the paint surface and poly-putty a fter drying.

– **Various grinders are available:**

  • **A**- Single-action polisher: Also called a unidirectional rotary grinder, it is mainly used for rust removal and remova l of old coatings.

  • **B**- Orbital Sander: The grinding pad reciprocates along an elliptical track, ensuring relatively uniform grinding and cutting forces. This helps prevent uneven grinding defects, making it ideal for poly-putty shaping and grinding.

  • **C**- Dual Action Grinder: It is also known as eccentric vibration sander, differentiated by eccentricity distance. Tho se with larger eccentricity distances are more appropriate for coarse grinding (poly-putty). Those with smaller ecc entricity distances are better suited for fine grinding (primer).



Polishing tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Polishing machine

Caution

- When operating, hold the polishing machine firmly with both hands while keeping the cord or air hose behind yo u over your shoulders to prevent the cord or air hose from tangling.
- During the operation, completely press the polishing pad on the workpiece surface before starting the polishing machine. Otherwise, the polishing machine will easily scratch the paint film.
- Start rotating the polishing machine at a low speed, let the polishing agent adhere to the entire surface, and adj ust the speed appropriately.

- **Purpose**: Used for trimming the paint film, there are two types: pneumatic polisher and electric polisher
  - **Pneumatic polishing machine**： Longer service life and relatively safer than using power as a source of power. Ensure a stable air supply during use.



  - **Electric polishing machine**: The driving torque is large, which can ensure stable rotation under load without bei ng affected by insufficient air or lack of air source.



Polishing pad

Caution

Spread the polishing wax evenly on the polishing pad before polishing.

– **Purpose**: After installing onto the polishing machine, trim the paint film. It can be classified into three categories:
  - **wool wheel**: Strong in grinding and cutting force, generally used for rough polishing.
  - **Dark Polishing Pad**： Generally used for fine polishing.
  - **Light Color Polishing Pad**： Generally used for rough polishing.



Color mixing tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Paint mixing cup

Reminder

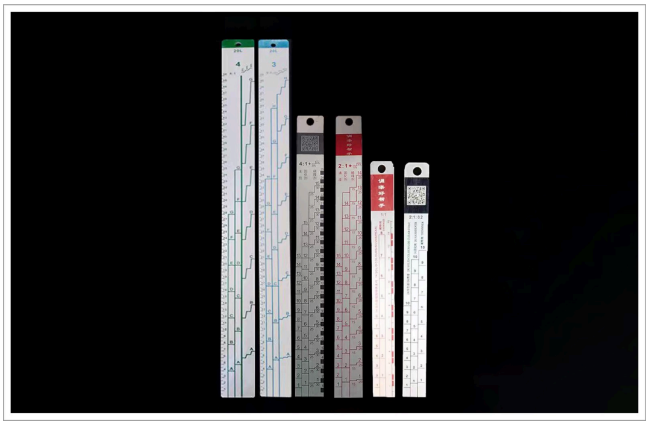
- Disposable paint mixing cups are usually used.
- When mixing water-based paint, select paint mixing cups with coating on the inner wall.
- Use straight cylindrical paint mixing cups with the same upper and lower diameters for paint mixing.

- **Purpose**: Weighing and mixing coatings.



Paint mixing ruler

- **Purpose**: The coating can be measured with a scale and can be used for mixing coatings.



Stirring cover

Reminder

To prevent rust, use a stirring cover made of stainless steel to stir water-based paint.

- **Purpose**: It is used to stir and pour out the color masterbatch paint.



Electronic scale

– **Purpose**: It is used to weigh the paint.

– **Instructions for use**:

  • Due to high sensitivity of the electronic scale, the influence of atmospheric air (wind) shall be avoided during use.

  • It must be placed horizontally. Avoid high temperature and vibration.



Paint mixing rack

Reminder

The mixing rack of water-based paint is insulated to prevent the paint from freezing.

– **Purpose**: Used for storing and mixing paint.

– **Instructions for use**: In order to ensure the stability of the color masterbatch concentration, it is necessary to stir for 15 mins every morning and noon after work.



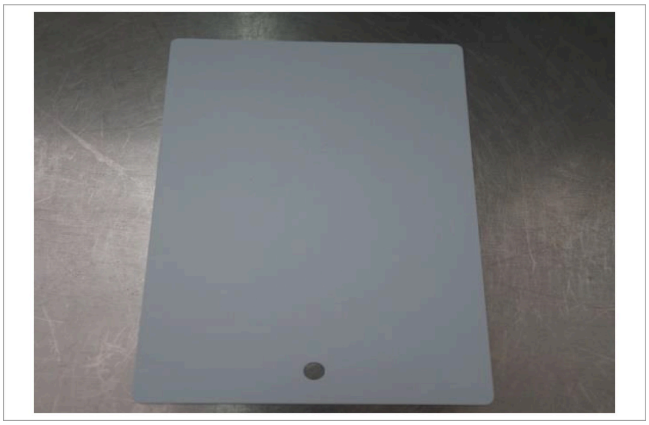
Color test plate

– **Purpose**: Used for comparing paint colors.

– **Instructions for use**:

  • Solvent-resistant color test plates should be used.

  • For comparison with water-based paint, the primed color test plate shall be used to avoid applying the paint direc tly on the bare metal.



Color mixing light

– **Introduction**: It, close to the effect of sunlight, can be used to recognize different colors and different colors of paints containing metal, pearl, Xirallic pearl and other pigment compositions.

– **Purpose**: Used to compare colors.



Colorimeter

– **Introduction**: Even if the corresponding color code of a certain car color cannot be found, a colorimeter can be used to measure the color closest to the formula in the formula database, thus simplifying the color matching work.

– **Purpose**:

  • It is an instrument that can recognize colors by computer, and it has the functions of recognizing colors and searc hing for formula information.

  • The color curve graph is analyzed with a colorimeter to obtain the formula of a color closest to it.



Spraying tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Upper cup spray gun

– **Characteristics**:
  - Suitable for medium-sized production enterprises that require efficient completion of large-scale spraying operations.
  - Pressurize the paint with a paint pressure pot or paint pump, and deliver the pressurized paint to the nozzle of the spray gun for atomization and spraying.
– **Disadvantages**: It takes a long time to clean, making it unsuitable for small-area spraying operations.



Upper cup spray gun (gravity feed)

– **Characteristics**:
  - Generally, its capacity is about 600 ml. The vent hole on the top of the paint cup shall be kept clear.
  - The gravity feed spray gun is suitable for small-area operations, such as local repairs with low paint consumption.
  - Disposable paint cup can be used to improve efficiency and save paint.
  - It minimizes fluctuations in spraying volume due to changes in paint viscosity.
– **Disadvantages**: The capacity of the paint storage tank is too small and not suitable for large area spraying.



Lower cup spray gun (suction feed)

– **Characteristics**:

- The capacity of its paint cup is large, making the suction feed spray gun suitable for large-area spraying.
- Using vacuum suction, the paint is drawn from the gun cup to the gun nozzle and then atomized and sprayed ou t.
- Disposable paint cup can be used to improve efficiency and save paint.
- It minimizes fluctuations in spraying volume due to changes in paint viscosity.

– **Disadvantages**: The amount of paint sprayed is significantly affected by the viscosity and density of the paint. High vi scosity will reduce the amount of paint sprayed, and the spray volume is also closely related to the caliber of the paint gun nozzle.



Top coat spray gun

– **Purpose**: It is mainly used for spraying single-process topcoat, dual-process base coat and clear coat.

– **Characteristics**: Atomizing the paint into fine particles and thin paint film can ensure that the paint film texture of the sprayed top coat layer is relatively thin and uniform.

– **Instructions for use:**
- **Recommended spraying distance**： 15-20cm。
- **Spray gun caliber at**： 1.0 - 1.5mm.



Primer spray gun

– **Purpose**: Mainly used for spraying anti-rust primer and primer. It is suitable for spraying operations with relatively hig h viscosity and thick paint film such as primer spraying.

– **Characteristics**:
- The paint is atomized evenly, but the atomization fineness is not as good as that of the top coat spray gun.
- The spray pattern is relatively concentrated, with a large wet area in the center and a small atomization area aro und.

– **Instructions for use:** Recommended spraying distance is 15-20cm.



Mini Spray Gun

- **Purpose**: The small spray gun for small area repairs makes localized repair work easier and more convenient.
- **Characteristics**: It features light weight, smaller nozzle size, easy application of thin coatings, and effective control of spraying area. When used for aluminum paint and pearl paint repair, it reduces the occurrence of "black circles".
- **Instructions for use:**
  - Use 0.7-2.0 bar air pressure and adjust the amount of paint output according to the shape and scope of the local area to be repaired.
  - When it is used, apply thin coating in multiple passes to slowly control color and masking.
  - **Spraying distance**: 10-15cm
  - **Spray gun diameter**: 0.8-1.2mm



Drying equipment and tools

Reminder

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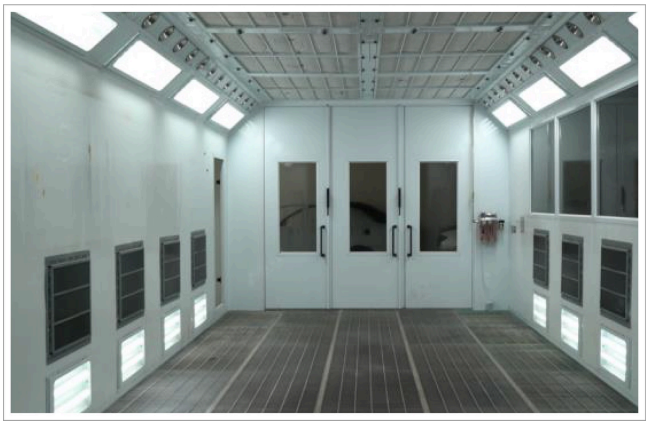
Spray booth

Caution

- Do not generate the naked flame in the spray booth, such as smoking.
- Non-staff workers are prohibited from entering the spray booth. Operators shall take personal protection before entering the booth. Refer to Spraying protection .
- During spraying operation, close the doors of the spray booth. Never enter and exit the spray booth at will. After the operation, take out all the remaining paints in the spray booth. Never heat up and bake the paints in the sp ray booth.

- **Requirements**: The lighting in the spray booth is required to be above 800 lx. Generally, multiple groups of fluoresce nt lamps are used on both sides of the roof. In addition, the noise during the operation of the spray booth shall not exc eed 80 dB.
- **Maintenance**:
  - During maintenance, be sure to turn off the main power switch of the spray booth.
  - The inlet filter cotton should be cleaned and replaced regularly according to the manufacturer's requirements, wit h a typical lifespan of: 60-80h。
  - Replace the top filter cotton regularly (with a general service life of 350-400 h) according to the manufacturer's re quirements.
  - Replace the bottle filter cotton (with a general service life of 80-100 h) regularly according to the manufacturer's r equirements.
  - Regularly inspect the activated carbon filter screen in the activated carbon environmental cabinet every quarter. I f the surface is covered with paint, it should be replaced in time to ensure smooth ventilation.
  - Check all wires and cables in the spray booth every six months, and replace them if they are aged.
  - Clean the whole spray booth every six months. Check the circulating air valve, air inlet and exhaust fan bearings. Check the smoke exhaust channel of the burner. Clean the sediment in the fuel tank. Clean the water-based prot ective film in the spray booth and perform repainting.
- **Instructions for use**:
  - For vehicles that require low-temperature touch-up paint repair, the baking temperature is generally 55°C.
  - Positive pressure air supply is generally used in the spray booth, and the indoor air supply pressure is generally kept at 4-12 bar higher than outdoors. The positive pressure air supply can ensure no flow of outdoor air into the spray booth and keep the booth clean.
  - The air supply pressure is adjusted by the damper.
  - The air supply rate shall reach 0.2-0.6 m/s during spraying, and the airflow rate is generally 0.05 m/s during heati ng and baking.
  - The best spraying environment for water-based paint is one with a temperature of 25°C and a relative humidity of less than 70%.
  - The use of short wave infrared or other thermal radiation equipment will greatly improve the drying speed of the p aint film, and has the advantages of thorough drying and consistency inside and outside.
  - Check the circuits of the thermal radiation drying equipment every year and determine whether they need to be r eplaced. The power supply circuit of the thermal radiation equipment has the problem of rapid aging.

- Clean the spray booth once a day. Remove all debris. Vacuum the floor, wall, grille, etc. to ensure the booth is cle an and tidy.



Infrared heating lamp

– **Characteristics**: The energy penetrates the surface of the paint film to the metal surface and then reflects out, causi ng the bottom layer of the coating to absorb energy and heat up first, allowing the paint film to dry from the inside out.

– **Instructions for use**:

- Generally, the distance between the heating lamp and the workpiece surface usually needs to be greater than 50 cm. Being too close can cause the temperature to rise too quickly, resulting in phenomena such as poly-putty blis tering, pinholes, and miliaria-like surface on the panels.
- Drying speeds vary due to variations in infrared absorption rates caused by different colors of irradiated surfaces. Colors are dependent on reflectance and absorption. For example: Dark colors dry faster than light colors.



Blow dryer

– **Purpose**: Used for drying water-based coatings.

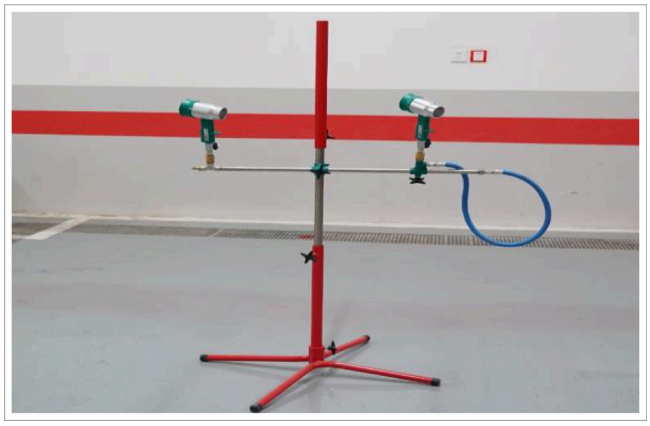
– **Instructions for use**:

- The blowing direction of the blow dryer must be consistent with the airflow direction of the spray booth.
- The blowing direction of the blow dryer must be consistent with the airflow direction of the spray booth. Place the blow dryer obliquely above the top of the larger part of the panel.
- Blowing distance: 30-80cm。



Blow dryer bracket

– **Purpose**: Fixed hair dryer to suit more scenarios.



Auxiliary equipment and tools

Reminder

Tools in this topic are general-purpose ones available on the market and can be purchased as required.

Compressed air supply system

Warning

To avoid personal injury, contact professionals from corresponding manufacturers for handling if the system fails.

– The compressed air supply system consists of important components such as an air compressor, air tank, freeze dryer, filter, and oil-water separator.



Air compressor

– **Types**: Divided into reciprocating piston air compressors and screw air compressors.

  • **Reciprocating piston type**: It utilizes the reciprocating motion of pistons to compress air, characterized by: medium air volume, rapid decline in performance with service time, and possible ingress of oil or oil vapor into the compressed air pipeline.



  • **Screw type**: Pressure is generated by the high-speed movement of two uneven rotors, characterized by: constant wind pressure and air volume, low noise, large air output, clean air, energy saving and high efficiency. It is suitable for repair workshops with large air consumption.



Gas storage tank

- **Purpose**: The air receiver tank is an energy storage device for compressed air, which functions to stabilize pressure and provide a standard air supply.
- **Instructions for use**: Generally, the air storage tank used in the after-sales workshop is 1-2 m³ in capacity with a 1 MPa working pressure. The specific selection of the air storage tank depends on the quantity of pneumatic tools and t heir frequency of use, that is, on the consumption of compressed air.



Freeze dryer

- **Purpose**: It is used to cool the hot air (up to 100-150°C) compressed by the air compressor, so that the oil and water mixed in the compressed air can be separated and discharged through the filter.
- **Instructions for use**: The specifications for the freeze dryer used in the workshop, which services about 400 units p er month, are: Processing capacity 3.5-4.0m³/min, working pressure is 1.3Mpa.



Precision filter

- **Purpose**: Used for dust filtration.
- **Instructions for use**:
  - Precision filters have various different grades. Coarse filters generally can remove dust down to 1μm and oil dow n to 1X10-6. Fine filters generally can remove dust down to 0.01 microns and oil down to 0.1X10-6. Ultra-fine filte rs can remove oil down to 0.003X10-6.

- Generally, the treatment capacity of precision filters used in repair shops that repair 400 vehicles per month need s to reach 3.5-4 m³/min.



Oil-water separator

– **Purpose**: Used to separate oil and water from the air.

– **Instructions for use**:

- In order to ensure a high-quality spraying effect, it is necessary to ensure that the compressed air is dust-free an d dry. Therefore, an oil-water separator shall be installed on the air supply pipeline before the compressed air ent ers the spray booth.
- The oil-water separator can separate oil and water through the action of deflectors, centrifugal devices, expansio n chambers, vibration pieces, and filters inside the unit, and discharge them through manual or automatic drain v alves to ensure that the output is clean and dry air.



Gun tail gauge

– **Purpose**: Used to adjust the spray pressure of the spray gun to achieve reasonable conditions for spray gun atomiza tion.



Air blowing gun

– **Purpose**: It is used to remove dirt and dust by air pressure.



Filter funnel

- **Purpose**: It is used for paint filtering and impurity removal when the paint is poured into the spray gun.
- **Instructions for use**:
  - The paper funnel has a variety of meshes. Select the appropriate mesh size according to the paint type.
  - For water-based paint, a filter funnel of about 125 μm is recommended.



Spare part bracket

- **Purpose**: Used to support the spare parts that need to be painted, to facilitate painting or grinding.



Repairing plastic parts

Reminder

This topic introduces the auxiliary material involved in repairing plastic parts. The specific brands and models of au xiliary materials shall be subject to the actual situation.

Resin adhesive

- **Purpose**: Used for filling depressions and areas with cracks.
- **Instructions for use**: To ensure the quality of repairs, reinforced lining fabric needs to be used in conjunction when r epairing areas with cracks.

Caution

The moisture, oil stains, and stains shall be removed from the surface before application.



Reinforced fiber

- **Purpose**: It is used to reinforce the fractured part and behind the reinforced cracked part.
- **Instructions for use**: When using, place it on the top of the damaged area, position it and press it down into the adh esive until the fiber web is saturated.

Reminder

The moisture, oil stains, and stains shall be removed from the surface before application.



Soft additives

– **Purpose**: It is mixed with paint to improve the flexibility of primer and top coat.

– **Instructions for use**: Follow the manufacturer's instructions for the mixing ratio and drying time.



Anti-corrosion

Reminder

This topic introduces the auxiliary materials involved in the anti-corrosion process. The specific brands and models of auxiliary materials shall be subject to the actual situation.

Anti-rust primer

- **Purpose**: Prevent panel corrosion.
- **Instructions for use**: After removing moisture and oil stains from the panel surface using a special cleaning agent, perform spraying or brushing operations on the exposed metal panel.

Caution

The moisture, oil stains, and stains shall be removed from the surface before application.



Sealant

- **Purpose**: Sealed body.
- **Advantages**: The sealant has a short hardening time and can be delivered to the next process more quickly.
- **Instructions for use**:
  1. Use a special cleaning agent to remove moisture and stains on the surface of the panel.
  2. Wait until the surface of the panel is completely dry.
  3. Use a special chassis adhesive gun to spray the chassis adhesive.

Caution

The chassis adhesive can only be used on the lower part of the door sill plate and the base plate, and shall not be sprayed on other positions.



Chassis adhesive

- **Purpose**: Prevent the paint surface from being damaged by stones thrown up from the road and from rusting, while also having soundproofing and shock absorption effects.
- **Characteristics**: The chassis adhesive still has certain softness after drying, and is mainly used at the bottom of door sill or base plate.
- **Instructions for use**:
  1. Use a special cleaning agent to remove moisture and stains on the surface of the panel.
  2. Wait until the surface of the panel is completely dry.
  3. Use a special chassis adhesive gun to spray the chassis adhesive.

> ⚠ **Caution**
>
> The chassis adhesive can only be used on the lower part of the door sill plate and the base plate, and shall not be sprayed on other positions.



Special Cleaner

> ⚠ **Caution**
>
> Since the degreaser is generally an organic solvent liquid, personal protection must be done for use.

Purpose:

- It can remove oil stains on the panel surface.
- Anti-corrosion cannot be guaranteed without the use of a degreaser.
- Before carrying out most anti-corrosion work, it is necessary to clean the panel surface with a degreaser.



Cavity anti-corrosion wax

> **⚠ Caution**
>
> If the cavity anti-corrosion measures are not strictly carried out, quality problems such as steel panel corrosion and rusting may occur after repair.

Purpose:

- Corrosion and rust prevention treatment shall be carried out for inaccessible positions.
- Spraying for wax-oil internal rust inhibitor.
- It is used for the anti-corrosion treatment of the inner cavities of door pillars and door sills.
- It is used for other damaged areas of sheet metal repair (where painting cannot be carried out inside).



Use standard:

- Cavity anti-corrosion wax is applied to protect internal vehicle components, particularly the gaps, seams, and surfaces within the engine compartment, trunk, doors, door sill panels, brake lines, and other parts. The surface must be dry, free of rust, dirt, and grease. The optimal spray distance is 30 centimeters, and the best spraying effect can be obtained when used within the temperature range of 15°C-25°C.
- Used for repair and long-lasting protection with high permeability and excellent penetration, effective protection even for hard-to-reach seams, water displacement effect with moisture destroyed and displaced, high temperature resistance as well as good flexibility at low temperatures, capable of withstanding high temperatures up to +180°C, free from aromatic compounds, suitable for commercially available conventional paints, as well as rubber and plastic components, even with a thin coating (including 50μ) corrosion protection can be achieved.
- Scope of application: Persistent protection of the internal body cavity to prevent corrosion. Used for post-treatment of existing seals and anti-corrosion restoration after accident repairs. Usage method: Shake well before use. Use a pressure cup spray gun and corresponding probe to spray a thin layer of cavity wax depending on the application area, either directly or using a probe.
- The cavity anti-corrosion wax has a small odor and will not produce any unpleasant smell during the use of the vehicle after maintenance is completed. With characteristics of high penetration, anti-corrosion, and waterproofing, it can pe

netrate into the gaps of the rice gold to achieve long-lasting anti-corrosion effects. There will be no drips when sprayed correctly, and it has good self-healing properties. When the vehicle is exposed to sunlight and the temperature increases, the viscosity of the anti-corrosion wax sprayed inside the panels will decrease and re-level to form a continuous coating film.

Usage Scenario：

1. Spray can operation:
   - After reshaping and repairing the outer panels, it is necessary to conduct cavity corrosion protection on the interior of the panels
   - After replacing the removable parts, it is necessary to carry out cavity anti-corrosion treatment, such as at the seams of the front fender, engine hood, door, and trunk lid;
   - Cavity anti-corrosion is required inside the plates at the welding (including tinning) and riveting points;
   - Carry out cavity anti-corrosion inside the replaced panel.
2. Spray gun operation:
   - Perform anti-corrosion treatment on all inner cavity surfaces according to the OEM's process specifications, including positions that are inaccessible. If anti-corrosion measures for the inner cavity are not strictly implemented, quality issues such as steel panel corrosion and rust may occur after repair. For inaccessible inner spaces of components, a spray gun with a hose should be used to apply cavity anti-corrosion wax. The spray angle of the spray gun with a hose is very large, and by simply changing the angle, it can cover nearly all inner cavity surfaces.

How to use:

Reminder

- Cavity anti-corrosion treatment must be performed after sealing and painting operations and before assembling components, otherwise the paint or assembled parts are easily contaminated by anti-corrosive wax
- During construction, wax mist should be avoided to prevent contamination inside the vehicle, and anti-corrosion wax must not be sprayed on the clamping area and contact surfaces of the collision energy absorption box in the longitudinal beam
- After the anti-corrosion wax has dried, it is necessary to ensure that the vehicle's drainage holes are not blocked
- The temperature of the anti-corrosion wax needs to be maintained above 15°C;
- Spray with preservative wax twice, with an air-dry time of more than 5 minutes between the second spray.

1. Post-repair panel after straightening: For areas inside the panel that are burned during dent puller machine welding, anti-corrosion wax must be applied. For hard-to-reach spots where anti-corrosion treatment cannot be applied directly, use a hose to spray anti-corrosion wax into the cavity. Damaged sealant areas should be repaired and reapplied. Anti-corrosion is a necessary process after panel repair.
2. New replacement parts: Spraying anti-corrosion wax requires the use of self-spraying anti-corrosion wax or spray guns. Through some holes inside the car body, insert the cavity wax spray gun duct and aim at the welding area inside the cavity. Ignoring the anti-corrosion process will lead to poor sealing performance of the vehicle and moisture entering the interior of the vehicle and corroding the panels, thus reducing the service life of the vehicle.
3. Welding, riveting and seams: When grinding weld seams, it is not allowed to thin the base material adjacent to them. After welding, clean all weld seams and welding spots with a wire brush. The wire brush removes burnt paint. Carefully prime and seal all welded joints that originally had body sealant applied on them. Apply wax to the internal cavities and replace any damaged or removed sound insulation materials.

Conductive anti-rust zinc powder coating

- **Introduction**: There are two types: spray and brush paint
- **Purpose**: Used for rust prevention on the welding joint surface of panels.


GALVANIZE

Primer

Reminder

This topic introduces the auxiliary materials involved in application of primer. The specific brands and models of aux iliary materials shall be subject to the actual situation.

The primer coating is the basis of spraying. The primer shall be correctly selected according to the construction procedure and the type of substrates, otherwise the quality of the top coat will be affected by improper use.

Epoxy primer

– **Purpose**: Epoxy primer is primarily used for application on bare metal, utilizing the paint film to achieve good adhesio n, fill in minor defects, and provide corrosion protection.

– **Operation instructions**:

  • The epoxy primer shall be stirred evenly before use. Special curing agent shall be used for the epoxy primer. Atte ntion shall be paid to selecting matching products and mixing them in proportion.

  • It dries slowly, so make sure that a thin layer is applied on the bare metal area during operation.

  • The ideal construction conditions are: 20°C, humidity below 80%. If the ambient temperature is lower than 15°C, i t is not recommended to use the primer due to slow drying.

– **Operation steps**: Refer to .



Primer

Type 1: Polyurethane primer

– **Characteristics**: Reliable operation performance, good filling property and easy polishing.

– **Operation instructions**:

  • The epoxy primer shall be stirred evenly before use. Special curing agent shall be used for the epoxy primer. Atte ntion shall be paid to selecting matching products and mixing them in proportion.

  • It dries slowly, so make sure that a thin layer is applied on the bare metal area during operation.

  • The ideal construction conditions are: 20°C, humidity below 80%. If the ambient temperature is lower than 15°C, i t is not recommended to use the primer due to slow drying.

– **Operation steps**: Refer to Spraying of primer .



Type 2: Nitrocellulose primer

– **Purpose**: Epoxy primer is primarily used for application on bare metal, utilizing the paint film to achieve good adhesion, fill in minor defects, and provide corrosion protection.

– **Operation instructions**:

  • The epoxy primer shall be stirred evenly before use. Special curing agent shall be used for the epoxy primer. Attention shall be paid to selecting matching products and mixing them in proportion.

  • It dries slowly, so make sure that a thin layer is applied on the bare metal area during operation.

  • The ideal construction conditions are: 20°C, humidity below 80%. If the ambient temperature is lower than 15°C, it is not recommended to use the primer due to slow drying.

– **Operation steps**: Refer to Spraying of primer .



Poly-putty

Reminder

This topic introduces the auxiliary materials involved in application of poly-putty. The specific brands and models of auxiliary materials shall be subject to the actual situation.

The poly-putty is mainly used to fill and repair defects on the object surface, such as pits, pinholes, cracks and small weld s, thus making the surface flat and smooth. Its main components are pigment, resin and solvent.

There are three types of commonly used poly-putty, namely **alloy poly-putty**, **plastic poly-putty** and **nitrocellulose poly-putty**.

Alloy poly-putty

- **Purpose**: Also known as sheet metal poly-putty, it is a two-component type that needs to be mixed with a curing age nt before use. It is suitable for filling depressions on materials such as ordinary steel panels, galvanized steel panels, and aluminum.
- **Operation instructions**:
  - **Thick Layer Type**: Fill deep indentations (over 3mm).
  - **Intermediate coating method**： Fill shallow depressions (less than 3mm).
  - **Thin application type**： Fill pinholes, small dents, and protrusions.
- **Operation steps**: Refer to Application of sheet metal poly-putty .



Plastic poly-putty

- **Purpose**: Plastic poly-putty is a two-component product, which needs to be mixed with a curing agent before use. It i s suitable for filling depressions on the surface of plastic parts.
- **Operation instructions**: Plastic poly-putty is flexible and has good adhesion. Applying it on plastic parts can prevent the putty from cracking.
- **Operation steps**: Refer to Application of plastic poly-putty .



Nitrocellulose poly-putty

- **Purpose**: Nitrocellulose poly-putty is a one-component type, which can be used without mixing with a curing agent. It is suitable for filling pinholes and sandpaper marks left after application of primer.
- **Operation instructions**: Since the nitrocellulose poly-putty is prone to shrinking, it cannot be used for repairing deep scratches or large-area scraping.



Grinding

Reminder

This topic introduces the auxiliary materials involved in grinding. The specific brands and models of auxiliary materi als shall be subject to the actual condition.

Round sandpaper

- **Purpose**: Remove vehicle paint film or grind poly-putty with Grinding tools .
- **Instructions for use**: For deep scratches that cracked the paint coating without causing metal deformation, a dual-a ction grinder can be used with P240-320 round sandpaper to remove the coating.



Square sandpaper

- **Purpose**: Cooperate with orbital sander to grind putty for shaping operations.



Scouring pad

- **Purpose**: Polish narrow areas such as edges and gaps.


BYD
Build Your Dreams

Polishing

Reminder

This topic introduces the auxiliary material involved in polishing. The specific brands and models of auxiliary materi als shall be subject to the actual situation.

Coarse polishing (coarse wax)

– **Purpose**: Rough polishing of paint film with Polishing tools .



Fine polishing (fine wax)

– **Purpose**: Cooperate with Polishing tools fine polishing of the paint film.



Primer

Reminder

This topic introduces the auxiliary materials involved in application of primer. The specific brands and models of aux iliary materials shall be subject to the actual situation.

Type 1: Polyurethane primer

- **Characteristics**: Reliable operation performance, good filling property and easy polishing.
- **Operation instructions**:
  - In some paint brands, the primer can be used to adjust the primer color or gray value, making it easier to cover w ith topcoat and reducing the amount of paint used.
  - The primer shall be mixed with a curing agent and thoroughly stirred before use. After the primer is applied, it ne eds to be dried with an infrared heating lamp to speed up the drying process.
  - It shall be applied to a suitable film thickness to fill the sand holes or sandpaper marks on the surface of the poly-putty. 2-3 layers of high-performance primer shall be applied, and the film thickness can reach 120-150 μm.
  - During application, appropriate solvent evaporation time shall be reserved for application of coatings to avoid pin holes or pock markings.
- **Operation steps**: Refer to Spraying of primer .



Type 2: Nitrocellulose primer

- **Characteristics**:
  - It dries quickly and is easy to be ground, with good construction operability. However, compared with the polyuret hane primer, it has slightly poor adhesion, coating thickness, filling property and isolation performance.
  - It is suitable for repairing small-area panel damage. For large-area panel damage, it is recommended to use two-component primer to ensure the repair quality.
- **Ingredients**: One-component product, mainly composed of nitrocellulose resin.
- **Operation instructions**:
  - It shall be applied to a suitable film thickness to fill the sand holes or sandpaper marks on the surface of the poly-putty. 2-3 layers of high-performance primer shall be applied, and the film thickness can reach 120-150 μm.
  - During application, appropriate solvent evaporation time shall be reserved for application of coatings to avoid pin holes or pock markings.
- **Operation steps**: Refer to Spraying of primer .


比亚迪汽车专用修补漆
物料名称:
硝基底漆
3.5L

Paint

Reminder

This topic introduces the auxiliary materials involved in spraying. The specific brands and models of auxiliary materi als shall be subject to the actual situation.

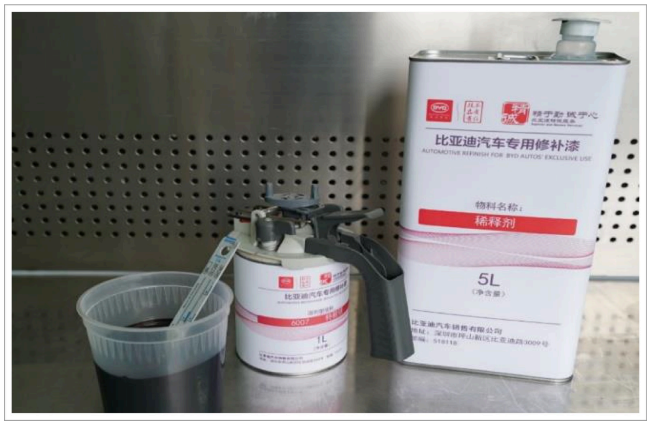
Water-based color masterbatch paint

– **Purpose**: As part of the paint process, it helps to ensure the correct parameters for the paint with appropriate ratio.



Solvent-based color masterbatch paint

– **Purpose**: As part of the paint process, it helps to ensure the correct parameters for the paint with appropriate ratio.



Clear coat and curing agent

– **Purpose**: After the application of the base coat, a clear coat needs to be applied to provide: Brightness, hardness, an d prevention of coating aging.



Thinner

– **Purpose**: Adjust the viscosity of paint to make it easy to spray.

  • **On the left is solvent-type thinner**: It can still be applied in low-temperature environments, but the drying speed may slow down, and there are specific requirements for the humidity and temperature of the application environm ent.

  • **Right side is water-based thinner**: Greatly restricted by temperature, it generally cannot be constructed below 5°C, as water will freeze at low temperatures, affecting the film-forming effect. However, the water-based paint is generally easier to clean under applicable conditions and features good hardness and durability after drying.

– **Instructions for use**: Before use, the appropriate type of water-based thinner should be selected based on the temp erature and humidity of the spraying environment, and added according to the proportion.



Masking material

Reminder

This article introduces the auxiliary materials involved in masking, and the specific brands and models of the auxiliary materials are subject to actual conditions.

Masking paper

- **Purpose**: It is used to mask areas where panels do not need to be sprayed.
- **Characteristics**: The solvent is impervious, masking paper does not produce dust, and the coating adhering to the paper will not fall off.



Masking tape

- **Purpose**: Used for securing masking paper, film, and masking boundaries.
-



Masking film

- **Purpose**: Used for covering larger areas than masking paper to improve masking efficiency and reduce costs.
- **Characteristics**: Prone to static electricity, which facilitates attachment to the car body and adsorption of paint dust.



Trim masking tape

– **Purpose**: Used for masking sealing strips or glass protective strips.

– **Characteristics**: Can be effectively inserted into the adhesive strip and reverse masked to avoid paint edges at that l ocation.



Gap tape

– **Purpose**: Used for the gaps around the engine hood, car doors, and trunk load floor to prevent paint mist from passin g through the gaps and polluting the interior of panels.



Cleaning auxiliary materials

Reminder

This article introduces the auxiliary materials involved in cleaning. The specific brand and model of the auxiliary mat erials shall be subject to the actual situation.

Tack cloth

- **Purpose**: It is used to remove foreign matter or dust from the sprayed surface.
- **Instructions for use**: To use a piece of tack cloth, spread it flat, and then fold it again to make it soft.



Degreaser

- **Purpose**: Clean and degrease the board.
- **Instructions for use**:
  - Spray the degreaser with a solvent spray pot, then wipe the panel first with a piece of wet wiping cloth, and then dry the panel with a piece of dry wiping cloth.
  - For use, select the appropriate degreaser according to the spraying environment in the spray booth and the paint type.



Anti-static detergent

- **Purpose**: It is used to remove static electricity on the panel surface and prevent absorbed dust under static electricity from producing dust spots during painting.
- **Instructions for use**: When in use, clean the panel surface by alternating between wet and dry wiping.



Fine fiber cloth

– **Purpose**: Used for cleaning board surfaces and narrow areas that polishing machines cannot reach.



Description

Purpose

As a global leader in new energy vehicles and an advocate of environmental protection concepts, BYD Auto has been striving to implement the concept and standards of "green maintenance."

BYD Auto's 'Green Maintenance' standard refers to achieving standard repair quality with the most reasonable repair materials, methods, and processes. Under the premise of meeting the repair quality standards and having a cost advantage, this model strictly adheres to the 'repair if repairable' principle, returning to the essence of maintenance and the original business intentions. It maintains environmental friendliness throughout the entire lifecycle of automobile maintenance, contributing social value.

Assignment Requirements

1. Sheet metal work should be carried out in a separate, open workshop with no flammable or explosive materials nearby and good airtightness
2. Painting operations should be carried out in a dedicated sheet metal workshop, and the sheet metal workshop should be equipped with ventilation equipment, dust removal equipment, wastewater discharge and treatment facilities, etc.;
3. Vehicle maintenance should be carried out at a fixed workstation, and the work area should be cleaned daily to keep the area tidy;
4. Wastewater should be treated to meet national and local discharge standards before discharge, following local environmental protection standards;
5. Collection and treatment of harmful substances such as exhaust gas and dust should be carried out in compliance with local environmental protection standards;
6. Sheet metal and painting operations should always pay attention to the experience of surrounding neighbors, and prevent pollution-related disturbances to the surrounding neighborhood, including wastewater, exhaust gas, waste discharge pollution, and noise pollution.

Basic Principles

1. **Security**： The repair of components with safety features should aim to restore their performance to meet the technical specifications of the original design of the components, and restore their usability to meet the repair quality standards.
2. **Component strength performance**： For parts with strength requirements, the goal should be to achieve the original design parameter requirements after repair, restore its performance, and meet the repair quality standards.
3. **Durability**： The repaired panels should be treated for corrosion and rust prevention, with the aim of ensuring that the repaired components meet the original design durability requirements and restore their performance to meet repair quality standards.
4. **Appearance consistency**: After the repair of the components, the assembly gaps between colors and components should meet the original design requirements of the car, and restore its appearance aesthetics to meet the repair quality standards.

Execution Standard

Reminder

When ordering maintenance parts, the smallest spare parts that meet the maintenance requirements should be selected based on the parsing results of the BYD TIS system.

Automotive Metal Coverings

Component Judgement Criteria:

Injury location	Type of Damage	Conditions for "Green Maintenance"
Front fender	Deformation	– The deformation area of the front fender ≤ 40% of the total area of the front fender – The dent depth of the front fender ≤20mm – The crease line of the front fender should be bent ≤20° – The corner area of the front fender reinforcement does not show plastic deformation, and the bending angle of the reinforcement line is ≤30°
	Cracking	– The crack length on the flat area of the front fender is ≤100mm, and the crack width is ≤2mm – The side length or perimeter length of the damaged area of the front fender is ≤100mm
Door	Deformation	– The deformation area of the flat part of the car door is ≤ 40% of the total area of the car door – The depth of the dent in the flat area of the door is ≤20mm – No wrinkles, deformation, or overall twisting in the local area of the glass frame – There is no multi-layer deformation at the glass installation groove and the rearview mirror installation area, and no deformation or tearing of screws and wire harness holes
	Cracking	– The crack length on the flat part of the door is ≤100mm, and the crack width is ≤2mm – The length of the side or the perimeter of the damaged area of the door is ≤100mm

Rear Fender	Deformation	– The deformed area of the flat part of the rear fender is ≤ 40% of the total area of the rear fender – The dent depth on the smooth area of the rear fender should be ≤20 mm – The deformation area at the edges, corners, and caulking joints is ≤15% of the total area of the rear fender and the dent depth is ≤20mm
	Cracking (Non-soundproofing cotton area)	– Crack length on the flat part of the rear fender ≤100mm, crack width ≤ 2mm – The side length or perimeter length of the damaged area of the front fender is ≤100mm
Exhaust pipe	Deformation	Dent deformation, the scratch dent at the end throat is ≤2cm, no dead crease
	Cracking	Crack diameter at the tail end of the exhaust pipe ≤ 15mm
Front hood and trunk lid	Deformation	– The deformed area of the flat part of the front hood or trunk lid ≤ 40% of the total area – The dent depth on the flat part of the front hood or trunk lid is ≤20mm
	Cracking	– The crack length on the flat area of the front hood or trunk lid is ≤100 mm, and the crack width is ≤2mm – Length of damaged area on the front hood or trunk lid ≤100mm

Standards for green repair process flow:

Type of Damage	Process Flow

Deformation	**Rebar Deformation Repair:** a. Before repair, disconnect the 12 V battery; b. Adjust the meson machine output current (55-65A), and pre pare the relevant materials and tools; c. Connect the ground wire of the meson machine to the pane l. d. For parts with ribs on the deformation area, first punch OT pieces or round pieces along the rib lines (spacing 3-5mm) e. Adjust the pull hammer hook to the central position of the O T sheet or disc, cycle the pulling, and tap the raised areas wit h a sheet metal hammer until the rib lines are restored f. Twist off the meson and use a pneumatic grinder (80#) to gri nd away the welding spots g. Annealing process: When the repair plate surface has chipp ing or high spots and surface elevation occurs, it is necessary to heat the repair plate using a copper or carbon rod, and cool the repair plate with an air gun (as appropriate) h. Remove surface weld spots with a pneumatic grinder (80#) and use a tactile touch to ensure smoothness and flatness: Th e repaired panels must be overall smooth, with no breakage o r high points, and the repaired surface must not be lower than 2mm below the original surface; **Non-rebar line deformation repair:** a. Before using the meson machine, disconnect the vehicle's l ow-voltage battery b. Replace the welding torch with a pulling hammer. Attach the triangular piece to the front end of the pulling hammer and per form spot welding at the deepest part of the deformation. The n, pull and strike c. Use a pulling hammer to repeatedly pull and tap down the r aised areas with a sheet metal hammer until the deformed are as are close to the original surface level d. Select the sunken low point again and repeat steps b and c until the sunken area is restored to a flat state e. Polish the weld spots using a pneumatic grinder (80#); f. Uniformly touch the deformed areas and use a sheet metal hammer to flatten the raised areas; then proceed with the shri nk flame treatment process: When there is chipping or high po ints on the panel surface, or when the surface is too high, use a copper rod or carbon rod for flame shrinking, and cool with a n air gun (as appropriate) g. Use a pneumatic grinder (80#) to polish the shaped areas, ensuring a smooth and flat finish by touch h. Touch and feel smoothness assessment: The repaired pan els must be overall smooth, with no breakage or high points, a nd the repaired surface must not be lower than 2mm below th e original surface;

Crack	a. Before repair, disconnect the 12 V battery; b. Use gas shielded welding, and adjust parameters according to the welding equipment manual. c. Wear a welding helmet and welding gloves before starting work, and take protective measures for non-welding parts and accessories of the fittings; d. Connect the ground wire of the gas shielded welding machi ne to the plate. e. Use a welding torch and welding wire to weld the crack (wel d points must be connected without false welding); f. Check by touch whether the area around the weld is smoot h. If there is deformation in the deformed area, use a die mac hine to replace the pull hammer, attach a triangular piece to th e front end of the pull hammer, and perform spot welding and pulling strikes on the deformed area until it is smooth g. Grind the welds with an air grinder (80#). h. Annealing process: When chips or high spots and surface h eight occur on the board surface, use a copper rod or carbon r od to shrink the fire, and cool it with an air gun (handle as app ropriate); i. Use a pneumatic grinder (80#) to sand and clean the repaire d area. j. Touch and feel smoothness assessment: The repaired panel s must be overall smooth, with no breakage or high points, an d the repaired surface must not be lower than 2mm below the original surface; i. Use an air grinder (80#) to grind and clean the repair area.

Automotive Plastic Covers

Component Judgement Criteria:

Injury location	Type of Damage	Conditions for "Green Maintenance"

Bumper body	Deformation	The deformed area of the bumper body is ≤ 20% of the total area of the bumper body and shows no signs of elongation
	Cracking	– The bending angle at the crack location of the bumper body is ≤15° – The crack length of the bumper body non-installation area ≤ 15cm – The cracking length at the installation parts of the bumper body (lug parts, bumper body corner parts, grille, lower grille installation area, etc.) ≤5cm
	Scratch	Single scratches can generally be repaired
	Missing	The original design structure is undamaged and the installation location is not missing
	Clip fracture	– The number of fog light mounting clips on the bumper body with cracks is ≤2, the clip thickness is ≥5mm, the length of the crack on the regular surface of the bumper body is ≤10cm, and the internal plastic fixed integral parts of the bumper body are not broken – The number of grille mounting clips on the bumper body that are broken is ≤3, the length of the crack on the regular surface of the bumper body is ≤10cm, and the internal plastic fixing integrated part of the bumper body is not cracked
Lamps	Scratch on the lamp surface	– The surface scratch depth ≤0.5mm – Edge scratch depth ≤1mm
	Shell rupture	– Scratch depth on the surface of the shell ≤1mm – The scratched area on the shell surface is ≤20% of the total shell area
	Lamp base breakage	– The lamp base is broken and not integrated with the lamp housing – The number of broken lamp bases ≤ 50% of the total number of lamp bases

Standards for green repair process flow:

Part	Type of Damage	Process Flow

Bumper body	Deformation	a. Heating: Use a high-temperature shaping electric heat gun to locally heat the deformed area, raising its surface temperature to about 60 degrees to achieve a plastic state b. Plastic Surgery: Using the rod tool set, perform pushing operations on the back of the plastic part to restore the dented area to its original shape through external force. If the reshaping area has cooled before the reshaping operation is completed, the damaged area can be reheated and the reshaping operation can be performed again. This process should be repeated; c. Cooling: Use a cold water towel or compressed air to cool down the dented area that has basically returned to its original shape after the shaping operation, so that the area can solidify and set d. Surface Fine Correction: Inspect the flatness of the repair area surfaces. If the repaired component surfaces still have slight dents and protrusions, further heating, fine correction, and cooling solidification shaping should be performed to achieve good flatness e. Polishing: Appropriately sand the repaired damage areas to confirm the surface smoothness for the next operation.

	Cracking	a. Crack fixation: Spot weld with a plastic welding gun at approximately 5mm intervals along the crack length on the outer surface of the bumper body for pre-fixation treatment b. Grinding bevel: Grind a welding groove on the inner surface of the crack of the bumper body, the groove is generally a straight line and the cross-section is arc-shaped. Then perform chamfering operations on the other side of the bumper body in the same way; if encountering a thinner panel, no grinding is needed, and the steel mesh step can be performed directly; c. Welding fill: Connect the power supply to the welding gun, and select the high position gear for the welding gun temperature setting. Take a plastic welding rod of the same material as the bumper body, with a length 10-15cm longer than the crack, and melt-fill from the outermost end of the crack. Then perform the welding and filling operation on the other side of the bumper body in the same manner; d. Post-weld surface treatment: Grind the outer surface welding area; make sure to grind until the welding groove and the bumper body surface are smooth, don't over-grind; apply steel mesh to the outer surface: Select the appropriate steel mesh based on the gap (the width of the steel mesh should exceed the welding groove by 10-15mm on each side), add the steel mesh (the surface of the bar body should melt and cover the steel mesh by about 1.5mm); after completely covering the steel mesh, smooth the surface overall; e. Polishing the surface: Grind the surface with an air grinder (120# sandpaper) to make the surface smooth and even; f. Inner surface polishing treatment: After the external surface treatment is completed, grind the welded part on the inner surface; make sure to grind it until the welding groove is level with the surface of the bumper body, but avoid over-grinding g. Inner Surface Final Treatment: After polishing the inner surface, check for any cracks in the welded areas. If cracks are present, steel mesh should also be added on the inside (the width of the steel mesh added on the inside should be approximately 5mm less than the width of the steel mesh added on the outside).

	Clip fracture	a. Crack fixation: Spot weld with a solde ring iron; b. Grinding bevel: Use a small electric g rinder to grind a welding groove on the i nner surface; c. Welding: Melt and fill the cracks with a welding torch and plastic welding rod s; d. Post-weld surface treatment: Use a s mall electric grinder to polish the welded areas to make the surface smooth e. Stencil for dispensing: Select the appr opriate steel mesh according to the crac k, and use a soldering iron to apply the steel mesh to the inner and outer surfac es; the width of the steel mesh should al ign with the width of the buckle, and the length should exceed the length of the i nner hole of the buckle; f. Polishing the surface: Use 120# sand paper to sand the surface, making it sm ooth.

Lamps	Scratch on the lamp surface	a. Mirror polishing: Use a pneumatic grinder with 240-grit sandpaper to sand the damaged areas of the lamp surface (use 120-grit sandpaper for deeper scratches). Extend the sanding area about 5cm beyond the damaged area and sand until the original scratches and marks disappear. In the previously sanded area, then sand once with 320-grit sandpaper and finally refine the surface texture with 400-grit sandpaper b. Mirror polishing: Use 600#, 800#, 1000#, 1500#, and 2000# water sandpaper sequentially to polish the entire lamp mirror surface until the entire lamp mirror surface appears hazy c. Mirror clarity: Rinse the polished lamp surface with clean water; then use an air blower and dust-proof cloth to clean the water and grinding residue powder; check if the entire mirror surface is completely foggy; if there are areas that are not polished properly, use 1500# sandpaper for local polishing again, and finally blow dry and wipe clean; d. Mirror Coating Restoration (1) Fumigation method: ① Pour an appropriate amount of headlight coating liquid into the coating cup, and then connect the power supply to heat the coating liquid ② Place the headlight to be repaired with the mirror side up, facing yourself. When the coating cup's vent begins to emit steam evenly, start the plating operation ③ Hold the plating cup, keep the exhaust port 2-3 cm away from the mirror surface, and move at a constant speed to evaporate the lamp surface ④ After fumigation is completed, let it air dry naturally for 30-40 minutes. (2) Spray method: ① Mix the special coating agent, curing agent, and thinner in a ratio of 2:1:1 and pour into the spray gun pot for later use; ② Place the lamp face up stably; ③ Adjust the spray gun so that its fan pattern is 10-15cm ④ Use the spray gun to evenly coat both sides of the car light surface; ⑤ Connect the infrared oven to the power supply, place the sprayed lamps into the oven, adjust the temperature to the range of 50-60 degrees, set the timer for 30-40 minutes, and start baking.

	Shell rupture	a. Grinding bevel: Inspect the cracks and use a small electric grinder to grind a welding groove at the cracks b. Welding crack: Select a plastic welding rod that is 10-15cm longer than the crack; start filling from one end of the crack, and move the welding gun nozzle at a uniform speed along the direction of the crack; during fusion welding, ensure the weld seam is uniform and avoid welding rod accumulation; c. Post-weld surface treatment: Use a pneumatic grinder (80#) to grind and treat the welded parts of the outer surface. Ensure that the grinding is done to keep the welding groove and the lamp housing surface smooth and level, without excessive grinding d. Polish outer surface: Use a pneumatic grinder or manually sand the surface (sequentially using 120#, 240#, 320# sandpaper) to make the surface smooth and flat; e. Paint touch-up: Spray the repaired area with black plastic paint, blending the repaired area with the surroundings to achieve a standard of basically no color difference
	Lamp base breakage	a. Fixed crack: Preliminarily fix the broken lamp holder with the lamp body; b. Grinding bevel: Use a small electric grinder to grind welding grooves on both sides of the fracture c. Welding crack: Use a welding torch and plastic welding rods to melt and fill on both sides of the fracture; ensure the weld is uniform and avoid accumulation of welding rods; d. Post-weld surface treatment: Use a small electric grinder or angle grinder to polish the welding areas on both sides of the broken part; make sure to grind just enough so that the welding groove is flush with the lamp base surface, do not over-grind; e. Laying Steel Mesh: Select an appropriate steel mesh according to the crack (the width of the steel mesh should extend 5-6mm beyond the original crack on each side), and inject the steel mesh (the surface of the lamp base melts and covers the steel mesh to around 1.5mm); after completely covering the steel mesh, smooth the surface as a whole; f. Polishing the surface: Sand sequentially using 120#, 240#, 320# sandpaper to treat the surface and make it smooth.

Component Judgement Criteria:

Injury location	Type of Damage	Conditions for "Green Maintenance"
Interior door panel	Deformation	– Deformation length ≤10cm – Deformation width ≤ 5cm – Depression depth ≤ 1cm
	Scratch	– Scratch length ≤ 10cm – Scratch width≤0.5mm – Scratch depth ≤ 0.5mm
	Cracking	– No damage or cracking on the outer surface, only involving internal clip seat breakage – The internal snap seat is broken ≤ 3 pieces

Standards for green repair process flow:

Type of Damage	Process Flow
Deformation	a. Tools Preparation: Hot air gun, wet towel, wool cloth, ruler, wooden chopping block with a smooth rounded side; b. Use paper tape to stick on the deformed area to prevent secondary damage during the repair process; c. Use a heat gun to heat the deformed area, the heating position is on the inner surface of the deformed area, and the heating temperature should be lower than 180° d. Use a wooden anvil with a surface similar to the deformed area to apply pressure based on the geometric dimensions of the deformation, allowing it to return to its original shape. If the deformed part protrudes outward, use a velvet cloth to cushion it when applying pressure to prevent surface damage e. Check the repair effect with a ruler or by touch; it is qualified if it feels smooth without any unevenness.
Scratch	a. Cleaning agent for car interiors and vehicles, removing scratches on interiors; b. Use masking tape to protect along the outer edges of the scratch to prevent damage from spreading during filling and sanding of putty; c. Scraping putty, baking, sanding; d. Spray orange peel paint on the polished damaged area to form an orange peel texture similar to the original car on the putty-scraped area e. Manual color matching and original car color 1K paint with softener spraying; f. Baking

Cracking	a. Find plastic with the same material as the trim panel, and cut it into plastic strips with a diameter of about 3mm using scissors; b. Align the broken buckle seat to its original position, use a plastic welding gun to melt the plastic strip, and connect the buckle and the base c. Test the firmness after cooling.

Automotive Electrical Components

Component Judgement Criteria:

Injury location	Type of Damage	Conditions for "Green Maintenance"
Wiring harness (with the prerequisite that the wiring harness being repaired is the non-high-voltage part)	Fracture	– Fractured single strand missing length <5cm (wires with diameter above 2.0 and airbag wires cannot be repaired) – The number of broken single wires in the repaired harness should be ≤5 (wires with a diameter of 2.0 or more and airbag wires cannot be repaired) – There is no coring and no multiple breaks inside the broken single line (wires with a diameter of 2.0 or above and airbag wires cannot be repaired)
	Terminal missing	Terminal missing and socket wiring harness < 3 (wires with diameter above 2.0 and airbag wires cannot be repaired)

Standards for green repair process flow:

Type of Damage	Process Flow
Fracture	a. Use wire strippers to strip 1-2cm of both ends of the wire that needs to be crimped; b. Determine the use of crimping studs based on the wire diameter, place the wire ends alternately in the crimping stud, secure the crimping stud and wire ends, and crimp; c. After the crimping is completed, remove the remaining crimping pins and observe whether the appearance of the crimping is good; d. Cut off the excess material at the end of the crimp pin, and perform a hand pull test to check if the harness is crimped properly e. Use heat shrink tubing, which needs to be placed on the wiring harness in advance; f. Fix the heat shrink tubing using a heat gun; g. Wrap the heat shrink tube with tape.

Terminal missing	a. Terminal removal tool 7# maintenance process: (1) Use the 7# terminal removal tool to pry open the clip on th e upper part of the sheath, then use the 7# terminal removal t ool to lift the clip from the front of the sheath, and pull out the corresponding wire by hand (2) Use the #7 terminal removal tool to lift the clip behind the s heath; then use the #7 terminal removal tool to lift the clip dow nward from the front of the sheath and pull the corresponding wire by hand (3) Use the No. 7 terminal removal fixture to pry open the clip at the end of the sheath, then insert the No. 7 terminal remova l fixture into the front of the sheath and press the spring piece behind the terminal flat to remove it. b. Terminal removal tool 10# maintenance procedure: (1) Push open the upper cover gently as it is easy to break an d damage at this point; use the 10# terminal removal tool to p ull out the secondary positioning pin, then remove the corresp onding sheath module, and press down the terminal's locking tab with the 10# terminal removal tool to remove the terminal (2) Use the 10# terminal removal jig to insert from the front of t he terminal, lift the retainer inside the housing, and then it can be pulled out (3) Use the #10 terminal removal tool to pry open the sheath t ail clip, then insert the #10 terminal removal tool into the front of the sheath from the top and bottom respectively, and flatten the tabs on both sides of the terminal to remove it (4) Use the 10# terminal removal tool to pry open the clip at th e back of the sheath. Then, use the 10# terminal removal tool to insert from the front left and right of the sheath. The clips in side the sheath can be pried up in sequence, and then it can b e pulled out. c. Terminal removal tool 23# maintenance process: (1) Use the 10# terminal extraction tool to pry open the clip at the end of the sheath, then use the 23# terminal extraction too l to insert from the front of the sheath and flatten the spring pie ce behind the terminal to pull it out; (2) Open the upper cover, use the No. 10 terminal removal too l to pull out the secondary positioning pin, and use the No. 23 terminal removal tool to insert into the small holes on both sid es of the sheath and pull the wire vertically out from the back end (3) Insert the terminal removal jig #23 into the front of the she ath, press down the spring piece behind the terminal, and the n it can be pulled out.

Aluminum alloy parts

Component Judgement Criteria:

Injury location	Type of Damage	Conditions for "Green Maintenance"
Hub	Wheel hub scratch (overall not deforme d, dynamic balance within 50 grams ran ge)	– Scratch length ≤ 20cm – Scratch width ≤ 5cm – Scratch depth ≤ 1mm

Standards for green repair process flow:

Type of Damage	Process Flow
Scratch	a. Preliminary grinding work on the hub. The polishing proces s can use a dry grinder to polish the entire damaged hub and quickly remove the paint b. Aluminum welding mainly requires the use of imported high- purity aluminum alloy welding rods, using the argon arc weldin g process; c. After welding, the hub needs to be ground at the welding po ints using a dry grinder. The area between the spokes require s manual sanding with sandpaper and splints. Detailed proces sing can solve the issue of paint surface marks on the hub d. Use aluminum alloy filler gray specifically for aluminum allo y wheels to fill in fine scratches. After filling, perform secondar y polishing and check the surface smoothness of the wheel. Af ter filling with aluminum alloy ash or aluminum rod material, it needs to be baked at high temperature in an oven for curing. The cured filling material is very hard e. Degrease the aluminum alloy wheel hub, spray high-temper ature primer on the aluminum alloy wheel hub, and after spray ing evenly, send it to a high-temperature oven to be baked at 160°C for one hour. After removal, let it dry and slightly sand o ff any small particles after the primer hardens f. Spray paint on the hub and spray high-temperature gloss pa int specific for hubs, and repeatedly put it into the high-temper ature oven. After taking it out, observe whether the gloss, hard ness, and fullness of the hub gloss paint meet the delivery sta ndards g. If the repaired wheel hub needs to test the paint finish qualit y, a dynamic balance test is required to ensure the safety of th e repaired wheel hub.

Specifications and requirements

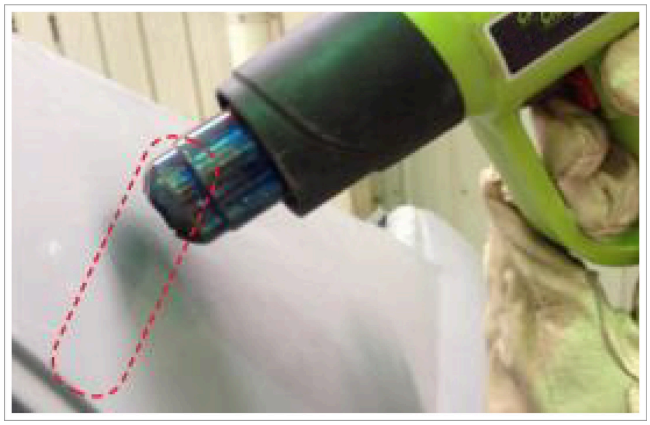
Warning message

Warning

- Before operation, master the positions and other important information of the high-voltage system and circuits of the corresponding vehicle.
- To ensure the safety of personnel and the electrical system, it is necessary to **disconnect the high-voltage and low-voltage electrical systems** before repair:
  - Disconnect the vehicle high voltage. Refer to: “Fangchengbao B8 Service Manual" - "Overview -> General repair information -> Pre-repair operation of high-voltage electrical system -> Power-off and power-on of high-voltage electrical system."
  - Disconnect the vehicle's low voltage. Refer to: Refer to “Overview -> General repair information -> Pre-repair operation of low-voltage electrical system -> Power-off and power-on of low-voltage electrical appliance” in “Fangchengbao B8 Service Manual”.
- When welding the vehicle body, properly lay fire blankets in the corresponding areas.
- Avoid direct contact with high-voltage components and wiring harnesses in the repair area, and operate according to the safety requirements of the high-voltage system.
- Do not exceed 180 °C when heating the bonding area, otherwise toxic gases may be emitted.
- Before welding, confirm that there are no flammable and explosive liquid substances in the operation area, and effective fire extinguishing equipment is placed within one meter of the operation area.
- Evaluate whether the high heat during operation affects the high-voltage battery. If so, remove the high-voltage battery before operation.

Detachment from bonding area

- The heating temperature shall not exceed 180°C.



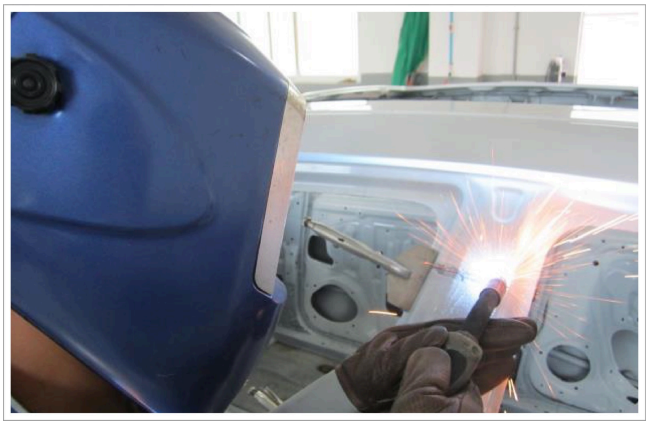
Adhesive bonding requirements

- **Pre-processing**： Grind (the paint layer within 30 mm around the welding spot to the galvanized layer or bare metal), and clean all four sides of the welding area.
- **Requirements**: If the ambient temperature is between 15 - 23 °C, complete the fastening work within 30 minutes. The downtime should be executed according to the auxiliary materials product manual.
- **Process**: Sand the joint surface with P150 sandpaper -> Clean with a cleaner -> Wait for drying (about 5 minutes) -> Apply adhesive.



Butt welding

- **Pre-processing**： Grind (the paint layer 30 mm around the welding spot to the galvanized layer or bare metal) and clean welds or the paint layer on the back of the welding spot, so as to prevent dirt from entering the welding pool through the weld root.
- **Requirements**: When using CO2 gas shielded welding, it is necessary to ensure that the welding gap is less than 1 mm. The larger the welding gap, the lower the connection strength.
- **Reinforcement requirements**: When welding the interface position, it is necessary to make a reinforcement piece with a width of 40 - 60mm. Before welding the reinforcement piece, it should be polished to expose the bare metal and then apply zinc powder conductive primer.
- **Post-treatment**:
  - When grinding welds, avoid the base material other than the welds.
  - Clean all welds, welding spots and burned paint with a wire brush.
  - Seal original welding areas that have been removed after application of primer.
  - Protect the internal cavity with cavity anti-corrosion wax. Refer to .
  - Replace the sound insulation material.



受损车维修流程

注意

- 在进行作业时，请按规定做好安全防护，安全防护的具体事项请参见Sheet metal protection、Spraying protection。
- 在进行作业前，请仔细阅读并遵守场地安全及车辆防护，详情请参见Site safety and vehicle protection。

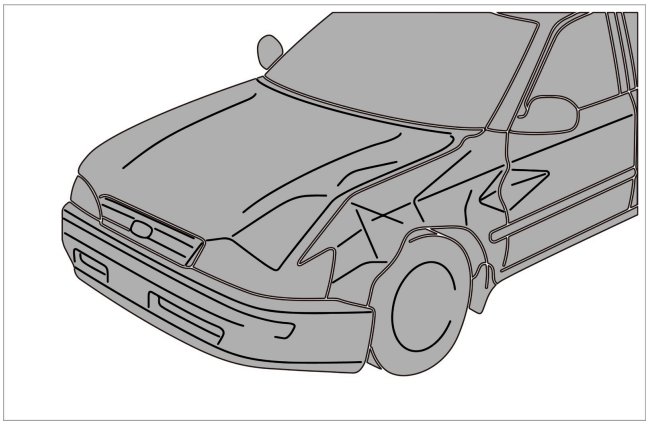
评估受损情况

温馨提示

需要与机电技师配合评估车辆受损情况。

车辆受损后需先评估并确认车辆受损程度，确认是否需要更换备件，其主要事项如下：

- **车外检查**：检查车外碰撞情况，其中包括：
  - 车辆外观件：保险杠、翼子板、机盖、大灯、中网等部件是否损坏或变形。
  - 车辆底盘件：减震器、副车架、转向机、转向管柱、下摆臂等部件是否损坏。
  - 动力系统：评估发动机或驱动电机是否损坏。
  - 驱动系统：评估车轮、变速器等部件是否损坏。
  - 冷却系统：评估冷却水泵、冷却水管是否损坏。
  - 电器系统：评估加热器、线束等部件是否损坏。
- **车内检查**：检查车内的损坏情况，其中包括：安全气囊、主副仪表、PAD、座椅、等部件是否损坏。



拆卸备件

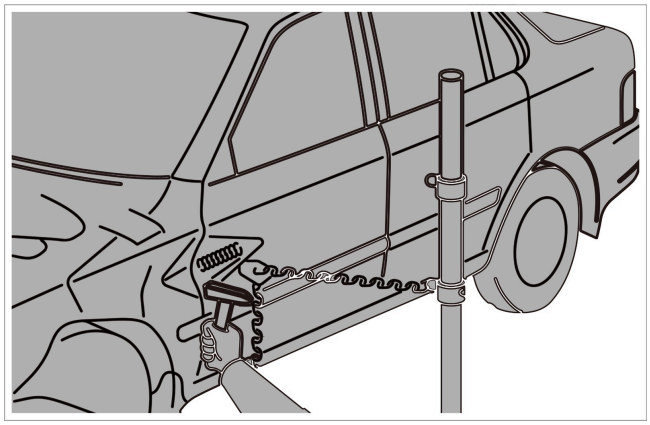
根据需求拆卸已评估好的受损备件，其中包括：

- **机电备件**：此备件需要协助机电技师进行操作，详情请参见方程豹 豹8维修手册。
- **钣喷备件**：可参见钣喷手册进行操作，详情请参见**更换车身钣金件**中的**部件概览**。
  - 部件概览（前舱）
  - 部件概览（侧围）
  - 部件概览（顶盖）
  - 部件概览（地板）
  - 部件概览（后围）

维修钢板

当车身外观件轻微变形时，可以通过拉拔的方式进行修复，其操作流程如下：

1. 评估车身钢板的损伤类型以及处理方法，参见Damage type of outer panel。
2. 去除损伤区域的旧涂层。
3. 将垫圈焊接至变形区域，使用拉拔拉拔凹陷区域后敲击修复钢板，参见How to repair the outer panel。
4. 对已进行拉板修复的区域进行缩火作业，参见Introduction to sheet shrinking process。
5. 对其进行防锈处理，参见。



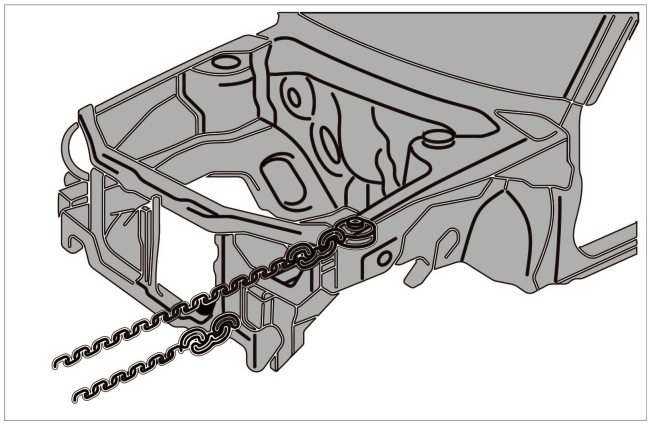
校正车身

危险

- 进入作业区需做好个人防护，详情请参见Sheet metal protection。
- 操作设备前应先清理场地，平台及周边不能堆放杂物，需整理油管和气管，防止挤压时操作变形，详情请参见Site safety and vehicle protection。
- 使用设备前应先检查设备是否正常，其中包括滑轮固定螺栓是否松动、以免拉塔滑落造成人员或物品伤害或损伤。

需要根据车身的受损程度从而进行评估校正车身方案后校正车身，其操作步骤如下：

1. 将车辆合理固定至校正台。
2. 测量车身数据，从而制定校正方案，参见。
3. 测量校正后的数据是否正确，参见**车身数据及结构信息**章节内容中的**车身尺寸**。
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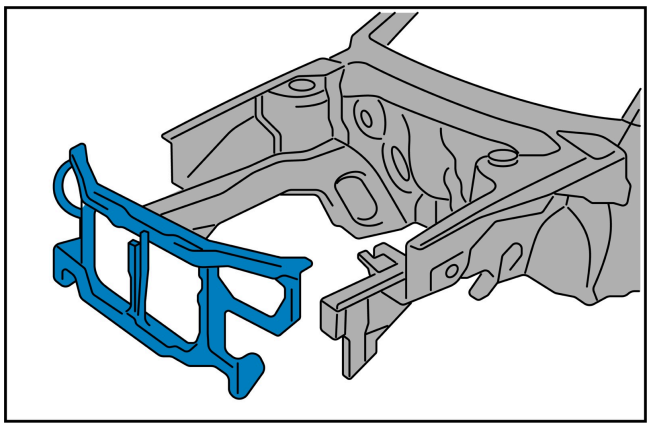
更换车身钣金件（难以维修时）

温馨提示

确认相应钣金件的更换方法可参见**更换车身钣金件**章节内容。

主要通过焊接等方式更换零部件，其具体流程如下：

1. 评估方案后，拆卸旧件。
2. 准备新部件。
3. 定位新部件，对新部件进行测量。
4. 预装配调试、间隙、段差检查。
5. 对接合部位进行打磨处理后，进行焊接。
6. 对已焊接部位进行防锈处理。



防锈处理

此步骤针对一些焊接后的部位，其操作流程如下：

1. 遮蔽施涂部位。
2. 施涂空腔蜡或环氧底漆。
3. 等待其干燥后，施涂密封胶。

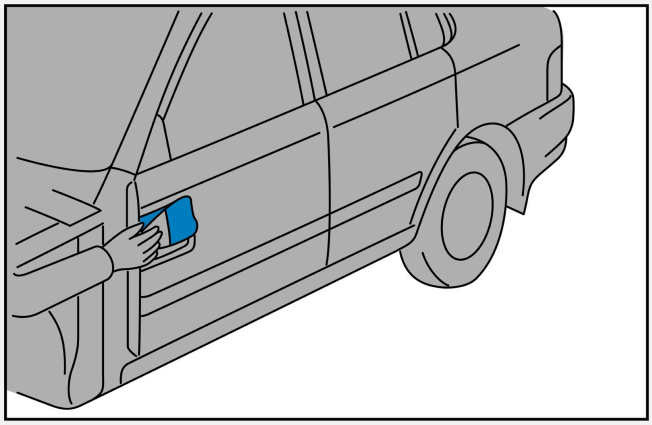
更多详情请参见。

原子灰整形

用原子灰填充受损板件表面，恢复表面形状及平整度，参见Application of sheet metal poly-putty、Application of plastic poly-putty。

⚠ 注意

– 原子灰研磨需全程使用干研磨工艺，避免质量问题的发生。
– 进行下一步前需等待原子灰干透。
– 配合使用红外线烤灯强制干燥原子灰，可提高效率。



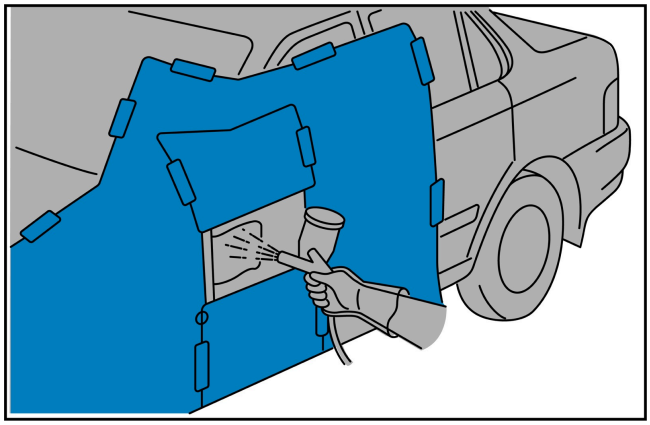
施涂中涂底漆

⚠ 注意

施涂时应覆盖多孔原子灰表面，以防止面漆图层被原子灰吸收。

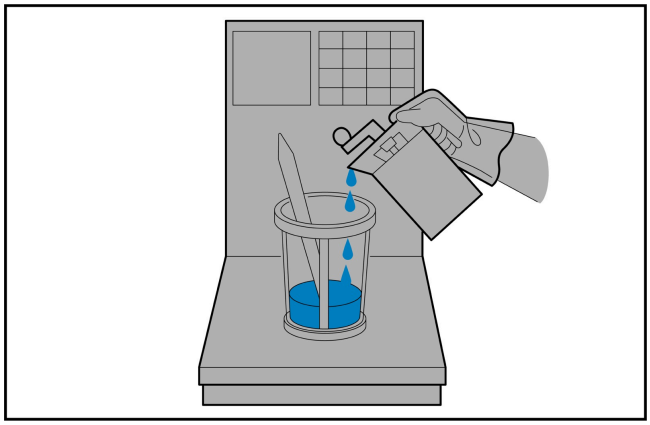
施涂中途底漆应在原子灰之后，其目的在施涂面漆前，形成光滑的表面，其操作流程如下：

1. 对非施涂区域做好遮蔽。
2. 混合中涂底漆。
3. 按从大到小的范围施涂底漆。
4. 使中涂底漆干燥。
5. 研磨底漆及板件旧涂层。



面漆调色

– 混合、称重色母料，以使面漆获得与施涂车辆车身板件相同的颜色效果，参见：
  • Color mixing of solid color paint
  • Color mixing of metallic paint



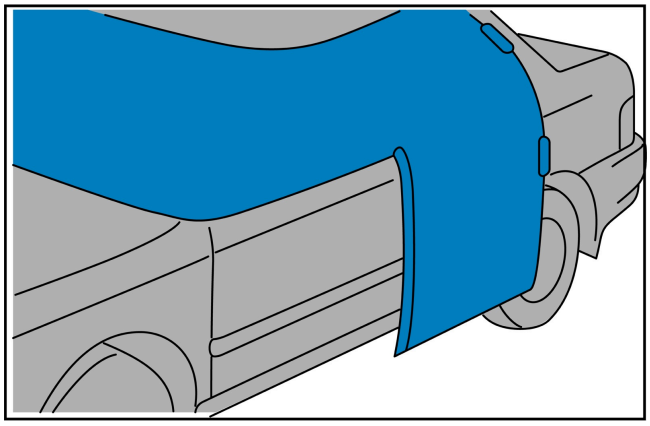
遮蔽

温馨提示

专用遮蔽纸和遮蔽膜可以提高效率，并减少尘点缺陷的发生。

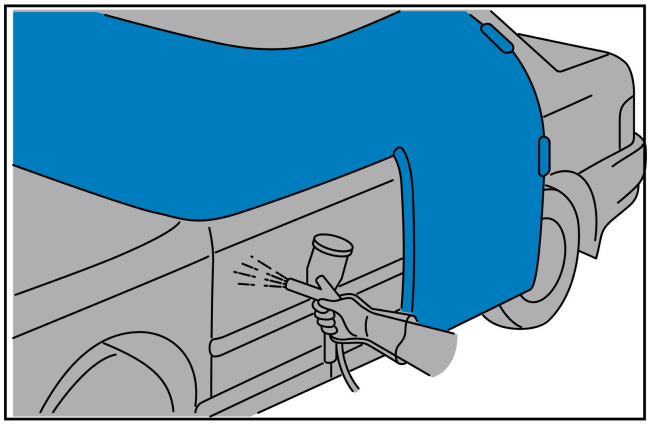
避免使涂料黏附到不需要进行修理的部位，其具体流程如下：

1. 清洁板件及缝隙灰尘。
2. 遮蔽施涂板件周围不需要被喷涂到的区域，参见Performing masking。



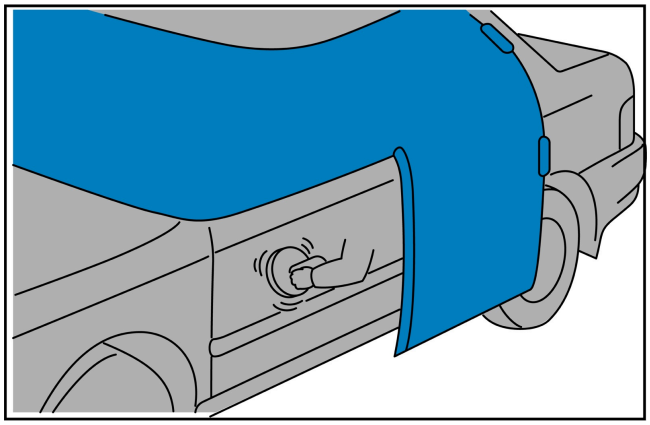
施涂面漆

– 为车身提供鲜艳的色彩及耐候性、耐酸碱、耐紫外线等功能，也为车体提供光泽、硬度、丰满度等涂层效果，参见：
  - 素色漆：
    - 施涂Solvent-based solid color paint。
    - 施涂Water-based solid color paint。
  - 金属漆：
    - 施涂Solvent-based Metallic Paint。
    - 施涂Water-based metallic paint。



干燥和抛光

- **干燥**：通过烤漆房，将施涂区域的油漆固化，参见How to dry。
- **抛光**：使得施涂面恢复光泽，参见Performing polishing。



装配备件

安装备件，调整板件间缝隙，恢复车辆原始外形，其操作流程如下：

1. 装配拆卸及更换后的零部件。
2. 调整板件缝隙，数据参见**间隙和面差**章节内容：
   -
   -
   -
   -

完工检查

参见Repair process quality checklist检查车辆维修后的质量，其流程如下：

1. 清洗车辆。
2. 检查喷涂质量。
3. 检查装配质量。
4. 检查车辆功能。

Damage type of outer panel

This article describes the types of damage to outer panels. For instructions on repairing outer panels, please refer toHow t o repair the outer panel .

Elastic deformation

Elastic deformation refers to the deformation in which case the original shape can be restored when the external force is re moved. In sheet metal repair, the dented area with elastic deformation shall be repaired first on the basis of the elastic def ormation principle, and the panels with large deformation shall be repaired from outside to inside.

Reminder

Elastic deformation exists in most deformed panels and can be repaired first.

- **Characteristics**: The original shape can be restored after the external force is removed.
- **Causes of deformation**: The applied external force does not exceed the elastic limit of the plate.

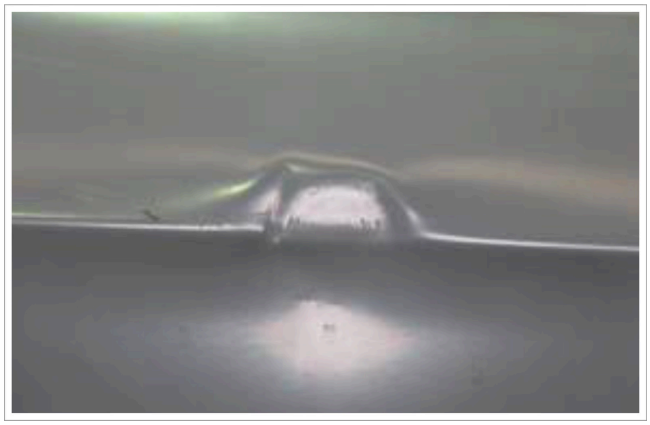


Plastic deformation

Plastic deformation refers to the deformation in which case the original shape cannot be restored when the external force i s removed. Compared with elastic deformation, plastic deformation is more difficult to repair and exhibits greater complexit y in types.

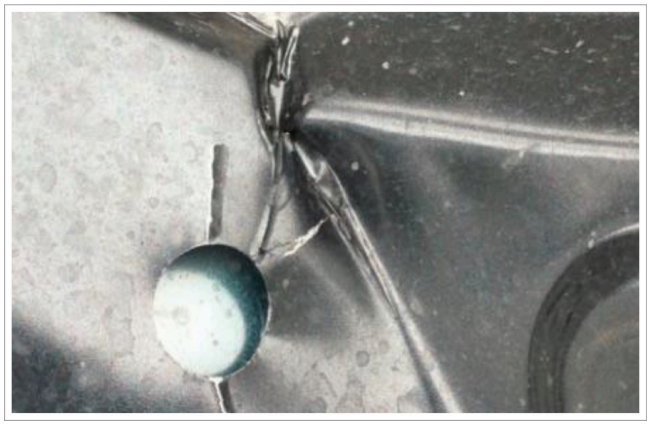
Type 1: General plastic deformation damage

- **Characteristics**: Deformation that cannot return to its original shape without external force.
- **Causes of deformation**: The external force applied exceeds the elastic limit of the plate.
- **Repair steps process**:
  1. Grind the paint film in the repaired area before using the dent puller machine.
  2. Use a crowbar or perform multi-spot welding to repair more seriously damaged parts first.
  3. Carry out fine repair and shrinking on the deformed surface.



Type 2: Crumple & folding

- **Causes of deformation**:
  - The phenomenon of inward shrinkage of the panel occurs after impact, usually appearing during large-area defor mation.
  - In case of excessive shrinking, panel crumple and deformation will also occur.
- **Repair method**: Use the backing bar and the sheet metal hammer for extension to repair the crumples.



Type 3: Other plastic deformation

- **Characteristics**:
  - Warping.
  - Bending
  - Stretching
  - Tear or perforation.
- **Repair method**:
  - Use the backing bar and the sheet metal hammer for extension to repair the crumples.
  - Before using a dent puller machine, it is necessary to weld the torn or perforated areas.



How to repair the outer panel

Caution

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

There are generally two methods to repair the vehicle body's outer panel, namely manual shaping operation and repair wit h a dent puller machine .

Repair tools and auxiliary materials

You can learn about the tools and auxiliary materials required for repair of outer panels by clicking on the following link.

– **Repair tools**:
  • Shaping tool
  • Grinding tools
– **Auxiliary materials**: Cavity anti-corrosion wax

Manual reshaping operation

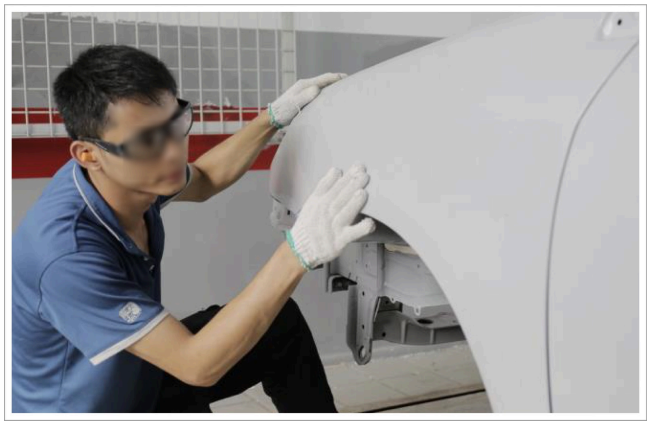
Step 1: Determine damage

Reminder

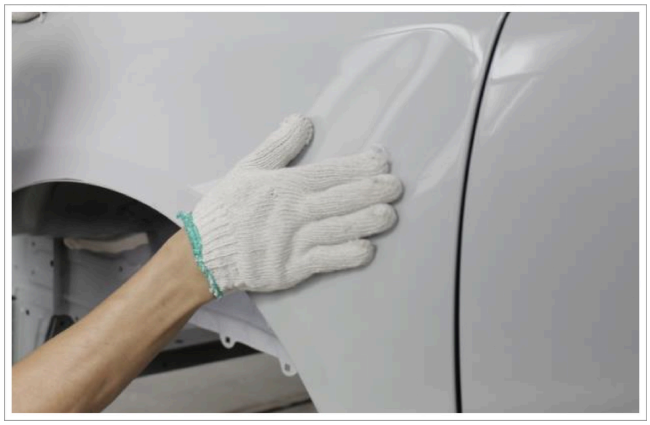
Mark the damage scope with a colored pen to avoid damage expansion during repair; otherwise, the work efficienc y may be reduced.

In actual repair, it is necessary to evaluate the damage through visual determination, touch determination, comparison with a ruler, and determination with a profile gauge to formulate a repair plan:

– **Visual estimation**: It is necessary to choose an appropriate light source to observe the deformation area from the fro nt or side angle and determine the extent of the damage.



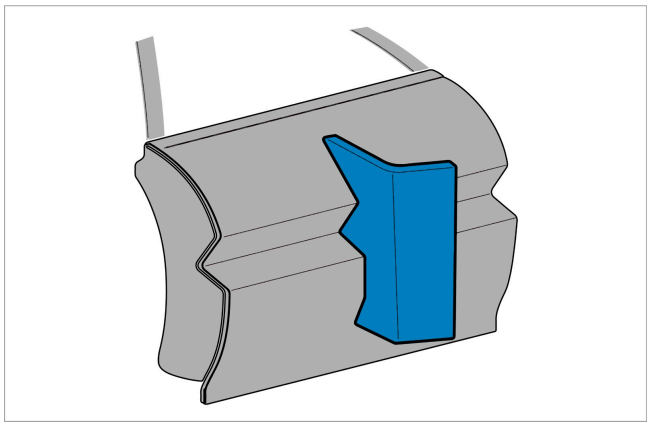
– **Determination by touch**: Check the intensity change by touching and pressing the panel.



– **Ruler Comparison**： Select a symmetrical position to the damage for comparison, use tools like a ruler to check the damage by aligning it with the deformed area, and judge the damage by comparing both sides.



– **Shape Ruler Judgment**: Compare the deformation conditions of the acquired contour and deformation area by fitting the undeformed plates with contour gauges, making the contour of the gauge pins identical to that of the plate, and co mparing it with the undeformed positions symmetrical to the damage.



Step 2: Shaping

⚠ Caution

– Before shaping, use appropriate tools to remove corresponding accessories. Protect the vehicle before removin g accessories.

– If shrinking is required during shaping, disconnect the negative terminal of 12 V battery.

– Disconnect the negative terminal of 12 V battery when using the dent puller machine for shaping, to avoid large current passing through the vehicle body and damaging the vehicle's wiring.

1. Hammering and shaping

⚠ Caution

Repair the panels from inside to outside in principle. That is, repair the inner structural panels first and then the outer panels.

- Select a sheet metal hammer or crowbar according to the deformed shape for repair.
- Perform the unaligned hammering on the corresponding part, and then perform the aligned hammering for finishi ng.
- Use a crowbar with a small angle to repair the edges and corners.
- Choose the line chisel based on the shape of the edges.
- Use a backing bar with a smooth surface to repair the edges and corners on the panel surface.



2. Grinding and finishing

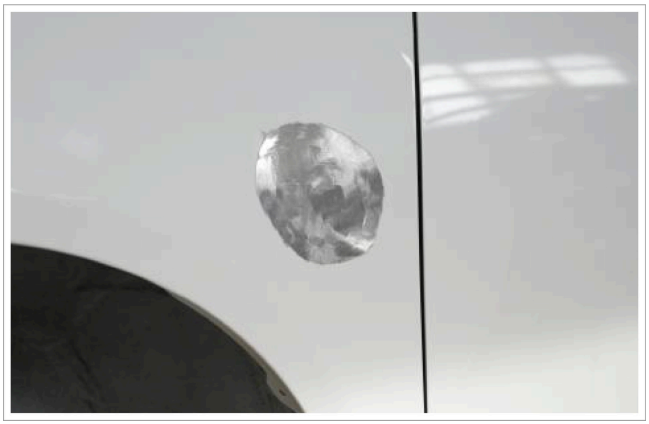
⚠ Caution

Only polish the damaged areas to prevent excessive polishing.

- Select a grinding tool and use appropriate sandpaper for grinding.
- Follow the principle of minimizing the damaged area during grinding.
- Carry out grinding from coarse to fine until the uneven traces disappear.



After repair and grinding, the contact edge between the bare metal and paint is linear, which is conducive to improving the efficiency of the next process.



Repair with dent puller machine

1. Determine the damage. Refer to Damage determination .
2. Use grinding tools along with appropriate sandpaper to remove the old paint film and expose the steel panel.

⚠ Caution

– Please wear the correct protective equipment properly during operation. For details, please refer to Sheet metal protection .

– Never remove the paint film using the grinding tool that produces too large particles. The grinding surface with too large particles will lead to the thinning of metal plate and the decrease in strength.

– Only remove the paint film at the positions where the pulling key needs to be welded.

– The width of paint film ground shall be that of the damaged area ± 10 mm.



3. Adjust the dent puller machine to an appropriate power to prevent burning through the panel. The commissioning step s are as follows:
   a. Select the working mode of dent puller machine.
   b. Adjust the current of dent puller machine.
   c. Perform trial welding operations on sheet metal with the same material thickness.



4. Weld a suitable pulling key to the concave and convex positions.

Caution

Carry out trial welding before the pulling key is welded.



5. Carry out drawing repair so that the surface of the panel is slightly 0.5~1 mm lower than the original surface and there are no bulges or holes.

Reminder

- When drawing the dent on the vehicle body panel, hammer the bulge around due to extrusion with a sheet metal hammer.
- Do not draw once to shape. Draw the panel surface by gradually increasing the force several times until it is restored to the height before deformation.
- During drawing, use tools for measurement and inspection in time to prevent the surface from being too high due to over-drawing.



6. Repair the car body lines.

Caution

– Knock the area around the pulled dents with a sheet metal hammer during drawing.

– The body lines after repair shall be about 0.5 mm lower than the original body lines.

– Draw from inside to outside in principle, and avoid drawing from the location with the least serious deformation, r esulting in excessive extension or bulges after steel panel drawing.

– To repair large area of deformation, use a fixed pull tower to assist in drawing.



7. Trim welding marks.

Caution

Do not grind sharp bulges with a grinder, because there is a risk that the steel panel will become thinner or be worn through.

Reminder

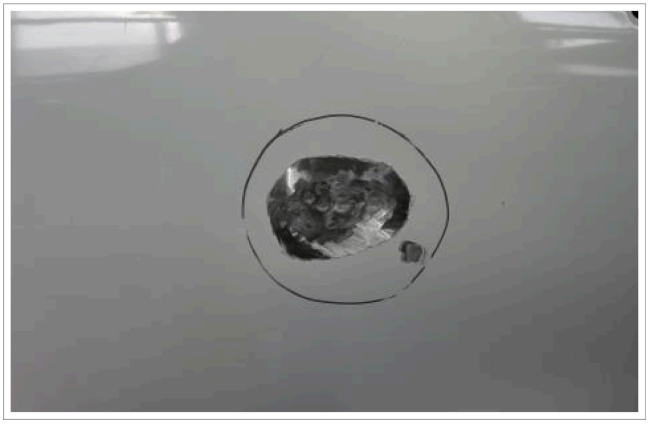
– Press the repaired surface with fingers to check its strength.

– Shrinking is required in case of decrease in strength. Refer to Introduction to sheet shrinking process .

– Further drawing is required in case of any undesirable dents.

a. Grind the welding machine area with a suitable tool and sandpaper so that the welding marks disappear.

b. Finish the bulges with the tip of a finishing hammer.



8. Carry out anti-corrosion treatment on the inner cavity. Refer to .

⚠ Caution

- The inner side of the panel burned during the dent puller machine welding must be treated with anti-corrosion wax for anti-corrosion treatment.
- For positions inaccessible, anti-corrosion wax can be sprayed by inserting a hose into the cavity.
- The area where the sealant is damaged needs to be treated and then re-applied.



How to repair plastic parts

Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

Reminder

This article uses bumper repair as an example to explain how to repair plastic parts. For information on the material of the bumper for this vehicle model, please refer to .

Repair tools and auxiliary materials

You can learn about the tools and auxiliary materials required for repair of outer panels by clicking on the following link.

- **Repair tools**: Repair tools for plastic parts
- **Auxiliary materials**:Repairing plastic parts .

Operation method

1. Evaluate the damaged area:
   - Visual confirmation: Visually inspect the distorted reflections with fluorescent lamps or light sources to identify th e damaged areas and assess the extent of damage, evaluating both the size of the affected area and the severity of the damage.
   - Touch Confirmation: By touch, you can gain a more comprehensive understanding of the dents and raised areas on the surface.
   - Mark the confirmed damage scope with a marker.



2. Handling cracks: Use a drill bit with a diameter of 4mm to drill at the end of the cracked area to prevent the crack from spreading.

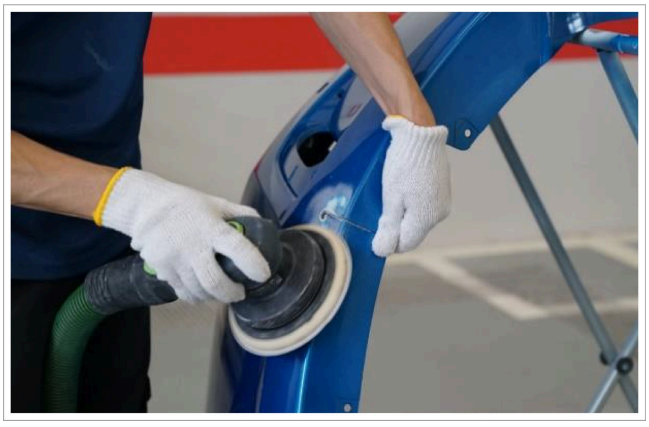


3. Making feather edges: Trim the step differences between bare surfaces and old coatings to prepare for the application of plastic poly-putty, operating steps:

> **⚠ Caution**
>
> After grinding, the feather edges shall be smooth. Otherwise, poly-putty marks will form after spraying of top co at.

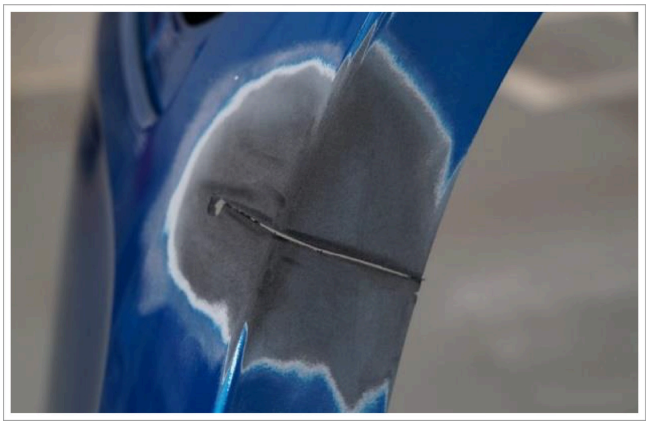
   a. Install sandpaper #P120-P180 on the grinder.

   b. Grind the damaged area, and avoid surface deformation of plastic parts during grinding.



   c. Blow dust with the air gun and confirm that there is no crack, except for the cracked area.

   d. Use sandpaper #P240 to grind the damaged area, and ensure that the feather edge shall exceed the edge of the damaged area by 20 mm during grinding.



e. Use a belt sander to sand the inner side of the bumper to ensure better adhesion during the application of adhesive.



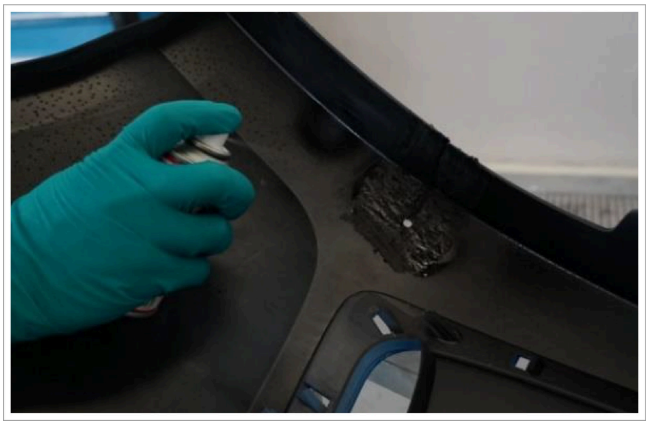
4. Cleaning of panels: After initially treating the plastic surface with a heat gun, use a cleaner in combination with a cleaning cloth to degrease the surface, ensuring that the cleaned surface is free of dirt, grease, and dust.



5. Apply plastic primer: Apply a thin and even layer of plastic primer to the exposed areas of grinding to ensure good adhesion for the subsequent application of adhesive.

⚠ Caution

- Due to the softness of the resin bumper, a special plastic primer is required.
- Do not apply the plastic primer too thickly in one time as this will cause the paint to peel or shrink around the feather edge.



6. Apply plastic adhesive: Mix the required amount of adhesive according to the instructions in the product manual and a pply it evenly to the sanding area.

⚠ Caution

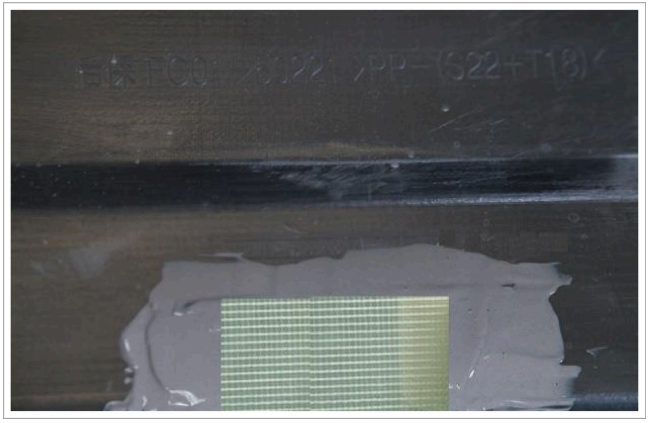
During application, fix a piece of auxiliary material (such as thin iron panel) on the outer side of the cracking pa rt to eliminate the height difference caused by bumper fracture.



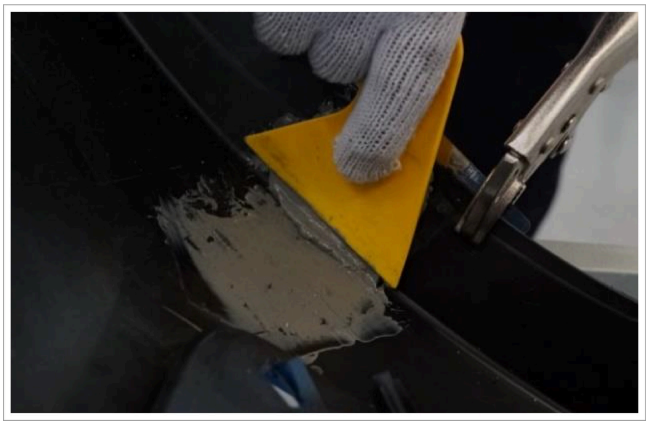
7. Reinforce the damaged area with reinforced fiber cloth: Paste reinforcing fiber cloth on the back of the bumper after a pplying adhesive to ensure the strength of the repaired panel. When pasting, use a scraper to apply pressure to ensur e the fiber cloth adheres to the adhesive.

ⓘ Reminder

This step can be ignored if the damaged plastic part is not cracked.



8. Apply resin adhesive:
   a. Continue to apply the adhesive on the surface of the reinforced fiber fabric until the entire surface of the fiber fabr ic is covered.



b. Use an infrared lamp to heat the applied area at 50°C for forced drying.

c. After drying and cooling, remove the auxiliary steel panels and tools.

d. Continue to apply the adhesive and forcibly dry it.



e. After drying, grind with a double-action grinder to roughly trim the damaged areas of the panel.



Subsequent operations

1. Apply the plastic poly-putty. Refer to Application of plastic poly-putty .
2. Apply primer. Refer toSpraying of primer .
3. Spray the plastic parts. Refer toSpraying of plastic parts .
4. Dry the sprayed paint. Refer to How to dry .
5. Perform fine treatment for the sprayed surface. Refer to Performing polishing .

如何测量与校正车身

⚠ 注意

- 在进行作业时，请按规定做好安全防护，安全防护的具体事项请参见Sheet metal protection。
- 在进行作业前，请仔细阅读并遵守场地安全及车辆防护，详情请参见Site safety and vehicle protection。

测量车身

根据实际需求选择测量工具：卷尺、直尺、通用测量尺和电子测量平台，参见Vehicle body measurement。

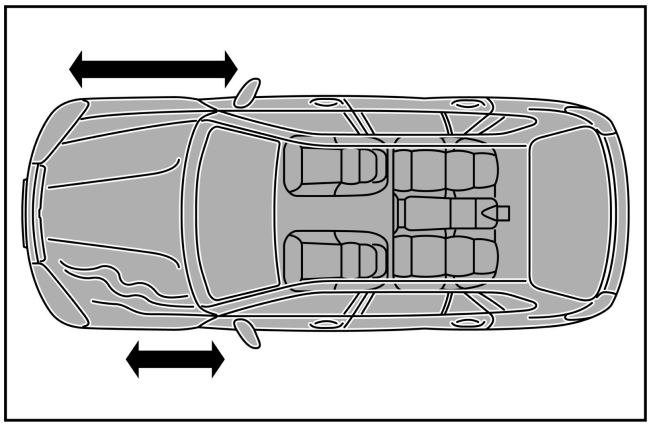
温馨提示

以下数据可辅助你测量此车型车身：

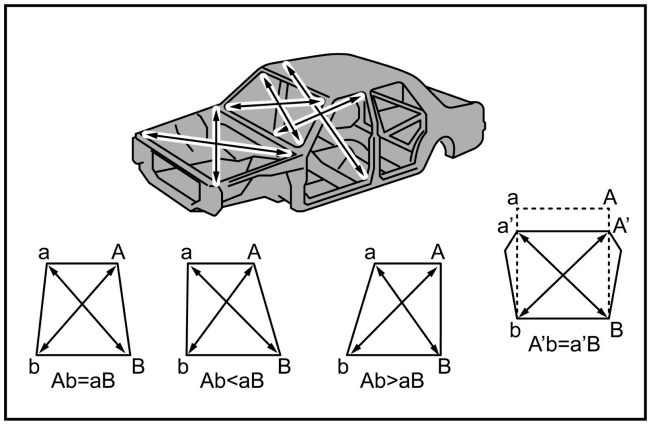
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在校正车身之前需要先测量车身从而评估校正方案，测量车身的方法有：

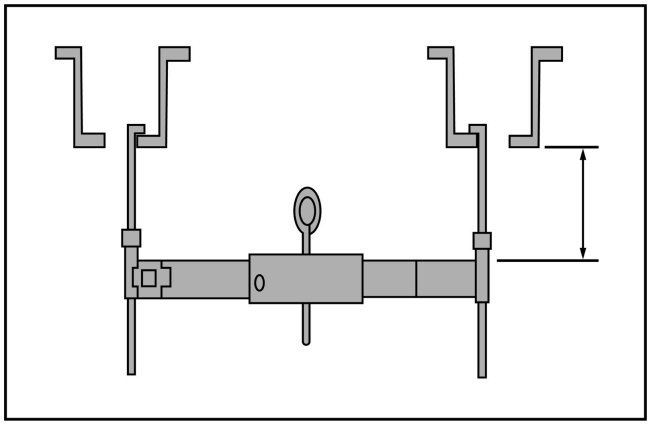
- **对比法**：先测量未损伤侧的尺寸数据，再测量损伤侧的尺寸，对比两者尺寸来确定维修拉拔的幅度。



- **左右对称法**：测量车身框式结构的两个对角尺 对比两者是否相同，从而判断车身是否有变形。



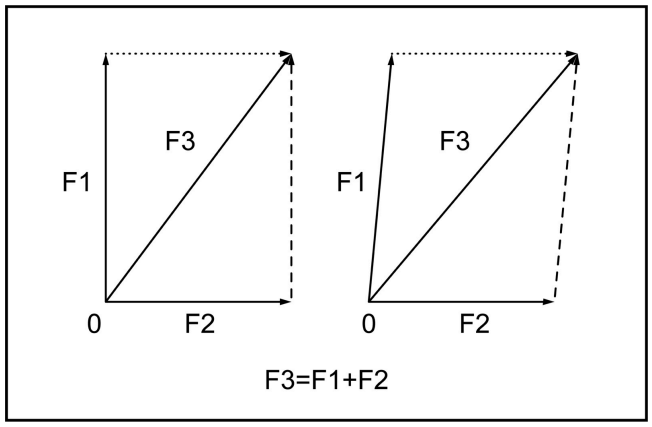
- **车身中心线法**：在车身底部正确位置悬挂合适数 量的车身挂尺，通过观察所有车身挂尺的中心点是否在同一条直线上来判断车身是否变形。



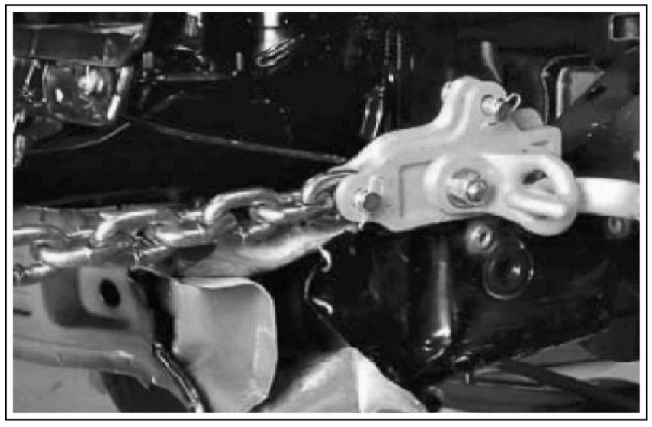
校正车身

在校正车身前您需要选择正确的校正设备和校正方法：

- **校正设备**：升降式校正台、可移动式校正台、小损伤修复校正台、平台式校正台、地笼式校正台、拉塔、固定夹具、车身固定支架、拉拔夹具、卡边式拉拔夹具、平面拉拔夹具、钩式拉拔夹具、双向式拉拔夹具和安全拉索。（该部分内容需匹配相应工具的链接）
- **校正方法与技巧**：
  - **向量拉拔**：
    - 从力的方向和角度来说，向量可分为合力和分力，即多个力量联合或分散力量的角度和方向。
    - 如图所示同时拉拔F1和F2的效果与单独拉拔F3效果相同。
    - 在有些特殊位置拉拔时，必须使用力量分解原理的向量拉拔方式。



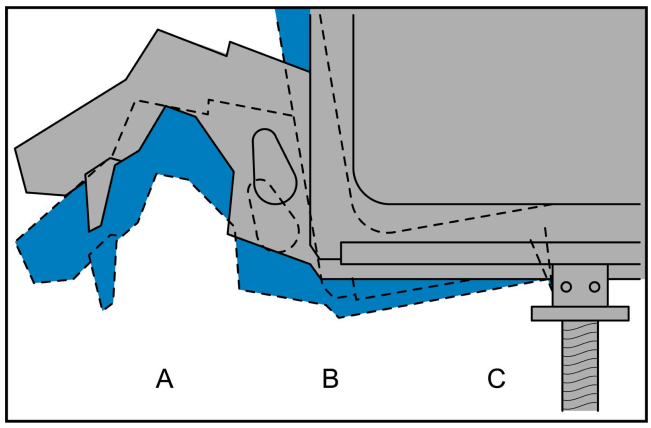
  - **多点拉拔**：
    - 较小程度的变形可以采用反向单点拉拔。
    - 车身发生的较严重或较大范围碰撞变形，可以通过多点反向拉拔校正，避免撕裂及拉力不均衡现象发生。
    - 多点拉拔时夹具不需要都夹在一个位置，选择多处严重变形点固定夹具，可以利用多个拉塔或钢链配合使用。



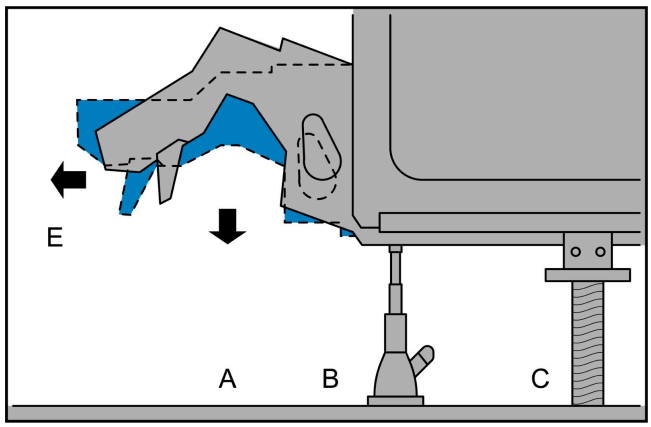
注：链条与液压缸的角度一般建议在90度，如果超过此角度，就会导致受力不均匀，从而对链条产生伤害。



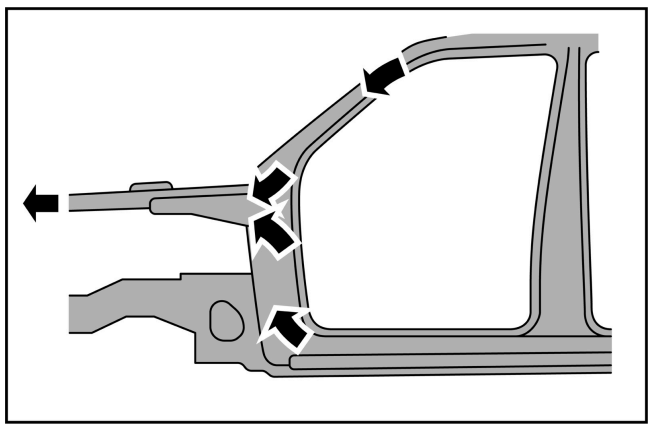
- **不用辅助支撑拉拔**：在拉拔校正前，必需确认是否需要辅助支撑，否则将导致二次损伤。



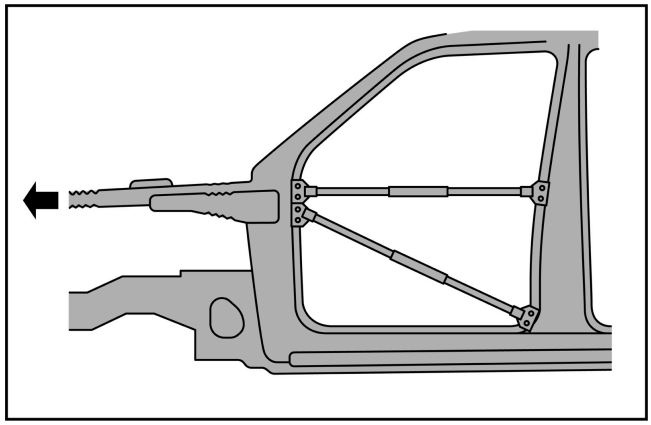
- **使用辅助支撑拉拔**：正确的使用辅助支撑，不但不会导致二次损伤，而且可以提高拉拔效率。



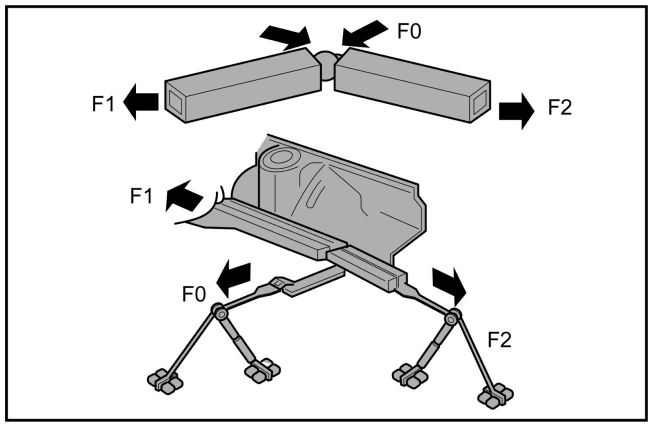
- **不用辅助固定拉拔**：在拉拔校正前，必需确认是否需要辅助固定，否则将导致二次损伤。



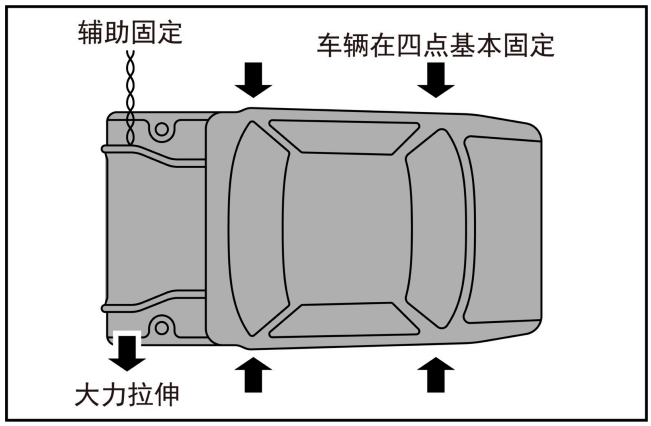
- **使用辅助固定拉拔**：正确的使用辅助固定支撑，不但不会导致二次损伤，而且可以提高拉拔效率。



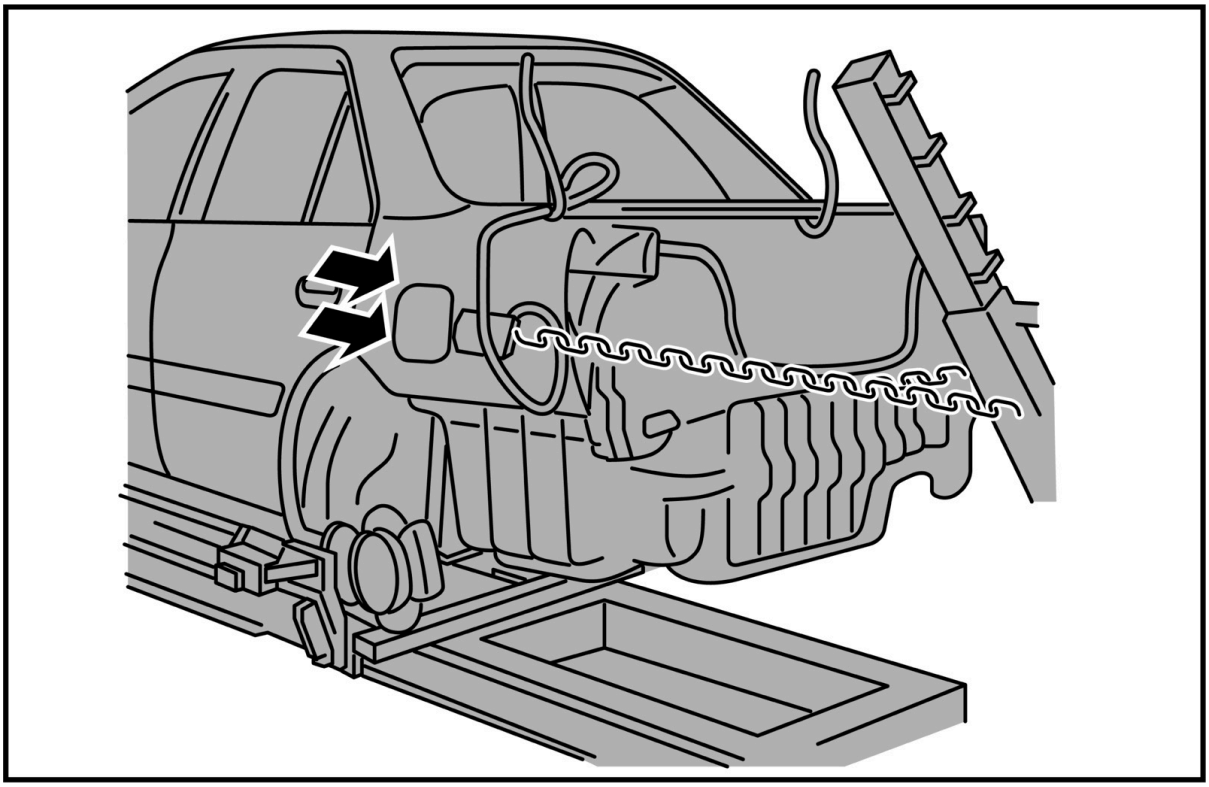
- **前纵梁拉拔技巧**：可采用多点拉拔，以提高效率。



- **门槛板拉拔技巧**：如果门槛板受到大面积变形损伤，可以采用圆棍插入法进行拉拔。



- **后翼子板拉拔技巧**：为提高拉拔效率，大面积损伤的后翼子板在拆除前，需要的拉拔，可以采用焊接辅助拉拔点的方法进行拉拔。

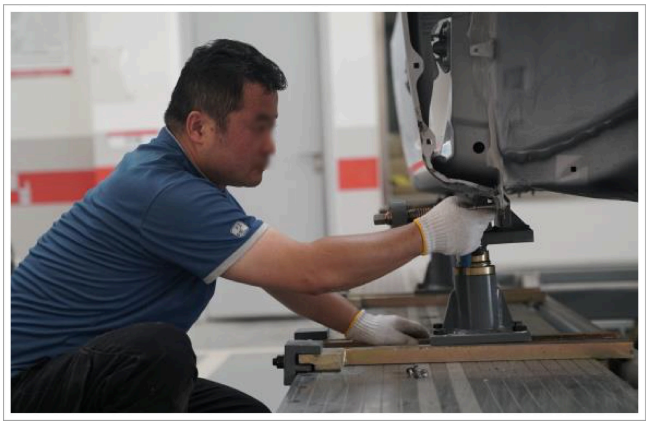


校正步骤

1. 查阅车身数据并使用测量工具测量车身损伤情况，参见Vehicle body measurement。
2. 根据需求选择合适的设备并将其正确安装。



3. 确认车身夹具是否紧固。



4. 选择合适的拉拔点，安装拉拔工具。



5. 安装安全拉锁。

危险

- 在车辆校正前必须安装安全拉索，防止拉拔工具断裂飞出后造成人身伤害或其它损伤。
- 安全拉索一端连接接拉拔夹具，一端连接车身校正位置。
- 拉拔过程中不可敲击钢链，防止断裂。



6. 安装气源接头。

温馨提示

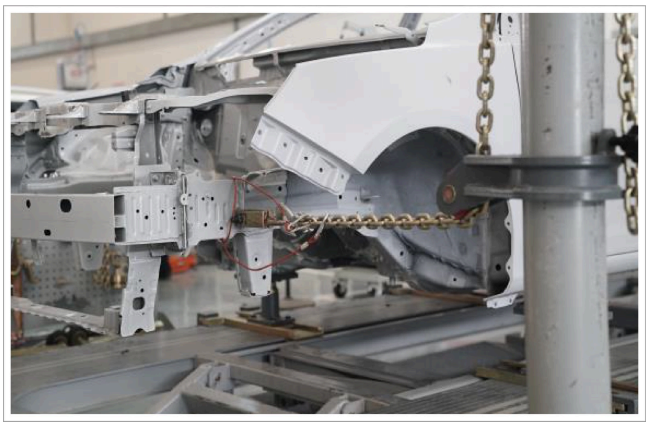
拉拔校正前，须保证气源压力充足，接头没有漏气现象。



7. 执行校正操作，其注意事项如下：
   - 校正时，为保证操作人员的安全，操作时必须站在拉拔方向的侧面，同时注意周围车辆和人员的安全。



– 校正时注意保持链条与拉拔部位成90度的拉拔角度。



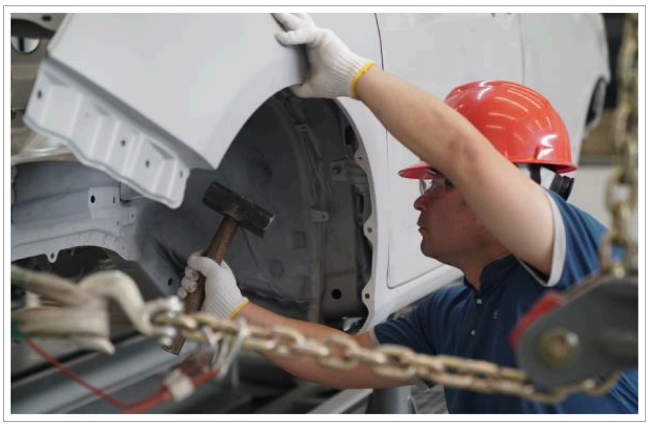
– 不可一次过度校正，需要进行多次测量与拉拔以达到最终状态。
– 校正过程中注意检查车门与车门，车门与前翼子板等部件之间的缝隙大小变化。



8. 校正后测量：
   – 拉拔时或拉拔后，需通过测量尺寸的方法确认此次拉拔的量，便于掌握下次拉拔时，所需要拉拔的量。
   – 测量全变化，判断拉拔效果，同时防止过度拉伸造成车辆的二次损伤。



9. 敲击板件的相应部位，清除校正后的应力。



10. 参照以上步骤进行二次校正后，检查相关数据的变化，测量各点数值是否达到理想数值。
    - **误差**：≤±2mm



Introduction to sheet shrinking process

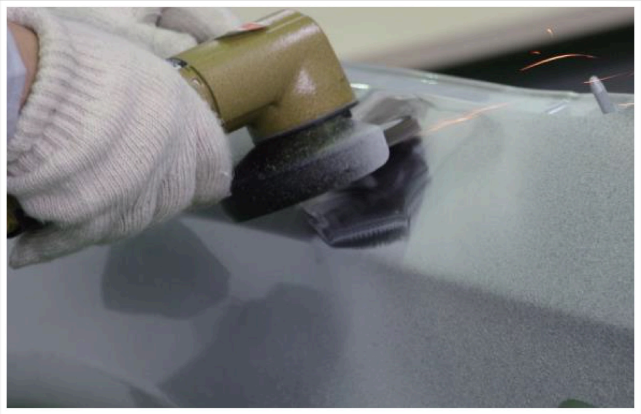
⚠ Caution

- During operation, please take safety protection measures as required. For details of safety protection, please refer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, please refer to Site safety and vehicle protection .

The extended panel fails to provide sufficient rigidity, and the extended bulge also makes it impossible to apply the poly-putty. Therefore, it is necessary to improve the strength of steel panels through shrinking process and make the excessive bulge contract. The method is to heat the steel panel and then rapidly cool it down, so as to recover the original shape of the extended area of the steel panel by virtue of heat expansion and cold contraction.

Operation process

1. Preparation for sheet metal shrinking
   - Grind the paint film or other impurities on the surface of the panel.
   - Select an appropriate position to connect the GND wire.
   - Carry out a trial operation on waste panels of the same material and thickness.

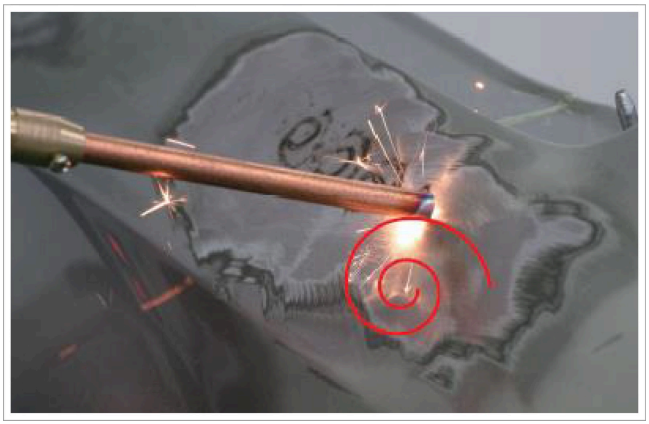


2. Suitable fire shrinking method shall be adopted for fire shrinking as required:
   Carbon rod shrinkage: Carbon rod shrinking is applied to the large-area extended repaired part of the vehicle body's outer panel. According to the size of the raised position, a heated carbon rod can be used to draw a spiral or circle shape. The circle drawing should be conducted from large to small and from outside to inside. The operation steps are as follows:

   ⚠ Caution

   - Do not use oxyacetylene shrinking, which will reduce the strength and durability of the panels.
   - Only air guns can be used for cooling during shrinking, and water cooling is prohibited.

   a. Adjust the retraction mode of the welding machine.
   b. After the carbon rod contacts the panel and is heated, knock it with a sheet metal hammer.
   c. Use an air gun for cooling.
   d. Cool for 5-6s.



Copper rod annealing： Copper bars can only be used for point contraction, and the operating steps are as follows:

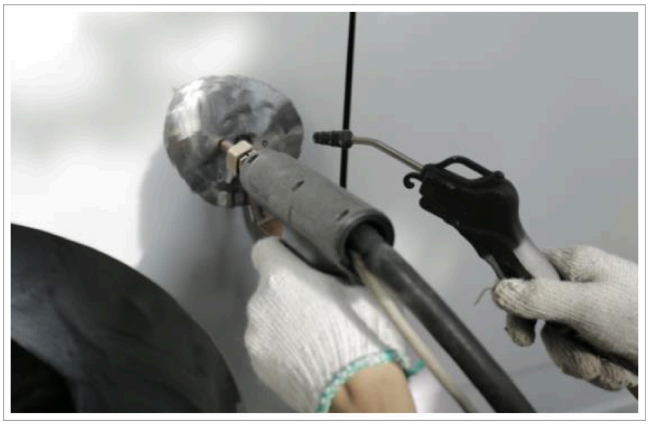
> **⚠ Caution**
>
> During shrinking, ensure that the electrode tip and panel are clean and free of other stains. Otherwise, the pan el may be burned through.

a. Adjust the welding machine's shrinking mode.

b. Use a copper rod to come into contact with the panel and apply force to press the panel in the extended position.

c. Heat for 1-2s.

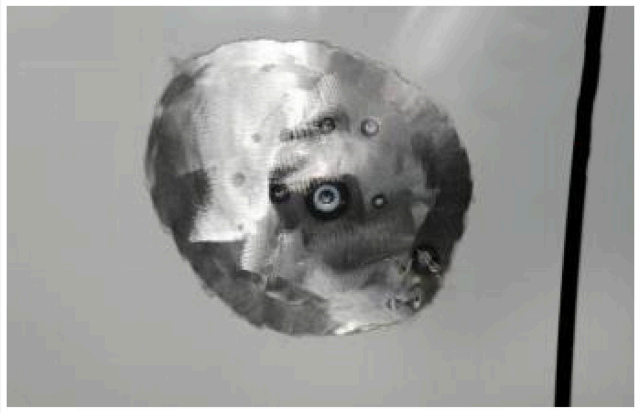
d. Quickly cool the heated area with an air gun.



FAQs

Dented or perforated panels (undesirable case)

– **Phenomenon**: Noticeable dents or perforations are generated on the surface of the outer panel after the shrinking op eration.



– **Causes**:

- Inappropriate adjustment of welding machine parameters and excessive current
- Dirt or impurities on the surface of the panels
- Power-on time too long

– Solution:
  - Adjust device parameters to shorten the power-on time.
  - Clean impurities or residual paint film on the shrinking surface.
  - If holes appear, they need to be filled using a welding machine before handing over to the next process.

Anti-corrosion treatment

Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

There are roughly three anti-corrosion methods, each corresponding to different parts:

- **Front beam seams, chassis, wheel wells, floor seams, spare tire groove position**: Use sprayed anti-corrosion m aterial.
- **At the flanging of new body panels, at door, hood, roof water channel, weld seams, welding edges, and panel replacement joints.**: Use extruded anti-corrosion material.
- **Joint between the trunk interior and the front engine compartment panels**： Adopt brush-applied anti-corrosion materials.

Anti-corrosion tools and accessories

You can learn about the required tools and auxiliary materials by clicking on the following link.

- **Tools**: Anti-corrosion tools
- **Auxiliary materials**:Anti-corrosion .

Sealing and anti-corrosion of front beam seams, chassis, wheel covers, floor seams, and spare tire slots

Danger

The material is flammable and explosive. Please confirm that the work area is free of factors leading to such risk be fore operation.

- The front beam joint, chassis, wheel arch, floor joint, and spare tire groove are generally treated with spray-applied a nti-corrosion materials. The procedure is as follows:
  1. Connect the high-pressure air required by the pneumatic glue gun.
  2. Adjust the required spraying pressure according to the construction requirements.
  3. Clean the spraying area to ensure it is free from impurities such as water stains, oil stains, dust, etc.
  4. Put the sprayable sheet metal sealant into the glue gun, spray anti-corrosion sealant in the corresponding area, and keep the gun nozzle 10-20 cm away from the spraying surface.



Note: When spraying the chassis, use sprayable chassis material.

⚠ Caution

Chassis sealant can only be used on the underbody.



Anti-corrosion of inaccessible locations

– The cavity anti-corrosion wax can be used for anti-corrosion of inaccessible locations. The spray gun with a hose has a large spraying angle, which can be changed to cover the surface of the inner cavity in almost all positions.



Edge wrapping of new vehicle body panels, doors, hoods, drainage trays on the roof, welds, weld edges and joints of replaced panels

⚠ Caution

– The sealing performance of the outer panel is particularly important to ensure that water does not flow into the v ehicle and avoid problems such as rusting.

– After applying the adhesive, use a hard brush to trim the adhesive, making it consistent in appearance with the original vehicle.

– Anti-rust sealant on the panel surface will make it difficult for the paint to adhere to the panel surface, so it is ne cessary to thoroughly clean up the residual anti-rust sealant.

The extrusion-type anti-corrosion materials are generally used for those positions, with operations as follows:

1. Clean the spraying area to ensure it is free from impurities such as water stains, oil stains, dust, etc.
2. Put the extrusion-type sealant into a glue gun and apply anti-corrosion sealant on the corresponding area.



Junction of the panels inside the trunk and the front engine compartment

⚠ Caution

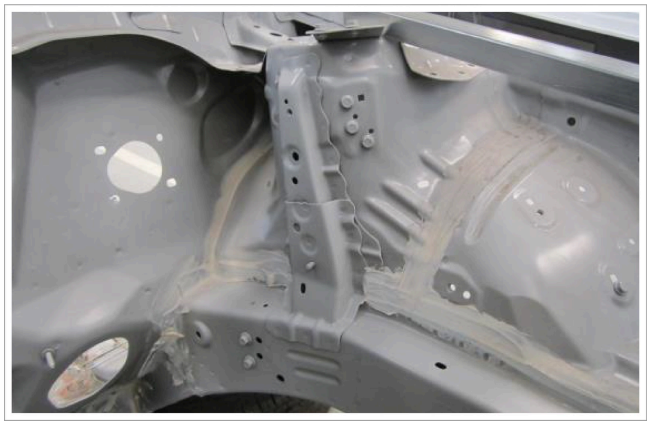
During operation, clean the spraying area so that it is free of impurities such as water stains, oil stains and dust.

The brush-applied anti-corrosion materials are generally used for those positions, including brush-applied anti-rust primer and brush-applied sealant, with operations as follows:

– **Brush-applied anti-rust primer**: After welding, brush the welding slag and burnt paint film with a steel brush, blow it clean with an air gun, and then apply a certified primer on exposed steel panels.



– **Brush applied sealant**: Some parts that are easy to be wet for a long time and those with more water flow call for sp ecial treatment.



– **Conductive primer**: Before resistance spot welding, please apply conductive primer to the joint.

Connection process in repair

In production	During repair
Electric welding	Electric Welding Bonding/MAG Hole spot welding/MAG Welding
MAG welding	MAG welding
MIG brazing	MAG welding
Laser welding	MIG welding Bonding MAG welding
Bonding	Bonding/MAG welding
Spot Welding Adhesion	Spot bonding Additional welding spot Additional MAG welding

Resistance spot welding

Welding tools

You can learn about the tools required for repair of outer panels by clicking on the following link.

– **Tools**:

Factors affecting welding

– Effect of welding current:

  • **Current Too Low**： The heat will be too low to completely melt the joint position of the welded panel, resulting in insufficient welding strength.

  • **Overcurrent**： The heat will be excessive, leading to welding position deformation of the welded panels. Meanw hile, it will cause a large heat-affected area and a reduction in strength.

  Undesirable case:



– Effect of welding time:

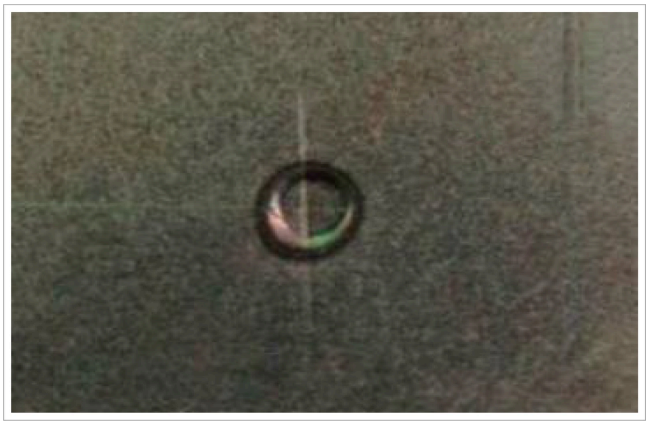
> **Reminder**
>
> Reasonable welding time will ensure moderate heat, no obvious deformation at welding spots and good weldin g quality.

  • **Time Too Long**: It will result in an excessively large heat-affected range around the welded area, but will not incr ease the weld strength. The heat will be too large, resulting in excessive weldment fusion or cracks at welding sp ots.

  • **Time too short**： The heat will be insufficient, resulting in no nugget or a small welding spot, and the fusion and strength of welding spots will be insufficient.

  Undesirable case:





– Effect of welding pressure:
  - **Pressure too low**： The fusion was not tight enough, resulting in reduced strength.
  - **Overpressure**： The reduction of resistance will lead to a decrease in welding heat, resulting in smaller base metal welding spots and lower welding strength.

Undesirable case:

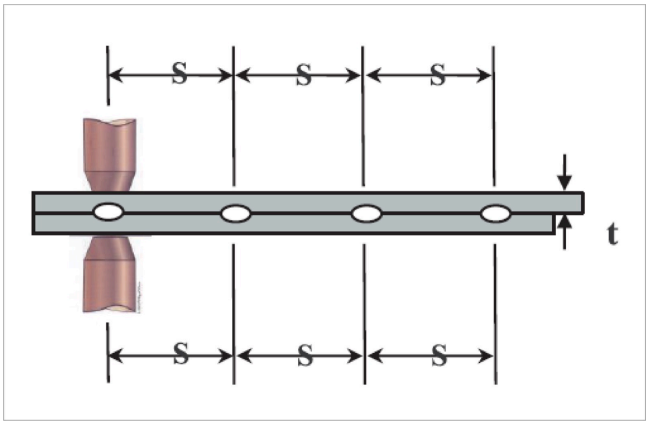


– Effect of welding distance:

⚠ Caution

– The spot spacing formula is S = 10 t + 10 mm (t = plate thickness).
– The number of welding spots at the resistance spot welding position of the replaced panel is about 1.3 times that of the OEM.

  - **Distance too long**: The overall connection strength of the panel is insufficient due to too few connection points.
  - **Appropriate distance**: The overall connection strength increases accordingly.
  - **Distance too short**: The current will flow through other completed welding spots, resulting in what is known as the shunting effect, which can lead to insufficient strength in the welding spots made later.

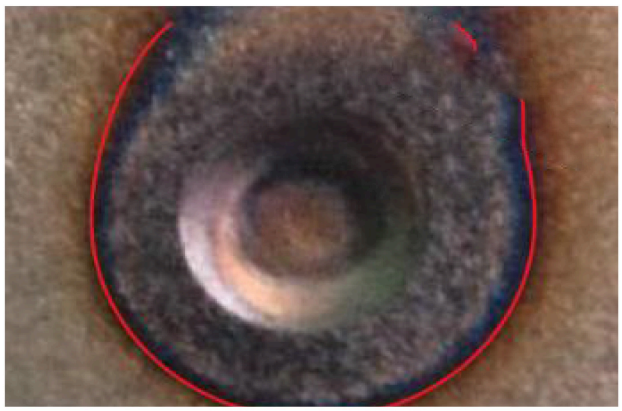


– Influence of spot-to-edge distance:

⚠ Caution

Pre-mark the welding spots during welding, determine their positions to avoid placing them too close to the ed ge.

- **Too close to the edge**： Prone to solder joint cracking.
- **Correct margin**: The distance from the center of the welding spot to the edge of the steel panel is approximately 6 mm.
  Undesirable case:



Operation process

⚠ Caution

– If the welder has sufficient power, three-layer steel panel welding can be carried out directly on the vehicle bod y.

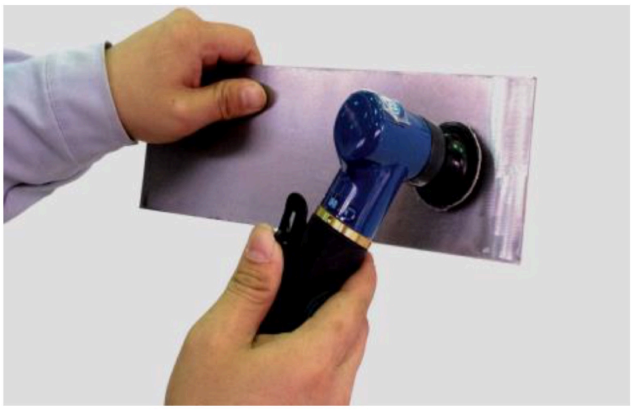
– When the power of the welder cannot meet the three-layer welding requirements, two layers of steel panels sha ll be welded first, and the third layer of steel panel shall be welded at the welding spots of the two layers of ste el panels.

– Failure to follow the above principles will result in the degradation of welding quality.

1. Polishing Panels: Use a grinder to remove the old paint film, grind and clean up the old paint film in the welding area t o ensure the conductive effect.

⚠ Caution

Using a grinding tool with too large particles to grind the panel will reduce the strength of the panel.



2. Clean and degrease.

⚠ Caution

Wear protective equipment properly during cleaning, such as masks and solvent-resistant gloves.

- Clean the welded surface with a wiping cloth moistened with detergent.
- A clean and uncontaminated surface allows current to flow smoothly through the steel plate.



3. Spraying conductive primer: Spray special primer for spot welding on the steel panel welding contact surface.



4. Positioning the panel: After positioning the steel panel to be replaced, fix it with a locking clamp.

⚠ Caution

- To avoid the diversion effect, the locking clamp shall not be too close to the welding spot to be welded.
- Ensure that there is no gap between the contact surfaces of welded panels.



5. Welder commissioning

– Set the welding parameters, including pressure to be applied, welding current, and power-on time.
– Carry out a destructive test on the welding spots after the trial welding.

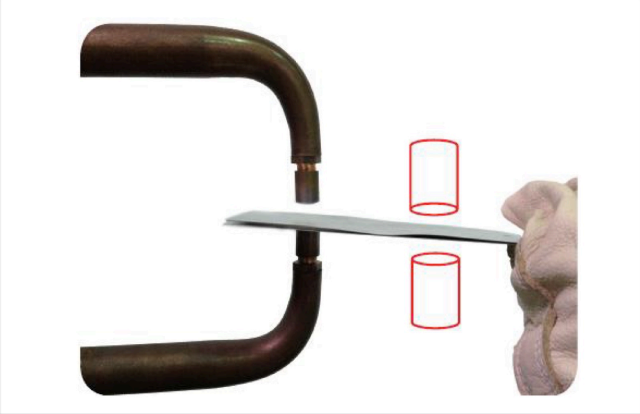


6. Welding

Caution

– Ensure that the panel joint surfaces and other surfaces are clean.
– Ensure that the two electrode tips are vertically aligned.

– The electrode must be perpendicular to the surface of the steel panel.
– Keep the distance between the two electrodes, the spot-to-edge distance, and the cooling time appropriate.



Inspection method for welding quality

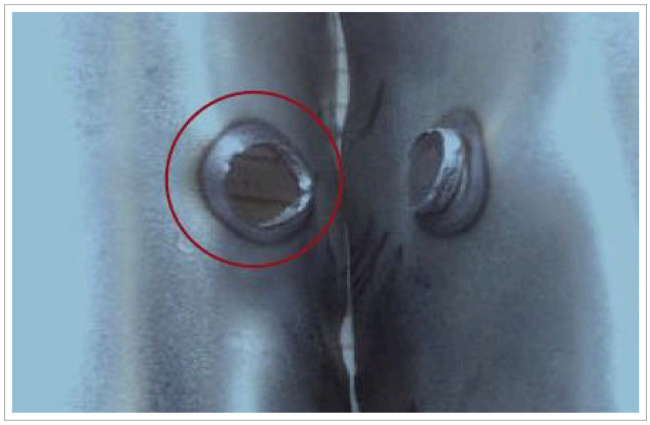
– **Non-destructive test methods:**

Reminder

After the two sample plates are separated, if a round hole with proper diameter is left on one side of the steel p anel and a bump remains on the other side of the steel panel, the welding quality is good.

- Take two steel samples (consistent or similar to the material to be welded).
- Grind and clean the steel sample plates.
- Try to weld a welding spot.
- Check the appearance of welding spots.
- Separate the test welding spots.
- Measure the diameter of test welding spots.





– **Destructive test methods:** Use a sheet metal hammer to knock the chisel between the welding spots, and check th e connection of the welding spots. If there is no cracking in the welding spots, restore the panel to its original state wit h a hammer and backing bar.

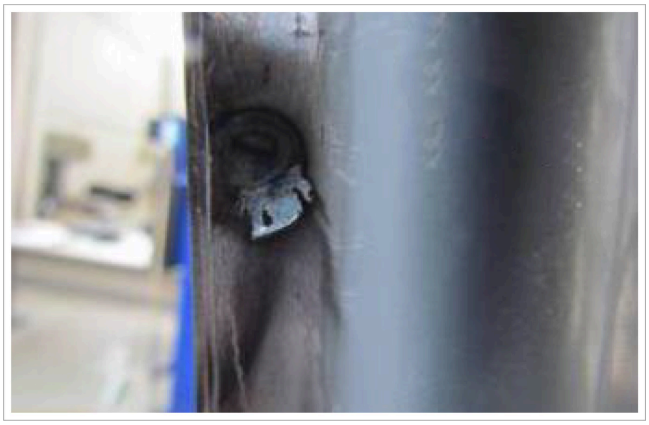
> **Reminder**
>
> This type of test is generally conducted on the car body. If the quality is good, the panel needs to be restored t o its original state.



– **Unqualified welding spots:**
Abnormal phenomenon:

- Spot welding perforation (hole formed by splashing of spot welding under poor welding conditions)
- Spot welding burrs (serious welding slag burrs formed at the welding spot).
- Spot welding cracks (cracks in the welding spot caused by poor welding conditions)
- Spot welding dent (deep welding spot dent caused by poor welding conditions)

Undesirable case:



Consequences:

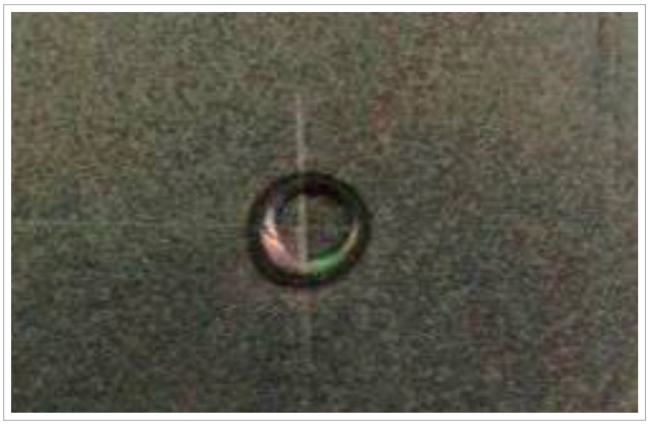
- The welding strength decreases.
- The appearance is rough and uneven.

Solutions:

- Adjust parameters such as welding current and power-on time.
- Clean the impurities on the welding surface of panels.
- Trim the flatness of panels to ensure the matching of contact surfaces.
- Adjust the clamping force of the welder.

– **Qualified welding spots:**

- The welding spot surface shall be smooth and free of obvious splash.
- The diameter of the weld nugget is moderate.
- The edge size affected by welding heat is about 20% of the welding spot.
- There are no obvious burn marks outside the weld nugget.



Gas shielded welding

Welding tools

You can learn about the tools required for repair of outer panels by clicking on the following link.

– **Tools**: Welding tools

Adjust the spot welding equipment.

You can apply the working modes of welding equipment to corresponding scenarios by studying the following key informati on.

– **Welding current**： Select the corresponding welding current according to the welding conditions (plate thickness, w elding position, welding speed, material, and other parameters).



– **Arc voltage**:

- In order to obtain a good welding effect, it is necessary to have an appropriate arc length, which depends on the arc voltage.
- If the arc voltage is too low, the welding wire will not generate an arc, but will stick to the steel panel, producing a bang-bang sound. This results in deeper fusion depth, increased welding slag, and higher weld bead.
- If the arc voltage is appropriate, not only a good welding effect can be obtained, but also a smooth squeaking so und can be heard.
- If the arc voltage is too high, the arc length will increase. In addition to increasing the amount of welding slag and noise, it will also lead to welding defects such as wider weld pool width and shallower fusion depth.



– **Wire feeding speed:**

- Wire feeding speed determines the filling amount of the weld pool. It shall be properly adjusted according to the c urrent value.
- If the wire feed is too slow, the arc will be intermittent; if the wire feed is too fast, there will be a popping sound du ring welding when the gun is bumped.



– **Welding power-on time:**

> **⚠ Caution**
>
> Generally, adjust this switch to "0" during sheet metal repair and welding. And the operator controls the power-on time of welding.

- The CO_2 gas shielded welder has the function of welding time control.
- Turn on this switch, and the welding time is intelligently controlled by the welder itself.
- Turn off this switch and adjust the time knob to "0". The welding power-on time is controlled by the operator.



– **Gas flow:**

> **⚠ Caution**
>
> Carbon dioxide welding is not recommended in a place with high wind speed, otherwise, it may cause poor pro tection of welding spots by the shielding gas.

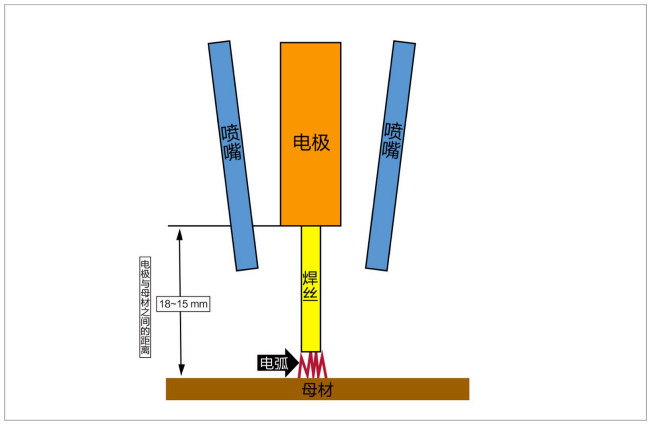
- The current standard flow is between 10-15 L/min.
- The size of the flow should also be adjusted in conjunction with the distance from the nozzle to the base material, the welding current, the welding speed, and the surrounding environment (wind speed) during welding.



– **Distance between electrode and base metal:**

> **⚠ Caution**
>
> – The general standard distance between the welding gun and the panel is about 8-15 mm.
>
> – Do not use the nozzle as a fulcrum to contact the plate during welding.

- The distance between the electrode and the base material is another important factor affecting the welding effect.
- If the distance is too large, the welding wire will melt faster. This is because the protruding length of the welding wire is too long, and the excessively long part will generate preheating. Therefore, the current flow rate will decre ase, thus reducing the penetration depth of weld beads. At the same time, excessive distance will also reduce th e isolation effect of shielding gas.
- If the distance is too small, it will be difficult for the operator to observe the welding area, thus affecting the weldin g quality.

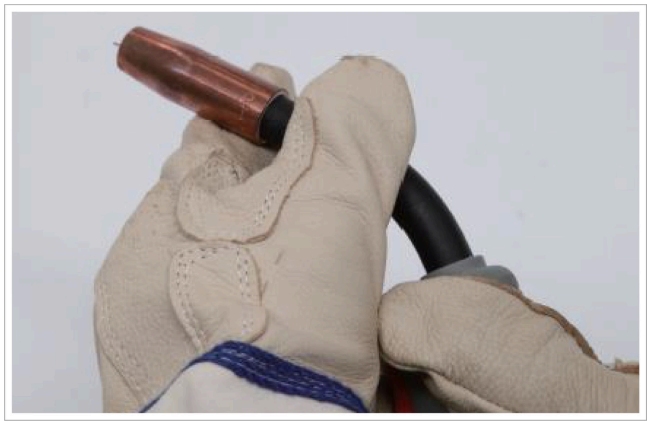


Welding skills

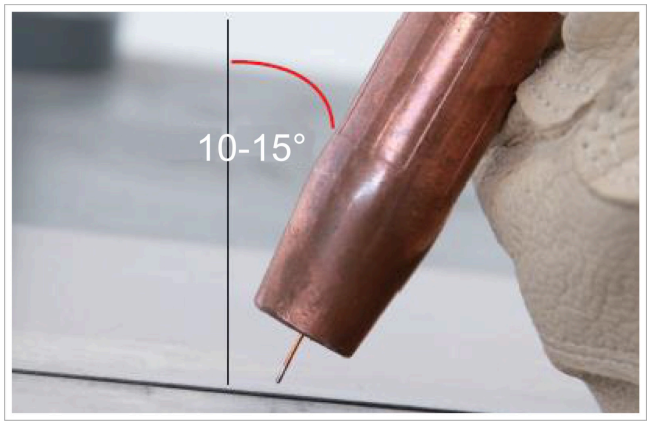
– Gun holding posture:

> **⚠ Caution**
>
> The gripping position should not be too close to the muzzle to avoid obstructing the view and getting burned.

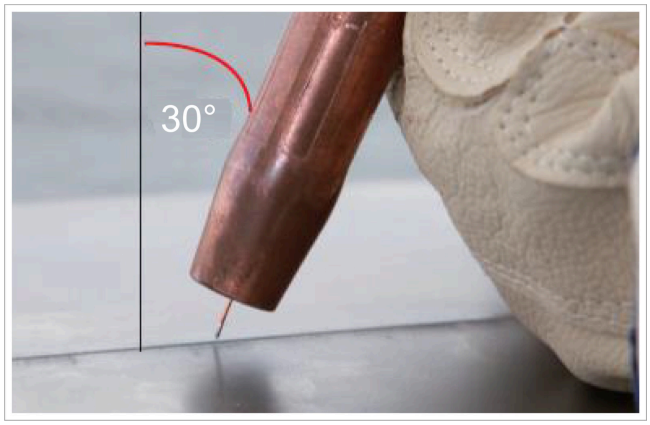
- Use the thumb and index finger mainly in the manipulation of the welding gun.
- Hold the gun with one hand and hold the handle of the welding gun with another hand to control the welding spot s.



– **Forehand welding method**： The angle of push welding is about 10°-15° to the vertical plane of the base metal. It is characterized by shallow fusion depth and high weld beads.

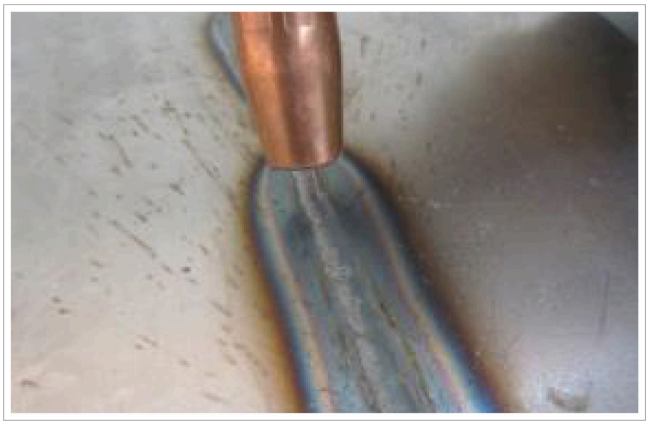


– **Backhand welding**: The angle of push welding is about 30° to the vertical plane of the base metal. It is characterized by deep fusion depth and flat weld beads.



– **Welding speed:**

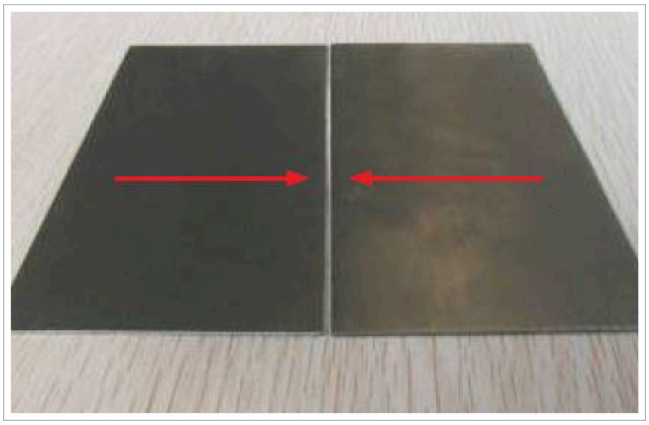
- During welding, the correct welding current and speed must be adjusted according to the thickness of the base m etal to obtain a good fusion depth and weld bead width.
- If the welding current remains constant, increasing the welding speed will reduce the penetration depth and bead width, causing the bead to protrude and fail to meet the welding strength requirements. If the welding speed is to o slow, the base material may overheat and cause burn-through.
- Generally, the welding speed of a thin steel panel with a thickness of 0.8 mm is 105-115 mm/min. Usually, the thi cker the steel panel, the slower the welding speed.



– **Butt welding:**

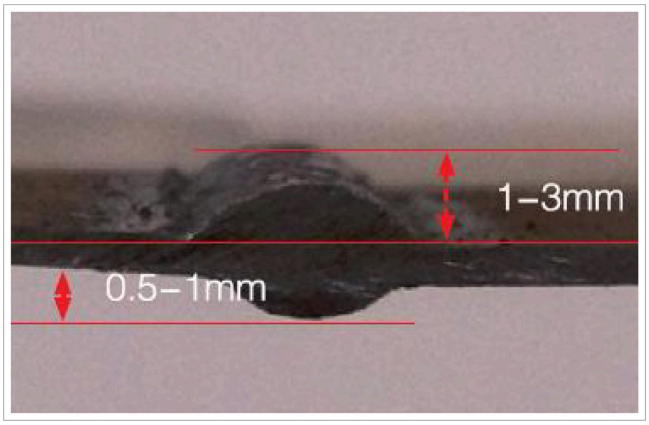
Operation instructions:

- The implementation of butt welding is relatively simple, but prolonged high temperatures can easily cause deform ation of the welding position.
- During welding, the method of reserved weld and tack welding can be adopted, and preferably, the welding shall be performed section by section, and special attention shall be paid to the welding sequence.
- Whenever possible, use a cross or leapfrog welding sequence.
- For butt welding, ensure the flatness of panels.



Welding requirements:

- Make tack welding as required and ensure that the panels are not deformed.
- Continuous seam welding shall be carried out in sections to minimize deformation.
- Although butt welding can be carried out for both thick and thin steel panels, in order to ensure better permeabilit y when welding thicker steel panels, the opening must be ground into a bevel.

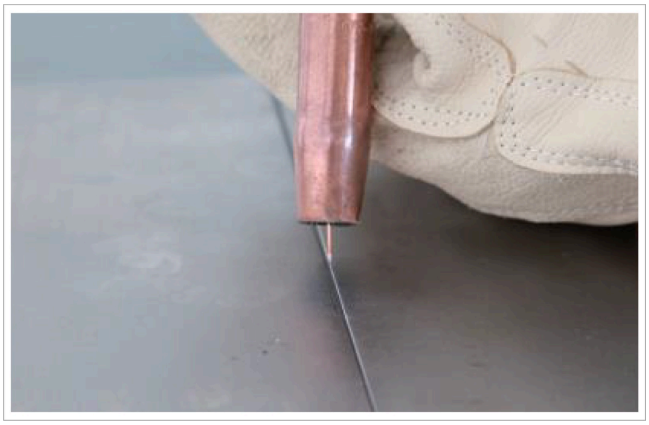


Welding methods:

⚠ Caution

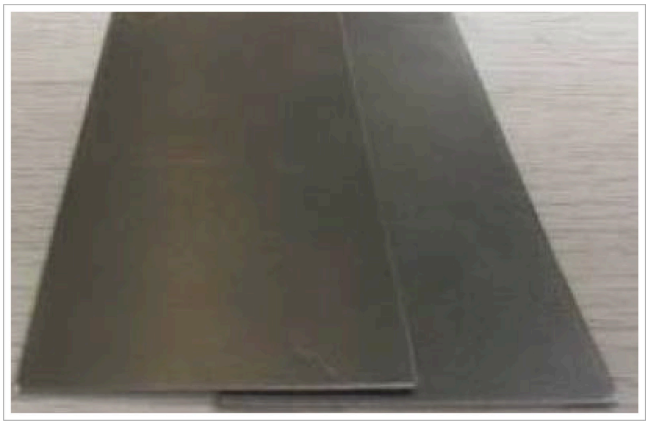
– This method is applied to the parts where overlap welding cannot be carried out.
– This welding method must be used on the exterior structural parts of the vehicle body to ensure the flatnes s of the exterior parts.

1. Place two steel panels on the same plane, and fill the gap between them for connection.
2. It is used on welding panels to be joined after cutting.



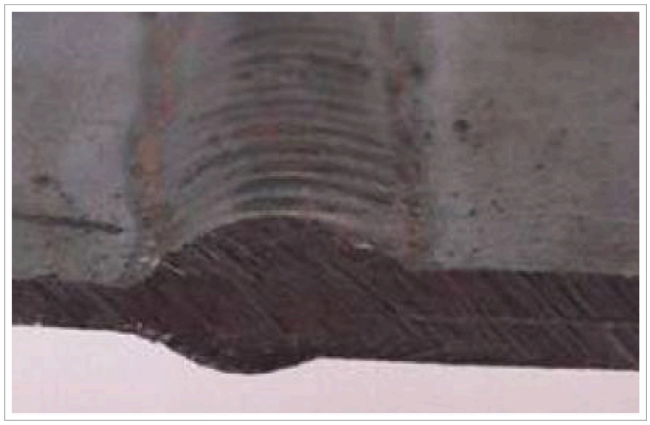
– **Lap welding:**
Operation instructions:

- Lap welding is relatively simple, and it is necessary to ensure that the gap between panels is kept tight before we lding.
- Resistance spot welding or gas shielded welding can be used for lap welding.
- Where gas shielded welding is adopted, temporary welding can be performed for fixing so as to prevent deformat ion. If plug welding is applied, the holes should be drilled in advance and the burrs on the edges of the holes sho uld be removed.
- It is mostly used for parts of the vehicle body where spot welding or plug welding cannot be carried out.
- This method is usually used for welding structural parts inside the vehicle body.

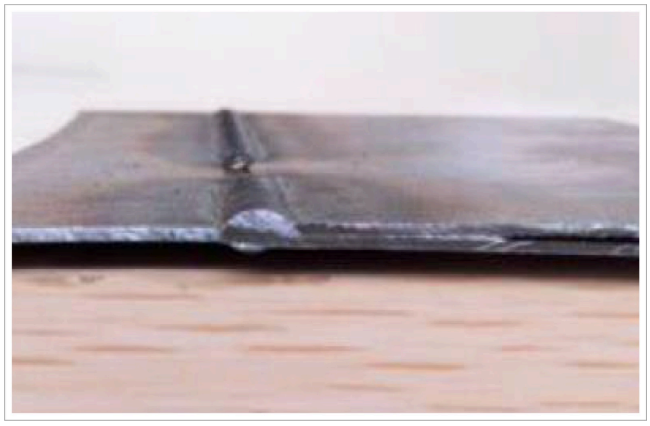


Welding requirements:

- Make sure that there is no poor soldering at the welding spots.
- No obvious porosity and burn-through.



Welding methods: Lap welding is a welding method in which the edges of two overlapping steel panels are welded to combine them into a whole.

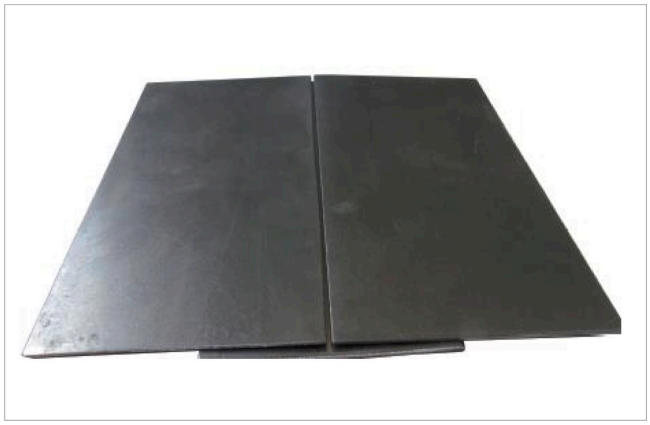


– **Lining plate welding:**

> **⚠ Caution**
>
> When welding the lining plates, avoid gaps between the upper and lower panels, otherwise, the interface positi on may be deformed.

Operation instructions:

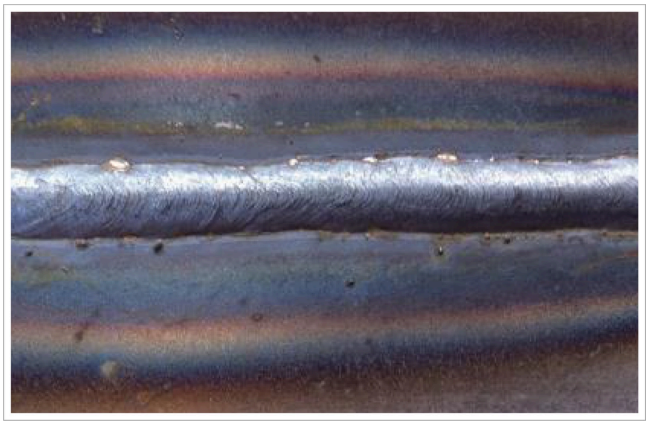
- The use of lining plates can avoid thermal deformation and improve welding strength. Resistance spot welding or plug welding can be used for welding the overlapping parts of lining plates.
- Lining plate welding is often used to weld local areas with long lengths and small shape differences and where gr eater welding strength is required.



Welding requirements:

- The welds of lining plate welding shall have the same surface profile and be free from defects such as pores.
- The heat-affected zone (discolored area) is between 20-30 times the thickness of the plate.

- There is no excessive penetration depth on the back, but obvious weld marks are required.

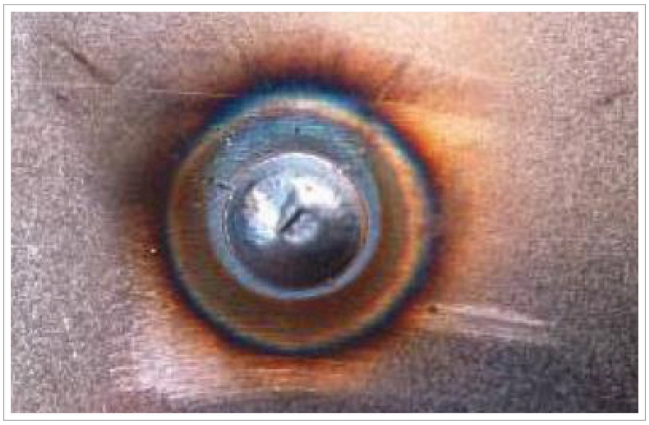


– **Plug welding:**

> **⚠ Caution**
>
> The welding gun shall be perpendicular to the panel.

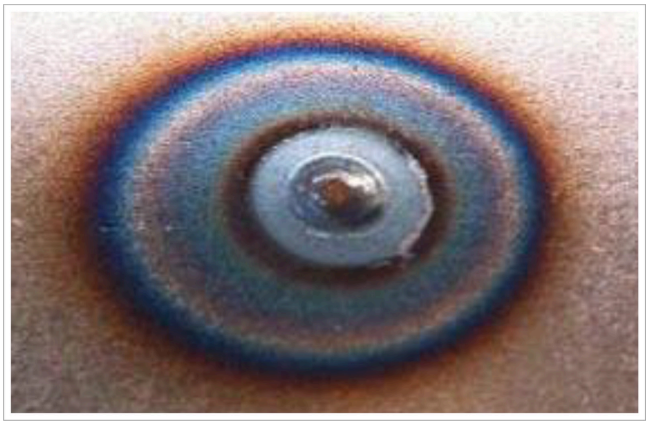
Operation instructions:

- Plug welding is the most commonly used welding method in vehicle body repair. Applied in special areas where s pot welding cannot be performed or where spot welding does not meet the strength requirements.
- Drill holes in the upper plate of two or more overlapping steel panels, and then fill them.



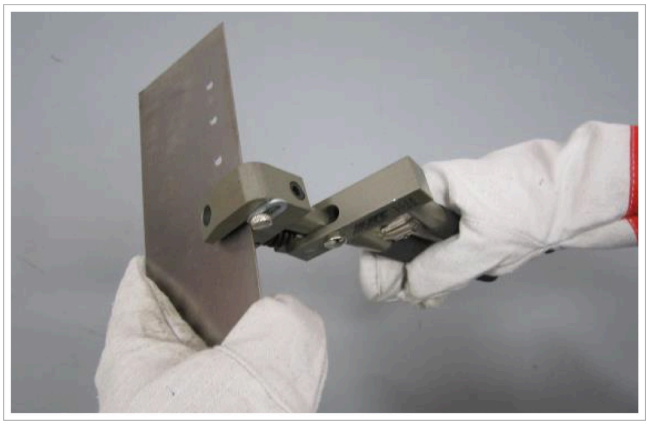
Welding requirements:

- Weld nugget diameter ≤ hole diameter + 2 mm
- There is penetration on the back.
- It shall be free of defects such as burnout, incomplete filling, and porosity.
- Plug hole height < 2 mm



Plug welding method for small holes (about 6 mm in diameter):

- Align the welding wire with the center of the hole and activate the switch of the welding gun.
- Fill the hole and release the welding gun switch.
- The hole diameter for plug welding on the body is 6mm for the outer panel and 8mm for the inner structural pane l.



Welding process

1. Positioning the panel: After positioning the steel panel to be replaced, fix it with a locking clamp.

⚠ Caution

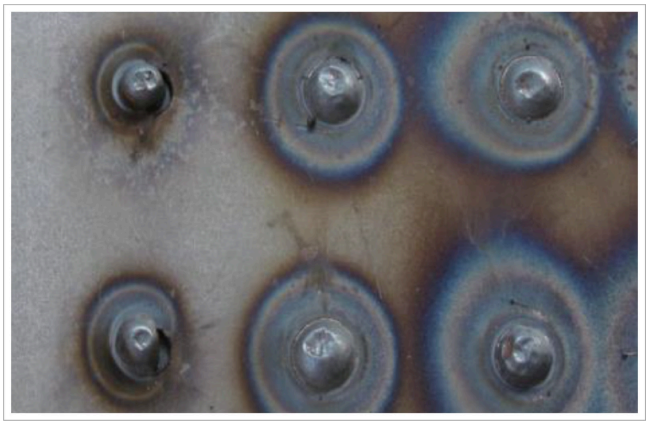
– To prevent panel deformation, the locking clamp shall not be too tight during positioning.

– When selecting a locking plier, make sure that the clamping surface is not too narrow and there shall be no foreign matter on the surface.

– Use U-shaped and wide-plane locking pliers to clamp panels and ensure that there is no gap at the joint po sition.

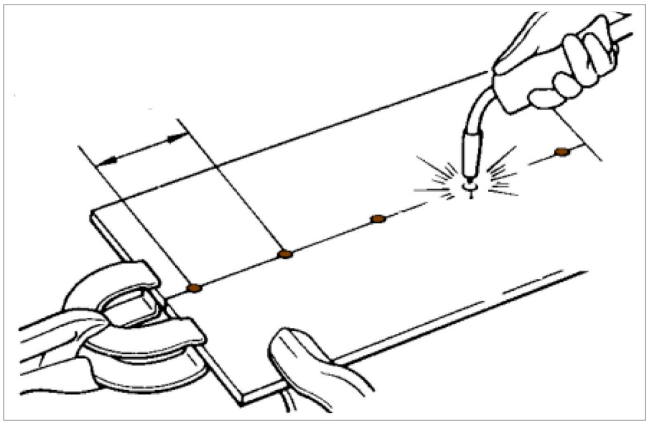


2. Welder commissioning
   – Adjust various functions of the welder according to the user's manual.
   – Test welding shall be carried out with test plates of the same material and thickness.
   – Place the nozzle end close to the steel panel.
   – Turn the welding gun switch to "ON", and contact the end of the welding wire with the steel panel to generate an arc.
   – First, confirm the welder is adjusted correctly, and then carry out panel welding.

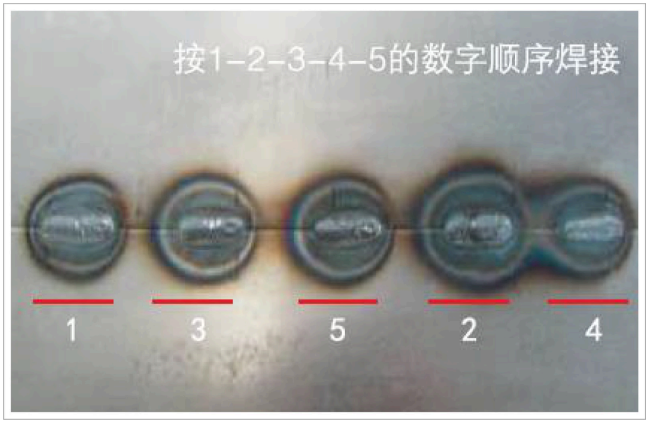


3. Tack welding: Using the method of spot welding can pre-position two steel plates.

> **⚠ Caution**
>
> The temporary welding spacing is generally 15-30 times the thickness of the welded plate.



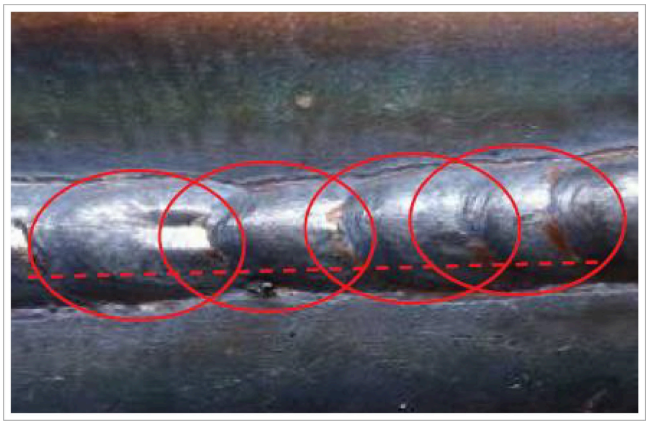
4. Welding in the order from 1 to 5 helps with the heat dissipation of the steel plate and prevents deformation.



5. Main welding.
   - Move in a stable posture to prevent the welding gun from shaking.
   - Align with the end of tack welding.
   - Repeatedly turn the Start/Stop switch to "ON" and "OFF".
   - Conduct continuous seam welding on the welding spot subject to tack welding.
6. Connect the welding point to point: Welding by aligning the welding wire with the end of the previous welding spot not only produces a good welding appearance but also effectively controls welding heat and prevents deformation.

> **⚠ Caution**

Weld the latter welding spot at about two-thirds of the previous welding spot.



7. Perform anti-corrosion treatment. Refer to .

⚠ Caution

Anti-corrosion treatment is indispensable; overlooking it will compromise the repair quality.

Inspection method for welding quality

Welding standard:

Item			Contents
Welding standard	Plug welding requirements	Surface	There are no cracks between the bonding panels
			There are no holes on the surface of the welding spot
			Fill the entire hole completely
			The weld bead height shall not exceed 2 mm
			Weld bead width: Diameter of drilled hole + 2 mm
		Back side	No burn-through
			There is obvious penetration depth, and the height of the penetration welding spot is 1 mm
	Butt welding requirements	Surface	There is no obvious thermal deformation on the surface of the bonding panels
			There are no holes on the surface of the panels
			There is no undercut at the joint edges of the panels
			The overlap between each bead surface in the weld pass should be 1/3
			The weld pass is completely filled
			The weld pass height shall not exceed 2 mm
			The weld pass width shall not exceed 5 mm
		Back side	No burn-through
			There is obvious penetration depth, and the height of the penetration welding spot is 1 mm
			There should be no cracks on the back and no deviation in the weld pass

Inspection method:

– **Visual inspection:**

Reminder

Select the position with sufficient light for multi-angle observation.

- Size of weld
- Appearance of weld bead
- Height of grooves and welds
- Surface impurities
- Penetration depths



– **Non-destructive test methods:** Non-destructive tests include X-ray irradiation and liquid penetrant testing agents.

> **Reminder**
>
> To use flaw detection testing agent, you should first know how to use it.



– **Destructive test methods:**

> **Reminder**
>
> After cutting and welding, use 600-grit sandpaper to polish, and inspect with a magnifying glass and testing ag ent.

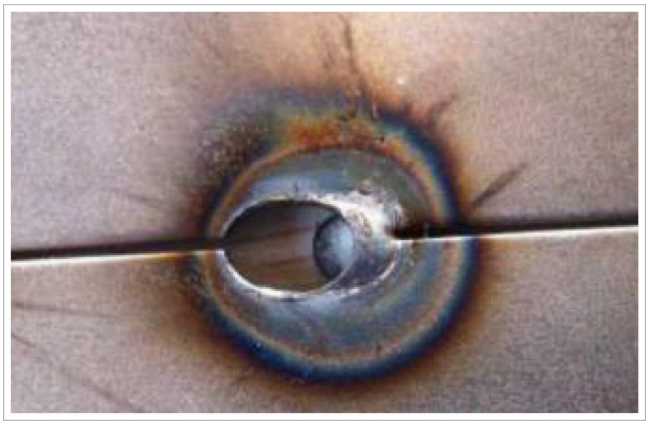
- Destructive test (tension test)
- Perform separation testing at the interface location to check for cracking phenomena.
- Cut the welding position to check the longitudinal section of weld pool.



FAQs and solutions

– **Burn-through and excessive penetration depth:**
Cause:

- Excessive current and voltage
- The welding speed is too slow and the heat is excessively concentrated.
- Unreasonable welding methods



Solutions:

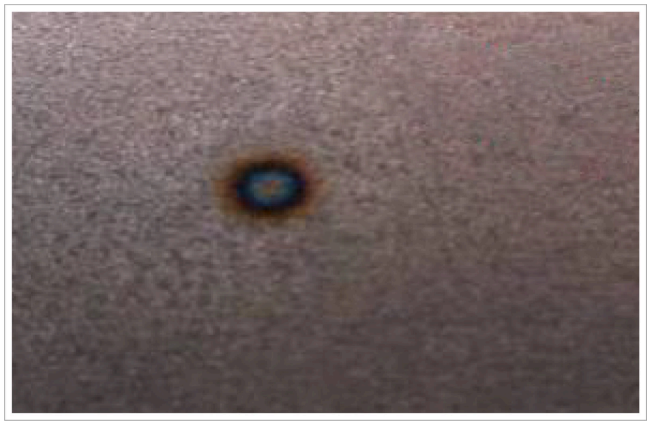
- Adjust to a reasonable current and voltage.
- Increase the welding speed.
- Select the appropriate forehand welding or backhand welding methods.
- Welding lining plates can be used to prevent burn-through or excessive deformation of panels.



– **Insufficient melting point:**
Causes:

- The current and voltage are too small.
- The welding speed is too fast and the heat is insufficient.
- Unreasonable welding methods





Solutions:

- Increase the gas flow (10-15 L/min).
- Before welding, clean the welding area of the panel to remove oil and impurities.
- Avoid welding in windy places.



– **Weld pass porosity:**

Causes:

- Insufficient shielding gas flow
- The welding area is not cleaned, with oil stains or other impurities.
- There is wind during welding.



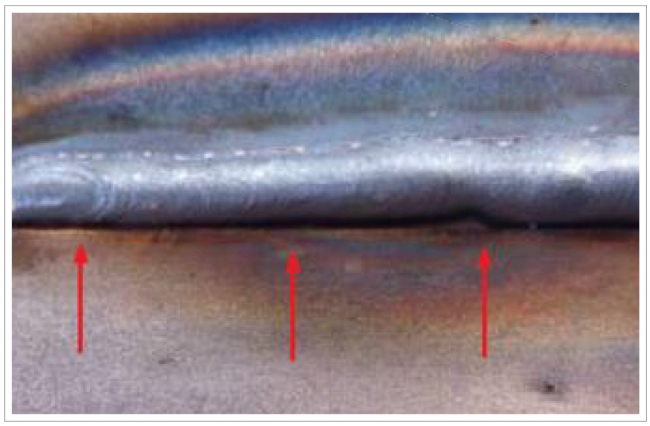
Solutions:

- Increase the gas flow (10-15 L/min).
- Before welding, clean the welding area of the panel to remove oil and impurities.
- Avoid welding in windy places.



– **Deviation of weld pass**:
Causes:

- Unstable gun movement during welding
- The angle of the welding gun is incorrect, blocking the sight.
- No special welding mask is used.



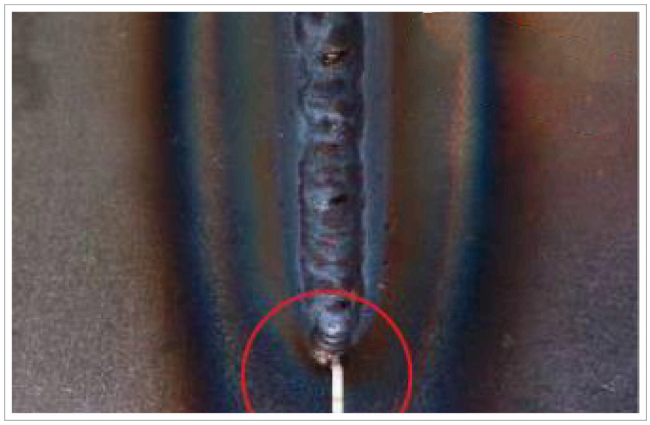
Solutions:

- Operators should strengthen welding training.
- Use the special welding mask to ensure the visibility of welding.
- Adjust the welding angle and direction.



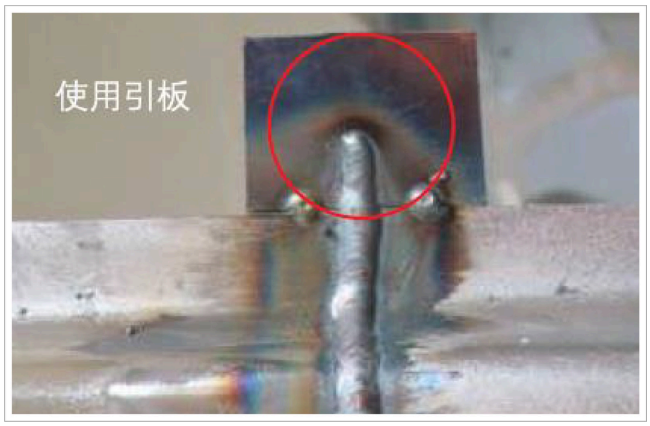
– **End biting.**
Causes:

- It fails to produce an arc at the start position of welding.
- It fails to produce an arc at the end position of welding.



Solutions:

- Use welding guide plates at the start and end positions.
- The length of the guide plate shall not be less than 20 mm.
- Welding starts and ends at the position of the guide plate.

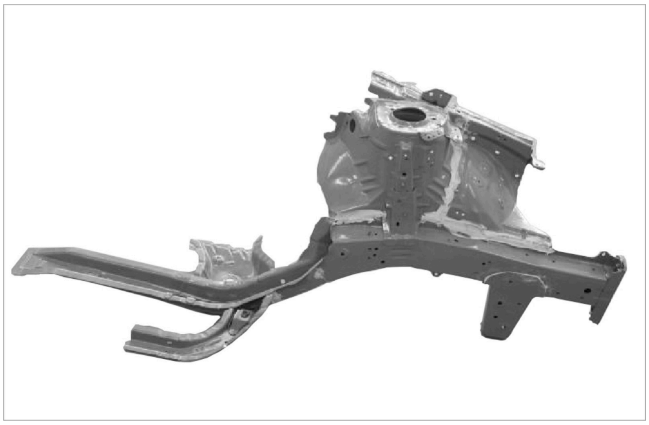


Cutting principle of metal parts

– Cutting principles:
  - The cutting position shall be set at the area without reinforcement on the inner side as possible.
  - There should be no stress concentration area (fold design) at the cutting position.
  - The area of welding joint at the cutting position is small, which is convenient for spraying.
  - The cutting and welding position shall be selected in a small area so that the thermal deformation of panels is sm all due to the small amount of heat generated by welding, which is conducive to improving the efficiency of sprayi ng process.
  - The cutting and welding area shall be selected at a position covered by the exterior spare parts to reduce the tim e for fine treatment after welding at this position and improve the operation efficiency (such as the installation pos itions of rear fender quarter window and rear trim strip of quarter window of Song model).
  - Select a position with few spare parts installed, or a position with installed spare parts that cover the welding joint area.



– Principle of non-cutting:
  - **Key reinforcements made of thermoformed steel materials and other materials (such as A-pillars, B-pillar s, front wheelhouse assemblies) must not be cut**: If there is a reinforced structural part inside the cutting pane l, it will not only affect the normal cutting stroke of the cutting tool, but also have the risk of damaging the inner rei nforced structural part during cutting.
  - **Folding design area cannot be cut**: After the cutting and welding in the fold design area are completed, when a frontal collision occurs again at this part of the vehicle, the fold design area will not crumple or its crumple functio n will decrease, which will affect the absorption of impact energy and thus reduce the safety performance of the v ehicle body.
  - The front longitudinal beam of the integral body not only ensures the torsional rigidity of the frame and bears long itudinal load, but also supports the main components of the vehicle. Therefore, it must be replaced in the form of an assembly provided as a spare part in case of bending deformation after a collision. And cutting replacement is not allowed.



– To identify the steel materials and strength of the vehicle body, refer to .

Inspection of repair quality

Operation quality standards

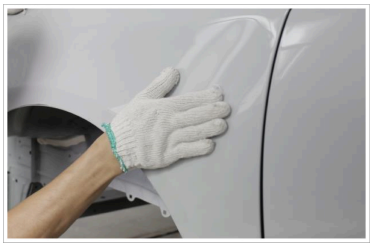
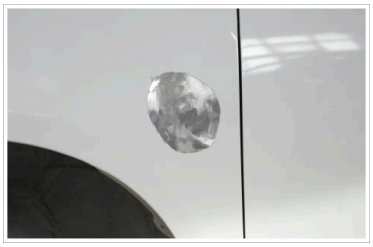
Item	Requirements
Flatness	– The highest bulge of the plane after repair in the straight direction shall not be higher than the original plane. – The lowest point of the dent after repair shall not be 1 mm lower than the original plane. The maximum area of each dent shall not be more than 5 cm×5 cm. – If the poly-putty layer on the working face is thicker than 3 mm or there are quality problems, it shall be removed and then repair shall be performed.
Radian of circular arc	– After repair, the arc surface shall coincide with the original arc surface, and after large-area repair, it shall coincide with the overall arc surface. – After repair, the arc surface shall not have any bulge higher than the original arc surface. – After repair, the area of each dent on the arc surface shall not be more than 5 cm × 5 cm, and the lowest point shall not be 1 mm lower than the original arc surface.
Surface strength	– With a force of 5 kg applied at any point of the repaired surface, the sag shall not exceed 1 mm. – There shall be no drum rebound in the repaired surface.
Line quality	– The highest bulge of the line after repair shall not be higher than the original plane. – After repair, the lowest point of the line shall not be 2 mm lower than the original plane. – After repair, the maximum bending point of the line shall not deviate from the reference line by 1 mm.
Edge quality	– After repair, the edge plane shall be flat in the vertical direction, with a maximum deformation of less than 1 mm. – After repair, the outer edge parallel to the plane shall not show obvious bending, with a maximum deformation of less than 1 mm. – The thickness of the outer edge after repair should be uniform and consistent, with a maximum difference of less than 1mm.
Edge quality	– The gap width shall be the same as that of the original vehicle, with an error of not more than 1 mm. – The width of the same gap shall be consistent, and the difference between the widest and narrowest positions shall be less than 1 mm. – The gap shall be flat on both sides, with a maximum height difference of less than 1 mm.

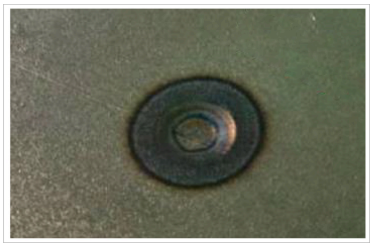
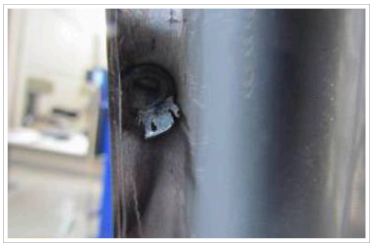
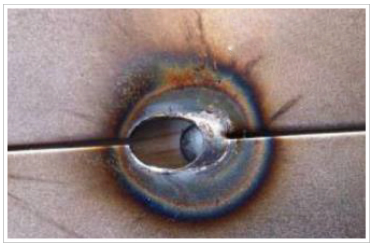
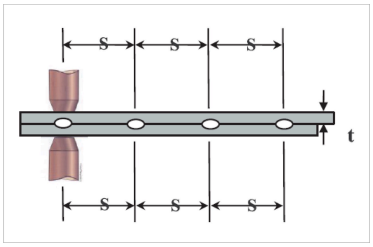
Item	Requirements
Sealing Requirements	– The sealant shall be applied at the joint of lapped steel panels. – After repair, the doors and windows must be tested for water tightness, without water or air leakage. – No joint surface gap shall occur after trims, sealing strips or bonding parts are assembled.
Stability	– All spare parts must be stable after assembly, without any looseness. – All screws and rubber buckles must be installed completely without omission.
Protection of non-working face	– There should be no scratches or scuffs on the painted and sprayed surfaces that are not the working face. – Glass and working painted surface shall not be scalded by welding slag. – Excess adhesive after bonding must be cleaned thoroughly.
Anti-corrosion quality	– After the non-painted working face is repaired, anti-rust paint shall be sprayed. – The inner side of the working face of sheet metal parts removed and repaired must be sprayed with anti-corrosion wax before assembly.
Cleanliness	– During process inspection, the assembled accessories such as door panel, interior trim panel, pressing strip and rubber strip must be cleaned. – During the completion inspection, the whole vehicle must be cleaned inside and outside.

Welding inspection standard

Inspection items		Requirements	
Welding standard	Plug welding	Surface	There are no cracks between the bonding panels
			There are no holes on the surface of the welding spot
			Fill the entire hole completely
			The weld bead height shall not exceed 2 mm
			Weld bead width: Diameter of drilled hole + 2 mm
		Back side	No burn-through
			There is obvious penetration depth, and the height of the penetration welding spot is 1 mm
	Butt welding	Surface	There is no obvious thermal deformation on the surface of the bonding panels
			There are no holes on the surface of the panels
			There is no undercut at the joint edges of the panels
			The overlap between each bead surface in the weld pass should be 1/3
			The weld pass is completely filled
			The weld pass height shall not exceed 2 mm
			The weld pass width shall not exceed 5 mm
		Back side	No burn-through
			There is obvious penetration depth, and the height of the penetration welding spot is 1 mm
			There should be no cracks on the back and no deviation in the weld pass

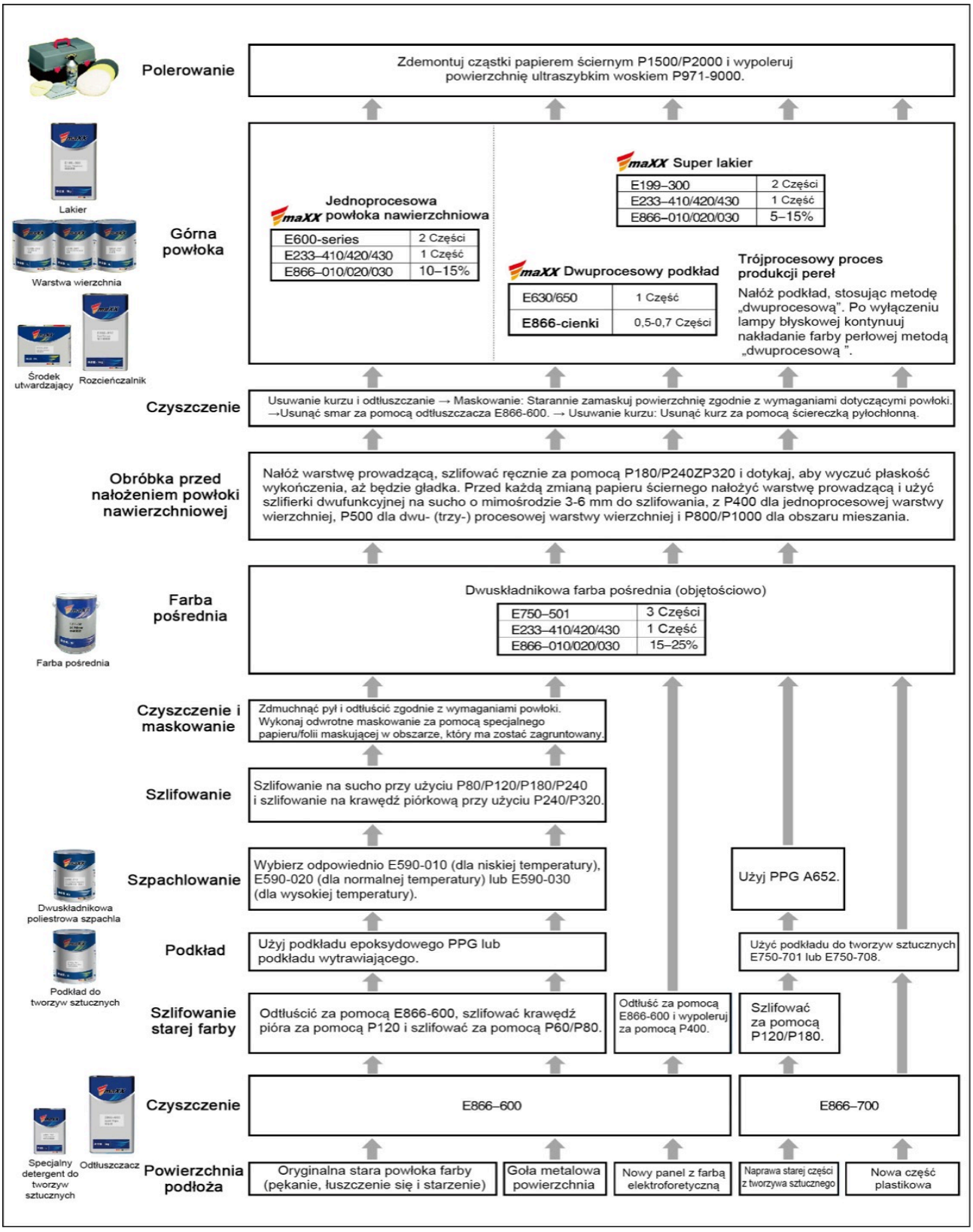
Sheet metal test method

Inspection items	Inspection method	Reference
Any bulge on the finishing surface	Gently place the palm on the panel surface, slowly move the palm to feel and judge. Move the hand from the undamaged surface to the damaged surface, and then move to the undamaged surface.	
	Observe the damaged part laterally at different angles, and judge according to the scene around the vehicle reflected on the panel surface. When it is not easy to observe, move your body slightly and stay away from the vehicle for observation.	
	Use the sandpaper #80~120, and gently place it on the finishing surface with a hand planer and rub to generate marks. The dent does not have sandpaper marks, while the bulge does.	
	Select the ruler and move from the undistorted surface towards the trimming surface, assessing the concavity or convexity based on the gap between the ruler and the panel.	
	Press the finishing surface with fingers to distribute the force on the whole panel and confirm whether there is any soft or dented part.	

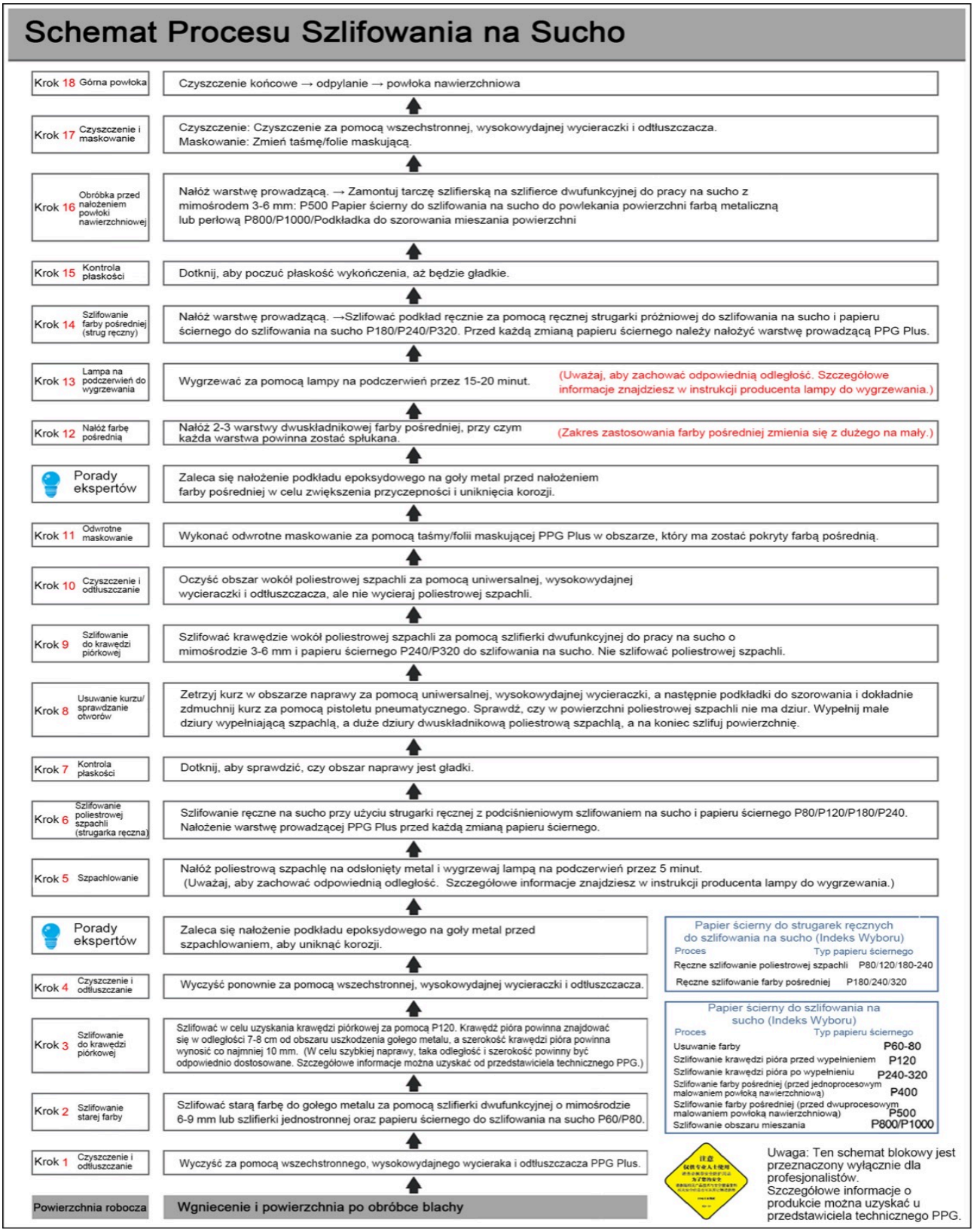
Inspection items	Inspection method	Reference
Welding	Is there cracking in the welding, are there s mall holes?	
	Check whether there are burrs at the weldi ng position, and the welding melting point i s too low.	
	Check whether there is too much welding s lag inside the welding spot.	
	Check whether the clearance at the joint of steel panels is too large.	
	Check whether the welding positions are e venly spaced. Check whether the number of welding spot s is more than 1.3 times that of the original vehicle.	
	Non-destructive inspection: Drive a wedge or chisel into the welded side, and the weld should be free of dropout. Stop driving the wedge until the welding position can be se en. Open 3-4 mm for the same plate thickn ess and 1.5-2 mm for different plate thickn ess.	

Vehicle paint repair process

Operation flow chart of PPG solvent-based paint Emaxx series products



Operation process of PPG water-based paint Quickline series



Operation process of Axalta solvent-based paint ANVANC series

Item	Process flow standard
A vehicle body that has undergone sheet metal work, internal rust prevention treatment, and spraying	Check the vehicle body condition and the planned operation r equirements
Degreasing and dewaxing (AC960)	Use AC960 together with a cleaning cloth to clean it by combi ning wetting and drying (AC960 can only be used for cleaning before grinding)

Item	Process flow standard
Grind and trim the beveled edges	Use Audurra sandpaper # P80/P120-180 to grind the areas of the vehicle body that have undergone sheet metal operation a nd need to be filled with poly-putty (if necessary, remove exce ssively thick or defective paint from the vehicle body)
Dust removal and cleaning (AC960)	Use a pressure gun and the degreaser AC960 to remove fine dust and stains on the vehicle body.
Masking	If necessary, please cover and protect the areas on the vehicl e body that do not need to be repaired
Putty filling (AC510)	Mix 2K sheet metal putty (with hardener AC520 added at a rati o of 100:1-3%) and apply it to the dented areas on the vehicle body. Subsequently, dry it by baking or allow it to air dry for 10 -15 minutes at a temperature of 25°C.
Grinding of poly-putty	Use Audurra sandpaper #P80/P120-P180-P240 to sand the dr ied poly-putty, and use touch or guide coat to check the flatne ss of the poly-putty, pinholes, and sandpaper marks
Thin puttying (AC510)	If necessary, apply a thin layer of AC510 putty to fill pinholes, sandpaper marks, and minor dents (Caution: only for use over primer/putty)
Grinding	Use Audurra sandpaper #P280/P320 to thoroughly polish the old paint that needs to be sprayed with primer on the vehicle b ody
Dust removal and cleaning (AC960)	Use a pressure gun and degreaser AC960 to remove dust and stains on the vehicle body
Masking	If necessary, paste the masking paper with reverse application techniques.
Primer spraying (AC710)	Mix 2K high-solid quick-drying primer
	Grinding process: Add curing agent AC810/AC811 and thinner AC910/AC911) at a ratio of 4:1:5-10%. Spray 1-2 layers with a n interval of 10-15 minutes between each layer, and then dry t hem at 60°C for 30 minutes or at 20°C for 1-2 hours
Spraying of guide coat	Spray a thin layer of guide coat before grinding to check the gr inding effect during grinding.
Grinding the primer	Grind the dried primer with Audurra sandpaper P400-500. If n ecessary, use a gray scouring pad or sponge sandpaper P600 -800 for small-area grinding
Inspection, dust removal, and cleaning (AC960)	Check the polishing effect. If necessary, perform micro-filling a nd grinding. Use a pressure gun and degreaser AC960 to rem ove dust and stains on the vehicle body
Masking	Protect and cover the vehicle body.

Item	Process flow standard
Dust removal and cleaning	First use a pressure gun to blow off dust particles on the car body, clean stains on the car body with silicone remover AC960, then use a pressure gun to blow dust out of the gaps in the car body, and remove fine dust on the car body with a tack cloth
Dual-process base coat (ANVANC two-process base coat)	Mix ANVANC two-process base coat, mixing ratio is 1:0.6-0.8 (AC920/AC921), spray 2-3 layers. Note: After the previous layer of colored paint has flashed off to a matte finish, you can spray the next layer of colored paint
	Spray the clear coat series after drying with a blower gun
Clear coat spraying (AC610/AC660/AC680)	Mix and spray 2 layers of AC610 standard clear coat / AC660 high-efficiency clear coat (2:1 ratio with hardener AC810 (fast) / AC811 (standard)), with a 5-minute interval between each layer
Drying	After standing for 5 minutes, dry at 20°C for 15-30 minutes or at 60°C for 20-30 minutes according to the product requirements
Waxing and polishing	If necessary, use polishing sandpaper #P1200-1500 to grind small sagging or dust spots, and then use Audurra polishing wax A8 to remove sandpaper marks and restore luster.

Operation process of Axalta water-based paint Syrox series

Item	Process flow standard
A vehicle body that has undergone sheet metal work, internal rust prevention treatment, and spraying	Check the vehicle body condition and the planned operation requirements
Degreasing and dewaxing	Use a cleaner in conjunction with a cleaning cloth, employing a wet and dry method for cleaning
Grind and trim the beveled edges	Use Audurra sandpaper # P80/P120-180 to grind the areas of the vehicle body that have undergone sheet metal operation and need to be filled with poly-putty (if necessary, remove excessively thick or defective paint from the vehicle body)
Dust removal and cleaning	Use a pressure gun and a degreaser to remove fine dust and stains on the vehicle body.
Masking	If necessary, please cover and protect the areas on the vehicle body that do not need to be repaired
Putty filling (S1100)	Mix 2K sheet metal putty (add hardener H-100 at a ratio of 100:2-3%) to fill the dents on the vehicle body, and then dry it naturally at 20°C for 10-15 minutes or bake it with a short-wave infrared heating lamp for 2-3 minutes (half power).
Grinding of poly-putty	Use Audurra sandpaper #P80/P120-P180-P240 to sand the dried poly-putty, and use touch or guide coat to check the flatness of the poly-putty, pinholes, and sandpaper marks

Item	Process flow standard
Thin puttying (S1100)	If necessary, apply a thin layer of S1100 putty to fill pinholes, sandpaper marks, and minor dents (Caution: only for use over primer/putty)
Grinding	Thoroughly sand the old paint on the car body where primer spraying is needed using P280/P320 sandpaper
Dust removal and cleaning	Use a pressure gun and degreaser AC960 to remove dust and stains on the vehicle body
Masking	If necessary, paste the masking paper with reverse application techniques.
Primer spraying (S3020/S3060)	Mix S3020 environment-friendly light gray primer or S3060 environment-friendly dark gray primer
	Grinding process: 4:1:0-10% Add hardener S6000 (slow-drying)/S6010 (standard)/S6020 (quick-drying) and thinner S8060 (ultra slow-drying)/S8080 (standard)/S8090 (quick-drying), spray 1-3 coats with an interval of 5-10 minutes between each coat. Then bake for 12-16 hours (20°C) and 25-30 minutes (60°C-65°C).
Spraying of guide coat	Spray a thin layer of guide coat before grinding to check the grinding effect during grinding.
Grinding the primer	Grind the dried primer with Audurra sandpaper P400-500. If necessary, use a gray scouring pad or sponge sandpaper P600-800 for small-area grinding
Inspection, dust removal, and cleaning	Check the polishing effect. If necessary, perform micro-filling and grinding. Use a pressure gun and degreaser AC960 to remove dust and stains on the vehicle body
Masking	Protect and cover the vehicle body.
Dust removal and cleaning	Blow out the dust on the vehicle body with a pressure gun, and remove stains on the vehicle body with silicone removal detergent, then blow out the dust in the gap of the vehicle body with a pressure gun, and use a tack cloth to remove the fine dust on the vehicle body.
Dual-process base coat (S100-S940 water-based color paint)	Add 20% S940 water-based viscosity regulator, and apply 2.5 layers of wet to dry spraying.
	Note: After the current base coat has flashed off to a matte finish, apply the next coat or proceed with baking.
Clear coat spraying (S5000/S5800)	Mix and spray 2 layers of S5000 environment-friendly universal clear coat/S5800 bright clear coat (add hardener S6020 (quick) /S6010 (standard) at a ratio of 2:1) at an interval of 5-10 minutes between each layer.
Drying	After standing for 5 minutes, dry at 25°C for 30 minutes, or dry at 60°C for 30 minutes according to product requirements.

Item	Process flow standard
Waxing and polishing	If needed, use polishing sandpaper P1200-1500 to sand small runs or dust spots, then use polishing wax A8 to remove sand paper marks and restore gloss

Process flow of Akzo solvent-based paint Wanda series

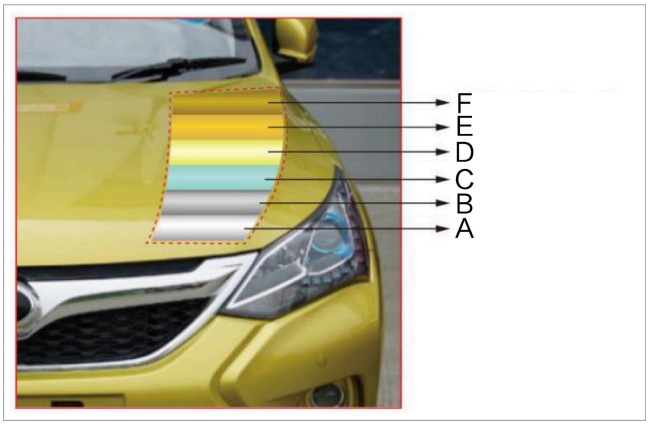
S/N	Item		Process flow standard	
1	Substrate	/	OEM original paint surface, original electrophoretic primer accessories, plastic parts, and bare metal surfaces	
2	Cleaning and degreasing		Wanda 800 degreaser	
			Wipe the workpiece surface with a cleaning cloth moistened with degreaser, and immediately wipe the surface dry with another dry cleaning cloth.	
3	Grinding		Select #5 or #7 rough grinder and use it in combination with dry grinding sandpaper P80-P240.	
			Remove the rusted and damaged old paint film with P80-180 first, and then carefully grind the edges with P180-P240.	
4	Cleaning and degreasing		Wanda 800 degreaser	
			Wipe the workpiece surface with a cleaning cloth moistened with degreaser, and immediately wipe the surface dry with another dry cleaning cloth.	
5	Application of primer		Wanda 4600 epoxy primer: Wanda 4600 epoxy curing agent: Wanda universal thinner	
			100:25:0~20	
			Upper cup: 1.5-1.8mm	Infrared baking for 10-15 minutes
			HVLP gravity feed spray gun: 1.2-1.5mm	Apply poly-putty or spray primer
			3-4 bar, wet spray one to two single coatings	
6	Application of poly-putty		Wanda 300 poly-putty or Wanda 310 poly-putty (can be directly used on the surface of galvanized sheet)	
			It is recommended to scrape a thin layer of poly-putty on the metal surface first, and then continue scraping layer upon layer until the surface is flat.	
7	Grinding		Select #3 fine grinder and use it in combination with dry grinding sandpaper P120-P320.	
			Grind the poly-putty area with P120-180 first and then grind edge with P240-P320 before the primer operation	
8	Cleaning and degreasing		Wanda 800 degreaser	
			Wipe the workpiece surface with a cleaning cloth moistened with degreaser, and immediately wipe the surface dry with another dry cleaning cloth.	
9	Masking	/	First, use high air pressure to remove debris and dust from the vehicle body, and then carefully and meticulously mask the surface as required for painting.	

<table>
<tr><th>S/N</th><th colspan="2">Item</th><th colspan="5">Process flow standard</th></tr>
<tr><td rowspan="5">10</td><td rowspan="5">Application of primer</td><td rowspan="5"></td><td colspan="5">Wanda 4000 two-component 5:1 primer: Wanda 4000 two-component curing agent: Wanda universal thinner</td></tr>
<tr><td colspan="5">100:20:20</td></tr>
<tr><td colspan="3">Upper cup: 1.6-1.8mm</td><td colspan="2">HVLP gravity feed spray gun: 1.2-1.5mm</td></tr>
<tr><td colspan="5">2-4 bar, wet spraying two to three single coatings</td></tr>
<tr><td colspan="3">Grindable at 30 °C after 1 hour</td><td colspan="2">Grindable at 60°C after 25 minutes</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Grinding</td><td rowspan="2"></td><td colspan="5">Choose 3# fine grinder, paired with dry sanding P400-P500 sandpaper, gray nylon cloth, etc</td></tr>
<tr><td colspan="5">Finely grind the surface to be repaired and to be sprayed with top coat, and carefully treat the blend area with materials such as gray nylon cloth.</td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">Cleaning and degreasing</td><td rowspan="2"></td><td colspan="5">Wanda 800 degreaser</td></tr>
<tr><td colspan="5">Wipe the workpiece surface with a cleaning cloth moistened with degreaser, and immediatel y wipe the surface dry with another dry cleaning cloth.</td></tr>
<tr><td>13</td><td>Masking</td><td>/</td><td colspan="5">First, use high air pressure to remove debris and dust from the vehicle body, and then carefully and meticulously mask the surface as required for painting.</td></tr>
<tr><td rowspan="9">14</td><td rowspan="9">Top coat</td><td rowspan="9"></td><td colspan="3">Wanda two-component top coat</td><td colspan="2">Wanda single-component base coat</td></tr>
<tr><td colspan="3">Wanda two-component topcoat: Wanda top coat curing agent: Wanda universal thinner</td><td>Wonda Single-Component Base Color Paint: Wanda 6000 blending resin</td><td>Wanda mixed base coat: Wanda universal thinner</td></tr>
<tr><td colspan="3">100:50:10%</td><td>75 portions: 25 portions</td><td>100:50~80</td></tr>
<tr><td colspan="3">Gravity feed spray gun 1.2-1.5mm</td><td colspan="2">HVLP gravity feed spray gun: 1.3-1.6mm</td></tr>
<tr><td colspan="3">Spray 2 single coatings at 2-4 bar with an interval of 5-10 minutes between each layer</td><td colspan="2">Spray two separate coatings at 2-4 bar pressure, allowing the layers to dry to a non-tacky state before applying the next coating. Note: If necessary, perform mist spraying again with a spraying pressure of 2 bar</td></tr>
<tr><td colspan="2">At 30°C</td><td colspan="2">At 60 °C</td><td rowspan="4">Spray the next layer after 15-20 minutes at 20°C</td></tr>
<tr><td>Wanda 515 curing agent</td><td>Wanda 530 curing agent</td><td>Wanda 515 curing agent</td><td>Wanda 530 curing agent</td></tr>
<tr><td>Assembly time</td><td>4 hours</td><td>9 hours</td><td>15 minutes</td><td>25 minutes</td></tr>
<tr><td>Time for complete drying and solidification</td><td>9 hours</td><td>12 hours</td><td>20 minutes</td><td>50 minutes</td></tr>
</table>

<table>
<tr><th>S/N</th><th colspan="2">Item</th><th colspan="8">Process flow standard</th></tr>
<tr><td rowspan="8">15</td><td rowspan="8">Clear coat</td><td rowspan="8"></td><td colspan="4">Wanda high-efficiency universal clear coat 3300</td><td colspan="4">Wanda high-concentration mirror clear coat 5500</td></tr>
<tr><td colspan="4">Wanda high-efficiency all-purpose clear coat: Wanda top coat curing agent: Wanda universal thinner</td><td colspan="4">Wanda high-concentration mirror clear coat: Wanda top coat curing agent: Wanda universal thinner</td></tr>
<tr><td colspan="4">100:50:0~5%</td><td colspan="4">100:50:0~10%</td></tr>
<tr><td colspan="8">Spray 2 single coatings at 2-4 bar with an interval of 5-10 minutes between each layer</td></tr>
<tr><td colspan="2">At 20°C</td><td colspan="2">At 60 °C</td><td colspan="2">At 20°C</td><td colspan="2">At 60 °C</td></tr>
<tr><td>Wanda 525 curing agent</td><td>Wanda 535 curing agent</td><td>Wanda 525 curing agent</td><td>Wanda 535 curing agent</td><td>Wanda 525 curing agent</td><td>Wanda 535 curing agent</td><td>Wanda 525 curing agent</td><td>Wanda 535 curing agent</td></tr>
<tr><td>8 hours</td><td>10 hours</td><td>25 minutes</td><td>30 minutes</td><td>10 hours</td><td>14 hours</td><td>35 minutes</td><td>40 minutes</td></tr>
<tr><td>12 hours</td><td>16 hours</td><td>35 minutes</td><td>45 minutes</td><td>16 hours</td><td>18 hours</td><td>60 minutes</td><td>60 minutes</td></tr>
<tr><td rowspan="2">16</td><td rowspan="2">Polishing</td><td rowspan="2"></td><td colspan="8">Soft small cushion block, P1500-P2000 wet grinding sandpaper</td></tr>
<tr><td colspan="8">Use P1500-P2000 sandpaper to sand away fine dust particles, slight sagging, and partially adjust the texture structure. Then, use polishing compound from coarse to fine, either mechanically or manually, to restore its gloss to the delivery standard</td></tr>
</table>

Coating

Automotive coating is a crucial link in automobile manufacturing. It not only concerns the appearance of a vehicle, but also directly affects its protection, durability and corrosion resistance. The automotive coating system usually consists of multipl e layers, and each layer has its specific function. The following is a detailed analysis of automotive coatings:



- **A**: Body steel plate
- **B:** Zinc Phosphate Layer (4-5 um):
  - Zinc phosphate coating is a chemical conversion film treatment method, in which a crystalline film of zinc phosph ate is formed on the metal surface by immersing the metal component in a solution containing phosphate and rea cting under suitable conditions. A chemical reaction on the metal surface is involved in this process to form a laye r of phosphate compound.
  - Zinc phosphate coating can significantly improve the corrosion resistance of metal surface, mainly because zinc has the characteristics of sacrificial anode. When the coating is damaged, zinc will preferentially corrode over iro n to protect the base material. This coating can also improve the adhesion of subsequent coatings and is often us ed as a pre-treatment step before painting.
- **C:** Electrophoretic primer layer (15-50 um):
  - It is the bottom layer of the automotive coating, directly applied to the pre-treated car body aluminum or carbon fi ber.
  - Through the electrophoretic deposition technology, the charged paint particles form a uniform coating on the vehi cle body surface, featuring an excellent corrosion resistance.
  - The electrophoretic layer can penetrate into every corner and crevice of the car body, providing comprehensive r ust protection.
- **D:** Primer coat (30-40 μm):
  - It is located on the electrophoretic layer, and mainly used to further enhance the anti-rust ability and improve the adhesion with the base coat.
  - It can also fill up the tiny pits and defects of the electrophoretic layer, making the surface smoother and providing a better base for the base coat.
  - Anti-stone-striking materials are sometimes added to the primer coating to increase the vehicle body's resistance to external impacts.
  - Implementation method, see Spraying of primer .
- **E:** Color paint layer (15um):
  - The base coat is responsible for giving the vehicle its unique color and visual effect, and can be plain, metallic or pearlescent paint.
  - This paint contains pigments or special effect particles (such as aluminum powder and mica flakes) to provide ric h color and luster for the vehicle.
  - Anti-stone-striking materials are sometimes added to the primer coating to increase the vehicle body's resistance to external impacts.
  - The quality of the base coat directly affects the appearance attractiveness of automobile.
  - Implementation method, refer to:

        - Solvent-based solid color paint
        - Solvent-based Metallic Paint
        - Spraying of plastic parts
- **F:** Clear coat (30-40 um):
    - As the outermost layer, the clear coat is a transparent coating. It is mainly used to protect the base coat, improve the glossiness, and provide additional weather resistance and wear resistance.
    - The clear coat makes the vehicle surface as smooth as a mirror and easy to clean, and can effectively resist the erosion of external environment such as ultraviolet rays and acid rain.
    - Implementation method, refer to:
        - Solvent-based solid color paint
        - Solvent-based Metallic Paint
        - Spraying of plastic parts

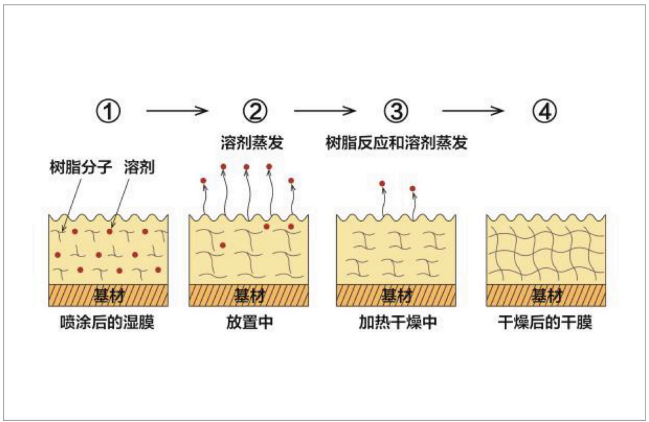
Paint

Thermosetting Coating

- **Purpose**: Mainly used for new car manufacturing on automobile original equipment manufacturing (OEM) production lines.
- **Process**: After the body is coated, heat it to approximately 140°C to cure the paint.
- **Characteristics**: During the heating process, a chemical reaction will take place to combine resin molecules to form l arge particles, thus forming a cured coating on the vehicle body. Even if it encounters solvents, this coating will not be easily dissolved.



- **Instructions for curing:**
  - When the coating is heated to a certain temperature (generally above 120°C), the resin polymerizes and forms a dense reticular structure.
  - After drying, the coating is no longer soluble in organic solvents.

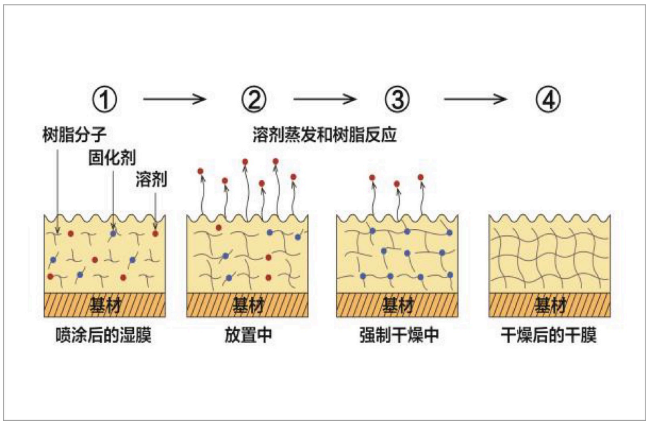


Two-component polymeric paint

- **Purpose**: It is mainly used for automobile repair and repainting.
- **Process**:
  - For two-component products, paint must be mixed with a curing agent.
  - To mix the paints, read the paint product manual carefully, select the matching curing agent or thinner. And mix th em according to the standard proportion of the product.
  - During operation, select painting materials reasonably according to the requirements of the operation process. I mproper selection of paint products will lead to painting defects.
- **Characteristics**:
  - The curing agent and resin components will react chemically to form a coating that does not dissolve easily even when exposed to solvents.
  - The commonly used paint type is acrylic polyurethane paint.



– **Instructions for curing:**
  - By mixing paint and curing agent, the resin reacts (polymerizes) to form a reticular structure. This reaction can al so take place at normal temperatures and will accelerate when the temperature rises. For the sake of operation e fficiency, forced drying operation is usually carried out at 60 °C.
  - The mesh structure is as dense as thermal aggregation drying, and the coating performance is excellent (for exa mple: Commonly used polyurethane coatings).
  - During the operation, it is necessary to mix the curing agent with reference to the proportion instructions carried i n the product manual. The two-component paint products shall be used with the matching curing agents; otherwi se, poor adhesion, low coating hardness, and poor brightness may occur due to differences in chemical composit ion ratios.



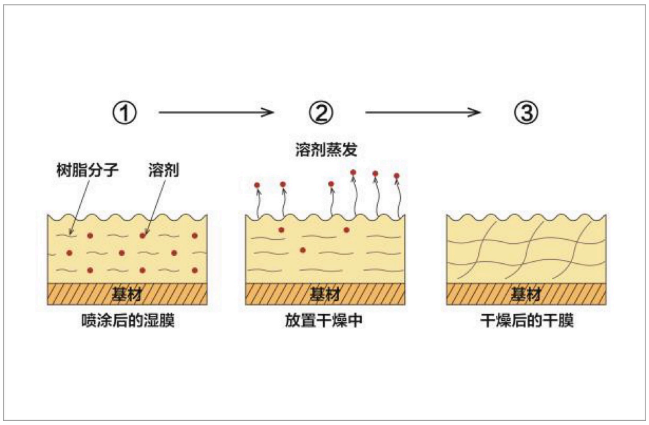
Solvent volatilization type paint

– **Purpose**: It is mainly used for automobile repair and repainting.

– **Process**:
  - One-component paint, directly mixed with a thinner before use.
  - After spraying, the solvent will evaporate, and the resin will form a coating.
  - The panel dries quickly after application.
  - Nitrocellulose paint coatings are easily dissolved by solvents, so when repainting panels sprayed with Nitrocellul ose paint, care should be taken to prevent shrinking.



– **Instructions for curing:** After the solvent in the wet coating film evaporates, the paint film is formed with no resin molecules bonding (networking) phenomenon, so as long as it is wiped with a thinner, the paint film will dissolve (for example: Nitro paint, air-drying primer).



Water-based paint

– **Purpose**: It is mainly used for automobile repair and repainting.

– **Ingredients**: Composed of water-based polyurethane resin, pigments, and additives, using water as the solvent.

– **Characteristics**:

  • Improve the operation environment and operation conditions and eliminate fire hazards during the painting operation. This has a significant effect on reducing pollution and saving resources.

  • Coating tools can be cleaned with "water" to reduce the consumption of cleaning solvents and effectively reduce harm to the working personnel.



Colored paint

Solid color paint

- **Characteristics**: The color effect is consistent when observed from the front and side views, and there is no particle sparkle phenomenon when viewed under sunlight.
- **Ingredients**: Mainly includes tinting pigment and resin.
- **Process**:
  - After a single-process solid color paint is sprayed, the paint coating provides covering power and brightness with out the need to spray a separate clear coat.
  - For the two-process solid color paint, the clear coat shall be sprayed after the base coat to provide the film bright ness.
  - OEM paint spraying process for solid color paint is usually: 3-spray 3-bake or 4-spray 3-bake.



Aluminum paint

- **Characteristics**:
  - It gives off glittering metallic luster in sunlight, and the colors of the front and side surfaces are quite different.
  - The aluminum pigments in the aluminum paint are completely light reflecting.
- **Ingredients**: The aluminum paint includes tinting pigments and aluminum pigments.
- **Process**: OEM paint spraying process for aluminum paint is usually: 4-spray 3-bake.



Pearl paint

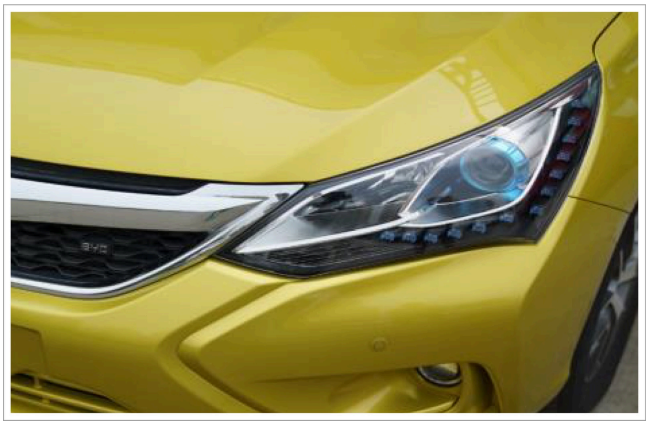
- **Characteristics**:
  - It presents a deep transparent effect and soft glitter in the sunlight and a solid color paint effect indoors.
  - In direct sunlight, it gives a blurry soft shimmer.
  - It has excellent transparency and deepness.

- **Ingredients**: The coating includes tinting pigments and pearl mica pigments.
- **Process**: OEM paint spraying process for pearl paint is usually: 4-spray 3-bake or 5-spray 3-bake.



Pearl aluminum powder

- **Characteristics**:
  - It presents a soft and blurry metal glitter effect in the sunlight, and also has a metal glitter effect indoors.
  - In well-lit areas, it exhibits a softer, blurrier metallic shimmer compared to one that merely contains aluminum pig ments
- **Ingredients**: It includes tinting pigments, titanium film mica pigments and aluminum pigments.
- **Process**: OEM paint spraying process, typically includes: 4-spray 3-bake.

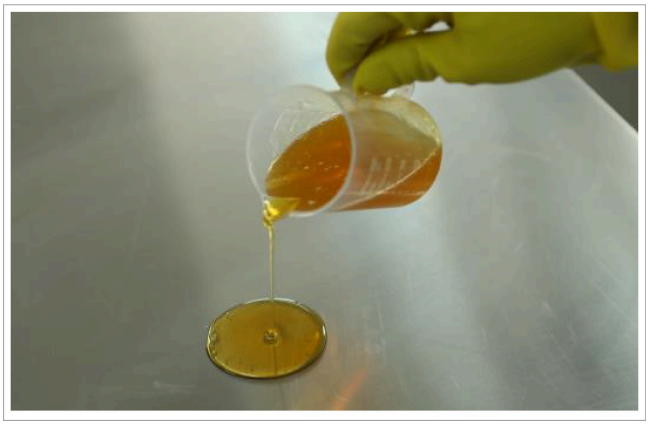


Paint composition

The paint is a liquid composed of **resin**, **pigment**, **additives**, **solvent**, **hardener**, and other components. It is usually form ulated and diluted to a paintable viscosity using a thinner before application.

Resin

- **Characteristics**: Transparent liquid used to increase gloss, hardness, and adhesion. This component can make the li quid paint form a "paint film" after the drying and curing process.
- **Types**: Natural resins and synthetic resins are one of the main components of the coating film. Their properties deter mine the final effect of the coating and the quality of the coating film performance. They are the most important compo nent of the coating film.
  - **Natural resin**: Usually extracted from animals and plants, such as: Shellac, rosin, etc.
  - **Synthetic resin**： Mainly refined from petroleum.



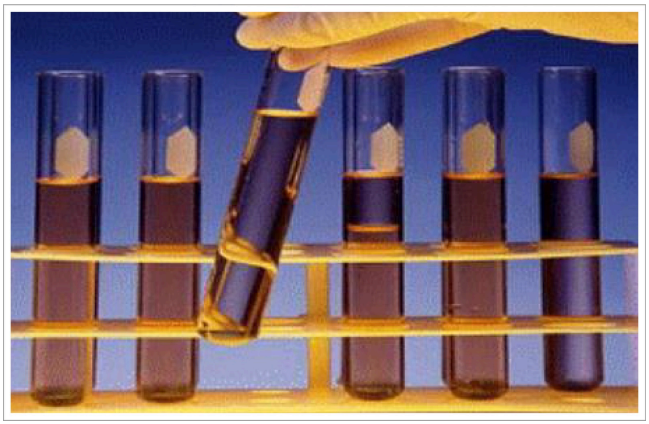
Pigment

- **Characteristics**:
  - It is powdery and can provide color for the coating and increase its thickness. Pigments do not dissolve in the sol vent and are added to the paint to provide color and filling properties.
  - Extremely fine powdery colored substances that are insoluble in water, oil, and solvents, usually classified as: Or ganic pigments and inorganic pigments.
- **Types**: Classified by usage:
  - **Color pigment**: Coloring.
  - **Bright Paint**: Add shine, such as metallic or pearlescent effect.
  - **Extender pigments**: Increase the coating thickness.
  - **Antirust pigment**： Has anti-rust effect.
  - **Extinction pigment**: Reduce resin gloss.



Additives

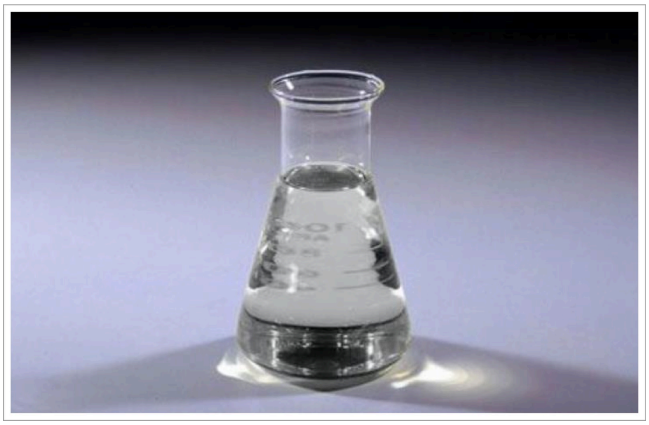
- **Purpose**:
  - Used to prevent bubble formation, pigment settling, or to improve coating performance, mainly divided into: Additives used by paint manufacturers and additives used by spraying personnel.
  - Paint manufacturers use additives to optimize the performance of paint products.
- **Types**:
  - **Pigment dispersant**: Help disperse the pigment and prevent the dispersed pigment from agglomerating with the binder.
  - **Ultraviolet absorber**: Absorb ultraviolet rays to prevent the paint surface deterioration from sunlight exposure.
  - **Defoamer**： Prevent the formation of foam, which will create bubbles during paint spraying.
  - **Leveling agent**: Allowing the paint to level helps form a smooth coat of paint.
  - **Anti-settling Agent**： Ensure the pigments in the paint are evenly dispersed to prevent uneven color concentration caused by paint settling.
  - **Softening Additive**: Change the elasticity of primer, top coat, and clear coat.
  - **Drying accelerator**： It accelerates the chemical drying of the two-component primer, top coat, and clear coat at low temperatures or in minor repair scenarios.
  - **Matting Agent**： Reduce the glossiness of the top coat or clear coat.
  - **Anti-roll Water**： It prevents the occurrence of fish eyes when the paint or the surface contains contaminants.



Solvent

- **Characteristics**:
  - It is a liquid that dissolves resin and helps blend pigments. The solvent is volatile, so there will be no solvent residue after the coating is dried.
  - After the paint dries, the solvent can completely evaporate and will not remain in the paint film.
- **Purpose**: As the viscosity of the resin is very high, a solvent is used to dilute it to the appropriate viscosity, giving it fluidity and spreadability.
- **Instructions for use**:
  - Different resins use different solvents as dissolving agents and thinners.
  - When in use, the thinner suitable for the evaporation speed shall be selected according to the operation temperature. Example: Quick, medium, slow, and super slow types of thinner.
  - If the solvent volatilizes too fast, the viscosity of wet paint film will increase too quickly. Without sufficient leveling time, the leveling performance will be poor, resulting in uneven coating surface and defects such as the orange peel effect and wrinkles. Adhesion problems can also arise due to insufficient wetting of the substrate by the coating film.
  - If the solvent evaporates too slowly, it will affect the reaction speed between the resin and the curing agent in the coating, leading to defects such as insufficient film hardness. The paint film on the vertical surface is prone to sag

ging.



Curing agent

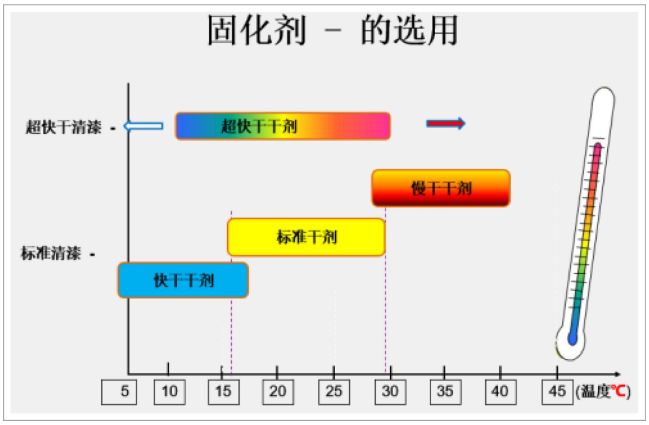
– **Characteristics**: The curing agent is the main component of paints and reacts chemically with resin to bind molecules, thus forming a hard coating.

– **Purpose**: Mainly used in two-component coatings, it can chemically react with synthetic resin to dry and form a film.

– **Instructions for use**:

  • Isocyanate in the curing agent is easy to react with moisture in the air, so care shall be taken in storage and use.

  • This substance is toxic and should be noted during construction. Wear a gas mask and rubber gloves when mixing and applying the paint.



Application of sheet metal poly-putty

⚠ Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

Operation method

1. Apply primer to the relevant areas, see .
2. Operating instructions for stirring poly-putty:

⚠ Caution

- If the poly-putty adhering to the tank is dried, particles or residues will be formed during application.
- If the poly-putty and curing agent are not fully stirred before mixing, the poly-putty will not cure properly.

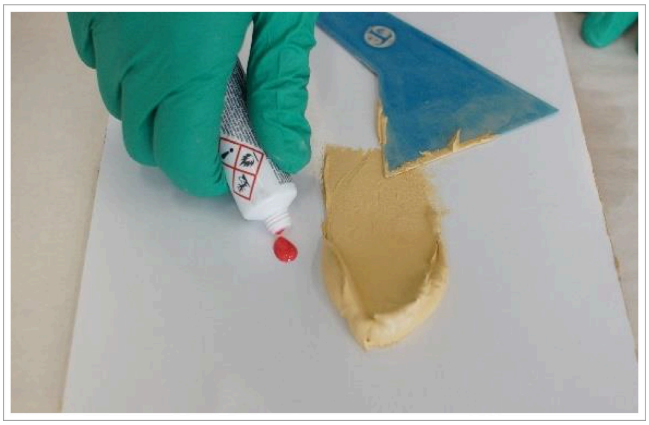
- While rotating the poly-putty tank, move the stirring rod up and down to stir the poly-putty.
- When stirring, do not let the poly-putty adhere to the edge of the tank. If it does, clean it with solvent.



3. Mix the poly-putty with the curing agent.
   a. Tighten the curing agent cover and knead the entire curing agent tube to mix the curing agent.



   b. Follow the manufacturer's instructions on the mixing proportion, and place an appropriate amount of poly-putty a nd curing agent on a clean mixing plate respectively. Do not allow direct contact between the two.



c. Take the curing agent with the edge of a scraper, and then draw circles with the scraper to mix the curing agent a nd poly-putty to a mixing rate of 70%~80%.

d. Shovel up about half of the poly-putty, scrape it onto the remaining poly-putty, press the poly-putty to spread it ev enly, and stir until the color is uniform.

⚠ Caution

- When starting to mix poly-putty and curing agent, mix the components within 1 minute, as the poly-put ty will start to cure and become too hard to apply after 5 minutes.
- Inadequate mixing of ingredients can result in poor curing.

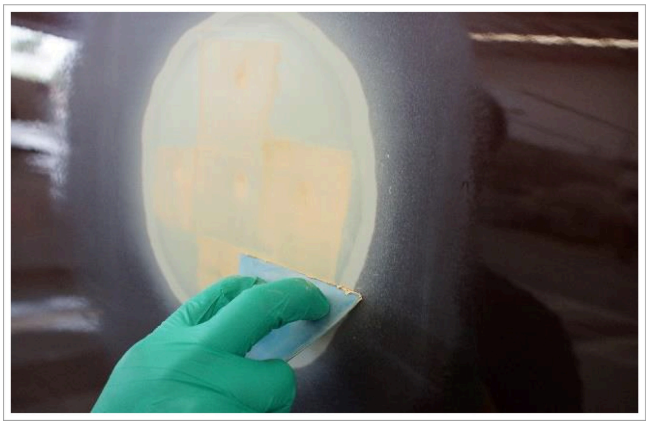


e. Press and scrape poly-putty thin to squeeze out the air, so as to prevent pinholes and improve the adhesion of p oly-putty.



4. Application of thin layer of poly-putty: Apply a thin layer of poly-putty over the epoxy primer-coated area to fill minor sc ratches or dents caused by welding. Operation notes:
   - Ensure that poly-putty is applied to the grinding area.
   - Hold the scraper with palm facing down, gently support the scraper with index and middle fingers in a V-shape, a nd shovel a small amount of poly-putty onto the edge of the scraper.

– When holding the scraper, only make the edge of the scraper touch the surface of the panel, and then press firmly to apply a thin layer of poly-putty.



5. Apply putty: Apply poly-putty in thin layers and divide into multiple applications. The application height should be higher than the undamaged reference surface. Operation instructions:

⚠ Caution

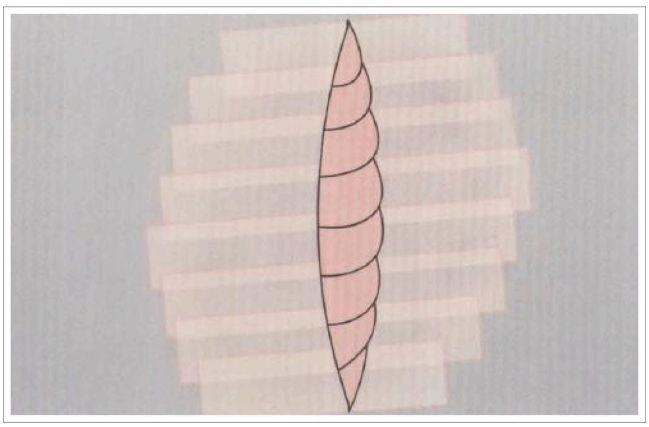
– If a large amount of poly-putty is applied in one time, air will be trapped in the poly-putty, resulting in pinholes.

– If the poly-putty cannot be applied in one time, wait for the edge of the applied poly-putty to dry to a touchable degree, and then proceed to the application of next layer of the poly-putty.

– Hold the scraper with palm facing down and gently support the scraper with index and middle fingers in a V-shape to apply poly-putty, and overlap the previous layer of poly-putty by 1/3 each time. Erect the scraper to apply a thin layer, and lower the scraper to apply a thick layer.



– Press the scraper against the steel panel, scrape the surrounding poly-putty layer thin, and move the scraper along the shape of the feather edge.



6. Trimming atomic ash: Trim all the steps around the edges of the putty and remove all the putty that has spread beyon d the sanding area, operation instructions:
   - Ensure that there are no steps between the poly-putty application area and the old coating.
   - Ensure that there is no residual poly-putty on the surface beyond the grinding area.
   - Press the scraper against the coating side and move it along the shape of the feather edge. The coating of the e dge shall be scraped into a thin layer.



7. Drying of poly-putty: Forced drying of putty to ensure it can be sanded, operating instructions:
   - After the poly-putty is dried to a touchable degree, dry it with a heating lamp. Avoid excessively high lamp tempe rature during drying.

> **⚠ Caution**
>
> If the poly-putty is heated rapidly during drying, it may crack or peel off.



   - Gently place the sandpaper on areas with thinner coatings and observe whether the poly-putty turns into powder during sanding to determine whether it is dry.



   - Use fingernail to gently scratch the thinner edge of poly-putty. If white marks appear on the surface, it indicates t hat the poly-putty is completely dry.

– The use of forced drying of the poly-putty will shorten the curing time of the poly-putty and improve working efficiency.

8. Coarse grinding of poly-putty: Grind the rough poly-putty area with sandpaper #80 or #120 to form a relatively smooth surface. Ensure that the poly-putty surface is free from steps, large dents, and bulges. Operation instructions:

⚠ Caution

– In order to avoid deep scratches on the steel panel, make sure that the thickness of grinding disc is appropriate before switching on the grinder.

– The steel panel that is still hot after drying with a heating lamp will expand, and the radian of the entire steel panel will be different. Before grinding, it is necessary to confirm that the panel temperature is normal.

– Before grinding, it is necessary to confirm that poly-putty is completely dry.

– Apply a carbon powder guide layer to the poly-putty application area, which is helpful in determining the grinding range and flatness.

– Stand at a position where the grinding plate can easily reach the entire area of poly-putty for grinding.

– Select a suitable grinding head and attach sandpaper. Support the grinding head from below and gently press it onto the surface of the atomized paint, sanding up to 10mm within the edge of the atomized paint. Grind only the poly-putty surface, and do not leave sandpaper marks on undamaged areas.

– After grinding the higher part, grind the entire surface, taking care to avoid local dents in the poly-putty area.

– Check whether the dents and bulges are ground evenly through visual inspection and hand touch.



9. Careful grinding of poly-putty: Apply toner to the surface of the poly-putty, then use a sanding block or grinder equipped with #180 sandpaper to sand the surface of the poly-putty until achieving 80% surface flatness. Provide a natural and smooth transition between the old coating and the surface applied with poly-putty. Operation instructions:

– Ensure that the entire feather edge is faintly visible at the edge of poly-putty.

– Stand in a suitable position to grind the poly-putty surface only, and do not leave sandpaper marks on the undamaged surface.

⚠ Caution

– The grinding shall be carried out in a multi-angle or multi-directional star-shaped manner to ensure the smooth surface of the poly-putty after grinding.

– During the grinding, the flatness of the entire surface shall be checked visually and by hand.

– During the grinding, both manual and machine methods can be used.

– Methods for dents and protrusions checks:

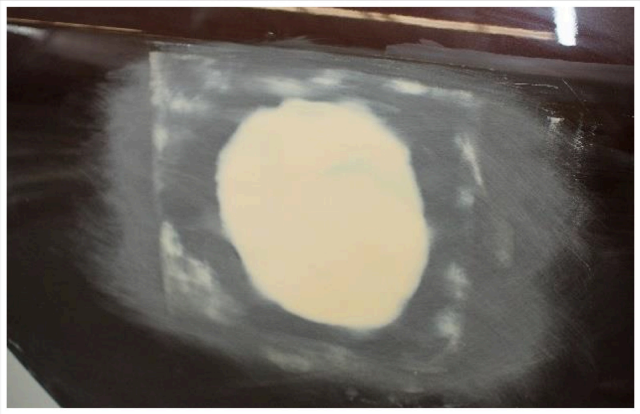
  • Touch the surface with your hand.

  • If necessary, check the surface flatness with a ruler.

- Check for small dents and bulges with a grinding indicator.



10. Fine grinding of poly-putty: Sand the entire poly-putty surface with a hand sanding block equipped with 240-grit sandp aper until 90% surface smoothness is achieved. Provide a natural and smooth transition between the old coating and the surface applied with poly-putty. Operation instructions:
    - Grind the entire poly-putty application range and 5 cm beyond the grinding area to ensure a smooth surface.
    - Check the surface for dents or bulges during grinding, and check the transition between the poly-putty surface a nd the undamaged surface by hand touch or a ruler.
    - Check for coarse sandpaper marks after grinding with a grinding indicator.
    - After grinding, blow compressed air onto the poly-putty surface to check for pinholes. If there are pinholes on pol y-putty, apply a thin layer of poly-putty with the same method for thin application and perform re-grinding.



11. Final grinding of poly-putty: Use a sanding head/grinding board equipped with 320-grit sandpaper to remove all sandp aper marks left during surface finishing. Operating instructions:

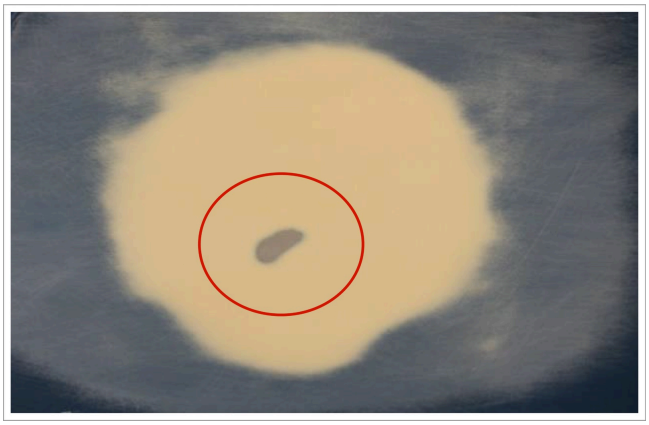
⚠ Caution

In order to prevent deep scratches on steel panel, the grinder shall be used to grind areas other than poly-putt y before grinding to make corresponding areas tarnished; otherwise, the coating may fall off.

- Adjust the dual-action sander to the appropriate speed to achieve the best sanding operation.
- Grind the surface exceeding the poly-putty edge by about 10 cm, ensuring that the area to be applied with prime r has been ground and the surface is no longer glossy. Be careful not to go too far beyond the area that needs to be repainted.



12. Fix defects.
    - Repair defects at high points:
        - **Defect description**: The steel panel is higher than the undamaged surface and exposed.
        - **Solutions**: Use pointed hammers or other tools to repair high areas, bringing them below the undamaged s urface. Then, use 120-grit sandpaper to remove the surrounding poly-putty from the repair area and smooth the location.



    - Repair lower areas:

> **⚠ Caution**
>
> Applying the poly-putty only in the lower part makes it difficult to achieve the natural transition of the poly-putty to the surrounding parts.

        - **Defect description**: A lower area formed due to excessive grinding.
        - **Solutions**: After cleaning and degreasing, thinly coat the entire surface with poly-putty. Application of remain ing poly-putty is then done in the lower areas, followed by application of poly-putty on the entire surface.



    - Repair pinholes:

- **Defect description**: There are pinholes on the surface that cannot be filled with primer or nitrocellulose poly -putty.
- **Solutions**: After cleaning and degreasing, apply a thin layer of poly-putty across the entire surface, using th e same method as for thin coatings, to fill only the pinholes. Then dry the surface with a heating lamp.



Further guidance

– Masking methods and skills
– How to perform color mixing:
  - Color mixing of solid color paint
  - Color mixing of metallic paint
– How to spray:
  - Spraying of primer
  - Solvent-based solid color paint
  - Solvent-based Metallic Paint
  - Spraying of plastic parts
– How to dry

Application of plastic poly-putty

Reminder

This topic describes the key steps of applying plastic poly-putty. The application methods for other steps are similar to those of sheet metal poly-putty. Refer to Application of sheet metal poly-putty .

Operation steps

1. Repair plastic parts, see How to repair plastic parts .
2. Application of plastic poly-putty:

   Caution

   – The choice of putty should be resin putty (plastic putty). Using ordinary polyester putty may lead to crackin g due to the lack of flexibility of plastic parts.

   – The plastic poly-putty is sticky and easy to generate steps after scraping. Follow this when scraping: Apply the construction work according to the principle of thin coating each time and multiple applications.

   – Thoroughly mix the main components of plastic poly-putty and curing agent, and apply the mixture on the parts t o be repaired.

   – Apply the first thin layer of poly-putty so that it can be squeezed into the gap in the damaged area.

   – Fill the damaged surface by applying multiple thin layers. In case of large steps on the surface, trimming is requir ed.

3. Forced drying of poly-putty: According to the product instructions of atomic putty, use an infrared lamp adjusted to 5 0°C to heat the area, setting the heating and curing time to cure the atomic putty.

   Caution

   Control the temperature for drying panels to avoid deformation of plastic parts due to excessive temperature.



4. Grind the poly-putty to restore the original shape of bumper:
   a. Paste sandpaper P120 on a double-action grinder or manual grinding plate for the first grinding, and repair the ex ternal profile of the damaged area.



   b. Use P240 sandpaper to grind for the second time to remove coarse sandpaper marks.
   c. Grind a slightly larger area with sandpaper P320, and reserve the primer application area.
   d. After grinding, clean and degrease the grinding part and its around.



Subsequent operations

1. Apply primer. Refer toSpraying of primer .
2. Spray the plastic parts. Refer toSpraying of plastic parts .
3. Dry the sprayed paint. Refer to How to dry .
4. Perform fine treatment for the sprayed surface. Refer to Performing polishing .

Masking methods and skills

⚠ Caution

- Cover irrelevant areas of the vehicle according to the requirements of painting.
- During masking, different materials shall be selected according to different operation requirements.
- The masking operation shall be standardized and rigorous to avoid damage and looseness after masking.
- Boundary masking shall be emphasized in work.
- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

Masking is required before painting to prevent the mist paint sprayed outside the spraying area from adhering to glass, tire and other non-coated areas. This topic introduces the main masking methods used before applying primer and top coat.

Masking method

Masking of openings

Before spraying, mask the openings left after removal of vehicle body components from the inside or outside to prevent pai nt from entering the vehicle interior from the openings.

⚠ Caution

- After masking, ensure that the masking tape is not peeled off by air pressure.
- After masking, ensure that paint mist sprayed does not enter the opening area.
- The masking tape can be applied either from the inside or from the outside.

– Mask the inside of the vehicle body opening.
  - Adhere the masking material to the inside of the opening.
  - Ensure that the masking tape can withstand external air pressure.



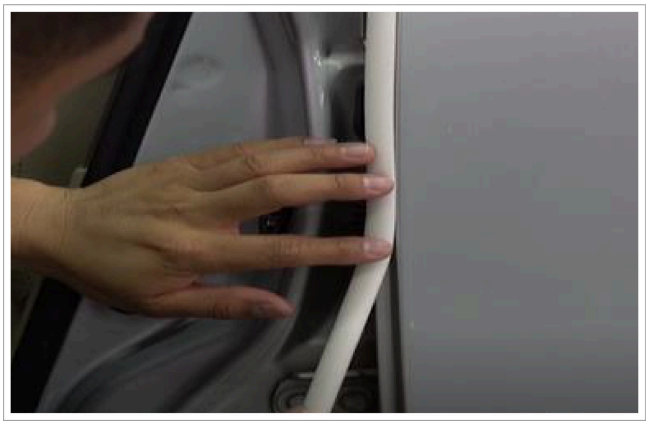
– Masking external body openings: Adhere the masking material to the outside of the opening, ensuring the masking m aterial is attached tightly and securely.



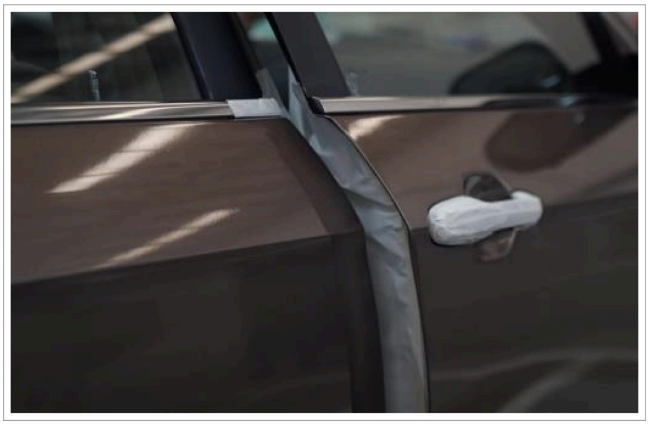
Masking of gaps

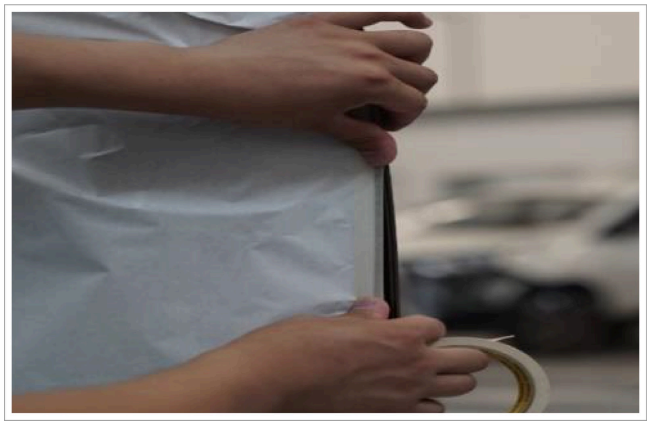
Before spraying, effectively mask the gaps between vehicle body steel panels. In the masking process, select appropriate masking materials according to the situation and ensure the masking quality.

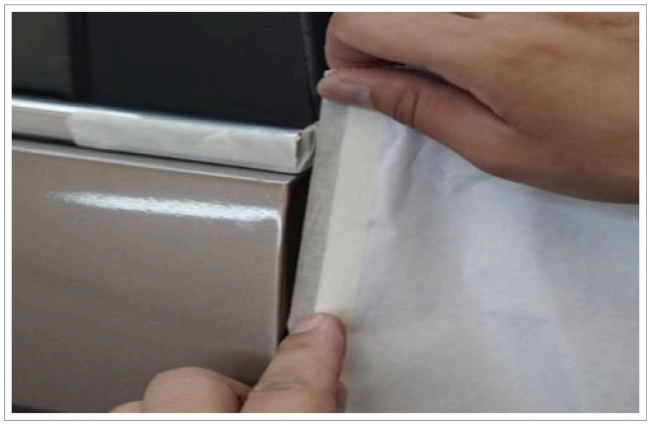
– Mask the gap with adhesive tape.
  - Clean the gap first to ensure firm bonding.
  - Ensure that paint mist does not enter the gap after adhesion.
  - When using gap tape, ensure that there is no gap between the tape and the steel panel, and pay special attentio n to the position of the upper and lower edges when masking the gap at the front and rear doors.



– Use masking paper to cover the gaps.
  - Clean the gap first to ensure firm bonding.
  - Ensure that the moisture inside the gap has been removed before masking the trim strip.
  - Cut appropriate length of masking paper and paste it along the front door sealant and the rear door edge steps to ensure good edge masking. Pay attention to the treatment of gap edge during the masking process.







Masking parts

– Mask the assembly parts that cannot be disassembled to prevent them from paint adhesion.

– Reserve a gap with the same coating thickness between the steel panel surface and the masking tape.

⚠ Caution

– The gap between the masking tape and the steel panel surface is too large, and the masked parts will adh ere to paint after spraying.

– The reserved gap is too small, which will lead to incomplete paint masking or no paint adhesion after edge spraying.

– Never pull the masking tape when pasting it to the bent part.

– Finally, mask the boundary of the assembly parts with masking tape.



Masking of glass protective strip

– To ensure that there is a gap between the glass sealing strip and the steel panel, insert the trim masking tape betwee n the two and pull it back, so that the sealing strip will be pulled away from the steel panel.

– For curved areas, cut a few notches on the tape with scissors before pasting the trim masking tape. Bend the window edge tape along the edge, and use tape to supplement the missing parts.

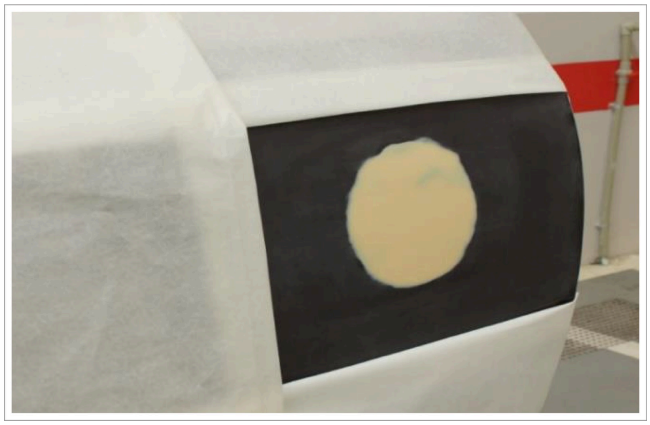
– After spraying and drying, when there is still residual heat, remove the window edge tape, and the edge sealing strip will recover to its original shape.



Masking skills

– **Reverse masking method**： It refers to the method of reverse folding masking paper when pasting, which serves to minimize the steps created by spraying as much as possible.

- If there is a body line in the masked area, reverse masking can be performed on the body line.
- It is difficult to clean and degrease after reverse masking, so it is necessary to prepare for degreasing and cleani ng before masking.
- Reverse masking method is often used before spraying the intermediate primer. Refer to



– **Transitional masking**: It refers to masking the area where transition operation is to be carried out, such as rear fend er or small-area local repair spraying.

- After spraying, ensure that the masked boundary surface does not produce steps or color difference.
- It is difficult to degrease and clean the transition area after masking, so it is necessary to degrease and clean wel l before masking.



Performing masking

Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

Reminder

This article gives coating examples of **Rear doors and fenders masking** and **Front doors masking** to guide you i n executing masking.

Masking when coating rear doors and fenders

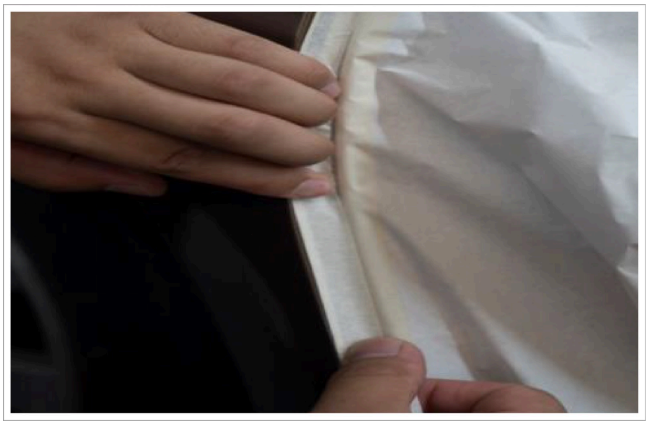
1. Clean the front panel gaps and assembly parts in the masking area with a degreasing cleaner to ensure that the corre sponding area is free of dust, moisture, and oil stains.



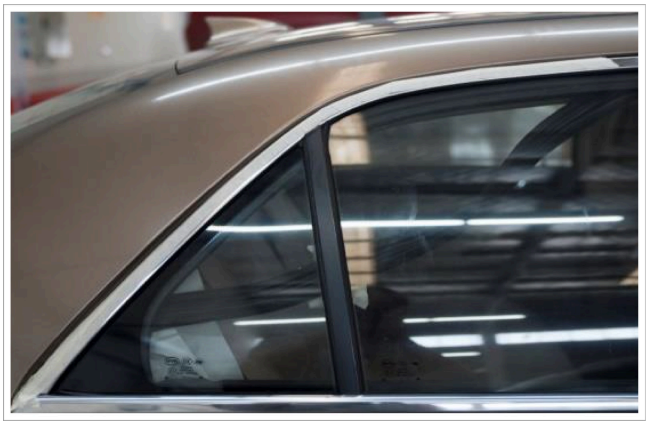
2. Paste the inner side of the panel： Apply masking paper along the inner edge of the rear fender panel to prevent the panel from being contaminated by paint during spraying.

Reminder

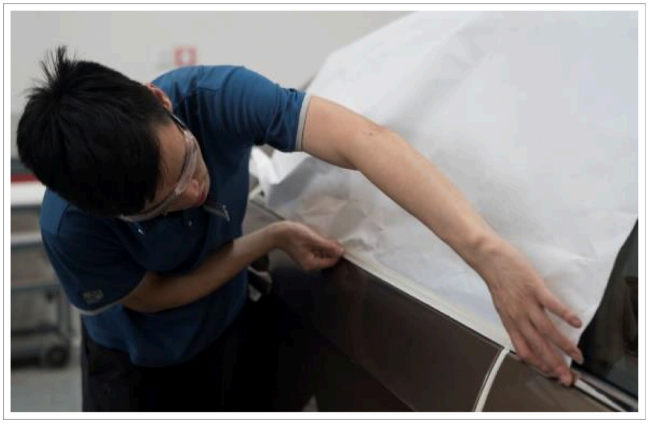
It involves the inner side of the car door and needs to be adhered along the sealing strip section.



3. Paste trim: Apply the masking tape in pairs to the edge of the rear fender on the upper side of the door, then close the door, and paste the remaining tape to the door frame, leaving a proper gap at the edge of the panel.



4. Paste the masking paper: Along the edges of the sheet, carefully apply masking paper to ensure a smooth surface aft er masking. Avoid omissions, excessive application, steps, and wrinkles.



5. Paste the masking film: Cut a suitable length of masking film and paste it to the vehicle body part.

Reminder

After the vehicle is moved to the spray booth, mask the tires, windshields, or other parts.



6. Covering transition area: After degreasing and cleaning, mask the blend area with reverse masking method.



Masking when coating front doors

1. Use a degreasing cleaner to clean the panel gaps and assemblies in the masked area to ensure that the correspondin g areas are free of dust, moisture, and oil.



2. Paste door: Paste the edges of the panel, fender upper trim cover, and the lower wheel arch area to prevent paint mis t from contaminating the inside during spraying.
   Pasting the upper part of door:



   Pasting the lower part of door:



3. Paste the masking paper:
   – Paste the masking paper slightly longer than the edge of the panel to the adjacent panel along the edge of the p anel, and avoid wrinkles during pasting.



   – Finally, paste the vehicle body trim strip and make sure to reserve suitable gap during pasting.



4. Paste the masking film: After moving the vehicle to the spray booth, apply and trim the masking film reasonably accor ding to the adhesion of the masking paper, ensuring no areas are missed.



5. Paste body trim: Paste the body trim and leave an appropriate gap to avoid the trim being painted during the spraying process, or the paint sticking the tape together after spraying.

> **⚠ Caution**
>
> Reserve a gap with the same coating thickness between the steel panel surface and the masking tape during pasting.



6. Paste the doorknob hole position, see .



7. Check the protection cover to avoid paint mist contaminating the vehicle body during spraying.



FAQs and solutions

Reminder

This topic summarizes the FAQs that may be encountered during masking and the solutions to address them.

Paint adhesion

– **Causes**:
  - The area covered by the masking material before spraying is too small.
  - There are gaps at the edges of panels or gap areas during masking.
– **Solutions**:
  - Polish the surface after removing paint adhesion. Refer to Performing polishing .
  - Wipe with solvent before the paint is completely dry.



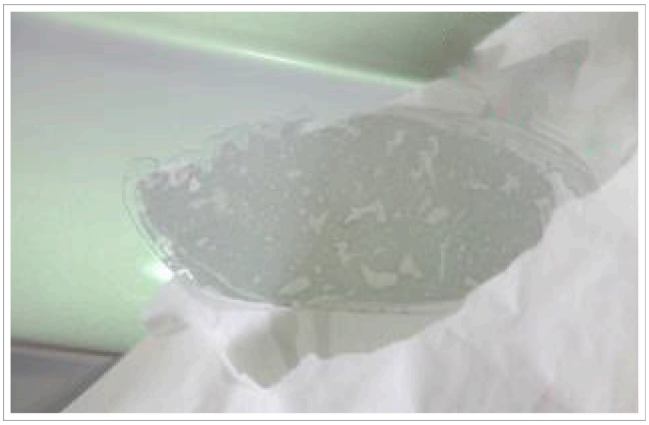
Coating steps

– **Causes**:
  - During the application of primer, reverse masking is not performed in the area, resulting in coating steps after spr aying.
  - The spraying range is not reasonably controlled during spraying operation, resulting in an excessively large spra ying area.
– **Solutions**:
  - Reasonably plan the application range before the primer spraying.
  - After thorough sanding, reapply paint in the primer application area. Refer to .



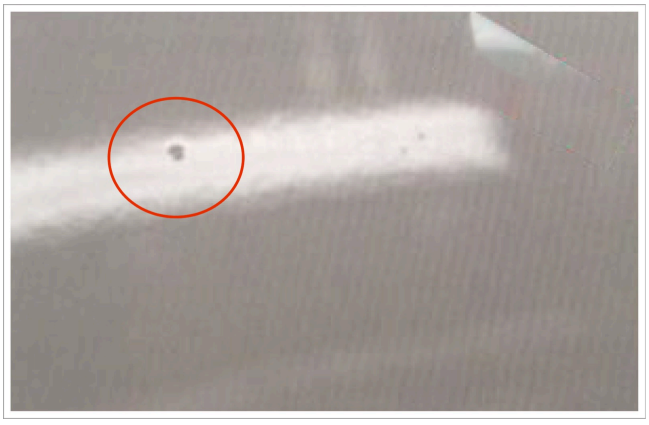
Masking material adhesion

– **Causes**:
  - During the application of primer, reverse masking is not performed in the area, resulting in coating steps after spr aying.
  - The spraying range is not reasonably controlled during spraying operation, resulting in an excessively large spra ying area.
– **Solutions**:
  - Reasonably plan the application range before the primer spraying.
  - After thorough sanding, reapply paint in the primer application area. Refer to .



Dirt or dust adhesion

– **Causes**:
  - The paint and dirt that gather at the folding of the masking material adhere to the surface.
  - The dirt and dust remaining in the gaps between the panels adhere to the surface.
  - There are steps when obstructed.
  - Gaps between panels are not completely masked.
– **Solutions**: Use sandpaper to sand the area to eliminate defects, then polish it, see Performing polishing .



Tape marks

– **Causes**:
  - The residue of adhesive tape affects the paint film.
  - The surface temperature of the panel is too high or the masking tape comes into contact with solvent, resulting in adhesive falling off.
  - No suitable sticking material is selected.
– **Solutions**:
  - Remove the tape before the surface dries.

- Polish the surface for repairs, see Performing polishing .



Boundary paint falling off

– **Causes**:
  - After forced drying, the masking tape is removed after the surface cools down. Improper operation of the method during the clearing process.
  - The surface of the substrate is not properly ground and cleaned before spraying.
  - The paint coating is too thick, and the method of masking tape removal is incorrect.
  - The angle is incorrect when the tape is removed.
– **Solutions**: Sand defects and repaint, Refer to:
  - Solvent-based solid color paint
  - Solvent-based Metallic Paint
  - Spraying of plastic parts

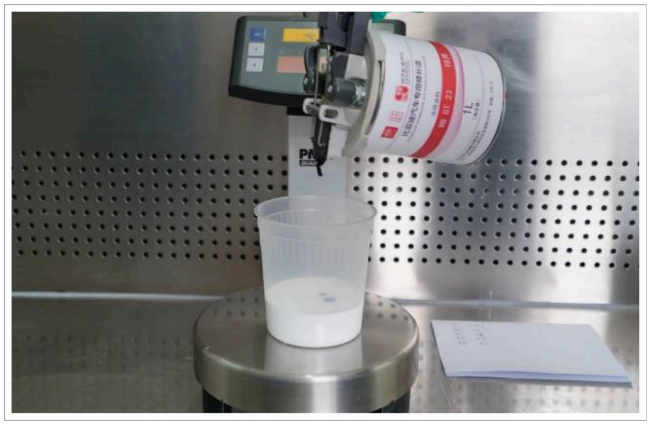


Basic principles

This topic introduces the basic principles of color mixing in terms of 8 aspects: color mixing, light and color, three primary c olors of light, three primary colors of objects, secondary colors, tertiary colors, complementary colors, and metamerism.

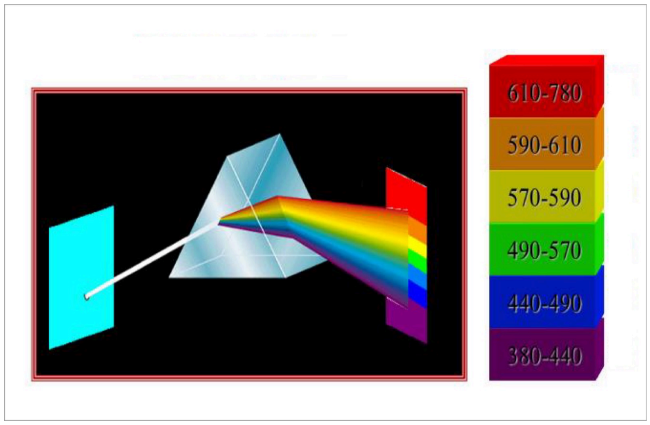
What is color mixing?

– Color mixing is: Mix two or more color masterbatch paints according to the required amount of paint to produce and a pply the same color as the target vehicle.



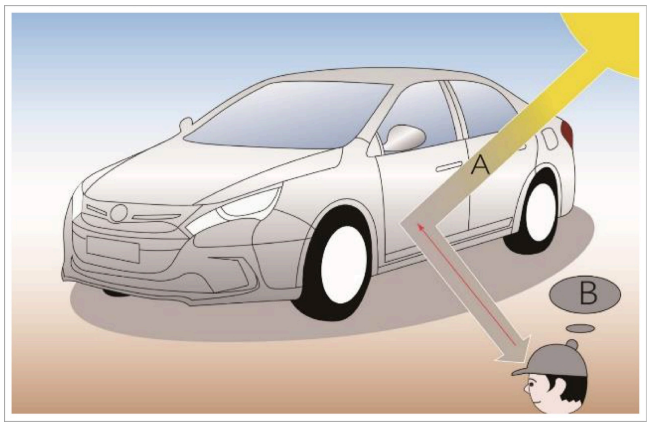
Light and color

– **Composition of light**: Although the sunlight appears white, it can be seen through a prism that white light is actually composed of red, orange, yellow, blue, green, cyan, and violet.



– **Identifying color**: Identification of colors requires a light source. When the light reflected by an object enters the obs erver's eyes, it stimulates the retina and forms signals. When these signals are transmitted by vision to the brain, color s can be seen.

- A： Light source
- B： Color



– **Attributes of color**: They include hue, lightness, and saturation.

  - **Hue**： Refers to the basic types of colors or the position of colors on the color wheel. Simply put, it is what we us ually call the "color name," such as red, blue, or green.

    Reminder

    If the color of the paint is not correct during color mixing, it means that the hue is incorrect.

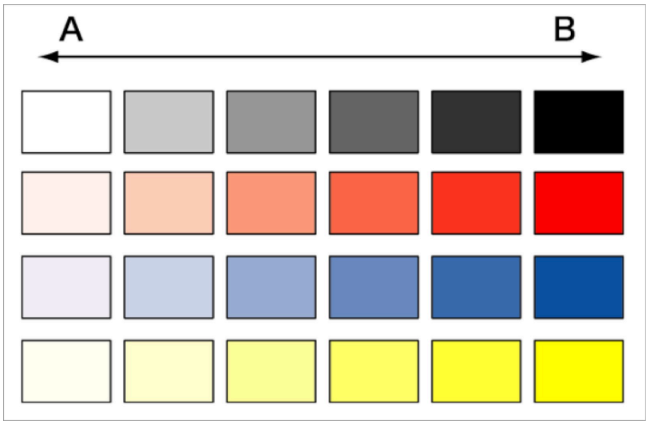


  - **Lightness**: It refers to the relative brightness or darkness of a color, which is a measure of the brightness and da rkness of the color. Colors with higher lightness appear brighter, while colors with lower lightness appear darker. Changes in brightness are independent of hue and saturation, and can be imagined as increasing or decreasing t he intensity of the light source to change the lightness or darkness of the color.

    Reminder

    If the color of the paint is too dark during color mixing, it means that the lightness is incorrect.

    - **A**: High brightness
    - **B**: Low lightness



  - **Saturation**: Saturation describes the purity or intensity of a color, that is, the vividness of the color. Colors with hi gh saturation are more vivid and close to pure colors in the spectrum, while colors with low saturation are dark, p ale, or gray, close to gray.

    Reminder

    If the color of the paint is too vivid or dull during color mixing, it means that the saturation is incorrect.

    - **A**: High saturation
    - **B**: Saturation Low

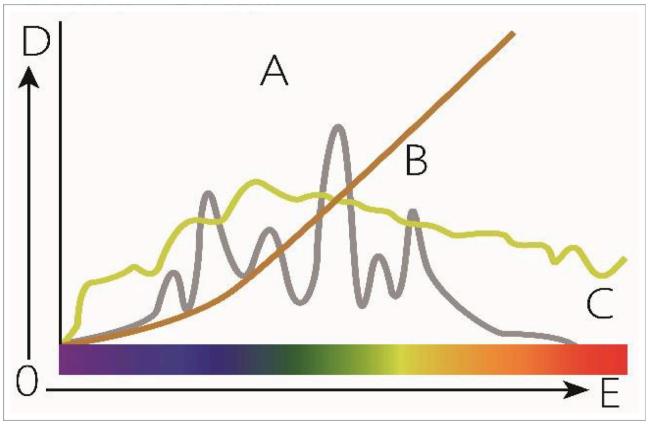


– **Relationship between Light and Color**: The color of an object as presented under sunlight is considered the standa rd color, and the distribution of wavelengths varies with different light sources; therefore, the same color may appear s lightly different under different light sources.

Reminder

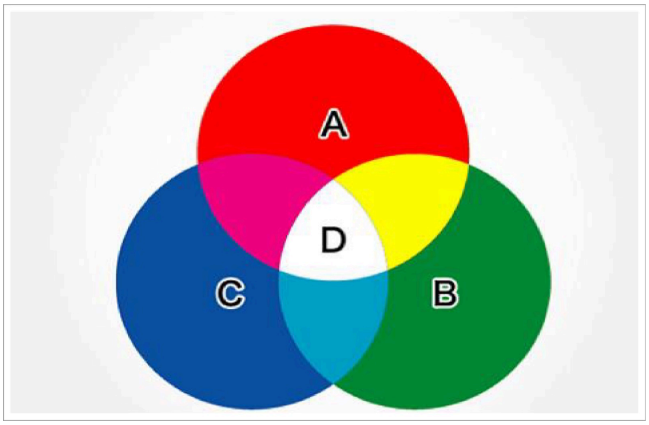
Use the correct light source for comparison during color mixing.

- **A Sunlight**: Includes an almost uniform range of all wavelengths.
- **B Incandescent light**: Compared to sunlight (A), it contains a relatively larger amount of light in the long wavele ngth range, thus the red effect is stronger.
- **C Fluorescent lamp**: Compared with sunlight (A), it contains a smaller amount of light in the long-wave range, th us enhancing the effect of blue.
- **D**: Indicates distribution.
- **E**: Indicates wavelength.



Three primary colors of light

– The three primary colors of light are red, green, and blue, commonly referred to as RGB. The three lights are mixed i n different proportions to form almost all the colors that human vision can perceive. In the color mixing model, when re d, green, and blue lights are mixed in equal amounts, the result is white light because these three colors of light contai n the main portion of the spectral range that the three types of cone cells in the human eye can respond to.

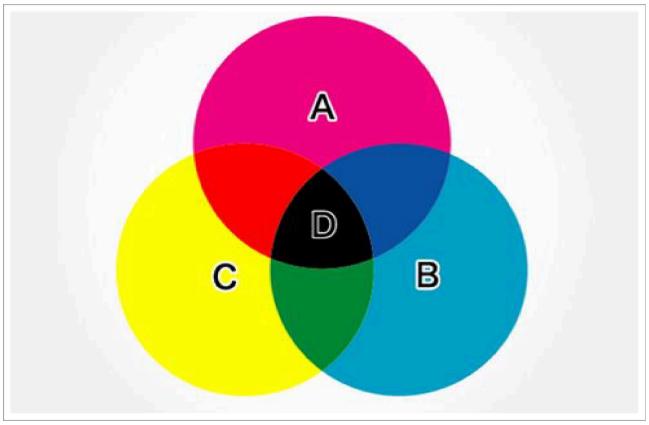


Three primary colors of object

– For colored materials such as paint, red, yellow and blue can be mixed properly to obtain most or even all colors. The se three colors are called "three primary colors of object". Mixing equal proportions of the three primary colors results i n black.

Reminder

This principle is used in color mixing.



Secondary colors

– A secondary color is a mixture of two adjacent primary colors. A second-order color as a result of the combination of t wo primary colors is called a "secondary color".

Reminder

When color grading, it is obtained by adding the three primary colors in pairs: Orange (red + yellow), purple (re d + blue), green (yellow + blue).



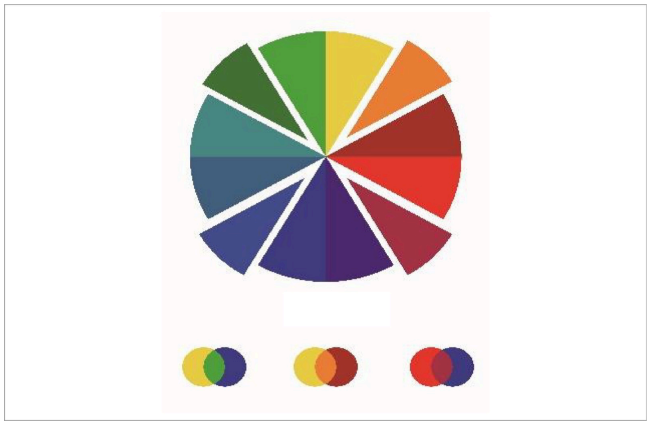
Tertiary colors

– The combination of a primary color and a secondary color or of two secondary colors yields tertiary colors. Depending on the color mixing ratio, the result may be more red, blue or yellow.

– A tertiary color contains all the elements of the three primary colors. Therefore, all the tertiary colors are broken colors with reduced purity and saturation.

Reminder

The tertiary colors include a large number of brown tones. The human eye can distinguish more than hundreds of thousands of colors. In fact, in automotive refinishing paint colors, three-stage colors are the most common type.



Complementary colors

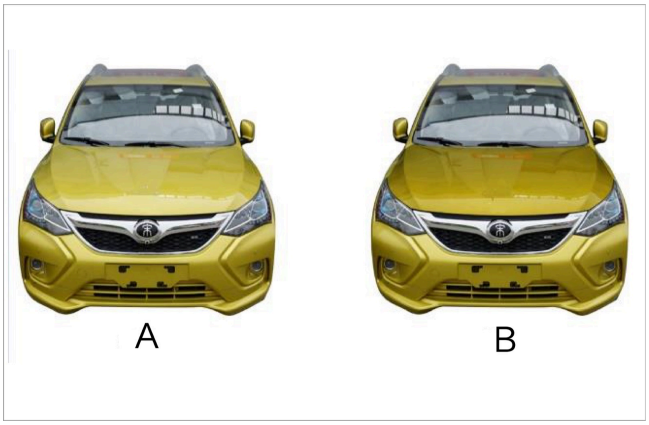
– Colors opposite each other on the color wheel are called complementary colors.

– Mixing a pair of complementary colors will form black. Example: The complementary color of magenta is green. If pure green is mixed with pure red, the result is a black color.



– **Phenomenon**:
  - The color of an object will change with the light source.
  - If there are two objects that are considered to be the same color under one light source, but they appear completely different under another light source, this phenomenon is called: “Metamerism” For example: The color looks the same under sunlight, but it appears different under incandescent light.

– **Causes**: Mixed with different pigments, rather than the ideal identical pigments. (For example: The green pigment is relatively a mixture of blue and yellow pigments).



– **Preventive measures**: Place the painting color plate and OEM standard panel in a light booth for comparison using D65 daylight, incandescent light, and sodium light. Observe them from different angles during the comparison.



How to identify the missing color

During the coloring process, it is necessary to identify and confirm the required colors in the paint. The following two metho ds are taken as examples to illustrate how to identify the required colors.

Method I: Analyze masterbatch characteristics

Analyze the color hue of the missing color by using the color masterbatch characteristic table, so as to determine the missi ng color.

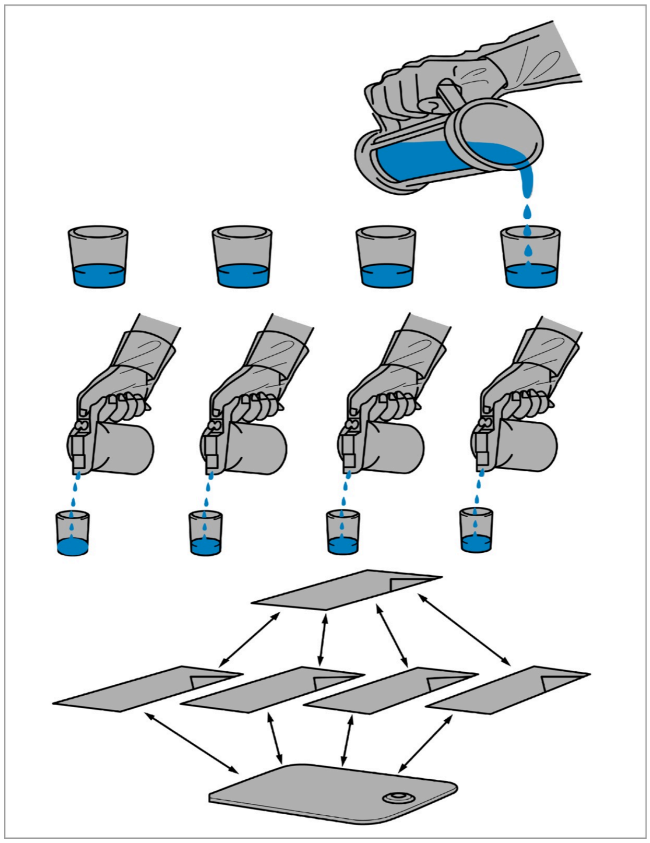
– Analyze the trend of each color masterbatch in the color formula and determine the lacking color hue in the color plat e.



Name of color mast erbatch	Color hue
White	Mainly used as the primary color in plain white, with excellent covering power.
Mud yellow	Used in plain color, aluminum powder and iron oxide yellow.
Yellow	The primary in plain yellow, appearing light yellow and slightly green. It can be added to the metal color to eliminate a small amount of red on the side.
Black	Used both in solid color and aluminum powder, and as the primary in black (yellow-black).
Blue	Commonly used color masterbatch for blue, appearing pure blue in the front and the sides.

Method 2: Determine the required color after adding color masterbatch

1. A plurality of containers are placed so that the number of containers is the same as the number of color masterbatch i n the paint.
2. Pour about 30 g of mixed paint (measured coloring paint) into the corresponding container.
3. Add one type of color masterbatch to each container, only 20% of the original mixing ratio.
4. Mix the above paint evenly with a paint mixing ruler and apply them to color test plates of different colors for color com parison.
5. Determine the color plate closest to the target color, so as to determine the type of color that should be added.



Further guidance

- Basic principles
- Color mixing of solid color paint
- Color mixing of metallic paint

Color mixing of solid color paint

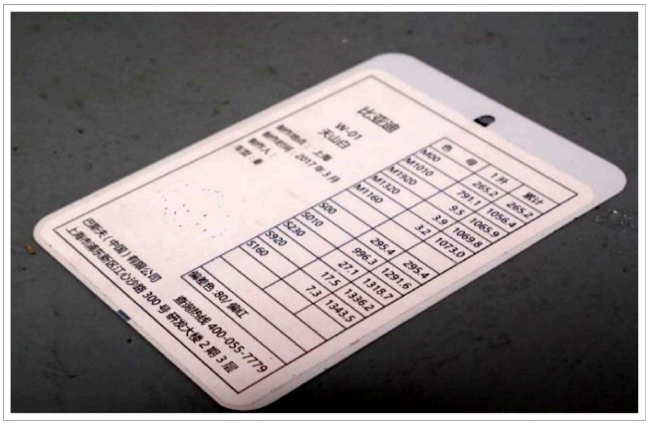
Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .
- In order to ensure the quality of color mixing, it is necessary to understand the color mixing before operation.

Obtaining formula

In the actual color mixing, some vehicles have color codes and color formulas, while some vehicles do not have color-relat ed information. The color information shall be reasonably distinguished according to the following color mixing process.

- **Color information**: It is extremely important to confirm the information on the color being mixed by consulting the col or information provided by the paint manufacturer. Fully understand and master the relevant color information so as to shorten the time for color mixing, and avoid problems that may arise during the color mixing process.
  - **Color mixing process**: **Confirming the vehicle body color (color code) -> obtaining formula data -> checki ng color swatch and vehicle body color -> color mixing by measurement -> color fine-tuning after trial sp raying and color comparison.**



- **No color data**: In this case, the color mixing is different only in determining the same color swatch and preliminary co lor mixing process.

Caution

In case of uncertainty about the accuracy of the color data, it is recommended to mix a small amount of paint t o confirm the color.

Reminder

During mixing, the dosage of corresponding paint shall be recorded to facilitate sorting and filing of color formu las.

  - **Color mixing process**: **Looking for similar color swatches to compare with the vehicle body color -> obtai ning formula data -> confirming the same color -> selecting the primary color formula -> color mixing by measurement -> color fine-tuning after trial spraying and color comparison.**
  - **Obtaining formula**: Look for similar color swatches to compare with the vehicle body color, and fine-tune the pai nt color after obtaining the formula.



Step 1: Color mixing by measurement

1. **Confirming formula**: Determine the color formula according to the vehicle body color number and vehicle model colo r swatch.

   ⚠ Caution

   – If one color number corresponds to multiple formulas, select the color that is close to the color of the target vehicle.

   – Select the appropriate environment for color comparison.



2. **Preparation of color masterbatch**: The color masterbatch for color mixing must be mixed for at least 15 minutes eve ry morning and evening with the paint mixer. If a new color masterbatch is used, it can be vibrated with an oscillator fo r 20 minutes before opening the barrel or stirred evenly with a paint mixing ruler before installing the slurry cover.

   ⓘ Reminder

   Clean the slurry cover and openings after each use. Please store the new tank of color masterbatch upside do wn to avoid pigment precipitation.



3. **Color mixing by measurement**: Follow the corresponding color formula, pour the corresponding color masterbatch i nto the paint mixing cup on the electronic scale, and ensure that the paint is accurately weighed and mixed evenly. Op eration instructions:
   - Plastic containers or metal containers with an inner coating should be used for water-based color masterbatch p aint, and avoid using metal containers directly.
   - Select a container of appropriate size according to the required amount of paint and thinner.
   - Accurately weigh the color masterbatch paint and add the color masterbatch in the formula one by one.
   - Tilt the color masterbatch barrel and then gradually pull the lever of stirring cover to slowly pour out the paint.
   - Repeatedly stir the paint and scrape off all paint adhering to the inner wall of the container with a paint mixing rul er.



Note: The image below shows two states of the stirred paint.

- Left: Not stirred evenly
- Right side: Stirred evenly.



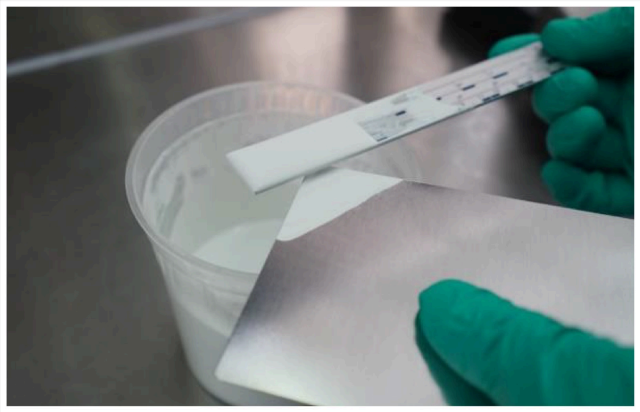
Step 2: Color fine-tuning after trial spraying and color comparison

In daily operations, you can choose **method I** or **method II** to fine-tune colors according to your needs.

Method I: Apply the paint to the color test plate and then fine-tune the color

It refers to the process in which the paint color is continuously close to the target color by color comparison and adding mis sing colors after the color is applied on the color test plate with a paint mixing ruler or stirring rod.

1. **Apply color test plate**: Apply the paint on the color test plate into a triangle with a paint mixing ruler until the backgro und color of the test plate is covered, and then dry the plate forcibly. Operation instructions:
   - Apply the paint to a range of about 30 mm from the edge of the color test plate.
   - Do not add the thinner, which will reduce the covering power of the paint.
   - It is recommended to apply multiple thin layers.
   - Use a primed color plate for water-based color masterbatch paint. Do not apply directly to a bare metal color test plate.



2. **Color comparison**: Select the appropriate light source, compare the color of the dried painted color plate with the col or of accessories at the damaged parts of the vehicle, and identify the difference between the color plate and the vehi cle body color according to the color, hue, lightness, and saturation .

Reminder

- If you stare at a color for a long time, your eyes will get used to the color, so it is difficult to judge the color difference. Therefore, when comparing colors, it is recommended to pause intermittently to allow the eyes to regain their judgment.
- Color comparison shall be performed under at least two different light sources before finalizing the color to prevent metamerism.
- The high-intensity light is required for comparisons of dark colors, while the light for comparisons of light co lors is not satisfying for comparisons of dark colors.



3. **Fine-tuning color**: After adding the missing color masterbatch at 10% each time, repeat the above steps and paint th e color test plate until the color is close to the target color. Confirm the required color paste, see How to identify the mi ssing color .

Caution

- When adding colors, do not mix two colors simultaneously, as it may be difficult to determine which color is causing issues when problems arise.
- The high-intensity light is required for comparisons of dark colors, while the light for comparisons of light co lors is not satisfying for comparisons of dark colors.



Method 2: Apply the paint on the color test plate and then fine-tune the color

It refers to the process in which the paint color is continuously close to the target color by color J comparison and adding m issing colors after the color is applied on the test plate with a spray gun.

1. **Paint mixing**: According to the required proportion, pour the curing agent, thinner, and other paints into the container and mix them. Operation instructions:

Caution

- Water-based paint requires the addition of a water-based thinner.
- Select the appropriate curing agent and thinner according to the temperature of the baking booth.



2. **Spray color test panel**： Spray the coating onto the color test plate. Operating instructions:

Reminder

When spraying the first color plate, use the coverage test paper to confirm the color coverage, so as to avoid p oor coverage.

a. Filter the thinned paint with a funnel and pour it into the spray gun.

b. Set the same spraying conditions as those for spraying vehicles, then apply several layers of paint to its surface, and reserve appropriate flash-off time.

c. Apply the clear coat until the coating surface becomes smooth.



3. **Drying color test plate**: Place the sprayed panel in the well-ventilated spray booth for 10-20 minutes, and dry it at 60°C for about 30 minutes.

⚠ Caution

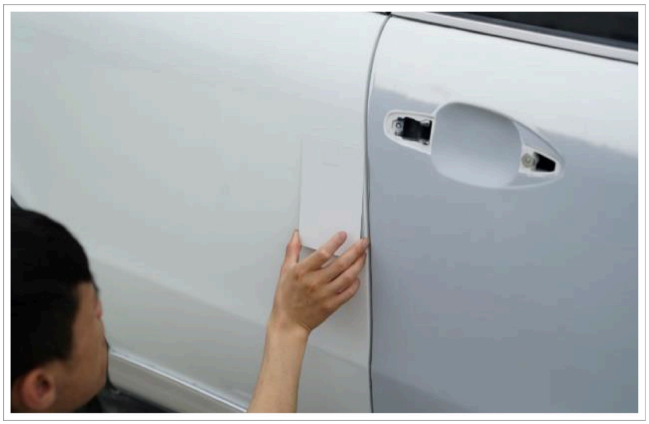
- If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.
- Excessive temperatures can cause plastic components to deform.



4. **Color comparison**: Select the appropriate light source, compare the color of the dried painted color plate with the color of accessories at the damaged parts of the vehicle, and identify the difference between the color plate and the vehicle body color according to the color, hue, lightness, and saturation .

⚠ Caution

- If you stare at a color for a long time, your eyes will get used to the color, so it is difficult to judge the color difference. Therefore, when comparing colors, it is recommended to pause intermittently to allow the eyes to regain their judgment.
- Color comparison shall be performed under at least two different light sources before finalizing the color to prevent metamerism.
- The high-intensity light is required for comparisons of dark colors, while the light for comparisons of light colors is not satisfying for comparisons of dark colors.



5. **Fine-tuning color**: After adding the missing color masterbatch at 10% each time, repeat the above steps and paint th e color test plate until the color is close to the target color. Confirm the required color masterbatch, refer to How to ide ntify the missing color

> **⚠ Caution**
>
> – When adding colors, do not mix two colors simultaneously, as it may be difficult to determine which color is causing issues when problems arise.
>
> – The high-intensity light is required for comparisons of dark colors, while the light for comparisons of light co lors is not satisfying for comparisons of dark colors.



Color mixing of metallic paint

Caution

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

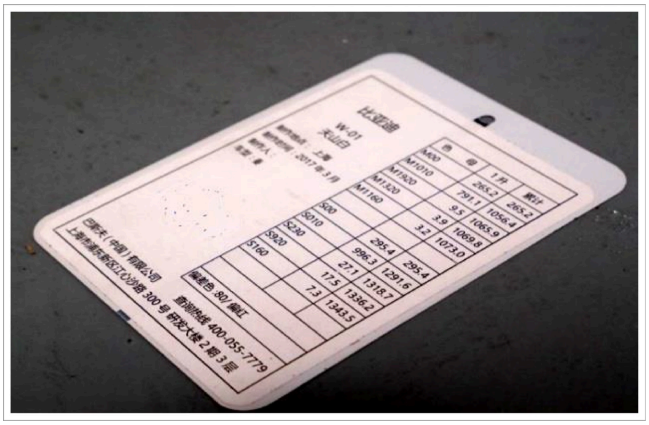
– In order to ensure the quality of color mixing, it is necessary to understand the color mixing before operation.

Obtaining formula

In the actual color mixing, some vehicles have color codes and color formulas, while some vehicles do not have color-relat ed information. The color information shall be reasonably distinguished according to the following color mixing process.

– **Color information**: It is extremely important to confirm the information on the color being mixed by consulting the col or information provided by the paint manufacturer. Fully understand and master the relevant color information so as to shorten the time for color mixing, and avoid problems that may arise during the color mixing process.

  • **Color mixing process**: **Confirming the vehicle body color (color code) -> obtaining formula data -> checki ng color swatch and vehicle body color -> color mixing by measurement -> color fine-tuning after trial sp raying and color comparison.**



– **No color data**: In this case, the color mixing is different only in determining the same color swatch and preliminary co lor mixing process.

Caution

In case of uncertainty about the accuracy of the color data, it is recommended to mix a small amount of paint t o confirm the color.

Reminder

During mixing, the dosage of corresponding paint shall be recorded to facilitate sorting and filing of color formu las.

  • **Color mixing process**: **Looking for similar color swatches to compare with the vehicle body color -> obtai ning formula data -> confirming the same color -> selecting the primary color formula -> color mixing by measurement -> color fine-tuning after trial spraying and color comparison.**

  • **Obtaining formula**: Look for similar color swatches to compare with the vehicle body color, and fine-tune the pai nt color after obtaining the formula.



Step 1: Color mixing by measurement

1. **Confirming formula**: Determine the color formula according to the vehicle body color number and vehicle model colo r swatch.

   ⚠ Caution

   – If one color number corresponds to multiple formulas, select the color that is close to the color of the target vehicle.

   – Select the appropriate environment for color comparison.



2. **Preparation of color masterbatch**: The color masterbatch for color mixing must be mixed for at least 15 minutes eve ry morning and evening with the paint mixer. If a new color masterbatch is used, it can be vibrated with an oscillator fo r 20 minutes before opening the barrel or stirred evenly with a paint mixing ruler before installing the slurry cover.

   Reminder

   Clean the slurry cover and openings after each use. Please store the new tank of color masterbatch upside do wn to avoid pigment precipitation.



3. **Color mixing by measurement**: Follow the corresponding color formula, pour the corresponding color masterbatch i nto the paint mixing cup on the electronic scale, and ensure that the paint is accurately weighed and mixed evenly. Op eration instructions:
   - Plastic containers or metal containers with an inner coating should be used for water-based color masterbatch p aint, and avoid using metal containers directly.
   - Select a container of appropriate size according to the required amount of paint and thinner.
   - Accurately weigh the color masterbatch paint and add the color masterbatch in the formula one by one.
   - Tilt the color masterbatch barrel and then gradually pull the lever of stirring cover to slowly pour out the paint.
   - Repeatedly stir the paint and scrape off all paint adhering to the inner wall of the container with a paint mixing rul er.



Step 2: Color fine-tuning after trial spraying and color comparison

After applying the color to the test panel using a spray gun, the process of adding the missing color through color comparis on to continuously bring the paint color closer to the target color.

1. **Paint mixing**: According to the required proportion, pour the curing agent, thinner, and other paints into the container and mix them. Operation instructions:

⚠ Caution

- Water-based paint requires the addition of a water-based thinner.
- Select the appropriate curing agent and thinner according to the temperature of the baking booth.



2. **Spray color test panel**： Spray the coating onto the color test plate. Operating instructions:

> **Reminder**
>
> When spraying the first color plate, use the coverage test paper to confirm the color coverage, so as to avoid p oor coverage.

   a. Filter the thinned paint with a funnel and pour it into the spray gun.

   b. Set the same spraying conditions as those for spraying vehicles, then apply several layers of paint to its surface, and reserve appropriate flash-off time.

   c. Apply the clear coat until the coating surface becomes smooth.



3. **Drying color test plate**: Place the sprayed panel in the well-ventilated spray booth for 10-20 minutes, and dry it at 6 0°C for about 30 minutes.

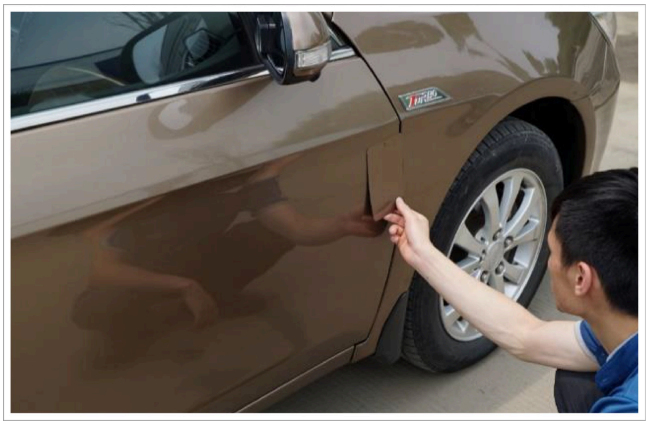
> **Caution**
>
> – If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.
>
> – Excessive temperatures can cause plastic components to deform.



4. **Color comparison**: Select the appropriate light source, compare the color of the dried painted color plate with the col or of accessories at the damaged parts of the vehicle, and identify the difference between the color plate and the vehi cle body color according to the color, hue, lightness, and saturation .

⚠ Caution

- Observe the color at a proper angle and distance for color comparison, and check whether the color obser ved is influenced by the ambient environment.
- If you stare at a color for a long time, your eyes will get used to the color, so it is difficult to judge the color difference. Therefore, when comparing colors, it is recommended to pause intermittently to allow the eyes to regain their judgment.
- Color comparison shall be performed under at least two different light sources before finalizing the color to prevent metamerism.
- The high-intensity light is required for comparisons of dark colors, while the light for comparisons of light co lors is not satisfying for comparisons of dark colors.



5. **Fine-tuning color**: After adding the missing color masterbatch at 10% each time, repeat the above steps and paint th e color test plate until the color is close to the target color. Confirm the required color paste, see How to identify the mi ssing color .

⚠ Caution

- When adding colors, do not mix two colors simultaneously, as it may be difficult to determine which color is causing issues when problems arise.
- The high-intensity light is required for comparisons of dark colors, while the light for comparisons of light co lors is not satisfying for comparisons of dark colors.



How to fine-tune the particle flickering

– The color and brightness of the particles will change according to different view angles, and this phenomenon is known as flickering. For metallic paints, the particle flickering can be adjusted by four methods. The balance point between direct vision and strabismus shall be maintained during fine-tuning.



- **Method 1: Fine-tuning using spraying conditions**: The flash can be adjusted by changing the thinner type, thinning ratio and spraying conditions of the spray gun (dry or wet spraying) and changing the arrangement of aluminum pigments.



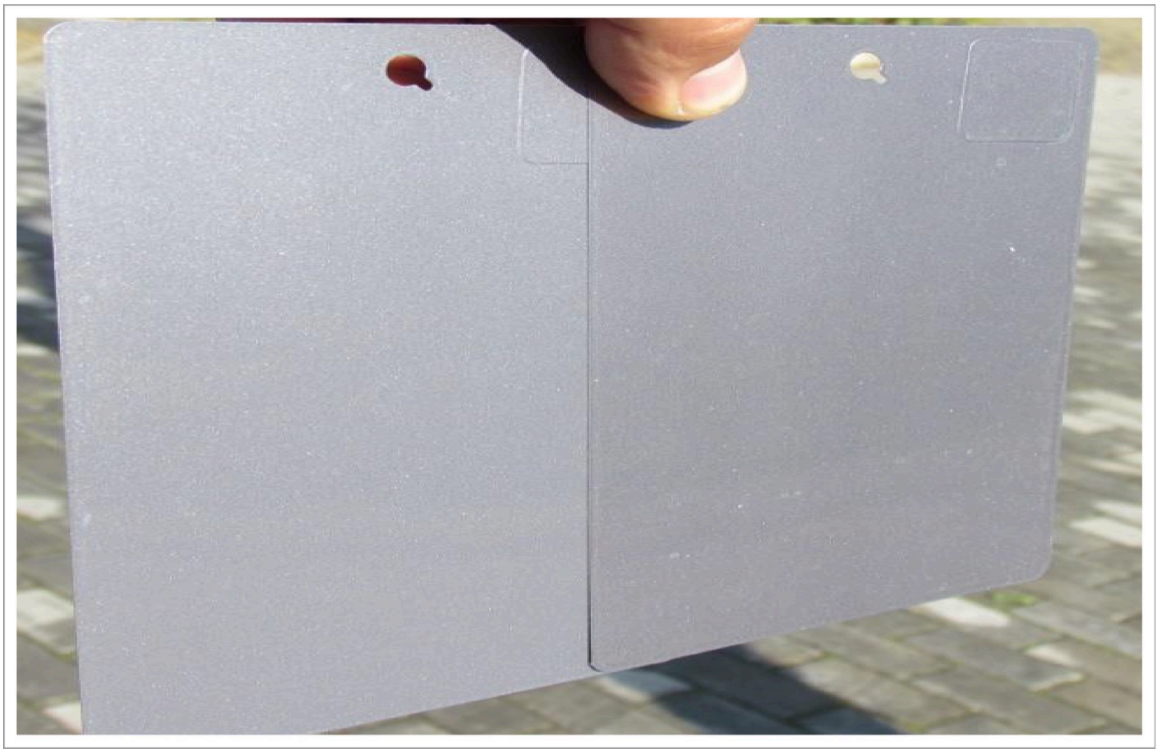
Spraying type	Direct observation: Bright Indirect observation: Dark	Direct observation: Dark Indirect observation: Bright
Amount of thinner	Much	A little
Type of thinner	Quick-drying	Slow-drying
Paint flow	A little	Much
Spraying pressure	High	Low

Spraying type	Direct observation: Bright Indirect observation: Dark	Direct observation: Dark Indirect observation: Bright
Spray gun distance	Far	Close
Spray gun speed	Quick	Slow
Overlapping of spray pattern	A little	Much

- **Method 2: Fine-tuning using additives**: Mainly use aluminum powder control agents and systemic pigments to fine-tune the particle flashing.
  - Silver powder control agent:
    - It enlarges the clearance between aluminum pigments, so that the glitter pigments take on their original size and the hue of tinting pigments and other primary colors is visible.
    - It makes the reflection of aluminum powder strong and black when directly observed.



  - Extender pigment (white color masterbatch):
    - It makes the reflection of aluminum powder turn white when observed indirectly.
    - It is mixed with aluminum pigments to prevent the particles of aluminum pigments from being arranged f latly but to stand up, enhancing the reflectivity when viewed obliquely, for a brighter surface.

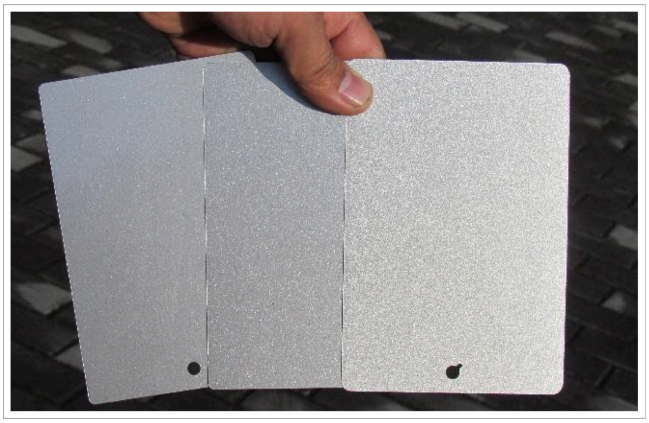


- **Method 3: Adjusting aluminum paint particle**: When using primary color particles of pigment for fine adjustme nt, first adjust the structure and mixing ratio of aluminum pigments, and then add tinting pigments to make the col

or consistent after glossiness adjustment under direct vision and oblique vision.

Reminder

The hues observed from the direct and oblique angles are different since the aluminum pigments are diffe rent in structures.



- **Method 4: Choosing glitter pigment**:
  - When fine-tuning two or more aluminum pigments, check the color masterbatch characteristic table to select an appropriate color masterbatch pigment.
  - The covering power of fine silver powder pigment is strong, so the coloring pigment is not obvious.
  - The tinting pigment is obvious since the coarse aluminum pigment has poor covering power.
  - Because the brightness from direct and oblique angles varies with different types of aluminum pigments, che ck differences of colors and glossiness from the direct and oblique angles of view during fine-toning.



Primer spraying

Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .
- Before applying the primer, evaluate and repair the damaged area. For details, please refer to How to repair the outer panel .
- If the part to be repaired is a plastic part, plastic primer needs to be sprayed, see How to repair plastic parts .

Reminder

Spraying of epoxy primer mainly aims to:

- **Fill and improve the substrate surface**: The epoxy primer has good leveling and filling performance, which ca n fill up cracks, holes, unevenness and other defects on the surface, providing a smooth and uniform foundatio n for subsequent coatings.
- **Enhance the adhesion of the coating film**: Through physical and chemical action, epoxy primer can form a d ense film on the surface of the substrate, greatly enhancing the adhesion of the top coat to the substrate, and preventing the coating from peeling or falling off.
- **Enhance corrosion resistance**: The epoxy primer has excellent chemical stability and can effectively resist th e erosion of various chemicals and solvents, significantly enhancing the corrosion resistance of the coated surf ace.

Reminder

This topic introduces the spraying method of metal primer, which is similar to that of plastic primer.

Operation method

1. Remove old coatings.

   Reminder

   If the old coating has been removed in sheet metal repair, this step can be ignored.

   - Protect panels or assembly parts that have not been disassembled adjacent to the grinding area with masking ta pe.
   - Use sandpaper #60 or #80 to grind and remove the coating along the same range as the marked circle.

     Caution

     - Make the grinder contact with the panel first, and then start the grinder.
     - Prolonged grinding at the same location can cause overheating and deformation.
     - When grinding the coating, if the grinder moves from the steel panel to coating, it is difficult to eliminat e wrinkles and the coating will be over-ground, consequently increasing the width of feather edge.



2. Make feather edges.
   – Adjust the angle of the dual-action sander, and use with the No. 5/7 grinding head and 120-180 grit sandpaper to sand the feather edge by moving the grinder outward in a 30mm circular motion.

Reminder

For deep scratches that do not cause metal deformation and cracking of the paint coating, use a double-a ction grinder in conjunction with P240-320 sandpaper to remove the scratches and grind into the feather e dges, then apply the primer for filling without applying poly-putty.

   – After grinding, ensure a smooth transition between the steel panel and the old coating, and grind a surface with a width of approximately 30 mm on the outer side of the feather edge.

Caution

- If the feather edge is not smooth, poly-putty marks will form when the sprayed paint coat is dried.
- Make the grinder contact with the steel panel before switching it on to avoid deep scratches.
- The qualified standard of the feather edge is that the width must reach 20-30 mm. When checking by hand, ensure that the transition between the coating and the steel panel is smooth.



3. Clean and degrease.

Caution

Inadequate cleaning can result in peeling or blistering of the coating.

   – Clean the panel with two degreasing cloths: wet cloth and dry cloth. Or operate with a solvent spray pot.
   – After removing all dirt or dust on the surface of the panel with the wiping paper and detergent, blow air with a hig h-pressure pneumatic gun to the panel surface to remove dust.

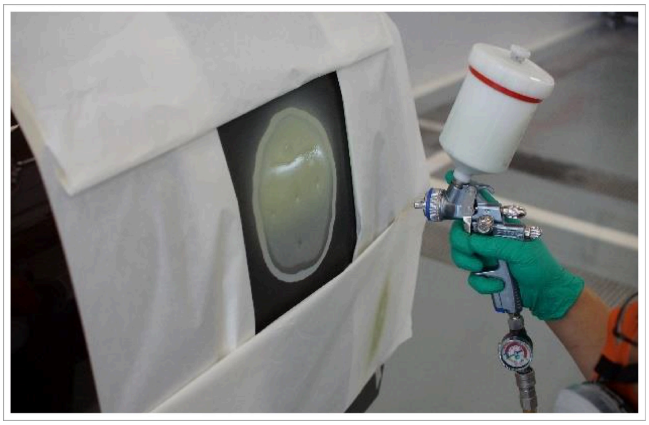


4. Apply epoxy primer.

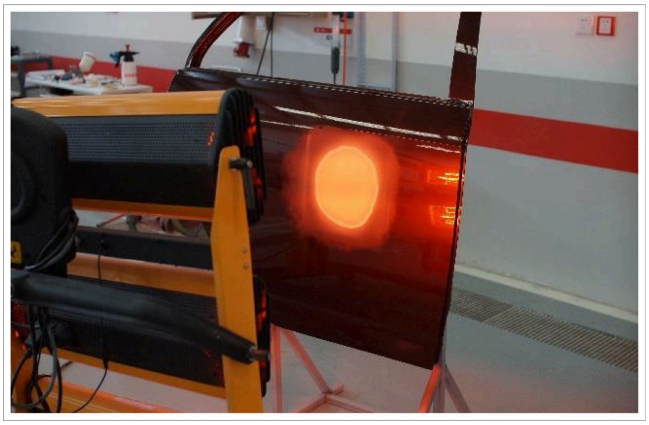
⚠ Caution

Application requires masking beforehand. For details, refer toMasking methods and skills .

– Apply a thin layer of epoxy primer to the prepared metal surface by a brush or spray gun, and ensure that the co mpletely exposed metal is covered after application.



– To improve work efficiency, a short-wave infrared heating lamp can be used to heat the epoxy primer. For specifi c time requirements, see the product manual.



Further guidance

– Application of sheet metal poly-putty
– How to perform color mixing:
  • Color mixing of solid color paint
  • Color mixing of metallic paint
– How to spray:

- Solvent-based solid color paint
- Solvent-based Metallic Paint
- Spraying of plastic parts

Spraying of primer

⚠ Caution

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

The reasons for applying the primer prior to the top coat are as follows:

– To protect the metal substrate, prevent the substrate metal from being exposed, and improve its rust resistance.

– Improve adhesion by grinding the steel panel surface to enhance the coating adhesion.

– To restore surface shape by repairing slight deformation.

– To prevent poly-putty from absorbing the top coat and affecting the brightness of paint surface.

Operation method

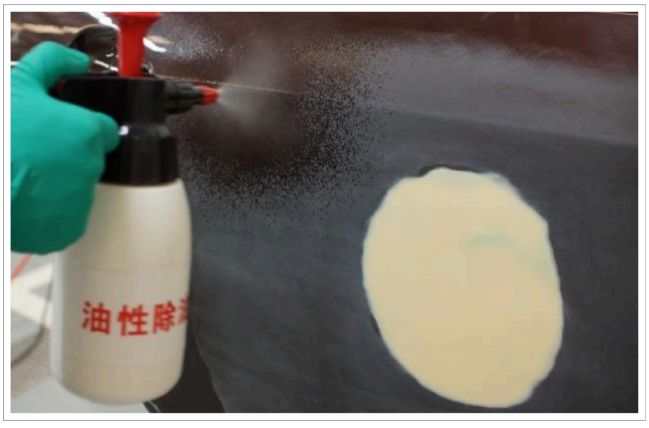
1. Application of poly-putty, refer to Application of sheet metal poly-putty .
2. Clean and degrease.

⚠ Caution

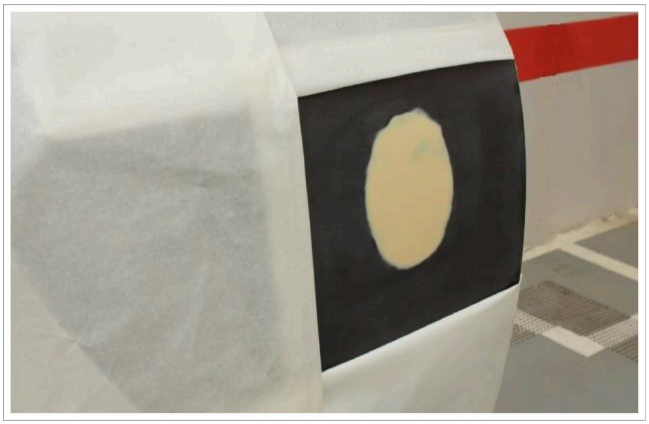
Inadequate cleaning can result in peeling or blistering of the coating.

– Clean the panel with two degreasing cloths: wet cloth and dry cloth. Or operate with a solvent spray pot.

– After removing all dirt or dust on the surface of the panel with the wiping paper and detergent, blow air with a hig h-pressure pneumatic gun to the panel surface to remove dust.



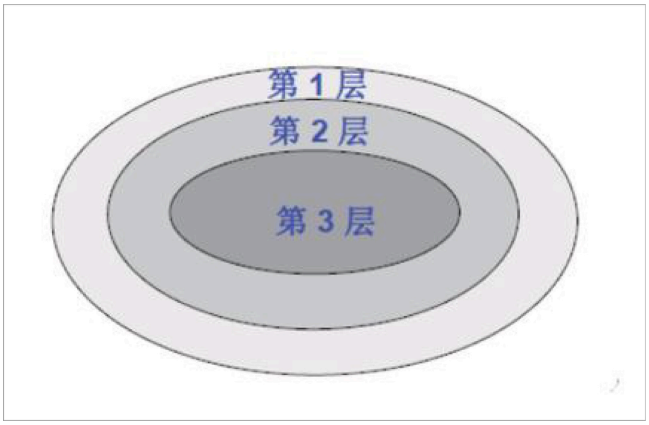
3. Mask the areas that do not require painting, see Masking methods and skills .



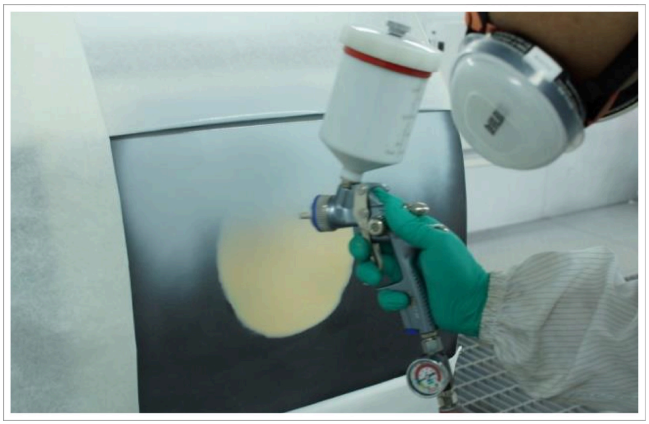
4. Mix primer. Operation instructions:
   - According to the mixing ratio of the paint manufacturer, select the thinner suitable for the spraying environment, and stir it evenly with the primer and curing agent.
   - Pour the well-stirred primer into the spray gun through a paper funnel after filtering.



5. Apply intermediate primer: Apply the primer in several coatings, ensuring that the primer is sprayed within the sanded area and that the poly-putty is completely covered. Operation instructions:
   - Adjust the spray gun to set the spray pattern, paint output, and spraying pressure, and test whether the spray pa ttern is normal.
   - Apply the first layer of primer to the area ground with sandpaper #320 until a wet coating is formed in the area.
   - Reduce the area applied with primer layer by layer during each application. Reserve sufficient flash-off time duri ng application.



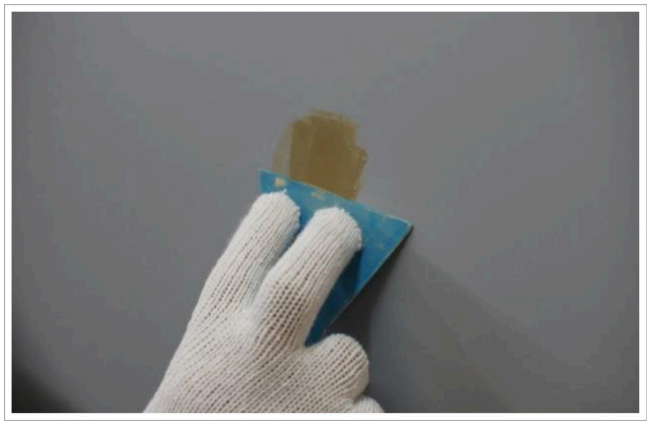
   - Confirm the effect after applying the intermediate primer. If pinholes or sandpaper marks are found, you can do p artial repair spraying for filling.



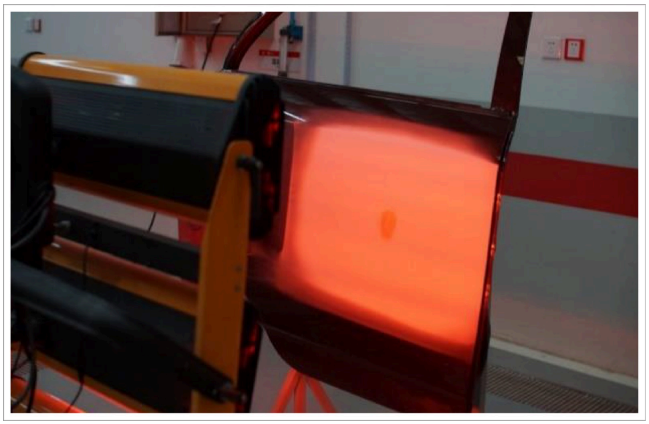
6. Drying intermediate coating primer: Force drying of intermediate coat primer to ensure it is completely dry and ready f or sanding, operating instructions:
   - Reserve 10 to 20 min before forced drying to allow the solvents in the primer to volatilize naturally.
   - Before drying the primer, reserve a period of curing time. Forced drying without curing time reserved will result in pinholes.
   - The distance between the infrared heating lamp and the panel should be no less than 80cm to prevent panel ov ertemperature.



7. Check the surface and apply nitrocellulose poly-putty as appropriate. Operating instructions:
   - Check the primer coat for defects in a well-lit environment.
   - If there are no pinholes or sandpaper marks, the step of repairing poly-putty can be skipped.
   - If there are defects such as sand holes or sandpaper marks in the primer applied area, apply nitrocellulose poly-putty for filling. Operation instructions:
     - Apply the nitrocellulose poly-putty into the pinholes and sandpaper marks, ensuring that all pinholes and san dpaper marks are filled.
     - Press firmly and scrape along the surface with a vertical scraper to apply a thin layer of poly-putty.



8. Dry the nitrocellulose poly-putty according to the drying conditions specified by the paint manufacturer.



9. Manually grind the primer and poly-putty with abrasive block equipped with sandpaper #320. Operation instructions:

⚠ Caution

If wet grinding is adopted for the primer, wet grinding sandpaper #800 shall be used. The related operation steps and key points are similar.

- Protect the area around the repaired part with masking tape.
- In the initial stage of polishing, slightly coarse sandpaper can be used for initial sanding, and then fine sandpaper should be used to ensure that the surface is smooth and there are no steps at the edges and surroundings of the intermediate primer.
- Grind from the primer to the old coating.
- Use a vacuum type hand planer to grind the primer surface. When the sandpaper is blocked, use a brush to remove the grinding dust.
- To prevent leaving coarse sandpaper marks, ensure that the grinding block is at an angle of 45° to the grinding direction.
- Do not expand the grinding area when spraying locally.
- Ensure that all pinholes and sandpaper marks in primer coating are filled.
- Ensure that the poly-putty is not exposed after grinding the primer area.



10. Use a dual-action sander with a No. 3 abrasive head equipped with 400-500 grit sandpaper to sand the intermediate coat. Operating instructions:

⚠ Caution

- Sand the exposed putty areas that need to be recoated with surfacer primer, as exposed putty will absorb the paint and cause defects.
- Smooth surface indicates that the grinding of the primer is completed. Otherwise, the primer needs to be ground by hand.

– During the polishing process, use polishing indicator to check if the surface is smooth.

– Adjust and test the sander speed before sanding because a higher speed will be difficult to operate and can easily grind through the primer coating.

– Grind from the primer to the old coating.

– Manually sand areas where the dual-action sander cannot be used.

– Do not expand the grinding area during local repair spraying.

– Ensure a smooth surface and no steps around the edges and surroundings of the primer, fill all pinholes and sandpaper marks and ensure the poly-putty is not exposed.



Further guidance

– How to perform color mixing:
  - Color mixing of solid color paint
  - Color mixing of metallic paint
– How to spray:
  - Solvent-based solid color paint
  - Solvent-based Metallic Paint
  - Spraying of plastic parts

Preliminary preparation

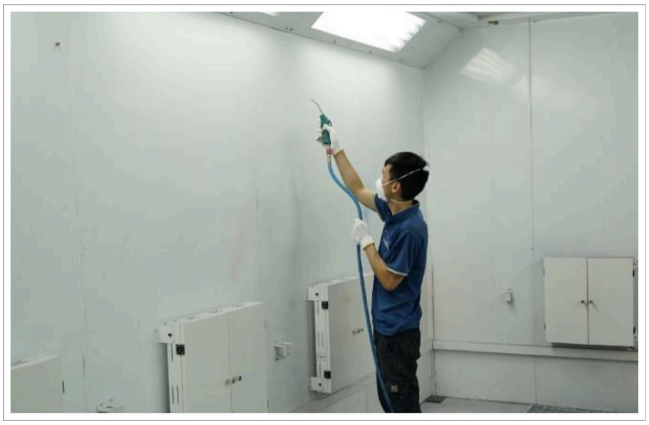
To ensure the operation quality, preliminary preparations shall be made before operation.

⚠ Caution

- During operation, please take safety protection measures as required. For details of safety protection, please refer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, please refer to Site safety and vehicle protection .

Cleaning of spray booth

- Clean the spray booth walls with compressed air to ensure that all dirt and dust have been removed.
- Regularly check the oil-water separator of the air compressor, and drain water if necessary, refer to Auxiliary equipment and tools .
- Do not use silicon-containing products in the painting workshop or spray booth.
- Regularly maintain the spray booth and replace the filter materials in it.



Clean oneself

⚠ Warning

Do not blow on your face or ears.

- Reasonably wear workwear, caps and protective masks for spraying, remove foreign matter and dust adhered to your body from top to bottom by using compressed air with a pressure higher than the spraying pressure.



Paint mixing

Warning

- Water-based paint shall be mixed in plastic containers or metal containers with coatings inside.
- Improper thinner or incorrect thinning will result in paint sagging, coarse textures and other defects.

- Uniformly mix curing agent, thinner and coloring paint suitable for the ambient temperature of the spray booth with an electronic scale (by weight) or a paint mixing ruler (by volume).



Subsequent operations

- Spray solvent-based solid color paint. Refer to Solvent-based solid color paint .
- Spray water-based solid color paint. Refer to Water-based solid color paint .
- Spray solvent-based metallic paint, refer toSolvent-based Metallic Paint .
- Spray water-based metallic paint, see Water-based metallic paint .

Solvent-based solid color paint

⚠ Caution

- During operation, please take safety protection measures as required. For details of safety protection, please refer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, please refer to Site safety and vehicle protection .

Scenario I: Spraying of local parts after repair

1. Apply primer. Refer toSpraying of primer .
2. For preparation, refer to Preliminary preparation
3. Cleaning of panels: After removing dust and dirt on the clearance of panels and spraying surface by using compressed air with a pressure higher than the spraying pressure, clean the panel with degreaser.

   ⚠ Caution

   If the panel to be sprayed is a plastic part, remove static electricity with the electrostatic cleaning agent.

4. Atomizing spraying: After moving the vehicle/panel to the spray booth, spray a single coating on the primer to make the coating slightly glossy.

   ⚠ Caution

   - Wait for a few seconds after spraying, and judge the glossiness.
   - Control the spraying range. Do not apply too much in one time.
   - During spraying, check whether there are fish eyes on the surface. If any, increase the pressure of spraying air and spray the surface with dry spraying method to cover them.
   - After spraying, confirm whether there is any defect on the sprayed surface with a fluorescent lamp. If any, refer to FAQs and solutions for treatment.



5. Color spraying: Use a spray gun to apply thin coatings in multiple passes to completely cover the substrate. After eac h coating is applied, allow appropriate flash-off time.

Reminder

- Paint sagging will occur if the coating is too thick at one time.
- Painting far away from the panel can result in coarse textures and excessive range.
- The spraying area should be reasonably controlled, and the coverage area should be slightly larger than th e previous coating for each spraying.
- Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.



6. Transitional spraying finishing: Apply paint, making the coverage area wider than the colored paint coating, operation i nstructions:

⚠ Caution

- Complete this process before the paint mist of color spraying is dried.
- The spraying range in the blend area shall be controlled within the grinding range and free of rough spots; otherwise, faults will occur during polishing.

- Add the thinner or blending solvent of the same amount into the residual paint for dilution.
- During spraying, pay attention to adjusting the trigger pressure and check the surface glossiness.





7. Forced drying: Place the sprayed panel in the well-ventilated spray booth for 10-20 minutes, and dry it at 60°C for abo ut 30 minutes.

Reminder

- If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.
- In case of incomplete drying, defects will occur at the blend area during polishing.

Reminder

In case of small-area spraying or local repair, the paint can be baked after the paint film surface is dry and dust -free.



8. Perform polishing and finishing treatment on the painted panel, refer toPerforming polishing .

Scenario II: Spray the entire panel surface

1. Apply primer. Refer toSpraying of primer .

Caution

This step can be ignored if the new panel is provided with primer.

2. For preparation, refer to Preliminary preparation
3. Cleaning of panels: After removing dust and dirt on the clearance of panels and spraying surface by using compresse d air with a pressure higher than the spraying pressure, clean the panel with degreaser.

Caution

If the panel to be sprayed is a plastic part, remove static electricity with the electrostatic cleaning agent.



4. Atomizing spraying: After moving the vehicle/panel to the spray booth, spray a thin layer of paint on its surface to mak e the coating slightly glossy.

Caution

- Wait for a few seconds after spraying, and judge the glossiness.
- During spraying, check whether there are fish eyes on the surface. If any, increase the pressure of sprayin g air and spray the surface with dry spraying method to cover them.
- After spraying, confirm whether there is any defect on the sprayed surface with a fluorescent lamp. If any, r efer to FAQs and solutions for treatment.



5. Color spraying: Use a spray gun to apply thin coatings multiple times to fully cover the substrate.

Reminder

- Painting far away from the panel can result in coarse textures and excessive range.
- Paint sagging will occur if the coating is too thick at one time.

– If the covering power of the paint is poor, it needs to be sprayed several times.
– For some colors, due to poor covering power, multiple sprayings may be required.
– Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

Reminder

Using color primer (adjustable grey primer) can improve the base color coverage to reduce paint consumption.



6. Spray finishing: Use spray painting and apply the coating in several thin layers until the texture and glossiness are ev en, aiming to match the texture of the adjacent panels as closely as possible.

Reminder

Texture and glossiness can be detected by a fluorescent lamp.





7. Forced drying: Place the sprayed panel in the well-ventilated spray booth for 10-20 minutes, and dry it at 60°C for abo ut 30 minutes.

Caution

- If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.
- Excessive temperatures can cause plastic components to deform.

Reminder

In case of small-area spraying or local repair, the paint can be baked after the paint film surface is dry and dust -free.



FAQs

- FAQs and solutions

Water-based solid color paint

⚠ Caution

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

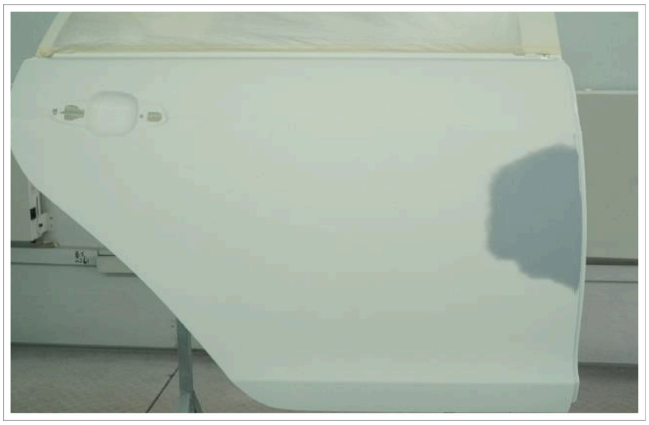
Scenario I: Spraying of local parts after repair

Step 1: Spray sater-based base coat

1. Apply primer. Refer toSpraying of primer .
2. For preparation, refer to Preliminary preparation
3. Cleaning of panels: After removing dust and dirt on the clearance of panels and spraying surface by using compresse d air with a pressure higher than the spraying pressure, clean the panel with degreaser.

⚠ Caution

If the panel to be sprayed is a plastic part, remove static electricity with the electrostatic cleaning agent.



4. Atomizing spraying: After moving the vehicle/panel to the spray booth, spray a single coating on the primer to achieve a uniform surface glossiness of 50% immediately after spraying.

⚠ Caution

– Wait for a few seconds after spraying, and judge the glossiness.

– Control the spraying range. Do not apply too much in one time.

– During spraying, check whether there are fish eyes on the surface. If any, increase the pressure of sprayin g air and spray the surface with dry spraying method to cover them.

– After spraying, confirm whether there is any defect on the sprayed surface with a fluorescent lamp. If any, r efer to FAQs and solutions for treatment.

– **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1 - 1.5 bar
  - **Paint output**: Turn 2.5 turns from the fully closed position, and fully open spray pattern.

- **Spraying distance**: 15 cm
- **Spray overlap**: 2/3
- **Spraying velocity**: 60 cm/s

– **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °



5. Color spraying: Apply a thin coating in several times with a spray gun, so that the substrate is completely covered and the glossiness of the sprayed surface is about 60 - 70%. Operation instructions:

Reminder

– Repeat spraying as many times as necessary until the substrate is covered.

– Insufficient glossiness after application will result in coarse textures.

– Paint sagging will occur if the coating is too thick at one time.

– Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

– The spray gun should be closer to the spraying surface than the atomizing spraying.

– With the increase of coatings, the absorption capacity of paint will enhance as well. Spray carefully for even glos siness of the whole surface.

– **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1 - 1.5 bar
  - **Paint output**: 2.5-3 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 10 - 15 cm

- **Spray overlap**: 3/4
- **Spraying velocity**: 60 cm/s

– **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °



6. Transition Base Color: Add blending solvent to the remaining paint to dilute it, then apply 1 or 2 coats within the edges of the color spraying area, eliminating the coarse overspray at the coating edges until the transition area disappears.

Reminder

– If the paint is applied to a dry surface, it will result in a rough texture and difficult transitions.
– Continue spraying in the colored area in case of coarse textures in such area.
– Paint sagging will occur if the coating is too thick at one time.

– **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1.2 bar
  - **Paint output**: Turn 2.0 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 10 - 15 cm
  - **Spray overlap**: 3/4
  - **Spraying velocity**: 60 cm/s

– **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °



Step 2: Spray clear coat.

1. Atomizing spraying: After confirming the application (adhesion by paint mist) area of the base color area, evenly spray a thin clear coat to ensure that the clear coat application area is slightly larger and glossy than the base coat blend ar ea.

Caution

- During operation, reserve sufficient flash-off time to ensure complete solvent evaporation.
- Do not dry the sprayed surface with high-pressure air.
- Uneven spraying texture may result in paint sagging or coarse textures.



2. Spray finishing: Apply a wet coating so that the coating texture is uniform and consistent with the surrounding panel; o therwise, repeat spraying.

Reminder

- Make sure that the texture of the sprayed panel is consistent with that of the original position of the adjace nt panel; otherwise, the paint mist cannot be integrated into the coating, resulting in coarse textures.

– If necessary, perform blending after the clear coat is applied and before the paint mist at the edge of the bl end area.

Reminder

Texture and glossiness can be detected by a fluorescent lamp.

– Apply several times on the wet coating.

– After spraying, reserve sufficient flash-off time to ensure solvent evaporation.



3. For forced drying, refer to How to dry

Reminder

– If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.

– Excessive temperatures can cause plastic components to deform.

Reminder

In case of small-area spraying or local repair, the paint can be baked after the paint film surface is dry and dust -free.



Scenario II: Spray the entire panel surface

Step 1: Spray sater-based base coat

1. Apply primer. Refer toSpraying of primer .

Caution

This step can be ignored if the new panel is provided with primer.

2. For preparation, refer to Preliminary preparation
3. Cleaning of panels: After removing dust and dirt on the clearance of panels and spraying surface by using compresse d air with a pressure higher than the spraying pressure, clean the panel with degreaser.

⚠ Caution

If the panel to be sprayed is a plastic part, remove static electricity with the electrostatic cleaning agent.

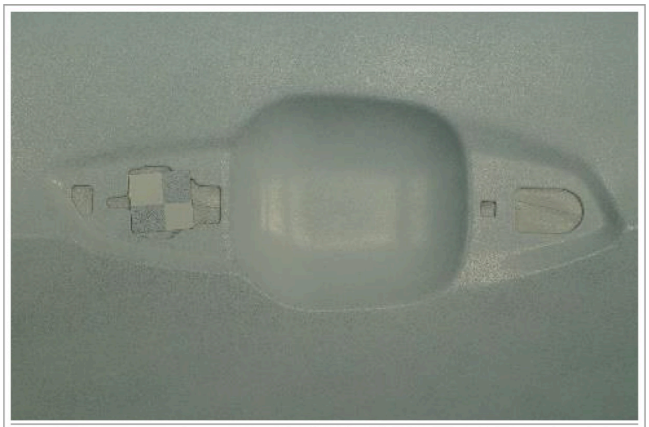


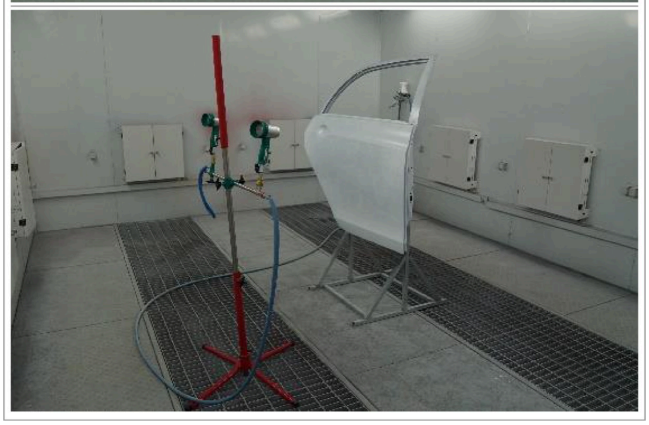
4. Atomizing spraying: Spray a layer of water-based primer evenly on the panel surface to make the glossiness of the sp rayed surface reach about 50%, and then dry it with a blow dryer until the surface glossiness disappears.

⚠ Caution

- Wait for a few seconds after spraying, and judge the glossiness.
- During spraying, check whether there are fish eyes on the surface. If any, increase the pressure of sprayin g air and spray the surface with dry spraying method to cover them.
- Too wet spraying and too high glossiness will result in paint sagging, and uneven glossiness will lead to co arse texture of coating.

- **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1.5 bar
  - **Paint output**: 2.5-3 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 15 cm
  - **Spray overlap**: 2/3
  - **Spraying velocity**: 60 cm/s
- **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °





5. Color spraying: Apply a thin coating in several times with a spray gun, so that the substrate is completely covered and the glossiness of the sprayed surface is about 60 - 70%. Operation instructions:

Reminder

– Repeat spraying as many times as necessary until the substrate is covered.

– Insufficient glossiness after application will result in coarse textures.

– Paint sagging will occur if the coating is too thick at one time.

– Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

– The spray gun should be closer to the spraying surface than the atomizing spraying.

– With the increase of coatings, the absorption capacity of paint will enhance as well. Spray carefully for even glos siness of the whole surface.

– **Configuration requirements of spray gun:**

  • **Spray gun diameter**: 1.3 mm

  • **Air pressure (gun tail):** 1-1.5 bar

  • **Paint output**: 2.5-3 turns from the fully closed position, and fully open spray pattern.

  • **Spraying distance**: 15 cm

  • **Spray overlap**: 3/4

  • **Spraying velocity**: 60 cm/s

– **Blow dryer usage requirements**:

  • Air pressure: 4 bar

  • Distance: Greater than 30 cm

  • Angle: 45 °



Step 2: Spray clear coat.

1. Atomizing spraying: Spray a thin clear coat on the panel surface. During spraying, spray the panel edge first and then the whole panel.

Caution

- During operation, reserve sufficient flash-off time to ensure complete solvent evaporation.
- Do not dry the sprayed surface with high-pressure air.
- Uneven spraying texture may result in paint sagging or coarse textures.





2. Spray finishing: Spray one third of the panel each time. During spraying, spray the panel edge first. Operation instructi ons:

Reminder

- Make sure that the texture of the sprayed panel is consistent with that of the original position of the adjace nt panel; otherwise, the paint mist cannot be integrated into the coating, resulting in coarse textures.

Reminder

Texture and glossiness can be detected by a fluorescent lamp.

– Apply several times on the wet coating.
– After spraying, reserve sufficient flash-off time to ensure solvent evaporation.



3. For forced drying, refer to How to dry

Caution

– If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.
– Excessive temperatures can cause plastic components to deform.

Reminder

In case of small-area spraying or local repair, the paint can be baked after the paint film surface is dry and dust -free.



FAQs

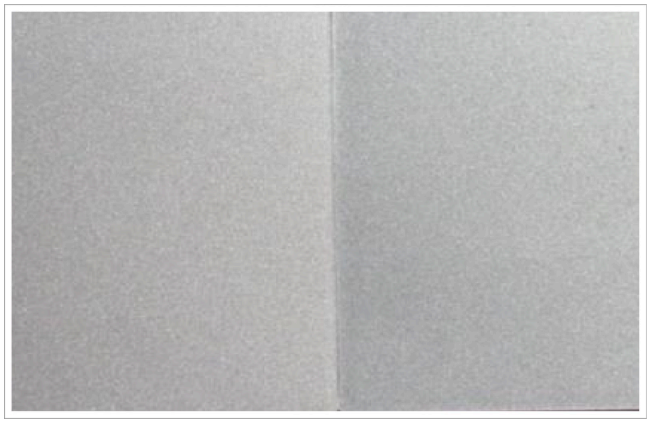
- FAQs and solutions

Material Characteristics

Features

Unlike solid color paints that only use tinting pigments and present the same color at different observation angles, metallic paints contain glitter pigments with special gloss under light and can exhibit different colors at different observation angles.

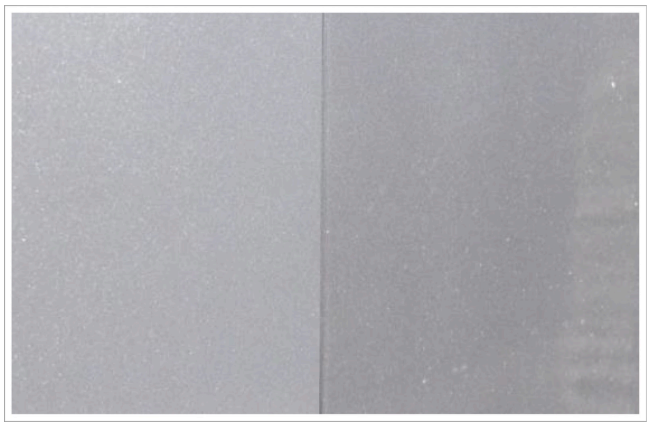
- It produces a unique glittering effect in sunlight.
- When viewed from the front or side, there is a great difference in the hue.
- It exhibits excellent transparency and three-dimensional effect.
- Difference from solid paint:
  - Different number of processes.
  - Different pigments used.
  - Different reflective effects.



Differences between wet and dry spraying processes

Due to the uniqueness of metallic paint materials, different wet and dry coatings will lead to different colors:

- Dry coating: The surface appears bright when viewed directly and dark when viewed at an angle.
- Wet Coating: The surface appears dark when viewed directly and bright when viewed at an angle.



Solvent-based Metallic Paint

⚠ Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

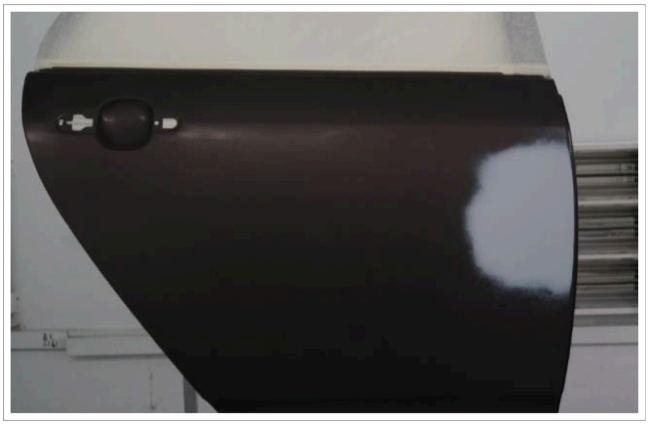
Scenario I: Spraying of local parts after repair

Step 1: Spray primer layer.

1. Apply primer. Refer toSpraying of primer .
2. For preparation, refer to Preliminary preparation
3. **Cleaning of panels**: After removing dust and dirt on the clearance of panels and spraying surface by using compress ed air with a pressure higher than the spraying pressure, clean the panel with degreaser.

⚠ Caution

If the panel to be sprayed is a plastic part, remove static electricity with the electrostatic cleaning agent.



4. **Atomizing spraying of base coat**: After moving the vehicle/panel to the spray booth, spray a single coating on the pr imer to make the coating slightly glossy.

⚠ Caution

- Wait for a few seconds after spraying, and judge the glossiness.
- Control the spraying range. Do not apply too much in one time.
- During spraying, check whether there are fish eyes on the surface. If any, increase the pressure of sprayin g air and spray the surface with dry spraying method to cover them.
- After spraying, confirm whether there is any defect on the sprayed surface with a fluorescent lamp. If any, r efer to FAQs and solutions for treatment.



5. **Color spraying**: Use an arcing technique to apply multiple thin coatings to transition the edge of the base coat, compl etely covering the substrate. After each coating is applied, allow appropriate flash-off time.

Reminder

- Paint sagging will occur if the coating is too thick at one time.
- Black circles at the edge of paint shall be avoided when an arc method is used for spraying.
- Painting far away from the panel can result in coarse textures and excessive range.
- The spraying area should be reasonably controlled, and the coverage area should be slightly larger than th e previous coating for each spraying.
- Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

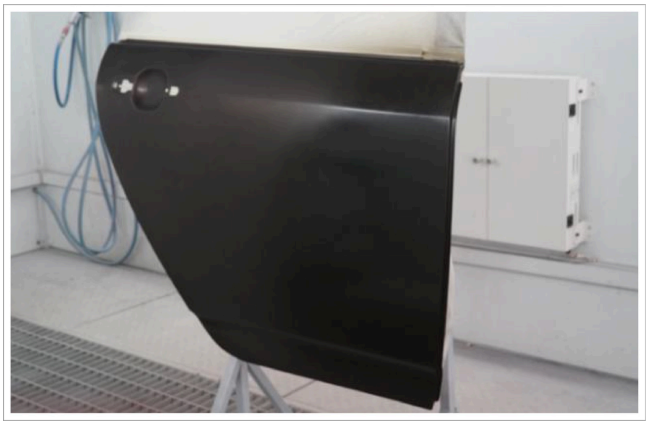


6. **Transitional spraying finishing**: Apply coating and eliminate blemishes through dry atomizing spraying, ensuring the coverage area is wider than the colored coating layer. Operating instructions:

Caution

- Complete this process before the paint mist of color spraying is dried.
- Expand the spraying area during each spraying, gradually reduce the coating thickness to transition the col or.
- The spraying range in the blend area shall be controlled within the grinding range and free of rough spots; otherwise, faults will occur during polishing.

- Add the thinner or blending solvent of the same amount into the residual paint for dilution.
- During spraying, pay attention to adjusting the trigger pressure and check the surface glossiness.



Step 2: Spraying clear coat

1. **Atomizing spraying of clear coat**: After checking whether the aluminum paint coating is defective, perform atomizin g spraying of clear coat in the blend area larger than the base color.

Caution

- During application, the previous coating shall not be too wet or dry. If too wet, aluminum paint particles ma y float into the clear coat to form spots; if too dry, poor adhesion will occur.
- During operation, reserve sufficient flash-off time to ensure complete solvent evaporation.
- Do not dry the sprayed surface with high-pressure air.
- Uneven spraying texture may result in paint sagging or coarse textures.



2. **Spray finishing**: Apply a wet coating so that the coating texture is uniform and consistent with the surrounding panel; otherwise, repeat spraying.

Reminder

- Make sure that the texture of the sprayed panel is consistent with that of the original position of the adjace nt panel; otherwise, the paint mist cannot be integrated into the coating, resulting in coarse textures.
- If necessary, perform blending after the clear coat is applied and before the paint mist at the edge of the bl end area.

Reminder

Texture and glossiness can be detected by a fluorescent lamp.

– Apply several times on the wet coating.

– After spraying, reserve sufficient flash-off time to ensure solvent evaporation.



3. **Forced drying**: Place the sprayed panel in the well-ventilated spray booth for 10-20 minutes, and dry it at 60°C for ab out 30 minutes.

Reminder

– If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.
– In case of incomplete drying, defects will occur at the blend area during polishing.

Reminder

In case of small-area spraying or local repair, the paint can be baked after the paint film surface is dry and dust -free.



4. Perform polishing and finishing treatment on the painted panel, refer toPerforming polishing .

Scenario II: Spray the entire panel surface

Step 1: Spray primer layer.

1. Apply primer. Refer toSpraying of primer .

Caution

This step can be ignored if the new panel is provided with primer.

2. For preparation, refer to Preliminary preparation
3. **Cleaning of panels**: After removing dust and dirt on the clearance of panels and spraying surface by using compress ed air with a pressure higher than the spraying pressure, clean the panel with degreaser.

Caution

If the panel to be sprayed is a plastic part, remove static electricity with the electrostatic cleaning agent.



4. **Atomizing spraying of base coat**: After moving the vehicle/panel to the spray booth, spray a single coating on the pr imer to make the coating slightly glossy.

Caution

- Wait for a few seconds after spraying, and judge the glossiness.
- Control the spraying range. Do not apply too much in one time.
- During spraying, check whether there are fish eyes on the surface. If any, increase the pressure of sprayin g air and spray the surface with dry spraying method to cover them.
- After spraying, confirm whether there is any defect on the sprayed surface with a fluorescent lamp. If any, r efer to FAQs and solutions for treatment.



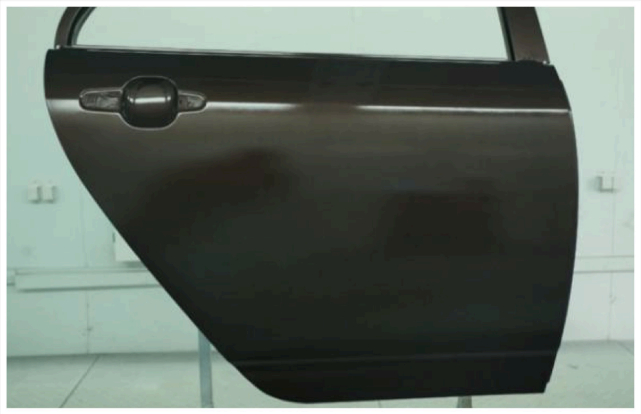
5. **Color spraying**: Wet spray the primer to make it glossy, operating instructions:

Reminder

- After each coating is applied, dry the paint with a blow dryer until the surface glossiness disappears.
- Repeat spraying as many times as necessary until the substrate is covered.
- Insufficient glossiness after application will result in coarse textures.
- Paint sagging will occur if the coating is too thick at one time.
- Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

– The spray gun should be closer to the spraying surface than the atomizing spraying.

– With the increase of coatings, the absorption capacity of paint will enhance as well. Spray carefully for even glos siness of the whole surface.



6. **Eliminate spots**: Apply 1 or 2 thin coatings to remove coating marks with a spray gun, ensuring the sprayed surface i s smooth, with a glossiness of approximately 30% - 50%.

Reminder

– After spraying, check whether there are spots. If any, repeat the spraying.

– After each coating is applied, dry the paint with a blow dryer until the surface glossiness disappears.

– Insufficient glossiness after application will result in coarse textures.

– Paint sagging will occur if the coating is too thick at one time.

– Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.



Step 2: Spraying clear coat

1. **Atomizing spraying of clear coat**: Spray a thin clear coat on the panel surface. During spraying, spray the panel ed ge first and then the whole panel.

Caution

– During operation, reserve sufficient flash-off time to ensure complete solvent evaporation.

– Do not dry the sprayed surface with high-pressure air.

– Uneven spraying texture may result in paint sagging or coarse textures.



2. **Spray finishing**: Spray one third of the panel each time. During spraying, spray the panel edge first. Operation instru ctions:

Reminder

– Make sure that the texture of the sprayed panel is consistent with that of the original position of the adjace nt panel; otherwise, the paint mist cannot be integrated into the coating, resulting in coarse textures.

Reminder

Texture and glossiness can be detected by a fluorescent lamp.

– Apply several times on the wet coating.
– After spraying, reserve sufficient flash-off time to ensure solvent evaporation.



3. For forced drying, refer to How to dry

Reminder

– If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.
– Excessive temperatures can cause plastic components to deform.

Reminder

In case of small-area spraying or local repair, the paint can be baked after the paint film surface is dry and dust -free.



FAQs

- FAQs and solutions

Water-based metallic paint

Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

Scenario I: Spraying of local parts after repair

Step 1: Spray primer layer.

1. Apply primer. Refer toSpraying of primer .
2. For preparation, refer to Preliminary preparation
3. **Cleaning of panels**: After removing dust and dirt on the clearance of panels and spraying surface by using compress ed air with a pressure higher than the spraying pressure, clean the panel with degreaser.

Caution

If the panel to be sprayed is a plastic part, remove static electricity with the electrostatic cleaning agent.



4. **Spraying of clear coat in the blending area**: After moving the vehicle/panel to the spray booth, apply 1-2 layers in th e color spraying area, so that the surface glossiness after spraying reaches 50%.

Caution

- Wait for a few seconds after spraying, and judge the glossiness.
- Control the spraying range. Do not apply too much in one time.
- When spraying clear coat in the blend area, adjust the state of the base color blend area to prevent the pai nt mist from causing a rough texture.

- **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1.5 bar
  - **Paint output**: 2.5-3 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 15 - 20 cm
  - **Spray overlap**: 2/3

- **Spraying velocity**: 60 - 80cm/s



5. **Atomizing spraying of base coat**: Spray a single coating over the primer to enable a glossiness of 50% of the sprayed surface.

⚠ Caution

– Wait for a few seconds after spraying, and judge the glossiness.

– Pay attention to the glossiness during spraying. The excessive glossiness will cause paint sagging.

– Control the spraying range. Do not apply too much in one time.

– During spraying, check whether there are fish eyes on the surface. If any, increase the pressure of spraying air and spray the surface with dry spraying method to cover them.

– After spraying, confirm whether there is any defect on the sprayed surface with a fluorescent lamp. If any, refer to FAQs and solutions for treatment.

– **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1 - 1.5 bar
  - **Paint output**: Turn 2.5 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 15 - 20 cm
  - **Spray overlap**: 2/3
  - **Spraying velocity**: 60 cm/s
– **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °



6. **Color spraying**: Spray primer on the surface of the panel until the glossiness of the color spraying area is about 50%, and there is no obvious transition area, operating instructions:

Reminder

- Wet spraying is required; otherwise, the paint will not adhere properly to the panel surface.
- Repeat spraying as many times as necessary until the substrate is covered.
- Insufficient glossiness after application will result in coarse textures.
- Paint sagging will occur if the coating is too thick at one time.
- Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

- **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1 - 1.5 bar
  - **Paint output**: Turn 2.0 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 10 - 15 cm
  - **Spray overlap**: 3/4
  - **Spraying velocity**: 60 cm/s
- **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °

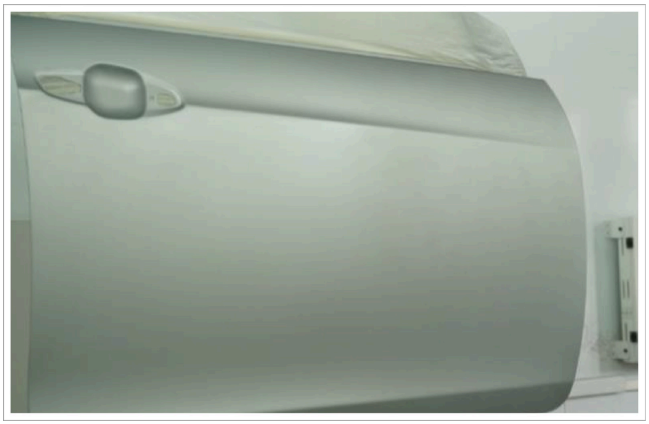


7. **Eliminate spots**: Using a spray gun, apply 1 or 2 thin coatings to remove coating blemishes, ensuring the sprayed su rface is even with a glossiness of approximately 50%.

Reminder

- After each coating is applied, dry the paint with a blow dryer until the surface glossiness disappears.
- Insufficient glossiness after application will result in coarse textures.
- Paint sagging will occur if the coating is too thick at one time.
- Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

- **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1.5 bar
  - **Paint output**: 2.5-3 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 15 - 20 cm
  - **Spray overlap**: 3/4
  - **Spraying velocity**: 80 cm/s
- **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °



Step 2: Spray clear coat.

1. **Atomizing spraying of clear coat**: After confirming the application (adhesion by paint mist) area of the base color ar ea, evenly spray a thin clear coat to ensure that the clear coat application area is slightly larger and glossy than the ba se coat blend area.

Caution

- During operation, reserve sufficient flash-off time to ensure complete solvent evaporation.
- Do not dry the sprayed surface with high-pressure air.
- Uneven spraying texture may result in paint sagging or coarse textures.



2. **Spray finishing**: Apply a wet coating so that the coating texture is uniform and consistent with the surrounding panel; otherwise, repeat spraying.

Reminder

- Make sure that the texture of the sprayed panel is consistent with that of the original position of the adjace nt panel; otherwise, the paint mist cannot be integrated into the coating, resulting in coarse textures.
- If necessary, perform blending after the clear coat is applied and before the paint mist at the edge of the bl end area.

Reminder

Texture and glossiness can be detected by a fluorescent lamp.

- Apply several times on the wet coating.
- After spraying, reserve sufficient flash-off time to ensure solvent evaporation.



3. For forced drying, refer to How to dry

Reminder

- If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.
- Excessive temperatures can cause plastic components to deform.

Reminder

In case of small-area spraying or local repair, the paint can be baked after the paint film surface is dry and dust -free.



Scenario II: Spray the entire panel surface

Step 1: Spray primer layer.

1. Apply primer. Refer toSpraying of primer .

Caution

This step can be ignored if the new panel is provided with primer.

2. For preparation, refer to Preliminary preparation
3. **Cleaning of panels**: After removing dust and dirt on the clearance of panels and spraying surface by using compress ed air with a pressure higher than the spraying pressure, clean the panel with degreaser.

Caution

If the panel to be sprayed is a plastic part, remove static electricity with the electrostatic cleaning agent.



4. **Atomizing spraying of base coat**: After moving the vehicle/panel to the spray booth, spray a single coating on its sur face until the glossiness of the sprayed surface reaches about 50%, and then dry the coating with a special blow dryer to ensure that the dried surface is no longer glossy.

> **⚠ Caution**
>
> – During spraying, check whether there are fish eyes on the surface. If any, increase the pressure of sprayin g air and spray the surface with dry spraying method to cover them.
>
> – After spraying, a fluorescent lamp should be used to check for gloss and dryness.
>
> – In case of high humidity and low temperature of ambient air, carefully check the glossiness to avoid paint s agging.

– **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1.5 bar
  - **Paint output**: 2.5-3 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 15 cm
  - **Spray overlap**: 2/3
  - **Spraying velocity**: 60 cm/s
– **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °





5. **Color spraying**: Apply a thin coating in several times with a spray gun, so that the substrate is completely covered an d the glossiness of the sprayed surface is about 60 - 70%. Operation instructions:

Reminder

- After each coating is applied, dry the paint with a blow dryer until the surface glossiness disappears.
- Repeat spraying as many times as necessary until the substrate is covered.
- Insufficient glossiness after application will result in coarse textures.
- Paint sagging will occur if the coating is too thick at one time.
- Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

- The spray gun should be closer to the spraying surface than the atomizing spraying.
- With the increase of coatings, the absorption capacity of paint will enhance as well. Spray carefully for even glos siness of the whole surface.
- **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1.5 bar
  - **Paint output**: 2.5-3 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 10 - 15 cm
  - **Spray overlap**: 3/4
  - **Spraying velocity**: 60 cm/s
- **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °

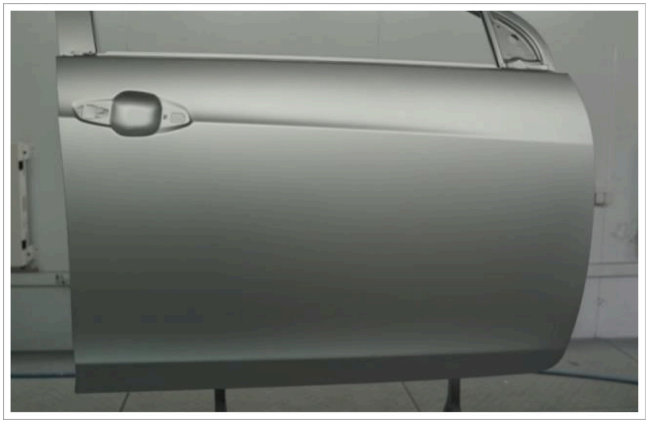


6. **Eliminate spots**: Apply 1 or 2 thin coatings to remove coating marks with a spray gun, ensuring the sprayed surface i s smooth, with a glossiness of approximately 30% - 50%.

Reminder

- After each coating is applied, dry the paint with a blow dryer until the surface glossiness disappears.
- Insufficient glossiness after application will result in coarse textures.
- Paint sagging will occur if the coating is too thick at one time.
- Pinholes will occur if application of the next coating is carried out while the previous coating has not been d ried completely.

- **Configuration requirements of spray gun:**
  - **Spray gun diameter**: 1.3 mm
  - **Air pressure (gun tail):** 1.5 bar
  - **Paint output**: 2.5-3 turns from the fully closed position, and fully open spray pattern.
  - **Spraying distance**: 15 - 20 cm
  - **Spray overlap**: 3/4
  - **Spraying velocity**: 60 - 80 cm/s
- **Blow dryer usage requirements**:
  - Air pressure: 4 bar
  - Distance: Greater than 30 cm
  - Angle: 45 °



Step 2: Spraying clear coat

1. **Atomizing spraying**: Spray a thin clear coat on the panel surface. During spraying, spray the panel edge first and the n the whole panel.

Caution

- During operation, reserve sufficient flash-off time to ensure complete solvent evaporation.
- Do not dry the sprayed surface with high-pressure air.
- Uneven spraying texture may result in paint sagging or coarse textures.



2. **Spray finishing**: Spray one third of the panel each time. During spraying, spray the panel edge first. Operation instru ctions:

Reminder

- Make sure that the texture of the sprayed panel is consistent with that of the original position of the adjace nt panel; otherwise, the paint mist cannot be integrated into the coating, resulting in coarse textures.

Reminder

Texture and glossiness can be detected by a fluorescent lamp.

- Apply several times on the wet coating.
- After spraying, reserve sufficient flash-off time to ensure solvent evaporation.



3. For forced drying, refer to How to dry

Reminder

- If the standing and curing time is short, paint sagging or pock markings on the sprayed surface will occur.

– Excessive temperatures can cause plastic components to deform.

Reminder

In case of small-area spraying or local repair, the paint can be baked after the paint film surface is dry and dust -free.



FAQs

– FAQs and solutions

Spraying of plastic parts

Caution

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

Reminder

This topic introduces how to spray plastic parts, taking the spraying of a damaged bumper and a new bumper as ex amples.

Spraying of damaged bumper

1. Repair the damaged area. Refer toHow to repair plastic parts .
2. Apply the plastic poly-putty. Refer to Application of plastic poly-putty .
3. Spray the primer, refer to Spraying of primer .



4. Spraying of top coat, to ensure spraying quality, please carefully refer to FAQs and solutions before operation.

Caution

During paint application of plastic parts, soft additive shall be used according to the softness of plastic parts an d product description of the paint manufacturer. Otherwise, it may cause cracks and poor adhesion in future.



5. Dry topcoat, see How to dry .

6. Repair defects, refer toPerforming polishing .

Spraying of new bumper

1. Release agent removal: Use hot soapy water to clean the bumper surface and remove the mold release agent.

Reminder

In the production of bumpers, in order to facilitate mold release, the mold release agent will remain on the bum per surface. Failure to remove it will cause defects such as poor adhesion of paint coating.



2. Sand the surface of the bumper: To increase adhesion, use a gray scouring pad and polishing paste to sand the entire surface of the bumper before spraying.

Caution

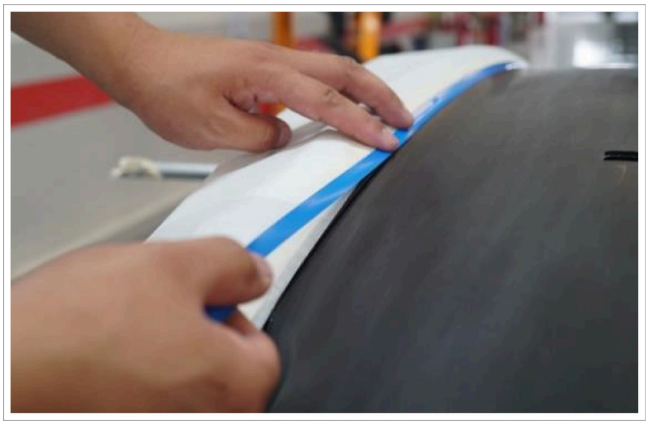
Repair the damaged area on the surface of new bumper.



3. Masking protection: Use masking tape + masking paper to cover the areas of the bumper that do not need painting. T he edge parts should be protected with special seam tape to avoid paint leakage at the tape edges.

Caution

The masking tape shall be removed after spraying and before coating drying.



4. Cleaning and degreasing: After cleaning and degreasing the bumper surface with a degreasing cleaner, use an antist atic cleaner to remove static electricity from the panel surface.

⚠ Caution

Since the plastic bumper is prone to generating static electricity, leading to defects in dust collection during spr aying, it is necessary to remove static electricity with electrostatic cleaning agent.



5. Thin plastic primer: When applied thinly, ensure that there is no exposed plastic surface on the plastic parts.

⚠ Caution

- If the plastic primer has not been applied, the paint will not adhere, resulting in coating peeling.
- Do not apply the plastic primer thickly as this will cause the paint to peel or shrink around the feather edge.



6. Apply primer. Refer toSpraying of primer .

⚠ Caution

- If the newly replaced bumper surface is defect-free and comes with a primer, you can skip this step.
- Add soft additive when applying primer, so as to avoid surface cracks of the plastic parts under stress.
- In case of defects, dust spots and sagging after application of primer, grinding is required after drying.



7. Spraying of top coat, to ensure spraying quality, please carefully refer to FAQs and solutions before operation.

⚠ Caution

During paint application of plastic parts, soft additive shall be used according to the softness of plastic parts an d product description of the paint manufacturer. Otherwise, it may cause cracks and poor adhesion in future.



FAQs and solutions

Reminder

This topic summarizes the FAQs that may be encountered during spraying and the solutions to address them.

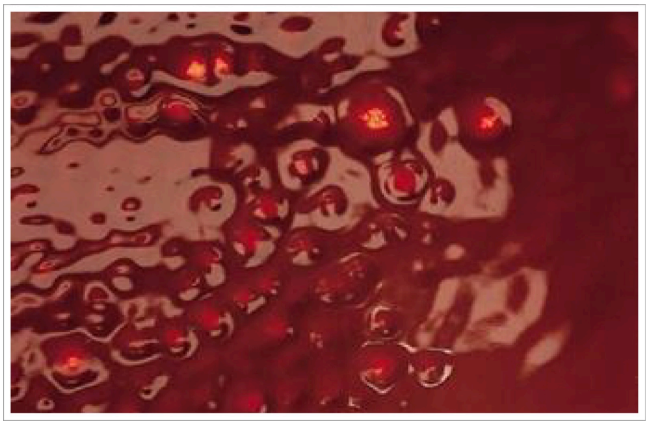
Fish eyes

– **Causes**:
  - Dirty cloth is used for degreasing, and the vehicle is not completely degreased.
  - The compressed air contains water or oil.
  - The paint booth is contaminated by chemicals, such as: Common materials for panel beating and spraying includ e panel wax, bolt loosening agents, and car body paint maintenance wax.

– **Preventive measures**:
  - Thoroughly degrease the vehicle before spraying. When degreaser is used, use two pieces of cloth for wiping in t urn.
  - Regularly check the oil-water separator of the air compressor, and drain water in time if necessary.
  - Do not use silicon-containing products in the painting workshop or spray booth.
  - Select water-soluble polishing wax without silicon wax for polishing.

– **Solutions**: After grinding the coating with fish eyes, add fish eye eliminator to the spraying material and re-spray. Ref er to
  - Solvent-based solid color paint
  - Water-based solid color paint
  - Solvent-based Metallic Paint
  - Water-based metallic paint
  - Spraying of plastic parts

Phenomenon I:



Dust spots

– **Causes**:
  - Dust particles remain on the vehicle surface and paint is contaminated during spraying.
  - Dust adheres to the paint surface during walking.
  - The filter cotton of spray booth is blocked, there is dust on the floor, the walls are dirty, and the top surface needs to be replaced.
  - The material is not filtered before spraying.

– **Preventive measures**:
  - Thoroughly clean all openings around the patch area.
  - Mask the area required to be masked with the masking paper by folding its torn edge inward and facing its smoot h side outward.
  - Filter the paint before it is poured into the spray gun.
  - During operation, wear clean, fiber-free and anti-static workwear (nylon).
  - Treat plastic surfaces with anti-static agent before spraying.

> **⚠ Caution**
>
> Degreasing is not required after the plastic surface is treated with anti-static agent.

  - Regularly maintain the spray booth and replace the filter materials in it.
  - Wipe the air pipe before spraying.
– **Solutions**: After grinding the coating with fish eyes, add fish eye eliminator to the spraying material and re-spray. Ref er to
  - During spraying, the needle tip can be used to remove dust in the paint film.
  - Small dust particles within the dry coating can be removed with polishing; refer to Performing polishing .
  - If dust is trapped deep in the coating, the surface should be ground and repainted. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint
    - Water-based metallic paint
    - Spraying of plastic parts

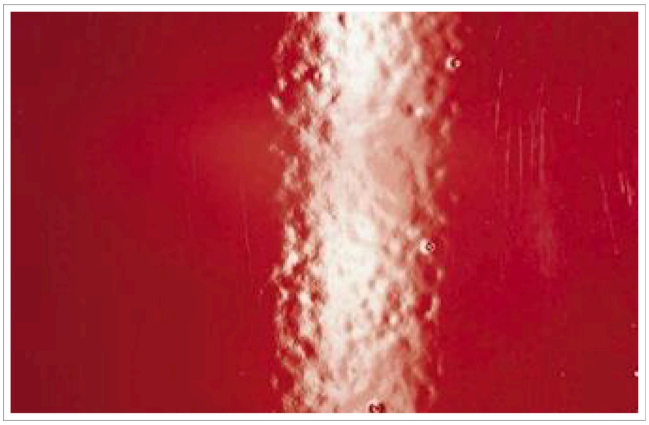


Orange peel effect (orange peel)

– **Causes**:
  - The paint spraying viscosity is too high.
  - The drying speed of the diluent is too fast.
  - Too high or too low spraying pressure, and too large nozzle
  - Too high or too low ambient temperature
  - Excessive fish eye eliminator added to the paint to be used
– **Preventive measures**:
  - Mix in the correct proportions with a scale and check viscosity.

- According to the ambient temperature, workpiece size and air circulation speed, select the thinner with reference to the technical information manual.
- Spray at a temperature of about 20°C.
- Properly use the fish eye eliminator to ensure a correct mixing ratio.

– **Solutions**:
  - Minor orange peel can be removed by polishing, see Performing polishing .
  - If it is serious, the surface must be ground and repainted. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint
    - Water-based metallic paint
    - Spraying of plastic parts

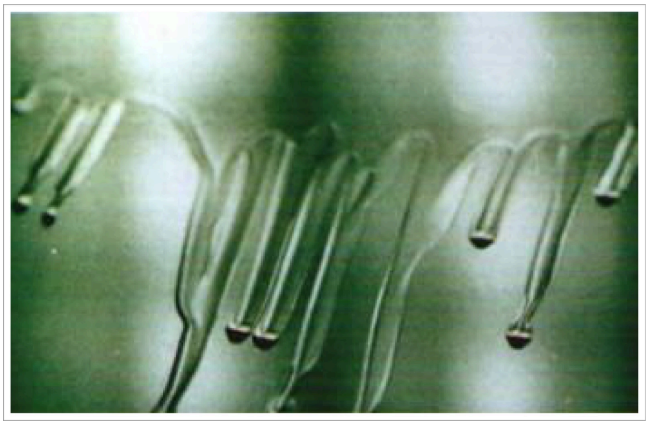


Sagging

– **Causes**:
  - The substrate is not thoroughly degreased so that the paint cannot adhere to the substrate firmly.
  - The drying speed of the selected thinner is too slow, and too much thinner is added to the paint.
  - Paint builds up in some areas due to too short spraying distance or uneven spraying.
  - The ambient temperature is too low and the thinner volatilizes too slowly.

– **Preventive measures**:
  - According to the workpiece size, ambient temperature and airflow rate, select the thinner with reference to the te chnical information manual.
  - Before spraying, the sprayed surface shall be degreased by reasonable methods.
  - Spray at a temperature of about 20°C.

– **Solutions**:
  - Minor sagging can be treated by sanding and polishing, see Performing polishing .
  - If it is serious, the surface must be ground and repainted. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint
    - Water-based metallic paint
    - Spraying of plastic parts



Whitening and fogging

- **Causes**:
  - The quick-drying thinner is used to sharply cool the sprayed surface, resulting in immediate condensation of wate r vapor on the wet coating surface.
  - Excessive spraying pressure causes the workpiece to cool down, followed by moisture condensation.
  - The sprayed panel is not completely dried before being put into use, and condensate invades the coating.
- **Preventive measures**:
  - Use slow-drying thinner in wet weather.
  - Avoid spraying in a wet and cold environment.
  - Regularly check the airflow rate of spray booth.
  - Select the corresponding drying time according to the workpiece temperature.
- **Solutions**:
  - If the problem is not very serious, the repair area can be polished, see Performing polishing .
  - If it is serious, the surface must be ground and repainted. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint
    - Water-based metallic paint
    - Spraying of plastic parts



Spotting (clouding)

Clouding only occurs in metallic base coat. Uneven aluminum pigment in the base coat causes uneven color, like clouding or spotting.

- **Causes**:

- Quick-drying thinner is used.
- Incorrect spray gun setting and incorrect spraying air pressure and distance cause too heavy base coat.

– **Preventive measures**:
  - Select the thinner based on ambient temperature, repair area and airflow rate.
  - Use the recommended settings for spray guns.
  - Spray base coat according to the technical data guide.

– **Solutions**:
  - When the clear coat has already been applied, grind with dry grinding sandpaper P500 or wet grinding sandpape r P1000, then reapply the paint following the preventive measures mentioned above.
  - When base coat spraying is still under way, respray it according to the recommended procedure or spraying tech nique.
  - Solvent-based solid color paint
  - Water-based solid color paint
  - Solvent-based Metallic Paint
  - Water-based metallic paint
  - Spraying of plastic parts



Pinhole

– **Causes**:
  - Poor quality of the selected thinner
  - Incorrect spraying pressure or improper nozzle size
  - Too thick coating and too short interval between coatings
  - No volatilization time given
  - Manual drying immediately after spraying, and too high drying temperature
  - Infrared drying equipment used too early, or too short distance from equipment to vehicle

– **Preventive measures**:
  - Select high-quality thinner suitable for ambient temperature.
  - Select the appropriate spray pressure and nozzle size.
  - Use the correct spraying technique and give sufficient volatilization time.
  - Follow the recommended volatilization time to allow the last layer of paint to volatilize for a period before manual drying.
  - Allow the coating to volatilize normally before infrared drying, and keep a proper distance between the infrared e quipment and the vehicle.

– **Solutions**: Grind the paint film surface until all solvent bubble marks are removed, and then respray it.

- Solvent-based solid color paint
- Water-based solid color paint
- Solvent-based Metallic Paint
- Water-based metallic paint
- Spraying of plastic parts



Wrinkling/paint lifting

– **Causes**:
  - The selected coating does not match the substrate.
  - The adhesion between the previous coating and substrate is poor.
  - It is repainted before the substrate is completely dry or hardened.
  - The paint is sprayed too much at one time.
  - The volatilization time is too long, and the previous volatile coating is dissolved by the solvent of the next layer of paint.

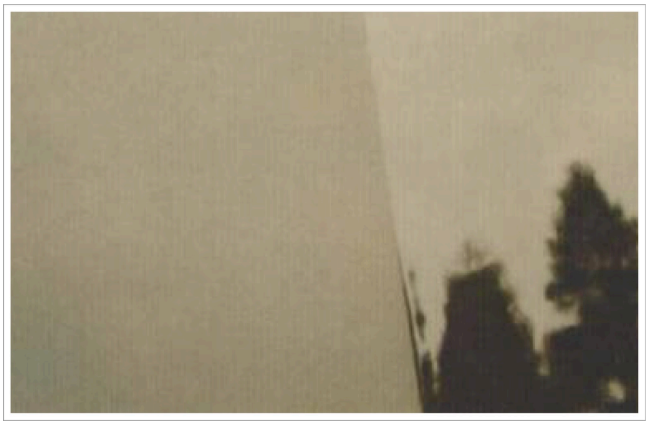
– **Preventive measures**:
  - Analyze the substrate of the repair area and select a suitable primer for the substrate, adopt the correct mixing ra tio and use appropriate spraying method to prevent excessive thickness.
  - After an appropriate volatilization time, apply the next coating.

– **Solutions**:
  - To a certain extent, the raised paint can be sanded to a good paint layer and then resprayed after it is completely dry.
  - For more sensitive substrates, paint carefully: the coating should be thin, and sufficient volatilization time is requir ed.
  - In case of serious paint lifting, it must be completely removed before repainting. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint
    - Water-based metallic paint
    - Spraying of plastic parts



Gloss loss

- **Causes**:
  - The wet coating absorbs wax or other similar contaminants.
  - The poly-putty is not completely dry before grinding.
  - The grinding sandpaper is too coarse, and the drying speed of selected thinner is too high.
  - The drying agent does not match the paint.
  - Improper amount of drying agent or thinner is added.
  - The mixing method of each component is incorrect (two-component product).
  - The baking temperature is too high or the baking time is too long.
- **Preventive measures**:
  - Thoroughly degrease the repair area and its surroundings before grinding and spraying.
  - Set the drying time according to ambient temperature and paint film thickness.
  - Select and use appropriate sandpaper.
  - Select the drying agent recommended by the paint manufacturer and compatible with the thinner.
  - Mix the paint with the help of a scale bar to ensure a correct mixing ratio.
  - Follow the recommended volatilization time and prevent excessive spraying from causing excessive coating thick ness.
  - Refer to the product technical manual to select the appropriate drying time before polishing.
- **Solutions**:
  - Perform polishing to increase glossiness, refer toPerforming polishing .
  - If it cannot be repaired, grind it before repainting. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint
    - Water-based metallic paint
    - Spraying of plastic parts



Sandpaper marks

- **Causes**:
  - The selected sandpaper is too coarse, leaving coarse sandpaper marks after grinding the repair area.
  - The primer or poly-putty coating is not completely dry before grinding.
  - Scratches are caused by abrasive grains or rough dust particles during polishing.
- **Preventive measures**:
  - Use sandpaper with 100 grits finer than that in the repair area for grinding.
  - Make sure that the substrate coating is sufficiently dry before grinding.
  - Remove all dust by dust removal or blow gun before grinding.
  - Use sandpaper of one grade finer for manual grinding.
- **Solutions**:
  - After the paint film is completely dry, use sandpaper of appropriate grit to sand the topcoat, and then proceed wit h polishing, see Performing polishing .
  - If it is too serious, grind it before repainting. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint
    - Water-based metallic paint
    - Spraying of plastic parts



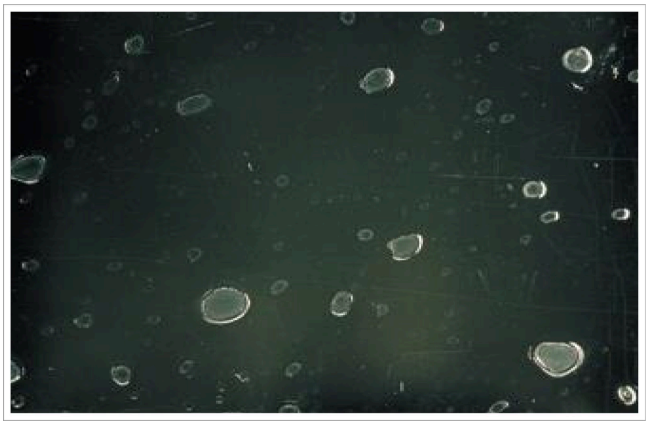
Water marks

- **Causes**:
  - The amount of drying accelerator added is inappropriate.
  - The coating is thick and it cannot be completely dried within the recommended time.

- The coating fails to dry properly.
- The coating contacts with rainwater or water droplets during its cooling.

– **Preventive measures**:
  - Mix in the correct proportions with the aid of a scale.
  - Avoid excessive thickness.
  - Dry the coating according to the standard drying time and temperature.
  - Use sandpaper of one grade finer for manual grinding.
  - Allow the vehicle to cool down before coming into contact with the liquid.

– **Solutions**:
  - Polish the surface until the marks disappear, see Performing polishing .
  - If it is too serious, grind it before repainting. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint
    - Water-based metallic paint
    - Spraying of plastic parts



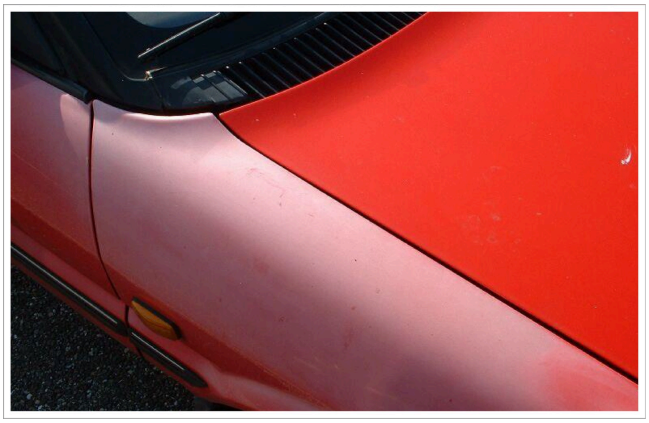
Pulverization

– **Causes**:
  - Curing agent not matching the paint.
  - Inappropriate or poor-quality curing agent, hence affected interlinking reaction between paint resin and curing ag ent.

– **Preventive measures**:
  - Use OEM certified paint products.
  - Use high-quality paint.
  - Use high-quality cleaning solution or detergent.
  - Regularly wax the paint surface.

– **Solutions**:
  - Minor pulverization can be removed through polishing, and the color can be protected with wax, refer to Performi ng polishing .
  - If it is too serious, grind it before repainting. Refer to
    - Solvent-based solid color paint
    - Water-based solid color paint
    - Solvent-based Metallic Paint

- Water-based metallic paint
- Spraying of plastic parts



Cracking

– **Causes**:
  - This problem will reappear after some time if the cracked old paint layer is directly painted again.
  - Spray over-thickness on old coatings with two-component type paint.
– **Preventive measures**:
  - Remove the whole paint layer to the metal surface, and repaint according to the technical requirements.
  - Avoid incompatible paint, and check the substrate before repair.
– **Solutions**: Needs to be re-sprayed after polishing, Refer to:



Poor hardening or poor drying of coating

– **Causes**:
  - The wrong type of hardener was used, the hardener is expired, or it has reacted with moisture in the air.
  - Too low drying temperature, too short drying time or insufficient air flow in the spray booth resulting in insufficient drying of coating.
– **Preventive measures**:
  - Use a hardener suitable for the ambient temperature.
  - Mix according to the technical data description.
  - Check the service life and sealing reliability of hardener before use.
  - Store paint products at an appropriate temperature.
  - Check the filter and maintain the spray booth regularly.
– **Solutions**:
  - Dry the panel for a long time at the temperature stated in the product manual. Refer to Performing polishing .

- If the wrong product is used, remove the paint with thinner or by grinding and repaint as required. Refer to
  - Solvent-based solid color paint
  - Water-based solid color paint
  - Solvent-based Metallic Paint
  - Water-based metallic paint
  - Spraying of plastic parts



Poor adhesion

– **Causes**:
  - Mismatched products are used.
  - Incorrect and poor-quality degreasing product is used. The release agent on new bumper is not removed (new c omponent).
  - Sandpaper of incorrect grade or improper materials are used, or grinding is insufficient or incorrect.
  - Failure to use the matching plastic primer will result in poor adhesion and thus unqualified paint coating.

– **Preventive measures**:
  - Use OEM certified supporting products.
  - Thoroughly clean the panel surface with recommended degreaser and two pieces of wiping cloth.
  - Grind with sandpaper of an appropriate grade.
  - Select a suitable primer according to the type of substrate.

– **Solutions**: Remove the entire paint system until it is smooth. If necessary, remove the entire paint system and prepar e and paint as recommended. Refer to
  - Solvent-based solid color paint
  - Water-based solid color paint
  - Solvent-based Metallic Paint
  - Water-based metallic paint
  - Spraying of plastic parts



Blistering

- **Causes**:
  - Dirt remains on the substrate before spraying.
  - Water vapor condenses on the vehicle after degreasing.
  - Calcium and salt deposits in the grinding water are still left on the vehicle and absorb moisture.
  - Poly-putty has been treated by wet grinding or has absorbed moisture from the air.
  - Inappropriate drying agent or thinner is used.
  - The drying agent has reacted with water vapor in the tank.
  - The compressed air contains oil or water.
- **Preventive measures**:
  - Check the substrate carefully before and during degreasing.
  - Dry grind the polyester poly-putty.
  - Cover the drying agent tank and seal it immediately after use.
  - Regularly check the oil-water separator of air compressor and drain water regularly as required.
- **Solutions**: Remove the problematic coating and repaint, Refer to:
  - Solvent-based solid color paint
  - Water-based solid color paint
  - Solvent-based Metallic Paint
  - Water-based metallic paint
  - Spraying of plastic parts



Falling off

- **Causes**:

- The panel substrate is not sufficiently ground.
- Inadequate degreasing or use of poor quality degreasers.
- Thinners that dry too fast were selected.
- Failure to use the matching plastic primer will result in poor adhesion and thus unqualified paint coating.
- The base coat is too thin and rough, and no tack cloth is used between the paint layers and in the last layer.

– **Preventive measures**:
- Improve the grinding quality before spraying top coat.
- Only use appropriate, quality-assured and correct degreasers.
- Select the thinner based on ambient temperature, repair area and airflow rate.
- Select a suitable primer according to the type of substrate.

– **Solutions**: Remove the paint to expose the bare metal and grind into feather edges. If necessary, apply poly-putty an d repaint. Refer to
- Solvent-based solid color paint
- Water-based solid color paint
- Solvent-based Metallic Paint
- Water-based metallic paint
- Spraying of plastic parts



Poly-putty mark

– **Causes**:
- The substrate is not completely hardened so that it absorbs the top coat.
- The sandpaper is too coarse, and improper thinner is used for the top coat.
- The parts have not been properly primed and sealed, and repaired with poly-putty or filler putty before spraying t he top coat.

– **Preventive measures**:
- Grind the repaired part until the metal layer is exposed.
- At the edge of exposed paint layer, use thinner for solvent test. If the paint is softened, this layer must be sealed.
- Select suitable sandpaper and make sure that all preparatory materials are completely dry.
- Poly-putty and filler putty can only be used on exposed metal instead of covering the original paint surface.

– **Solutions**: After the repair material has dried, sand down the damaged area, then apply a primer to separate it, and t hen repaint. Refer to:
- Solvent-based solid color paint
- Water-based solid color paint
- Solvent-based Metallic Paint

- Water-based metallic paint
- Spraying of plastic parts



Spots and blurring - metallic paint

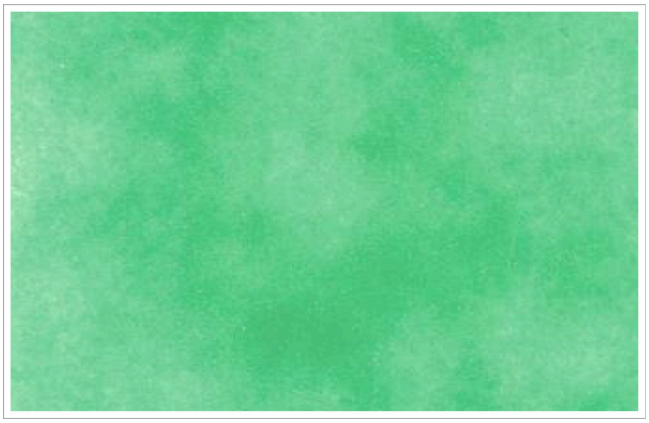
– **Causes**: The uneven distribution of glitter pigments and the uneven thickness and glossiness of coatings lead to une ven reflection light in various colors (blurring or spotting).

– **Preventive measures**:

- **Techniques for removing blemishes**: Generally, a medium dry spraying technique is used to complete the proc ess. To prevent uneven silver powder, it is necessary to maintain the four parameters of the spray gun operation and ensure uniform coating thickness.
- **Opportune time for eliminating spots**: After the base coat is sprayed and the solvent evaporation of the paint fi lm begins, the gloss of the wet paint film decreases to a matte state with 50% to 70% of the original glossiness. A pply the metallic paint to remove blemish spraying.
- **clear coat blemishes**： Applying clear coat immediately after spraying aluminum paint can cause blotches; ther efore, after spraying the aluminum paint, a slightly longer intercoat dwell time is needed. Once the base color lay er is confirmed to be dry, apply the clear coat appropriately and avoid excessively wet spraying.

– **Solution**: Repaint. Refer to:

- Solvent-based solid color paint
- Water-based metallic paint



Darkening of the blend transition area - metallic paint

– **Phenomenon**: When the edge of the blend area of aluminum paint dries, it can cause the surface color to darken wh en viewed obliquely.

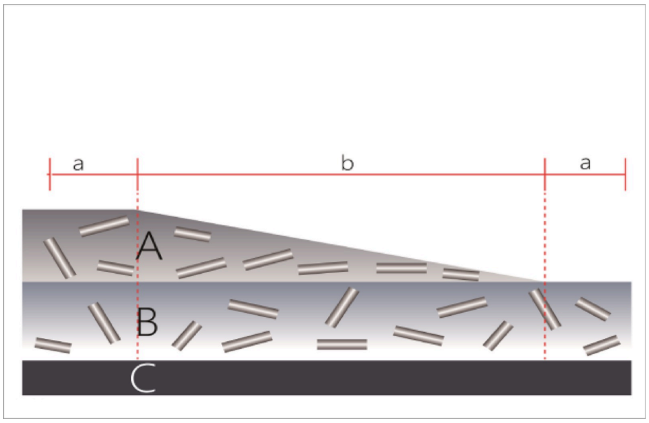
– **Preventive measures**:

- Apply a joint resin coating on the surface of the transition area during the transition.
- Resin blender can avoid the problem of thinning coating edges and quick drying of coating during spraying, and make the coating surface smooth while enhancing the adhesion of other base coats and preventing color darkeni ng.

– **Solutions**: Repaint. Refer to:
  - Solvent-based solid color paint
  - Water-based metallic paint

Image description:

- a: Dark
- b: Bright
- A： Repair coating
- B: Panel old coating
- C: Body Panels



How to dry

⚠ Caution

- During operation, please take safety protection measures as required. For details of safety protection, please refer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, please refer to Site safety and vehicle protection .

Purpose of drying during repair of vehicle paint:

- **Form a hard protective layer**: Through the drying and curing process, the solvents in the car paint evaporate, and the resin components in the coating crosslink or polymerize to form a hard, continuous protective layer. This protective film can effectively prevent corrosion, UV damage, physical abrasion, and chemical erosion, protecting the car body metal from environmental damage.
- **Enhance aesthetics**: During the drying process, the paint surface becomes smoother and more even, with enhanced glossiness and color saturation, giving the vehicle a more vibrant appearance and elevating its overall aesthetic appeal.
- **Enhanced Adhesion**: Proper drying processes can ensure good adhesion between the paint layer and the substrate, as well as between the paint layers, preventing the occurrence of paint peeling or bubbling.
- **Shorten the construction period**： By accelerating the drying process, the entire painting operation time can be shortened, thereby improving work efficiency.
- **Reduce Defects**： Proper drying and curing can prevent paint surface defects caused by improper drying, such as sagging, orange peel, pinholes, cracks, etc., ensuring paint surface quality.
- **Stability and Durability**： A fully dried paint film has better physical properties and chemical stability, allowing it to maintain its appearance and protective performance for a long time, thereby extending the lifespan of the car paint.

Natural drying

⚠ Caution

Make sure that the drying environment is clean and dust-free.

- It refers to the process of placing the sprayed panels in a workshop for natural drying. The drying duration varies with the surrounding environment and temperature.

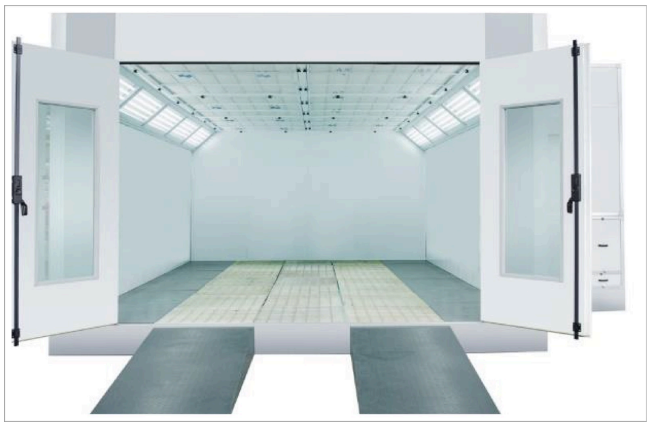


Forced drying

It refers to the process in which auxiliary drying equipment is used to speed up the drying. To avoid pinholes, sufficient curing time should be reserved before drying.

Common methods:

– Drying the paint surface using an air heat exchanger:
  - Use the hot air circulating from the device to dry the paint surface.
  - It is safe for use since the air containing volatile solvent is not in direct contact with the heat source, but the heati ng efficiency is low and the equipment is large.



– Use the spray booth for drying:

> **⚠ Caution**
>
> Before using the spray booth, please understand its requirements, refer to Drying equipment and tools .

  - Drying the paint surface with heating light tube:
    - The short-wave infrared heating lamp is fast in heating and convenient for use. However, the heating range i s affected by the radiation range of the lamp.
    - After spraying, ventilate the paint surface and let it stand in the spray booth for 10 - 20 minutes, and then dry it at 60°C for about 30 minutes to forcibly dry it.
    - When spraying or repairing the small-area paint surface, wait until the paint film surface is dry and free of du st, and then use the heating light tube for forced drying.



Further guidance

– Performing polishing

Principle and essentials

⚠ Caution

- During operation, please take safety protection measures as required. For details of safety protection, please refer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, please refer to Site safety and vehicle protection .

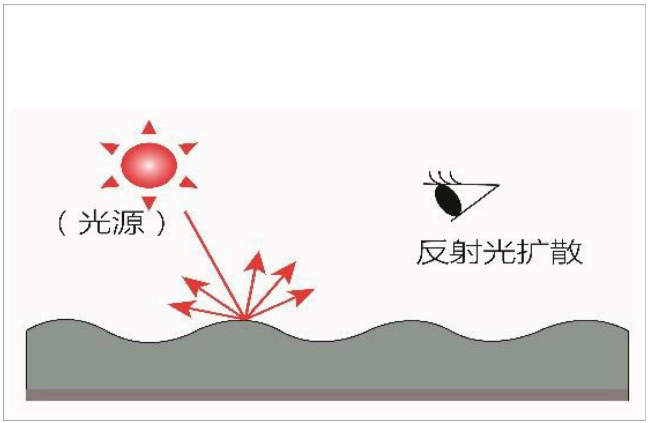
Function of polishing

- In daily operations, potential defects on the surface of the layers can be repaired through polishing, such as: Such as sagging, dust spots, orange peel, loss of gloss, poor fullness of the paint film, and transition difference at the junction of the new and old paint films, etc.
- It can increase the glossiness and smoothness of paint films, and eliminate fine defects on paint surfaces such as particles, slight flow marks, orange peel, fine sandpaper marks, and scratches.
- It can be used for re-painting of old paintwork.

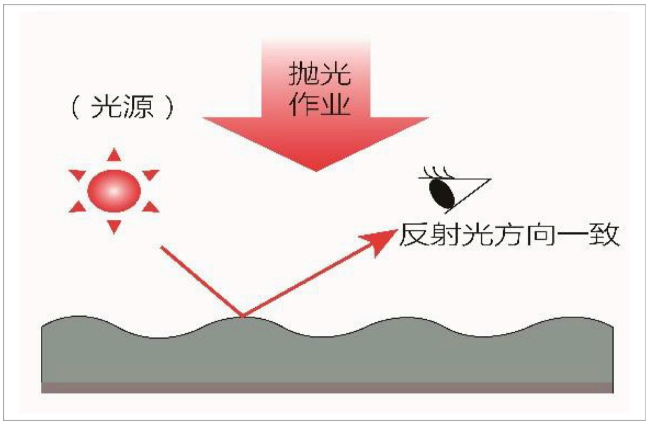


Polishing principle

- **Reasons for uneven layer surface**: The gloss of a paint coating is produced by the reflection of light, so when light diffusely reflects on a rough and uneven surface, numerous small scratches will be seen, giving the appearance of lacking luster.

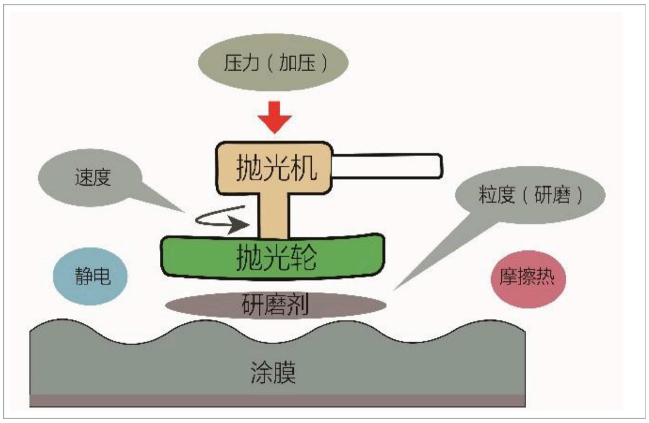


- **Polishing Principle**： Reduce surface diffuse reflection, resulting in a uniform brightness on the coating surface.



Key Points of Polishing

- Polish with proper force, abrasive (polishing wax) and speed.
- The "frictional heat" and "static electricity" generated by friction of the polishing pad on the paint film are also factors t hat adversely affect the polishing.
- Quality Requirements: Ensure the texture and gloss of the repainted surface match the original surface.
- Work environment: The workshop environment needs to be sufficiently bright to inspect the condition of the paint film, and a clean working environment is needed to prevent dust from damaging the surface.



- Contact location: When operating, the polisher should be slightly tilted so that the polishing pad gently touches the su rface. Do not let the entire polishing pad contact the surface.

> **⚠ Caution**
>
> To avoid deformation of the steel panel or condensation of polishing wax, spray water on the steel panel during operation.



- Moving range:

⚠ Caution

To avoid deformation of the steel panel or condensation of polishing wax, spray water on the steel panel during operation.

- Move the polishing machine so that its movement path overlaps 2/3 of the previous path.
- When polishing a larger area, polish sequentially over an area of approximately 30cm×30mm.



Further guidance

– Performing polishing

Performing polishing

⚠ Caution

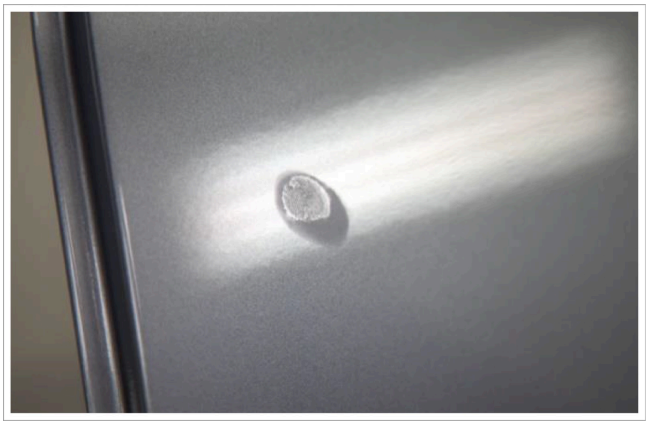
– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

Operation method

1. Evaluation of spray-painted surface.

   – **Evaluate drying state**： Choose areas that will not affect the overall repair quality, press the coating with your fi nger to determine whether the surface is sufficiently dry for polishing. If the surface is not sufficiently dry, forced d rying is required.



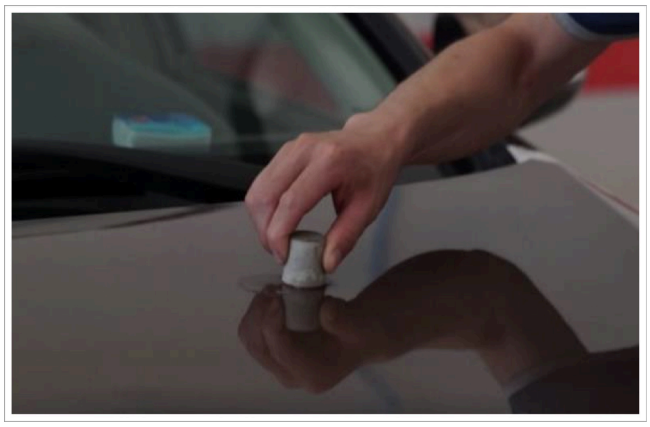
   – **Assess whether there are particulates**: Check the paint film surface for particles. If any, determine an appropri ate grinding method.

      a. Spray a small amount of clean water on the painted surface in areas with particles.

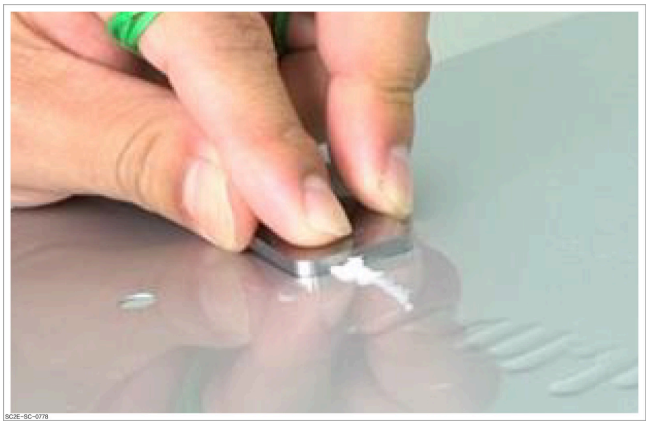
      b. Grind the dust spots with a rubber grinding block complete with sandpaper #1500-2000.

⚠ Caution

Hold the lower part of the cushion block during grinding to reduce damage to the paint film surface.



   – **Evaluate whether the surface sags**: If the sagging mark is obvious, use a scraper to level them first, then com pletely remove the sagging marks with sandpaper #1000-1500.



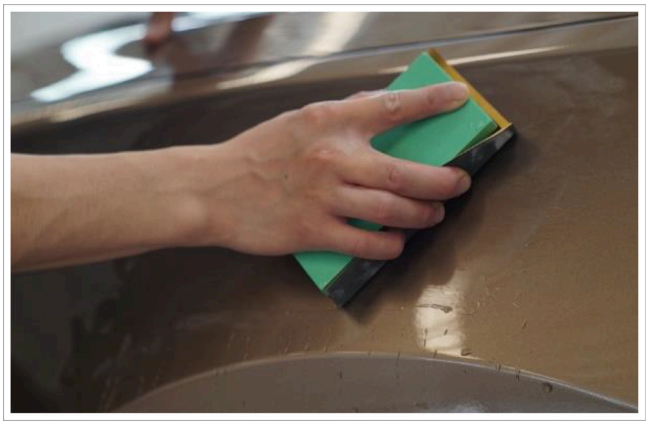
– **Evaluate the texture of the paint film**： If the dried surface texture is slightly rougher than that of the original p aint film, wipe off dirt and dust on the steel panel with clean wiping paper, and manually grind the corresponding area with a wet grinding pad equipped with sandpaper #1500-2000.

> **⚠ Caution**
>
> To prevent sandpaper from being blocked, use water for grinding. During grinding, keep the grinding block at an angle of 45° to the grinding direction to prevent scratches.

Abnormal texture:



Grinding technique:



2. Masking the adjacent areas of polishing areas that are susceptible to contamination or damage

> **⚠ Caution**
>
> To prevent inhalation of fine dust and particles generated by polishing, wear dust masks, safety goggles and s afety shoes during polishing.

Reminder

If the masking on the body after spraying is not cleaned, this step can be ignored.



3. Choosing the right polishing pad: Select the polishing pad based on the polishing range of the panel and install it in th e center of the polishing machine to prevent the machine from shaking.

Reminder

Clean the polishing pad before use to remove all dirt. If there is a large amount of dry wax or dirt on the surfac e of the polishing pad, it will cause scratches on the paint film for polishing.

Reminder

Use a small polishing machine for spot grinding with a polishing pad as the vehicle body surface is curved and the defective area is usually small.



4. Rough polishing: Use a polishing machine equipped with a wool pad or white foam wheel to perform a coarse polish o n the paint surface to eliminate adjustment textures or remove sandpaper marks generated during particle and paint s agging. Operation instructions:

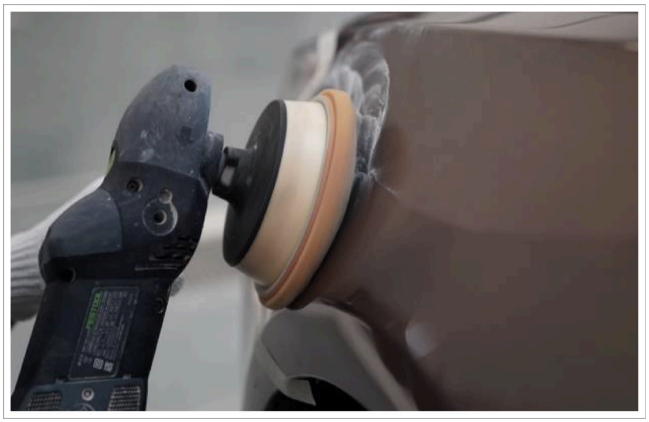
Caution

Pay special attention to body lines, edges, corners and zones above the plane. Those locations are easily acc essible during polishing, causing the paint film to be ground through.

– Clean the surface of the panel, install the rough polishing pad, evenly apply polishing wax on the polishing pad, and adjust the speed of the polishing machine to 1000-1500 r/min.

– Place the polishing pad flat on the paint surface, then start the polisher, and polish back and forth in a regular ho rizontal motion on the paint surface, see Principle and essentials .

– Ensure that all sandpaper marks generated during repair are removed and the surface has the same texture as t he adjacent paint coating.



5. Fine polishing: Use a polishing machine equipped with a fine polishing foam pad to eliminate swirl marks caused by th e coarse polishing process and produce a shine.

⚠ Caution

– Ensure that all swirl marks generated during rough polishing in the area after the operation are removed an d the surface has the same texture and glossiness as the adjacent steel panel.

– It is necessary to reasonably select ultra-fine polishing wax.

– Use auxiliary color checking lights to check for swirl marks. If swirl marks are still visible, polishing is requir ed.



6. Polishing Transition Area: Polish the transition lap area using fine polishing pads and polishing wax to ensure that the edges of the transition area are smooth and free of any roughness or coating interface burn-through. Operation instru ctions:

– If the edges of the blend area are significantly rough, use a wool pad and ultra-fine polishing wax.

– When polishing, move the polisher from the refinished surface to the original surface, and adjust the angle of the polisher appropriately so that the rotation direction of the polishing pad rotates from the refinished surface to the original surface.



7. Glazing: Use a dual-action polisher equipped with a foam pad to eliminate swirl marks (halos) caused during the fine polishing process to restore the coating's gloss. Instructions for use:

⚠ Caution

Ensure that all swirl marks generated during rough polishing in the area after the operation are removed and th e surface has the same texture and glossiness as the adjacent steel panel.



FAQs

– FAQs and solutions

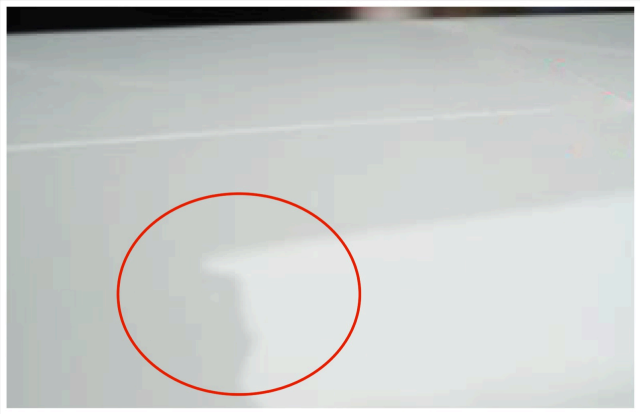
FAQs and solutions

Reminder

This topic summarizes the FAQs that may be encountered during polishing and the solutions to address them.

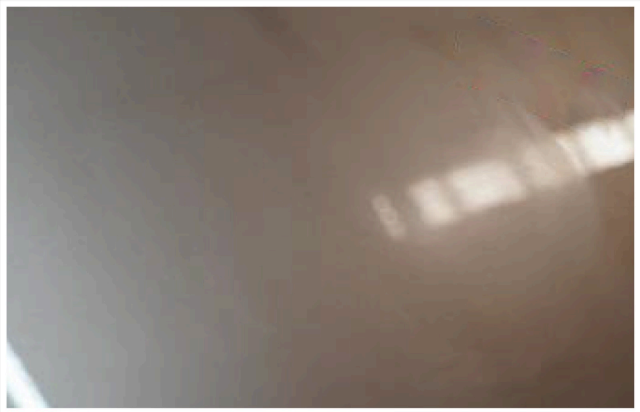
Low glossiness

- **Causes**:
  - Surface polishing before sufficient drying of paint coating
  - Used inferior polishing wax.
- **Solutions**:
  - Thoroughly dry the surface, then polish it, see Performing polishing .
  - Select an appropriate polishing material according to the type of paint.



Polishing marks

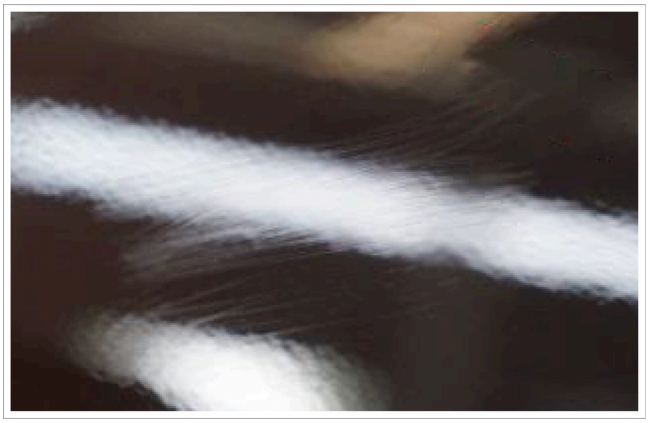
- **Causes**: Polished the inadequately dried surface.
- **Solutions**: Wait for sufficient drying before repolishing. If the operation is ineffective, repaint the surface. Refer to:
  - Solvent-based solid color paint
  - Solvent-based Metallic Paint
  - Spraying of plastic parts



Sandpaper marks

- **Causes**: Insufficient rough polishing or too deep sandpaper marks.

– **Solutions**: Re-select fine polishing sandpaper to sand the defect area, then proceed with polishingPerforming polishing .



Rough texture

– **Causes**: Insufficient or excessive polishing.

– **Solutions**:

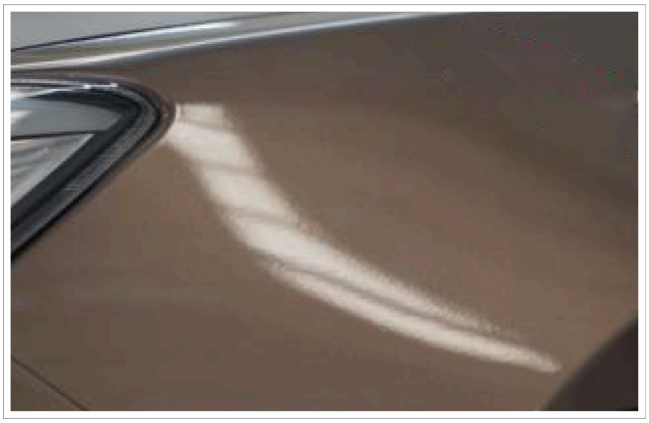
  • Insufficient polishing: Proceed with further polishing, see Performing polishing .

  • Excessive polishing: Repaint. Refer to:

    • Solvent-based solid color paint

    • Solvent-based Metallic Paint

    • Spraying of plastic parts



Exposure due to polishing

– **Causes**: Over-polishing.

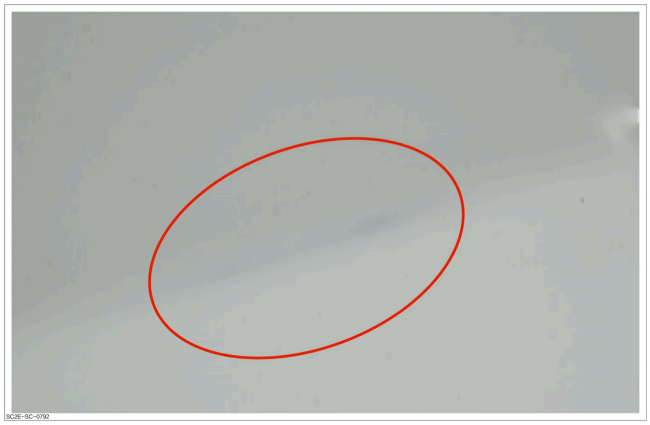
– **Common parts**: Body feature line.

– **Solutions**: Repaint. Refer to:

  • Solvent-based solid color paint

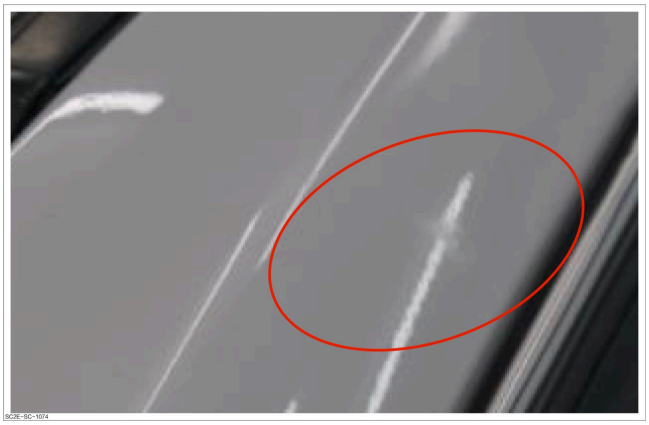
  • Solvent-based Metallic Paint

  • Spraying of plastic parts



Interface penetration

- **Causes**:
  - Excessive polishing of the coating surface in the overcoat area leads to coating cracking.
  - The polishing machine moves from the undamaged surface to the repainted surface during polishing.
- **Solutions**: Repaint. Refer to:
  - Solvent-based solid color paint
  - Solvent-based Metallic Paint
  - Spraying of plastic parts



Quick repair of painting

⚠ Caution

- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .
- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

What is quick repair of painting?

Quick service refers to the small-area paint recovery, without sheet metal removal, installation and welding, which can be c ompleted in 2 - 4.5 hours after simple price evaluation, for small exterior damages of the paint coating. Its features are as f ollows:

- No complicated sheet metal and welding operations are required.
- Use quick-drying products with high performance together.
- Have a standardized management process.
- It is not necessary to remove vehicle body trims, lights and other parts.
- Use standardized equipment and tools.
- It takes 2-4.5 hours for quick repair.
- **Principle**: For minor vehicle repairs where no panel replacement is needed, consequently without extensive removal, installation and alignment of sheet metal, it is possible to perform all the repair work in the same station. Neither vehicl e movement or technician substitution is required, thus allowing for continuous and quick repair. The entire repair time can be reduced to a few hours. The quick paint repair is a rapid repair service developed based on this characteristic.
- **Operation instructions**:
  - The damaged area is 30 cm².
  - The damaged area of sheet metal after repair is within 30% of the panel.
  - It is recommended to spray clear coat on the whole vehicle body panel.
  - The quick repair process is not recommended for horizontal surfaces of the vehicle body.



Reception process

- The difference from the traditional accident vehicle repair process: Reception - electromechanical part - sheet metal - painting - assembly.
- The quick repair claims consultant is responsible for handling quick repair vehicles: Insurance claims - appointment - reception - dispatch schedule control - quality inspection and car delivery, etc.

– Since vehicles undergoing quick paint repair typically suffer minor panel damage, direct dispatch from reception to w orkshop repair can simplify workflows, enhance work efficiency, and prevent waiting issues during construction operati ons.

– The full-time quick repair and claims consultant for sheet metal painting can control the vehicle repair progress and d elivery time more effectively by using the progress board.



Personnel allocation

– Quick repair of painting realizes the integrated repair of sheet metal and painting. Vehicles with moderate and minor damages can be directly repaired at the quick repair station without entering the sheet metal workshop. It is very impo rtant for the claims consultant at reception to judge whether quick repair is applicable to the vehicle from a profession al perspective and make reasonable overall planning and vehicle diversion.

– The BYD authorized dealer is equipped with full-time quick repair reception and repair resources, so as to smoothly e stablish a green channel for quick repair of painting. Optimal allocation of vehicles requiring repair is a key factor.

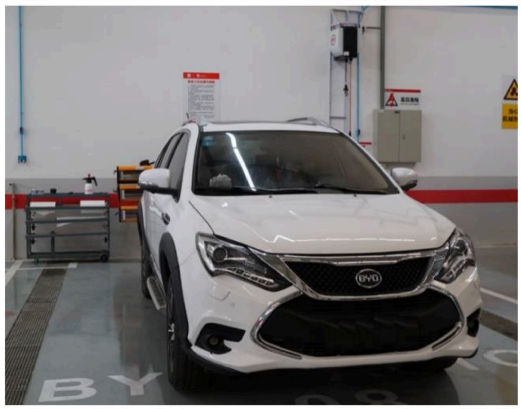


Operation area, materials and equipment

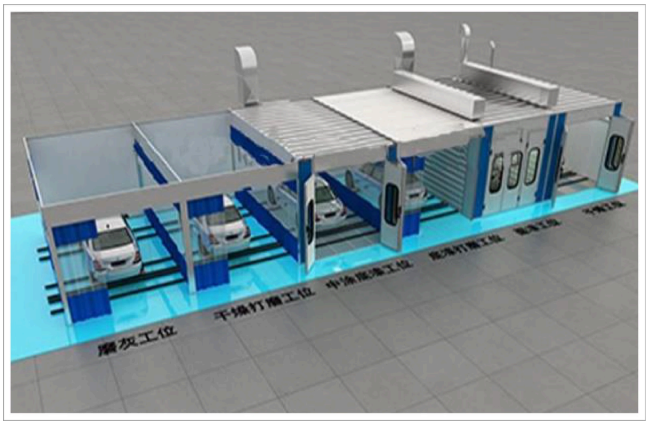
– **Quick repair station**: The quick repair of painting needs to combine the processes of sheet metal and painting. To s horten the repair time by highly integrating efficient operation process, equipment and tools, it is necessary to establis h a special quick repair station for painting.



– **Independent Quick Repair Station**： All tools, equipment and materials required in the repair process are allocated to the station. Full-time painting technicians are assigned to complete the whole process from poly-putty to polishing at the same station without moving the vehicle. Carry out maintenance work using dry grinding technology, efficient quick-drying paint products, and infrared heating lamps. This reduces the waiting time during operation and improves repair efficiency.



– **Small Sheet Metal Spray Production Line**： All tools, equipment and materials required in the repair process are allocated to the station. Full-time painting technicians are assigned to complete the whole process from poly-putty to polishing at the same station without moving the vehicle. Carry out maintenance work using dry grinding technology, efficient quick-drying paint products, and infrared heating lamps. This reduces the waiting time during operation and improves repair efficiency.



– **Main equipment:**
  - Sheet metal rapid shaping machine
  - Dry grinding equipment
  - Infrared heating lamp
  - Mini touch-up spray gun.
  - Paint accessory tool trolley

– **Efficient paint materials**: Using efficient quick-drying paint materials is a necessary factor for quick repair of spray paint. Efficient quick-drying products can reduce waiting time during the construction process and improve repair efficiency
  - Quick repair of clear coat.
  - Quick-drying primer
  - Alloy poly-putty.
  - High-efficiency polishing wax



Vehicles suitable for quick repair

– **Damage Requirements**： For the vehicle body panel, the exterior damage with an area equivalent to A4 paper does not require extensive sheet metal work during repair. Appropriate removal and installation, as well as some sheet met al reshaping, may be necessary. Extensive application of poly-putty is not needed.



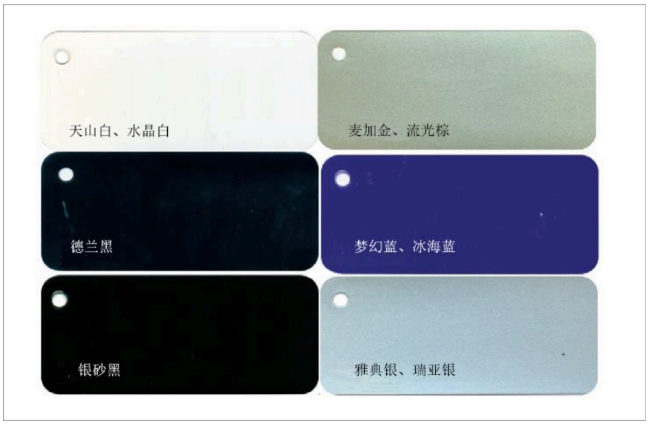
– **Position Requirements**： Not all positions on the car body are suitable for quick repairs. Vehicle damage repair has certain requirements as shown in the figure:

- Roof and hood: Not suitable for quick paint repair. It is recommended that the whole panel be paint-sprayed if the horizontal area is subject to major damage.
- Door: Optional, the color in this area is relatively easy to repair, and attention should be paid to the color transitio n between the panels.
- Front bumper, door sills, rear fenders: It is recommended to use the quick paint repair process. The damaged are a can be easily repaired, and the blend spraying shall be adopted for the clear coat.



– **Color requirements:**

- Colors that can be quickly repaired: Tianshan White, Ceramic White, Crystal White, Delan Black, Silver Sand Bla ck, Fran Red, Hera Red, Purple Red Pearl, Athenian Silver, Rhea Silver, Mecca Gold, Flowing Light Brown, Drea m Blue, Icy Sea Blue, Sky Blue, Vibrant Orange.



- Colors that cannot be quick-repaired: Three-process white pearl, three-process red pearl, champagne gold.



Description of quick repair scenarios

– **Minor damage:**

- The damage area is of A4 paper size. The damaged part is within 30%, and the damage depth does not exceed 1 cm. Scratches are generally between 5 cm and 15 cm, and the damage at lines and corners is within 7 cm.
- Slight scratches, with the clear coat slightly scratched.
- No spraying is required after treatment by dry grinder.
- The top coat can be sprayed directly.
- 1 panel: The car can be delivered in 3 hours.
- 2 panels: The car can be delivered in 4.5 hours.
- 3 panels: The car can be delivered in 6 hours.



– **Moderate damage:**

- Gravel impact marks.

- The damage part exceeds 50%, the damage depth exceeds 3 cm, and the damage at lines and corners is more t han 25 cm.
- The scratch reaches the base coat, the primer can be seen, and the bottom metal surface is not deformed.
- No spraying is required after treatment by dry grinder.
- 2 pieces: The car can be delivered in 9 hours.
- 3 pieces: The car can be delivered in 12 hours.



– **Major damage:**
  - The damage part exceeds 50%, the damage depth exceeds 3 cm, and the damage at lines and corners is more t han 25 cm.
  - The scratch reaches the substrate, with slight deformation.
  - No complicated sheet metal treatment is required.
  - It can be restored to the original state by applying 1-2 layers of poly-putty thinly.
  - 2 pieces: The car can be delivered in 9 hours.
  - 3 pieces: The car can be delivered in 12 hours.



– **New parts for replacement:**
  - 2 pieces: The car can be delivered in 6 hours.
  - 3 pieces: The car can be delivered in 9 hours.



Quick repair process

1. Sheet metal and paint reception.
2. Repair sheet metal, see How to repair the outer panel .
3. Application of poly-putty.
   a. Use a spray bottle to evenly apply the degreaser on the damaged panel.
   b. Wipe back and forth with a wiping cloth. Before the degreaser volatilizes, wipe it in one direction with another wipi ng cloth and wipe off the degreaser to clean the whole panel.

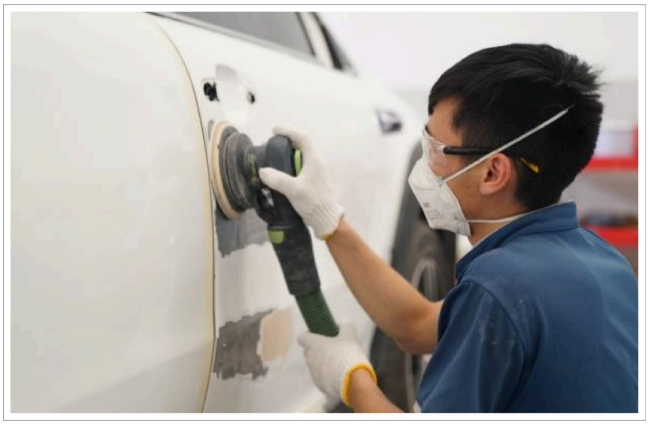


   c. Polish the feathered edge.

⚠ Caution

- Ensure that the difference in grit numbers when changing the sandpaper does not exceed 100, P80-P 120-P180.
- Touch the ground feather edge with hands to check for smoothness.
- The width of the feather edge is 3 cm.

- Grind with grinding head #5/7 and sandpaper #P80-120, and slightly tilt the grinding pad of grinder to the pa nel to shorten the grinding time.
- Grind the pad along the feather edge until the feather edge width of each paint layer on the old paint film re aches about 30mm.
- Use a sandpaper #P180 to grind the whole part to be coated with poly-putty, and ensure that the grinding ra nge exceeds the coating range.



d. Clean and degrease.
   - Spray the degreaser evenly in the damaged panel area.
   - Clean with a wet wiping cloth and then dry with a dry wiping cloth.



e. Apply poly-putty.
   a. Open the poly-putty tank to stir the poly-putty base stock evenly.
   b. Mix the poly-putty and curing agent in a ratio of 100:2-3.
   c. The first coat should be scraped thinly and forcefully to fill in small dents or sandpaper marks after repair, av oiding mixing of air that could cause pinholes and bubbles.
   d. Apply the second coat of poly-putty which can be thicker as appropriate and pay attention to trimming to red uce poly-putty marks.
   e. Use an alternating method of lateral and longitudinal application in the subsequent process to ensure better f illing.





f. Forcibly dry it for 5-10 minutes with an infrared heating lamp.

Reminder

- The distance between the heating lamp and the panel is about 50cm.
- Check if the poly-putty is dry by touching its edge with fingernails.



g. Grind the poly-putty.

Caution

- Apply carbon powder during the polishing process to identify defects in the poly-putty areas.
- Ensure that the difference in grit numbers when changing the sandpaper does not exceed 100, that th e grinding range gradually transitions from the middle to the edge, and that the sandpaper marks fro m previous grinding are removed.
- Clean the repair area, check pinholes and reapply poly-putty if necessary.

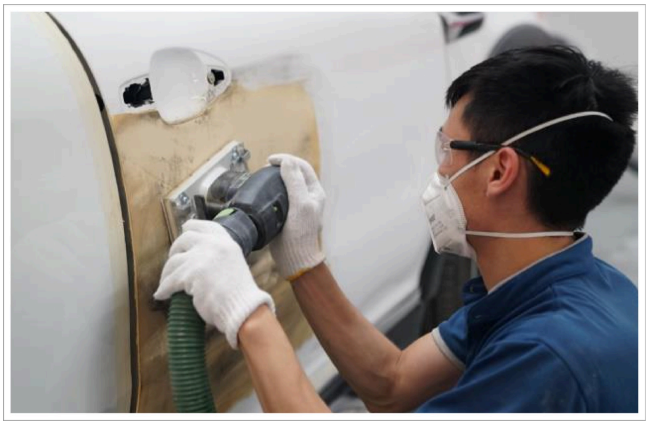
a. Apply carbon powder indicator on the poly-putty to better judge grinding quality of poly-putty.

b. Grind the poly-putty and shape it with a suitable grinder and sandpaper #P80-120.

c. After the poly-putty is ground flat, trim and polish it with a manual grinding panel and sandpaper #P180.

d. Remove coarse sandpaper marks with a fine grinder and sandpaper #P240.

e. Use grinder #3 and sandpaper #P320 to grind the surrounding paint film beyond the range of primer, and us e a dust gun to remove dust in small holes on the poly-putty surface.



4. Apply primer.
   a. Preparation before application
      a. Clean the area around the repair area. Do not wipe the poly-putty area during cleaning.



      b. Reversely mask the periphery of the part to be sprayed within the grinding range and then degrease and cle an it.



   b. Spraying of primer.

⚠ Caution

- The surface of the poly-putty must be free of dust before spraying.
- The first coat is applied throughout the grinding range.
- Ensure an appropriate flash-off time between coatings.
- The spraying range of primer is reduced layer by layer.

      a. Prepare the paint according to the mixing ratio recommended by the paint manufacturer.
      b. Spray with a special primer spray gun. Apply the first coat lightly to avoid layer biting. Try not to spray too clo se to the masking paper to prevent thick paint edges that are difficult to sand.

c. Apply the second coat by wet spraying and keep the spraying range within the first coat.

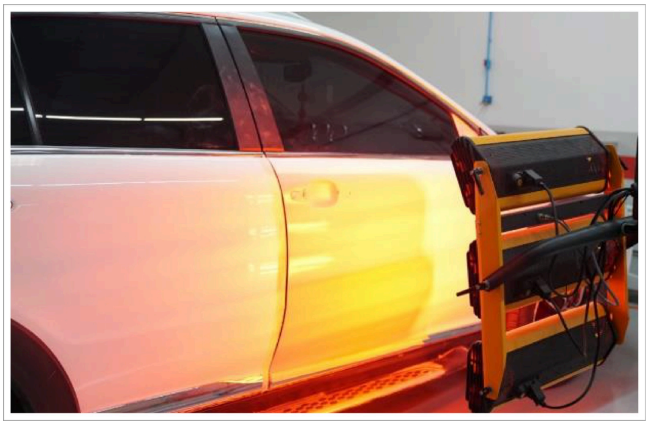
d. The third coat should be applied after the second coat has flashed off to avoid the occurrence of pinholes. T he spraying method is still wet spray, and the spraying area should be within the range of the second coat.



c. Drying of primer

– Forcibly dry the paint surface for 20 minutes with an infrared heating lamp about 50 cm away.

– The panel is 60°C and dried with an infrared heating lamp for 20 minutes.



d. Grinding of primer

⚠ Caution

– Apply toner to the edges each time the sandpaper is replaced to identify defect areas.

– The grinding pad is closely attached to the panel, and the radian of the panel should be taken into acc ount.

– During grinding, it is crucial to grind from different directions and continuously check the flatness by ha nd.

a. Apply carbon powder indicator on the primer surface first.

b. Manually grind the sprayed poly-putty area with a hand planer and sandpaper #P320 (if necessary)

c. Use grinding head #3 and sandpaper #P400 to grind the primer area.

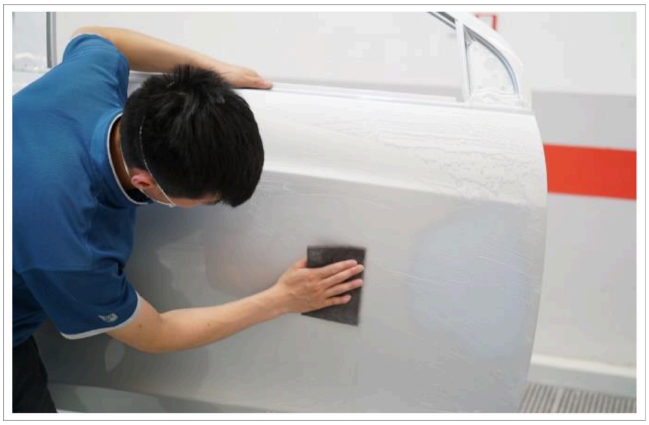
d. Use sandpaper #P600 to grind the primer area.



e. Polishing Butt Joint Transition Area: Grind with grinding head #3 and sandpaper #P1000, or grind with gray scour ing pad and abrasive paste.

⚠ Caution

- When sanding the transition paint surface, be careful about skipping sandpaper grits.
- It is recommended that the edge of the panel be treated with scouring pad and abrasive paste.



5. Application of top coat
   a. Preparation for application
      a. Clean and degrease the panel to be sprayed. During cleaning, carefully check the defective parts of primer a nd repair them in time.



      b. Mask the area required to be masked with the masking paper.



c. Use a blower and tack cloth to perform dust cleaning from top to bottom.

d. Prepare an appropriate amount of paint according to the mixing ratio recommended in the paint manual.

e. Select a filter funnel with more than 120 meshes for filtration of primer.

b. Spraying of solid color paint

a. Adjust the parameters of the spray gun such as the spray pattern, paint output, and pressure.

b. Spray the first layer of base coat on the primer surface with a gun distance of about 20 cm.

c. After flash-off of the painted surface, spray the second coat while ensuring a proper gun distance, constant s peed, overlapping range, vertical angle, parallel distance, trigger retraction and release, and wrist angle.

d. Spray the third coat after flash-off of the second coat.

e. Inspection.

– Spot check of 2K solid color paint spraying

• For solid color paint, the first coat should be applied with semi-wet spraying to achieve 80% of glos siness, and the second coat should be applied with full-wet spraying to achieve 100% of glossines s.

• The flash-off time of the first coat is about 15 minutes.

– Spot check of 1K metallic paint spraying

• For metallic paint, atomizing spraying, wet spraying, and semi-wet spraying are used for the first, s econd, and third coats, respectively.

• The flash-off time of each coat is 5-10 minutes.

• It is required to remove the paint mist with tack cloth before proceeding to the next coat.

• The water-based base coat should be applied properly based on the spraying method.



c. Metallic base coat overspray.

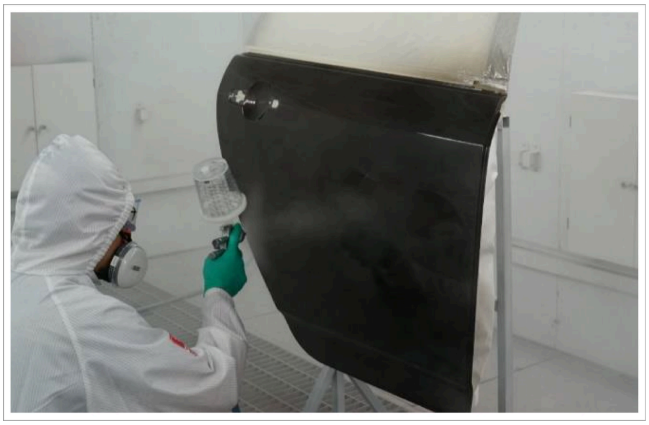
– When the local repair area is near the edge of an adjacent panel, the paint should be transitionally sprayed onto the neighboring panel.

– For whole panel spraying, use transitional spraying to adjacent panels on both sides and then apply clear c oat to all areas.

– If it is a single-process topcoat, the transition area needs to be treated with interface water after excessive spraying, and then polished after drying.



6. Spray clear coat.
   a. Adjust the spray gun and apply a thin layer of clear coat on an area larger than the base coat spraying area.
   b. Spray the second coat of clear coat after flash-off to ensure fullness of the clear coat while paying attention to det ails such as gun distance, moving speed of spray gun, vertical angle, and overlapping of spray pattern. Ensure s ound coating texture and paint film brightness after spraying.

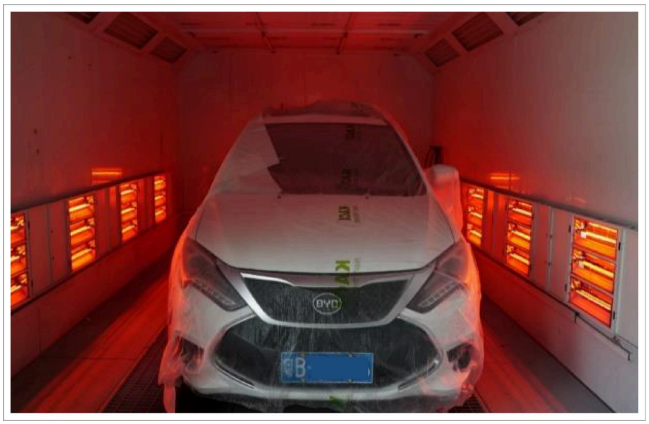


7. Baking

⚠ Caution

– After the top coat is sprayed, it is required to wait for 10 minutes before heating and baking it.
– It can be baked for 30 minutes by heating the spray booth to 60°C, or baked for 20 minutes by using an infr ared heating lamp. Or let it dry naturally.

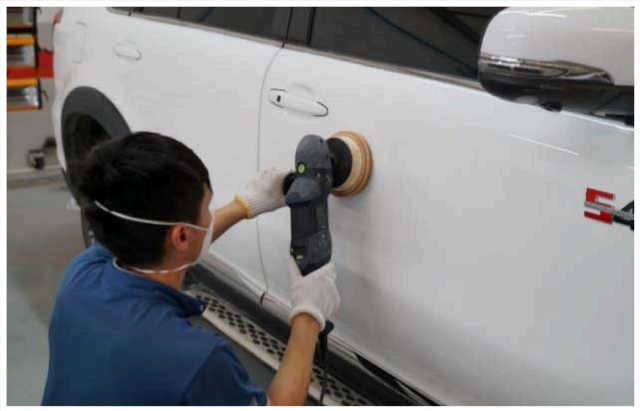
– Forcibly dry the paint after spraying.
– Tear off the covered adhesive tape after baking and before cooling down of the panel. Otherwise, the adhesive t ape will harden and become difficult to peel off.



8. Polishing
   a. After marking defects such as dust spots on the paint surface with a marker, use a spot sander with P1500 sandp aper and water spray, or use a sanding block with wet grinding sandpaper to manually sand the dust spots.

> **⚠ Caution**
>
> Use an appropriate grinding head and fine sandpaper #P2000 for large-area grinding.

   b. Polish with coarse wool wheel or sponge wheel and polishing wax.
   c. Polish with fine polishing wax and fine polishing wheel to restore the gloss of paint film coating.



9. Quality inspection and vehicle delivery

> **⚠ Caution**
>
> – Make sure that the vehicle is cleaned.
> – Make sure that all repair items are completed.
> – Make all necessary preparations before delivery.
> – Make sure that the vehicle body color, panel flatness and panel clearance meet the quality standards after repair.

   a. After cleaning the vehicle, perform a completion check. Refer to Repair process quality checklist , Inspection of re pair quality for inspection.
   b. The front desk claims consultant needs to contact the customer to schedule a pick-up time. When the customer c omes to pick up the car, the front desk claims consultant will lead the inspection of the vehicle's repair quality, en suring the customer leaves satisfied.



Inspection of repair quality

1. Flatness
   - The vehicle surface is smooth, without unevenness when viewed from the front. The vehicle is free of unevenne ss when viewed from any direction outdoors.
   - The lines are straight and smooth. Waves and unevenness are not allowed.
2. Paint quality
   - The paint surface should be smooth without defects such as flow marks, fish eyes or blistering.
   - No defects such as dust spots and pinholes should be observed at a distance of 1 m.
3. Color quality.
   - If the whole vehicle is refurbished, its color must be consistent without any color difference.
   - The color must be the same as that of the adjacent parts for paint touch-up, and the color must be consistent wh en observed within 1 m and be free of obvious color difference when observed from a long distance and multiple directions.
4. Paint film brightness
   - The paint surface should be glossy enough, with uniform reflections. Misty surface or uneven texture of paint film is not allowed.
   - Except for special requirements, obvious orange peel texture is not allowed on the ordinary paint surface.
5. Base coat quality
   - The particle size, density and reflectivity of metallic paint must be the same as those of the original paint surface.
   - Sandpaper marks are not allowed on the base coat.
6. Painting quality of inner side of the panel
   - Before assembling the sheet metal, it is required to observe the inner surface. The paint must be consistent with that of the original vehicle.
   - The uncovered surfaces in the interior and boxes shall be painted the same as the outer surfaces.
   - The requirements for puttying and polishing covered surfaces in the interior or boxes could be slightly lower than those for the outer surface.
   - The tire cover, wiper arm, water spray nozzle and door handle of the refurbished vehicle shall be painted, and th e interior and exterior of chassis shall be painted.
7. Color bar quality
   - The color bar shall be properly pasted with a deviation not exceeding 1 mm.
   - The color bar lines shall be straight and free of waves.
   - In the color bar, obvious bubbles are not allowed, with a diameter of no more than 1 mm, and no more than 2 bu bbles in each color bar.
8. Protection of non-processed surfaces
   - Sandpaper marks are not allowed in the electroplating and glass surfaces.
   - Defects such as abrasion and paint mist are not allowed in non-painted surfaces.
   - The exhaust pipe, trim panel and rubber strip shall not be sprayed with paint.
9. Cleaning quality
   - Before the delivery of sheet metal assembly, the silt and water inside the vehicle must be cleaned up.
   - During process inspection, the painted surface must be clean and free of dust, water droplets, residual wax, etc.
   - During the completion inspection, the whole vehicle must be cleaned inside and outside.

FAQs and solutions

This topic collects FAQs that may be encountered in the process of repairing vehicle paint and their solutions. You can clic k the following links to find the corresponding contents:

- Click to find mask FAQs and solutions .
- Click to find sprayingFAQs and solutions .
- Click to find polishFAQs and solutions .

Paint color code of this vehicle model

Car model color code：

Vehicle model	Color	Color code
Fangchengbao B8		EA7
		JM
		AAP

Repair process quality checklist

Process name	Process inspection items	Evaluation	Status
Spot checklist of sheet metal trimming	There is no bulge on the panel surface after repair.	Y N	
	The toughness of steel panel is completely restored (without bounce).	Y N	
	The vehicle body accessories and the trim strip adhesive and residues are removed.	Y N	
	After repair, the inner back of steel panel is treated for rust prevention.	Y N	
	The surface ablation and rust in the damaged area have been removed.	Y N	
	In case of large-area repair, there are no pits on the surface.	Y N	
	The paint film of the repaired part in the steel panel is removed (paint film in putty applied area).	Y N	
	During spot welding, the number of welding spots conforms to the operation instructions (the number of original welding spots × 1.3).	Y N	
	The periphery of the plug hole is melted, and part of it is melted into the inner side (without fracture, cracking, holes, etc.).	Y N	
	Weld marks and rust on the welding positions are completely eliminated.	Y N	
	After sealant application, the structural parts of vehicle body are treated for rust prevention.	Y N	
	Clearance accuracy of each assembly panel (complies with service manual standards: clearance, step deviation and clearance deviation)	Y N	
	All assembly parts are in good appearance after being assembled (clearance and inclination are in good condition).	Y N	

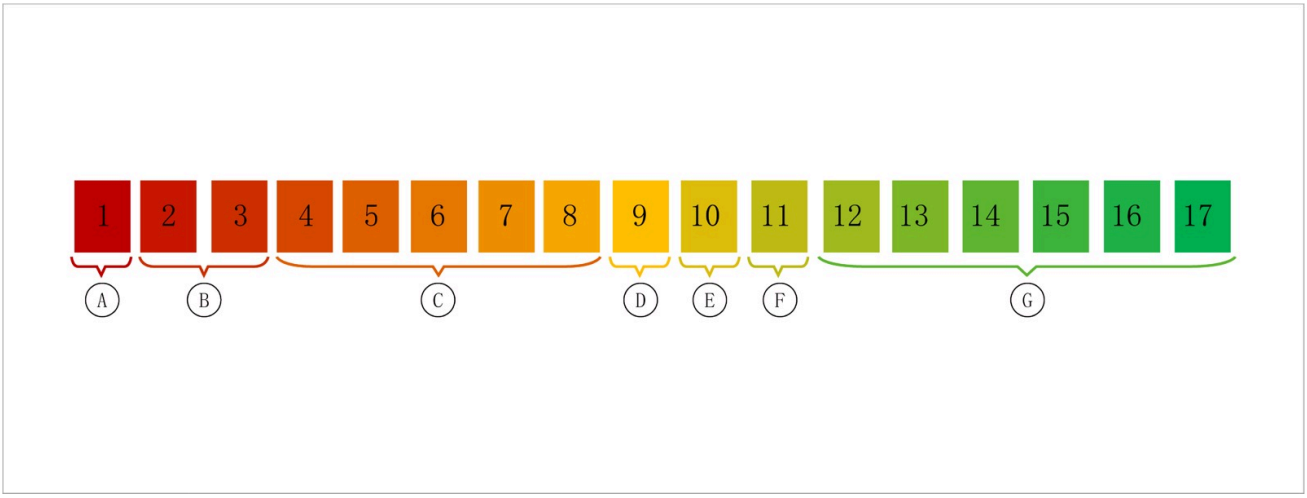
Process name	Process inspection items	Evaluation	Status
Spot checklist of base treatment	Whether the feather edge is smooth without steps	Y N	
	Whether the total width of feather edge is not less than 3 CM	Y N	
	Whether the width of feather edge of repaired paint coating is not less than 5 mm	Y N	
	Whether the first coat of poly-putty is compact and thin	Y N	
	Whether the distance between the poly-putty infrared lamp and panel is more than 0.8 m during drying	Y N	
	Whether the dryness/hardness is tested before poly-putty grinding	Y N	
	Whether the sandpaper is used properly during poly-putty grinding	Y N	
	Is the grinder chosen correctly for grinding? Is the sandpaper grit number correct	Y N	
	Whether the sandpaper marks on the poly-putty surface are uniform	Y N	
	Whether the poly-putty is flat after grinding	Y N	
	Whether the poly-putty is blown to check for pinholes and other defects after grinding	Y N	
	Whether the quality is checked and the site is managed according to 5S methodology after base treatment	Y N	

Process name	Process inspection items	Evaluation	Status
Primer operation check sheet	Whether the base treatment is inspected before primer operation	Y N	
	Whether a paint mixing ruler is used for preparation of primer	Y N	
	Whether the mixing proportion of curing agent meets the requirements	Y N	
	Whether to use a professional primer spray gun	Y N	
	Whether the base is exposed after primer spraying	Y N	
	Whether the primer has orange peel after spraying	Y N	
	Whether the correct grinder is selected to grind the primer	Y N	
	Whether to apply carbon powder grinding indicator	Y N	
	Whether the panel is exposed after grinding	Y N	
	Whether there are obvious sandpaper marks on the panel after grinding	Y N	
	Whether the blend transition area is properly controlled within the primer grinding zone.	Y N	
	Whether the sandpaper in blend area is selected correctly for grinding	Y N	
	After sanding the primer, check for dusting, pinholes, and other defects	Y N	
	Whether the paint is cleaned and the site is cleared in time for 5S after coating	Y N	

Process name	Process inspection items	Evaluation	Status
Spot checklist of top coat operation	Whether the primer operation is inspected before top coat operation	Y N	
	Whether the paint mixing proportion meets the requirements	Y N	
	Whether the primer is prepared with a paint mixing ruler or measuring cup	Y N	
	Whether the barrel cover is tightened in time after paint mixing	Y N	
	Whether the bottom is exposed after spraying (base color not covered or missing painting)	Y N	
	Whether there is orange peel after spraying	Y N	
	Whether there is obvious sagging after spraying	Y N	
	Whether there is gloss loss after spraying	Y N	
	Whether the aluminum paint is sprayed poorly	Y N	
	Whether the sandpaper is properly selected during polishing	Y N	
	Whether the polishing pad is clean during polishing	Y N	
	Whether the polishing wax is selected properly during polishing	Y N	
	Whether all defects such as dust pits are removed from the surface of polished panels	Y N	
	Whether the vehicle/vehicle body is cleaned up after polishing	Y N	
	After polishing, the texture of the top coat is consistent with the original car	Y N	

Description of VIN

The Vehicle Identification Number (VIN) is a 17-digit code that serves as the unique identifier for a vehicle:



Vehicle Identification Number Reference Table:

S/N	The number of characters in the Vehicle Identification Number	Information on the Vehicle Identification Number
A	1st digit	Countries and regions of vehicle production
B	2nd and 3rd digit	Vehicle Manufacturer
C	4th to 8th digits	Vehicle type/Series/Body and powertrain
D	9th digit	Vehicle check digit
E	10th digit	Vehicle Production Year
F	11th digit	Vehicle assembly plant code
G	12th to 17th digits	Vehicle Production Serial Number

Correspondence Table of Vehicle Production Countries and Regions:

Code	Country/Region	Code	Country/Region
1	United States	J	Japan
2	Canada	S	United Kingdom
3	Mexico	K	South Korea
4	United States	L	China
6	Australia	V	France
9	Brazil	R	Taiwan, China
W	Germany	Y	Sweden
T	Switzerland	Z	Italy

Vehicle production year comparison table:

Year	Code	Year	Code	Year	Code	Year	Code
1991	M	2001	1	2011	B	2021	M
1992	N	2002	2	2012	C	2022	N
1993	P	2003	3	2013	D	2023	P
1994	R	2004	4	2014	E	2024	R
1995	S	2005	5	2015	F	2025	S
1996	T	2006	6	2016	G	2026	T
1997	V	2007	7	2017	H	2027	V
1998	W	2008	8	2018	J	2028	W
1999	X	2009	9	2019	K	2029	X
2000	Y	2010	A	2020	L	2030	Y

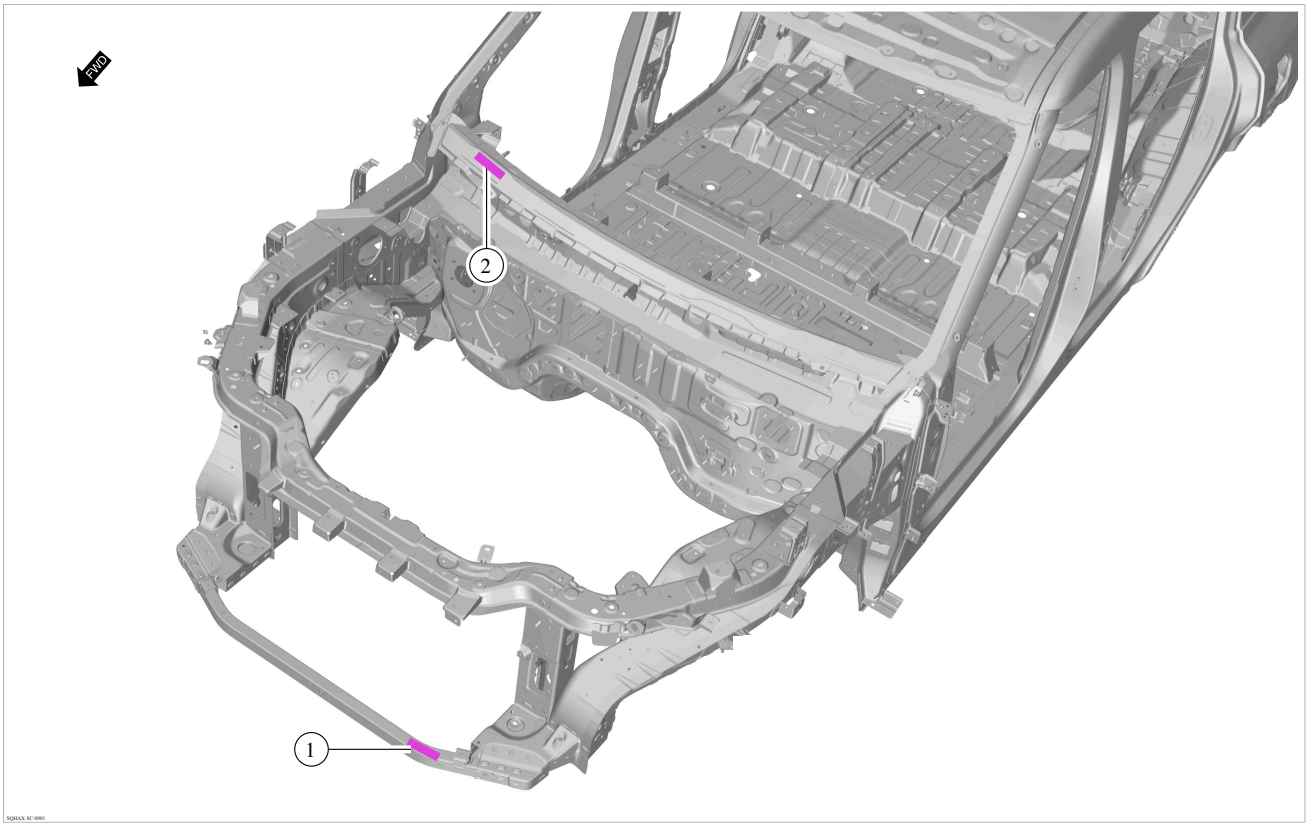
VIN position

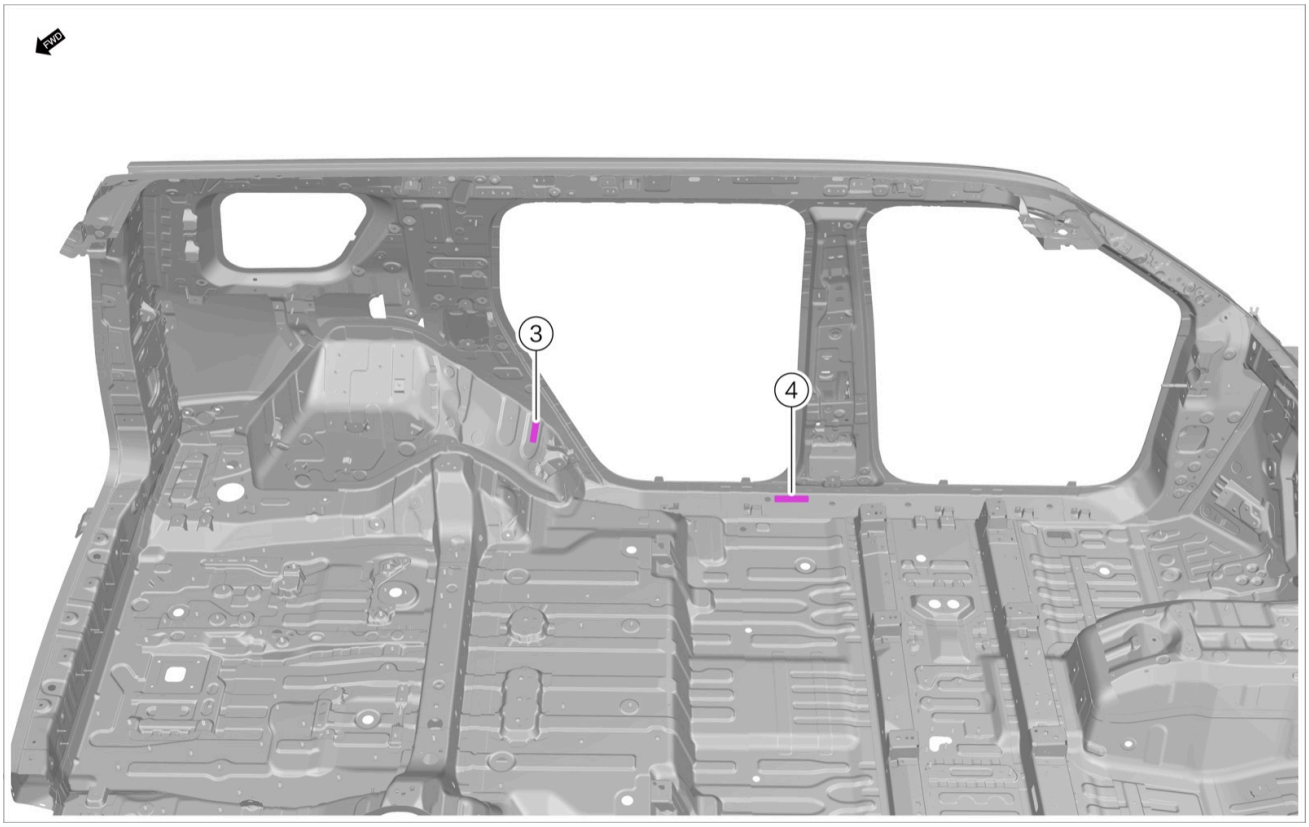
Reminder

This article only shows Vehicle Identification Numbers (VINs) related to body and spray work. If you need to see mo
re content, please refer to the repair manual.

Caution

After replacing the components involving VIN, restore them to avoid violating relevant regulations.

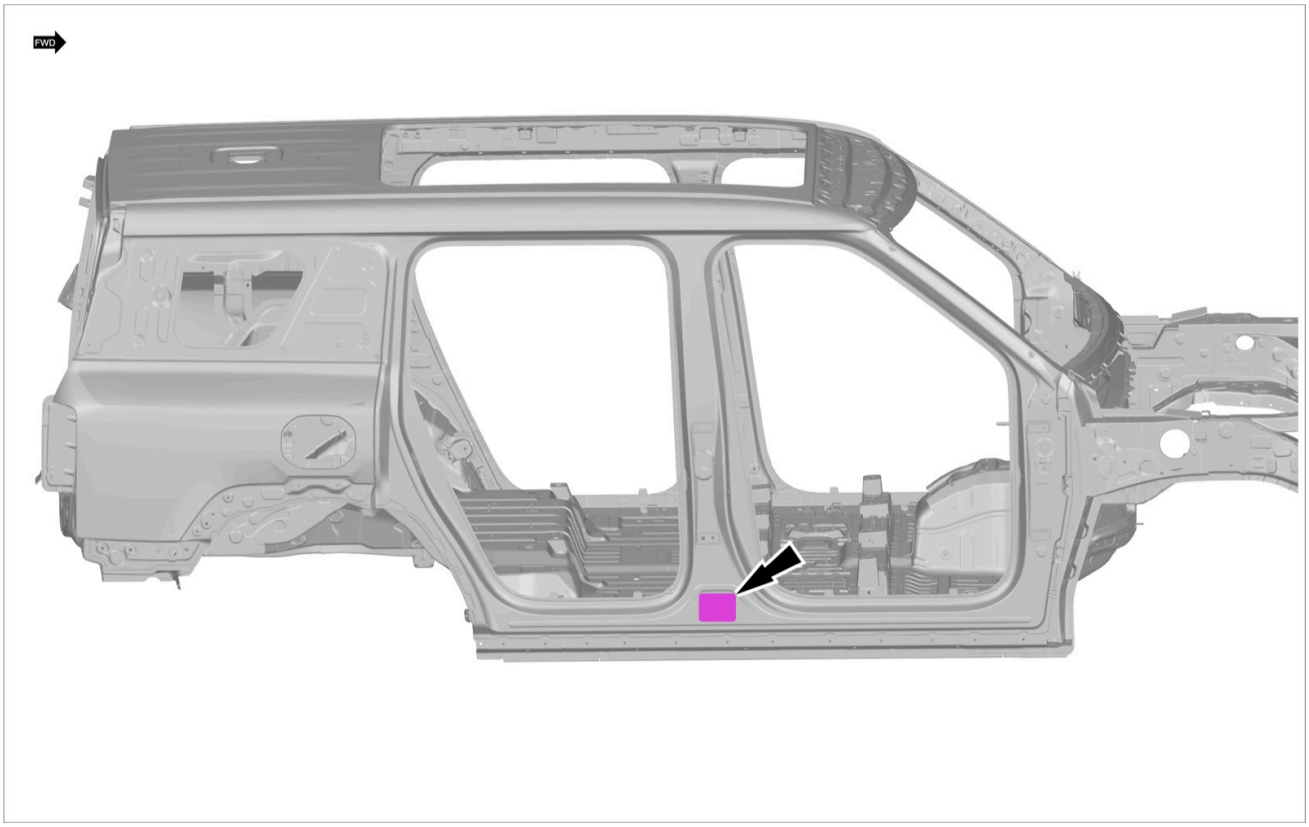




S/N	Position
1	Located on the front crash beam
2	Located on the front right corner of the dashboard body
3	Located at the left rear wheel arch connector sheet metal
4	Located at the sheet metal plane of the left door panel

Position and description of vehicle nameplate

Position



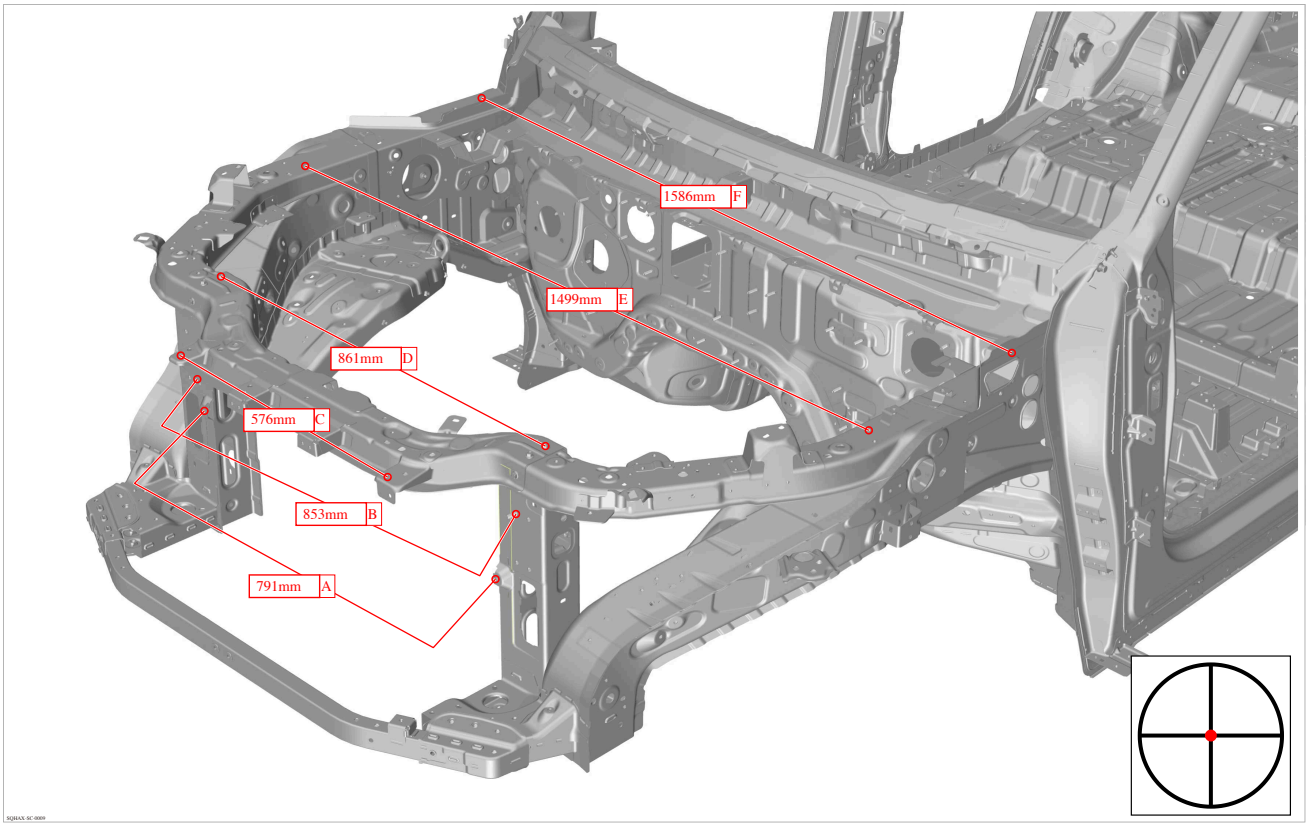
Description

The vehicle nameplate is affixed below the right-side B-pillar, and its surface information includes: Company Name, Brand, Country of Manufacture, Vehicle Model, Seating Capacity, Manufacturing Date, Engine Model, Engine Displacement/Maximum Rated Power, Drive Motor Model, Drive Motor Peak Power, Power Battery System Rated Voltage/Rated Capacity, Vehicle Identification Number, Maximum Allowable Total Mass, Maximum Allowable Towing Mass.

Front compartment

– If only one dimension is marked in the figure, it indicates that the data is symmetrical on both the left and right sides.

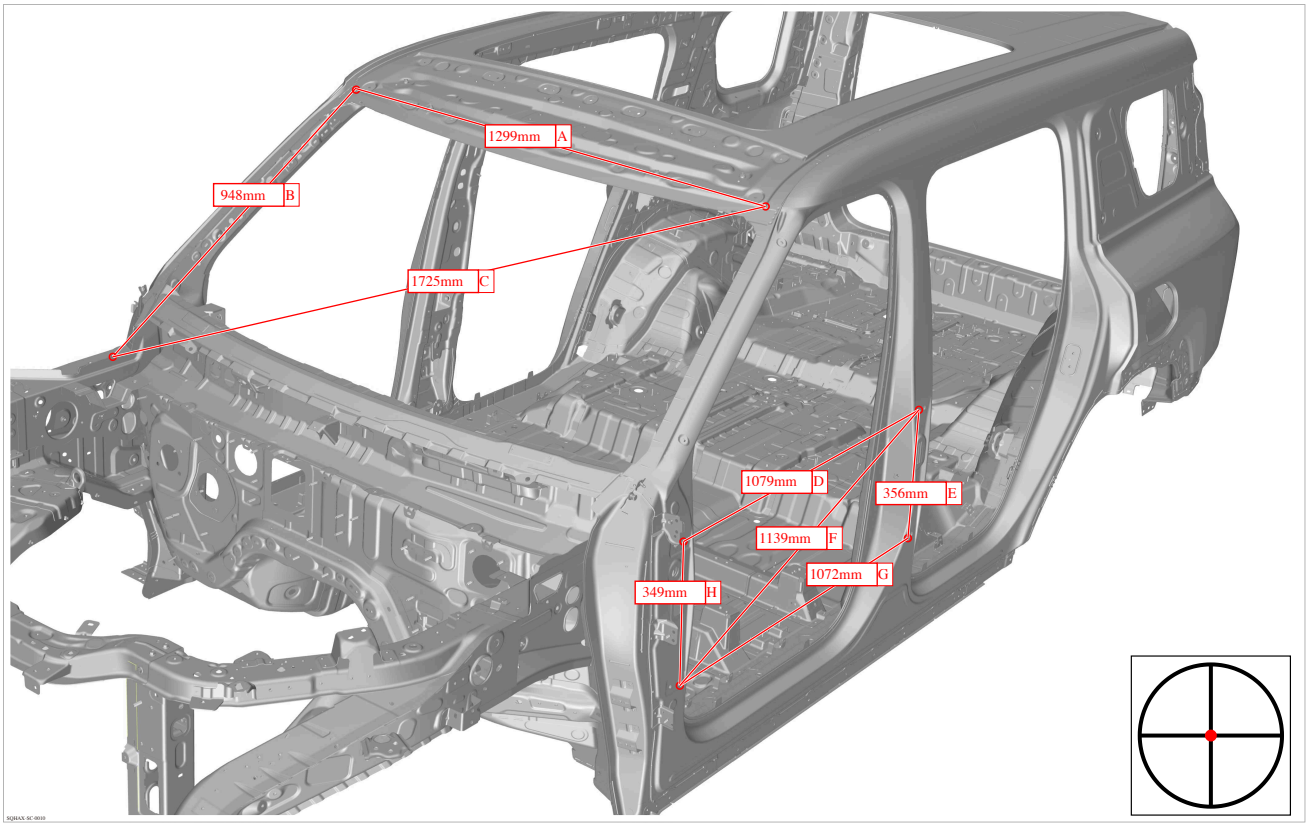
– Measure the center point of the circular hole.

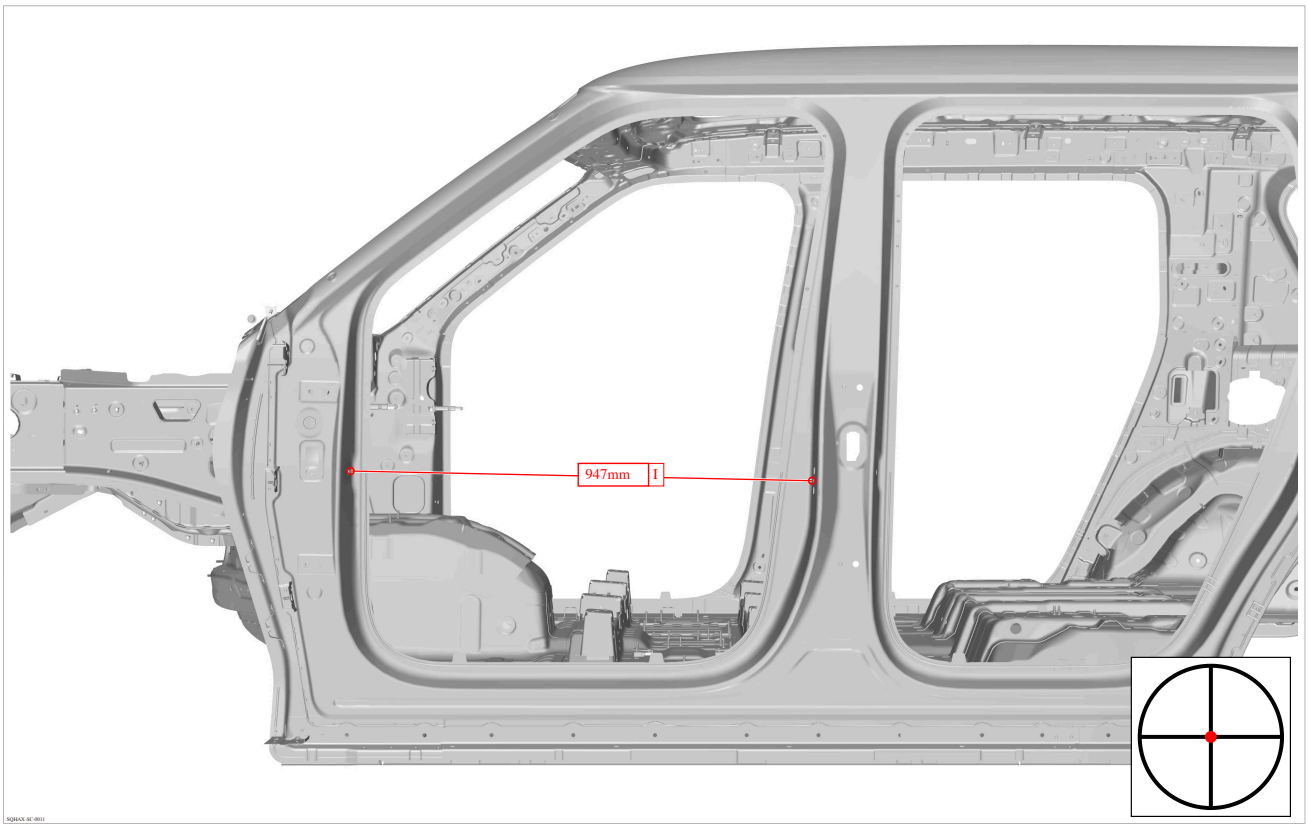


Hole measurement data:

Letter	Dimension (mm)	Location
A	791	Right front headlight mounting hole - Left front headlight mounting hole
B	853	Right side pedestrian protection crossbeam mounting hole - Left side pedestrian protection crossbeam mounting hole
C	576	Right front bumper installation - left front bumper installation hole
D	861	Upper beam mounting bolt of the right water tank - Upper beam mounting bolt of the left water tank
E	1499	Right wing sub-panel bracket mounting hole - Left wing sub-panel bracket mounting hole
F	1586	Right Engine Cover Hinge Rear Mounting Hole - Left Engine Cover Hinge Rear Mounting Hole

- If only one dimension is marked in the figure, it indicates that the data is symmetrical on both the left and right sides.
- Measure the center point of the circular hole.



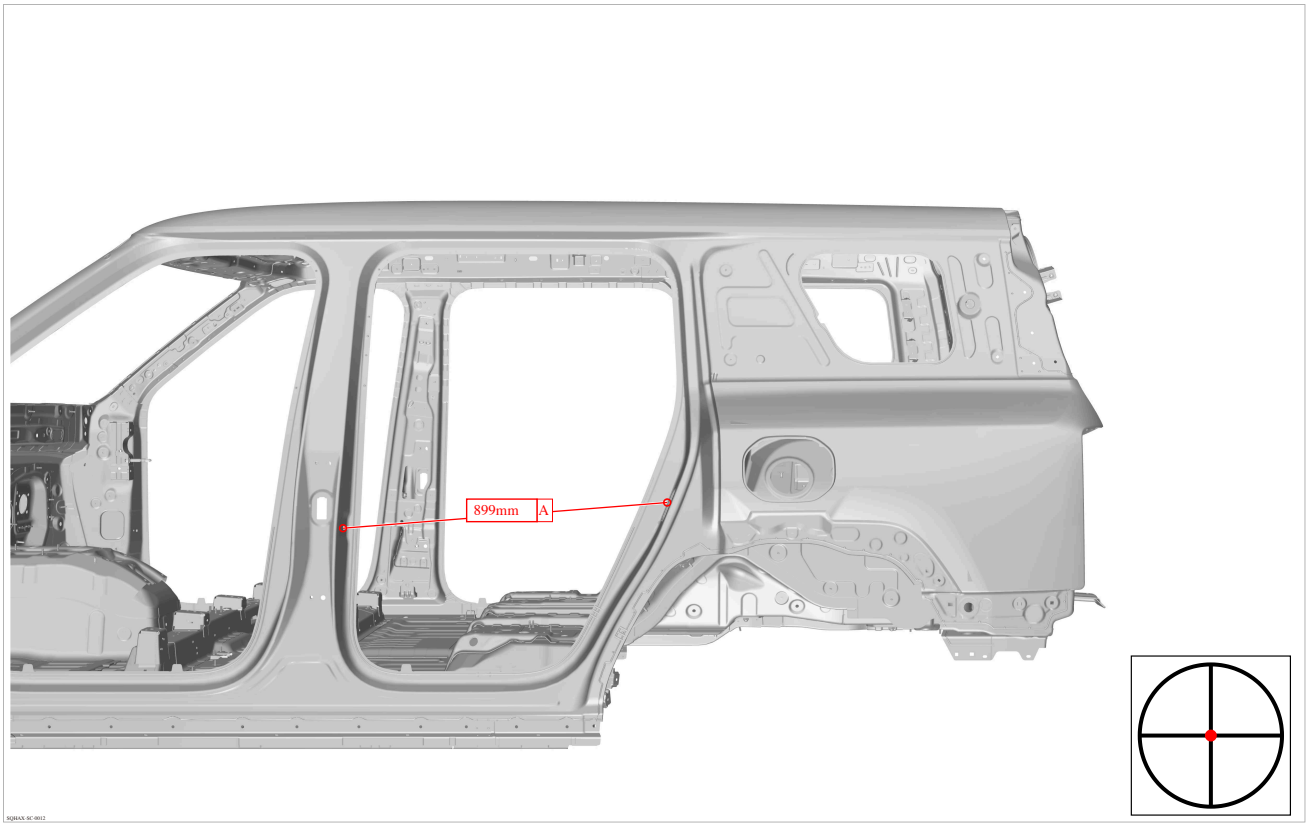


Hole measurement data:

Letter	Dimension (mm)	Location
A	1299	Left roof panel corner - right roof panel corner
B	948	Right roof panel corner - right front engine hood hinge rear mounting hole
C	1725	Left side roof panel corner - Right side front hood hinge rear mounting hole
D	1079	Left front door upper hinge rear installation hole - Left rear door upper hinge rear installation hole
E	356	Rear Installation Hole of Left Rear Door Upper Hinge - Rear Installation Hole of Left Rear Door Lower Hinge
F	1139	Installation hole behind the lower hinge of the left front door - Installation hole behind the upper hinge of the left rear door
G	1072	Rear installation hole of the lower hinge of the left front door - Rear installation hole of the lower hinge of the left rear door
H	349	Rear Installation Hole of Left Front Door Upper Hinge - Rear Installation Hole of Left Front Door Lower Hinge
I	947	Left front door checker mounting hole - Mounting hole on the left front door striker

– If only one dimension is marked in the figure, it indicates that the data is symmetrical on both the left and right sides.

– Measure the center point of the circular hole.



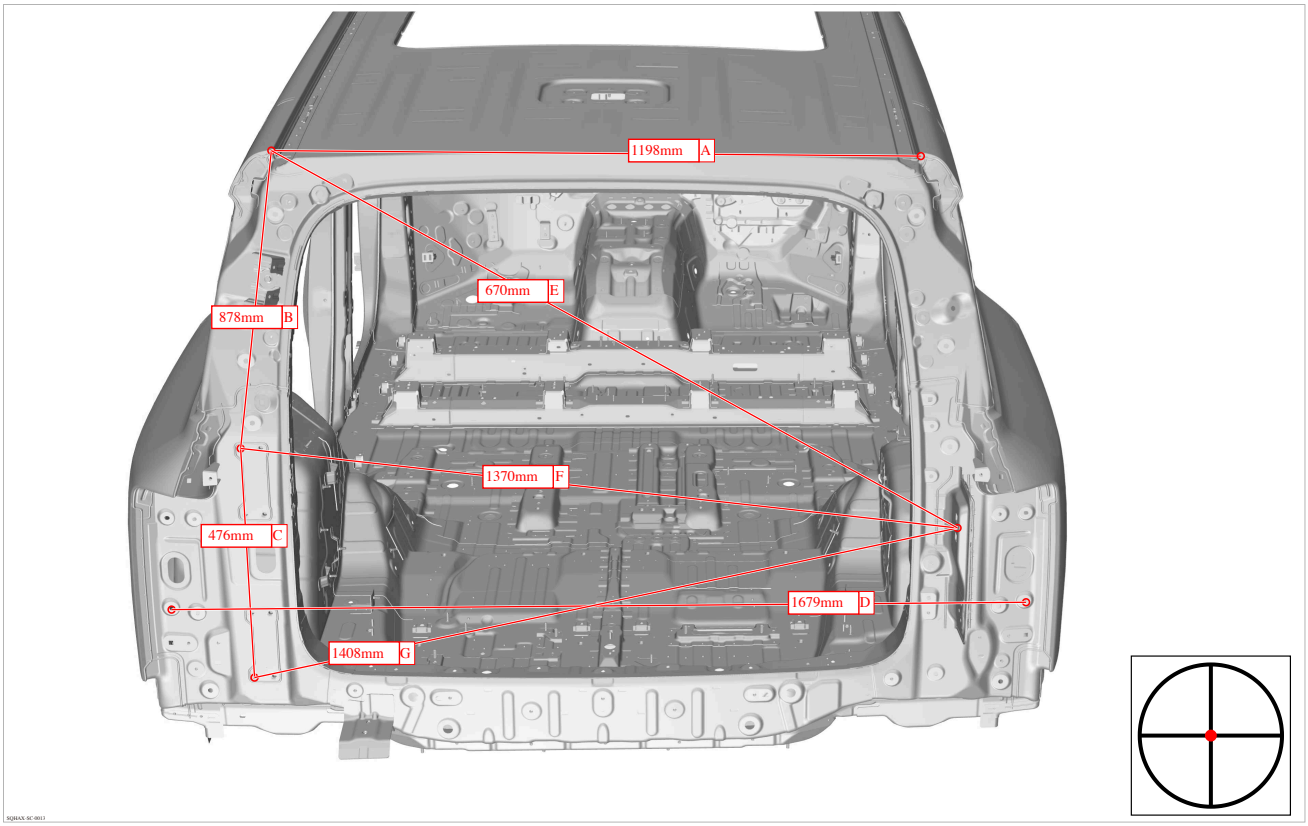
Hole measurement data:

Letter	Dimension (mm)	Location
A	899	Rear left door stopper mounting hole - mounting hole on the rear left door lock loop

Trunk lid

- If only one dimension is marked in the figure, it indicates that the data is symmetrical on both the left and right sides.
- Measure the center point of the circular hole.

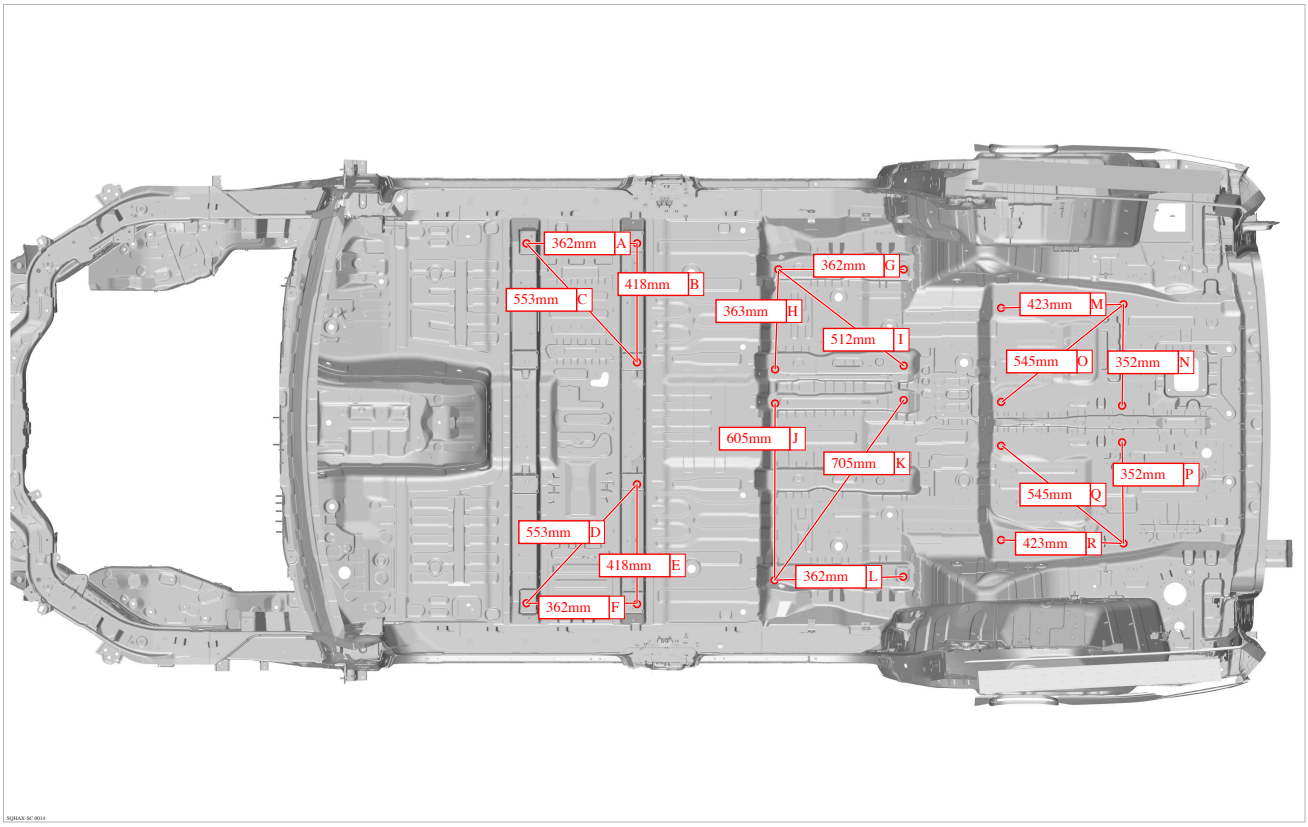
Trunk lid



Hole measurement data:

Letter	Dimension (mm)	Location
A	1198	Right roof panel corner - Left roof p anel corner
B	878	Left roof panel corner - back door u pper hinge mounting hole
C	476	Rear door upper hinge mounting ho le-Rear door lower hinge mounting hole
D	1679	Installation hole under right rear tri m lamp - Installation hole under left rear trim lamp
E	670	Left roof panel corner - back door lo ck ring mounting hole
F	1370	Back door hinge installation hole - b ack door lock ring installation hole
G	1408	Tailgate Lower Hinge Mounting Hol e - Tailgate Lock Ring Mounting Hol e

Floor



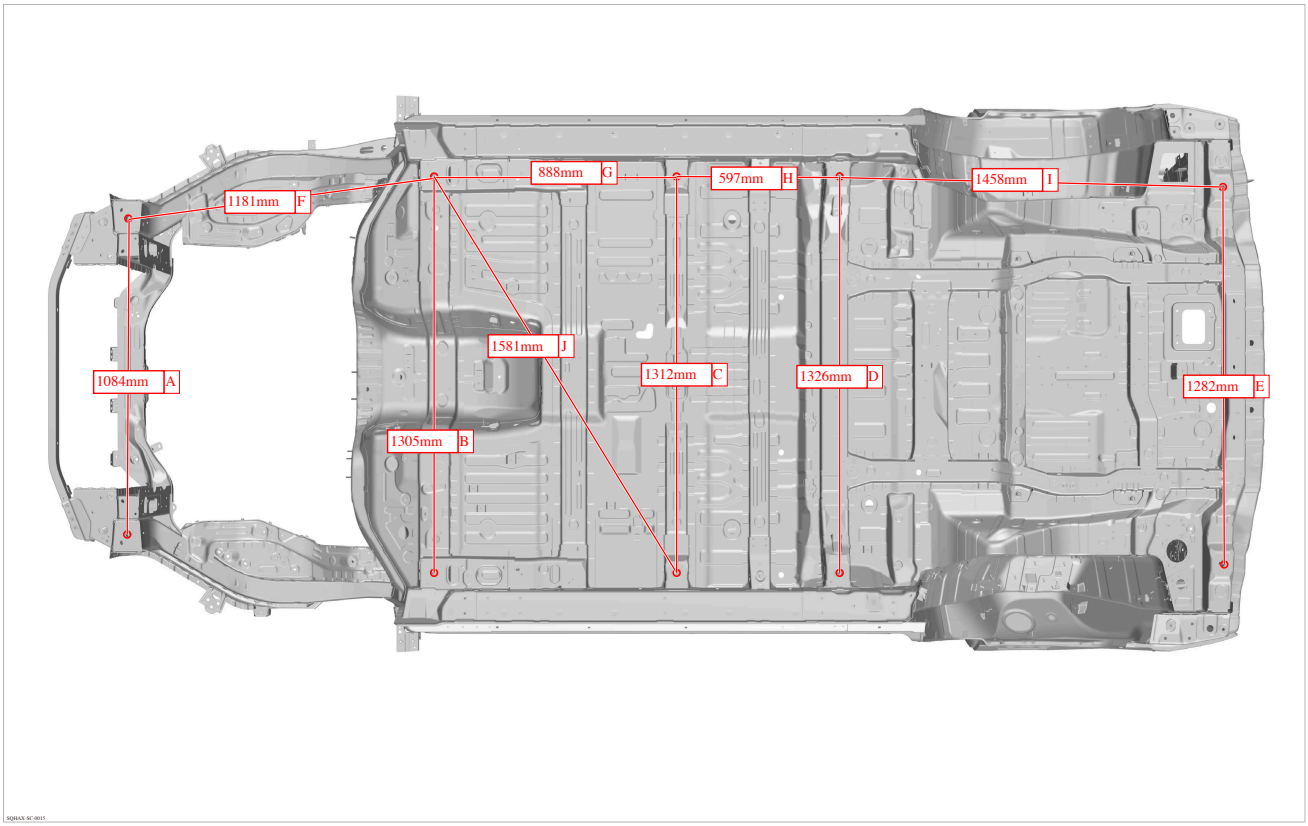
Hole measurement data:

Letter	Dimension (mm)	Location
A	362	Front passenger seat mounting hole
B	418	Front passenger seat mounting hole
C	553	Passenger seat mounting hole
D	553	Driver's seat mounting hole
E	418	Driver seat installation hole
F	362	Driver seat installation hole
G	362	Middle-right seat mounting hole
H	363	Installation Hole for Middle-Right Row Seat
I	512	Middle Right Seat Mounting Hole
J	605	Middle left seat mounting hole
K	705	Middle-left seat mounting hole
L	362	Middle left seat mounting hole
M	423	Mounting hole for the right seat in the third row

Letter	Dimension (mm)	Location
N	352	Right seat installation hole in the thi rd row
O	545	Installation hole for the third row rig ht seat
P	352	Installation hole for the third-row left seat
Q	545	Left seat installation hole in the third row
R	423	Left seat mounting hole in the third r ow

Underbody

- If only one dimension is marked in the figure, it indicates that the data is symmetrical on both the left and right sides.
- Measure the center point of the circular hole.



Hole measurement data:

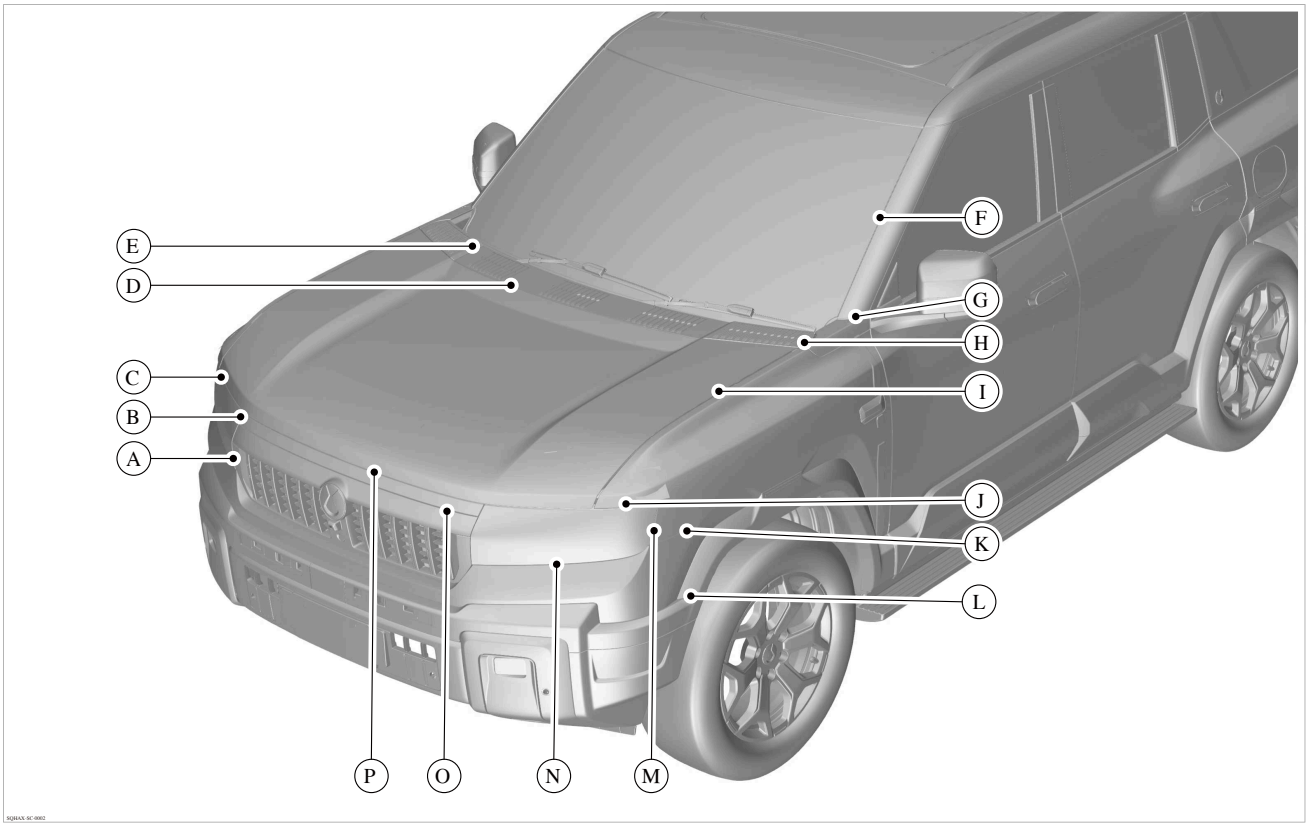
Letter	Dimension (mm)	Location
A	1084	Right first row frame mounting hole - left first row frame mounting hole
B	1305	Right second row frame mounting hole - Left second row frame mounting hole
C	1312	Right third row frame mounting hole - Left third row frame mounting hole
D	1326	Right fourth row frame mounting hole - Left fourth row frame mounting hole
E	1282	Right fifth row frame mounting hole - Left fifth row frame mounting hole
F	1181	Left first row frame mounting hole - Left second row frame mounting hole
G	888	Left second row frame mounting hole - Left third row frame mounting hole

Letter	Dimension (mm)	Location
H	597	Left third row frame mounting hole - Left fourth row frame mounting hole
I	1458	Left fourth row frame mounting hole - Left fifth row frame mounting hole
J	1581	Left second row frame mounting hol e - Right third row frame mounting h ole

Front

Reminder

- The data on the left and right sides of the vehicle body are consistent.
- For the meanings of **clearance, flushness and tolerance**, refer to Terms
- A feeler gauge can be used as a measuring tool. Be careful during measurement to avoid scratching the paint s urface.



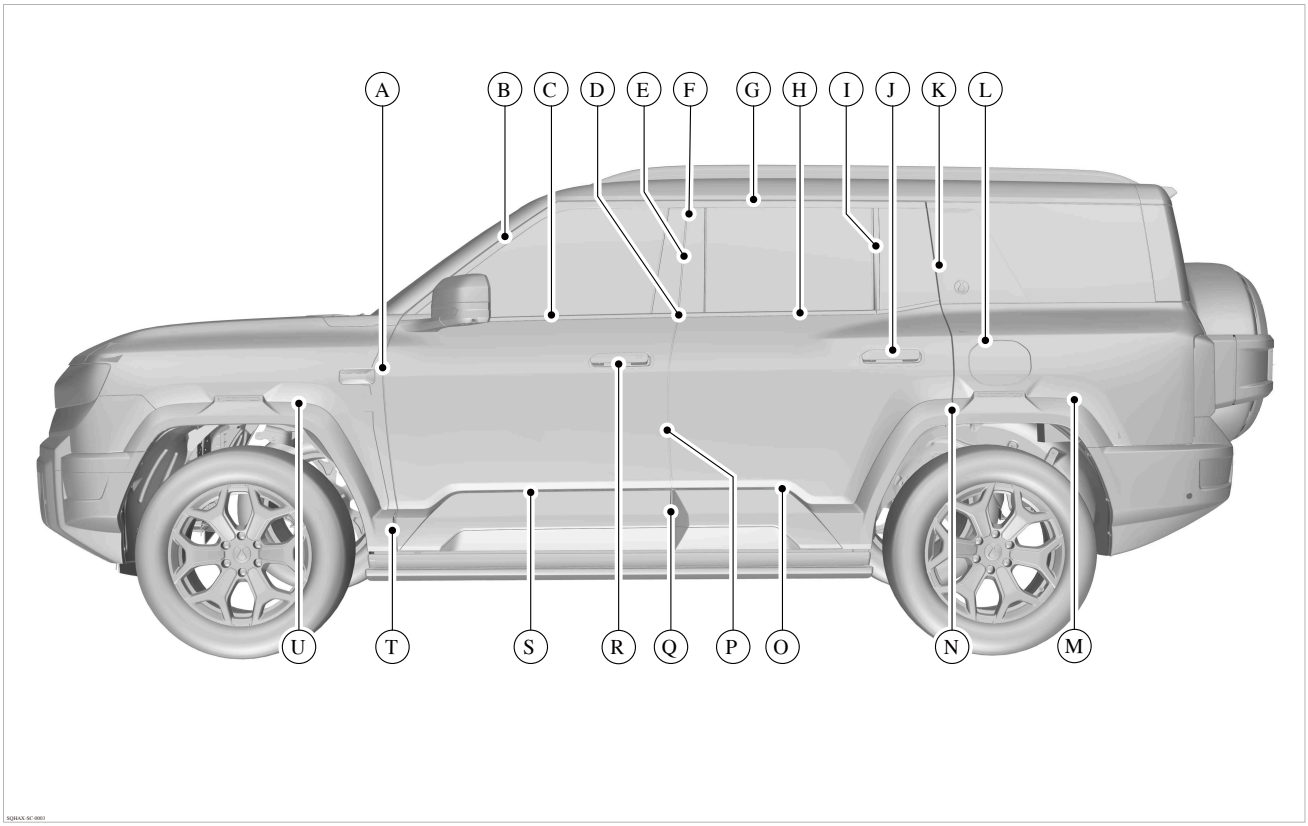
Position	Location name	Clearance (mm)	Flushness (mm)
A	Front combination lamp and grille	2.5 Tolerance: ±1.5	-
B	Front combination lamps and front middle position lamps	2.5 Tolerance: ±1.5	-1.5 Tolerance: ±1.5
C	Headlight cluster and hood	5.5 Tolerance: ±1.5	-
D	Front Hood and Front Hood Trim II	0.2 Tolerance: (-0.2,0.8)	-2 Tolerance: ±0.7
E	Front Hood Trim Panel I and Front Hood Trim Panel II	1.0 Tolerance: ±1.0	-
F	A-pillar trim and windshield	4.3 Tolerance: ±1.2	-

Position	Location name	Clearance (mm)	Flushness (mm)
G	Fender trim panel and side w all A-pillar trim panel	2.5 Tolerance: ±1.2	-
H	Fender Trim and Front Hood Trim I	4.0 Tolerance: ±1.2	0.0 Tolerance: ±1.2
I	Hood and fender	3.5 Tolerance: ±1.0 Parallelism tolerance: 1.0	0.0 Tolerance: ±1.0
J	Fender and front combination lamp	4.0 Tolerance: ±1.0 Parallelism tolerance: 1.2	0 Tolerance: ±1.0
K	Fender and front bumper	0.5 Tolerance: （-0.5,0.5）	-0.5~0 Tolerance: ±0.7
L	Front bumper and wheel arch	1.0 Tolerance: ±1.5	-0.5 Tolerance: ±1.2
M	Headlight cluster and fender	2.0 Tolerance: ±1.0	-1.1~-1.7 Tolerance: ±1.0
N	Front combination lamp and f ront bumper	2.0 Tolerance: ±1.2	-
O	Front position lamp and front bumper grille	1.0 Tolerance: ±1.0	-
P	Front position lamp and front hood	5.5	-

Side

Reminder

- The data on the left and right sides of the vehicle body are consistent.
- For the meanings of **clearance, flushness and tolerance**, refer to Terms
- A feeler gauge can be used as a measuring tool. Be careful during measurement to avoid scratching the paint s urface.



Position	Location name	Clearance (mm)	Flushness (mm)
A	Front door and fender	3.8 Tolerance: ±1.0	0.0 Tolerance: -0.5，1.0
B	Front door groove and side b ody A-pillar trim	5.0 Tolerance: ±1.5	-
C	Front door and front door out er weather strip	1.0	1.5
D	Front door outer water trim a nd rear door outer water trim	4.0 Tolerance: ±1.2	0 Tolerance: ±1.2
E	Rear door B-pillar exterior tri m panel and front door B-pill ar exterior trim panel	4.0 Tolerance: ±1.2 Parallelism tolerance: 1.2	0.0 Tolerance: ±1.2

Position	Location name	Clearance (mm)	Flushness (mm)
F	Front door B-pillar trim panel and front door groove	0.5 Tolerance: ±0.5	0.5 Tolerance: ±0.5
G	Side wall and rear door channel	5.0 Tolerance: ±1.5	0.0 Parallelism tolerance: 2.0
H	Water Drainage Outside Rear Door and Rear Door Assembly	1.0	1.5
I	Fixed back door glass trim and rear quarter glass	4.5 Tolerance: ±1.2	±1.0 Tolerance: ±1.2
J	Rear door handle and rear door outer panel	2.5-2.7 Tolerance: ±0.5	-0.5 Tolerance: ±0.7
K	Fixed back door glass and rear side glass	4.5 Tolerance: ±1.5 Parallelism tolerance: 1.5	2.0 Tolerance: ±1.5
L	Side wall and charging/refueling port cover	2.5 Tolerance: ±0.5 Parallelism tolerance: 0.5	-0.5 Tolerance: ±0.7
M	Rear wheel arch and side panel	0.2 Tolerance: （-0.2，0.8）	-
N	Rear wheel arch of the side panel and rear door wheel arch	4.0 Tolerance: ±1.2	0.0 Tolerance: ±1.2
O	Rear door and rear door skirt panel	2.5 Tolerance: ±0.5	-0.5 Tolerance: ±0.7
P	Rear door and front door	3.8 Tolerance: ±1.0 Parallelism tolerance: 1.0	0.0 Tolerance: (-0.5, 1.0)
Q	Front door trim panel and rear door trim panel	4.7 Tolerance: ±1.2	-
R	Front door handle and front door outer panel	2.5-2.7 Tolerance: ±0.5	-0.5 Tolerance: ±0.7
S	Front door and front door skirt panel	0.2 Tolerance: -0.2/+0.8	-
T	Fender Trim and Front Door Skirt Panel	4.5 Tolerance: ±1.2	0.0 Tolerance: ±1.2

Position	Location name	Clearance (mm)	Flushness (mm)
U	Fender and front wheel arch	0.2 Tolerance: （-0.2，0.8）	-

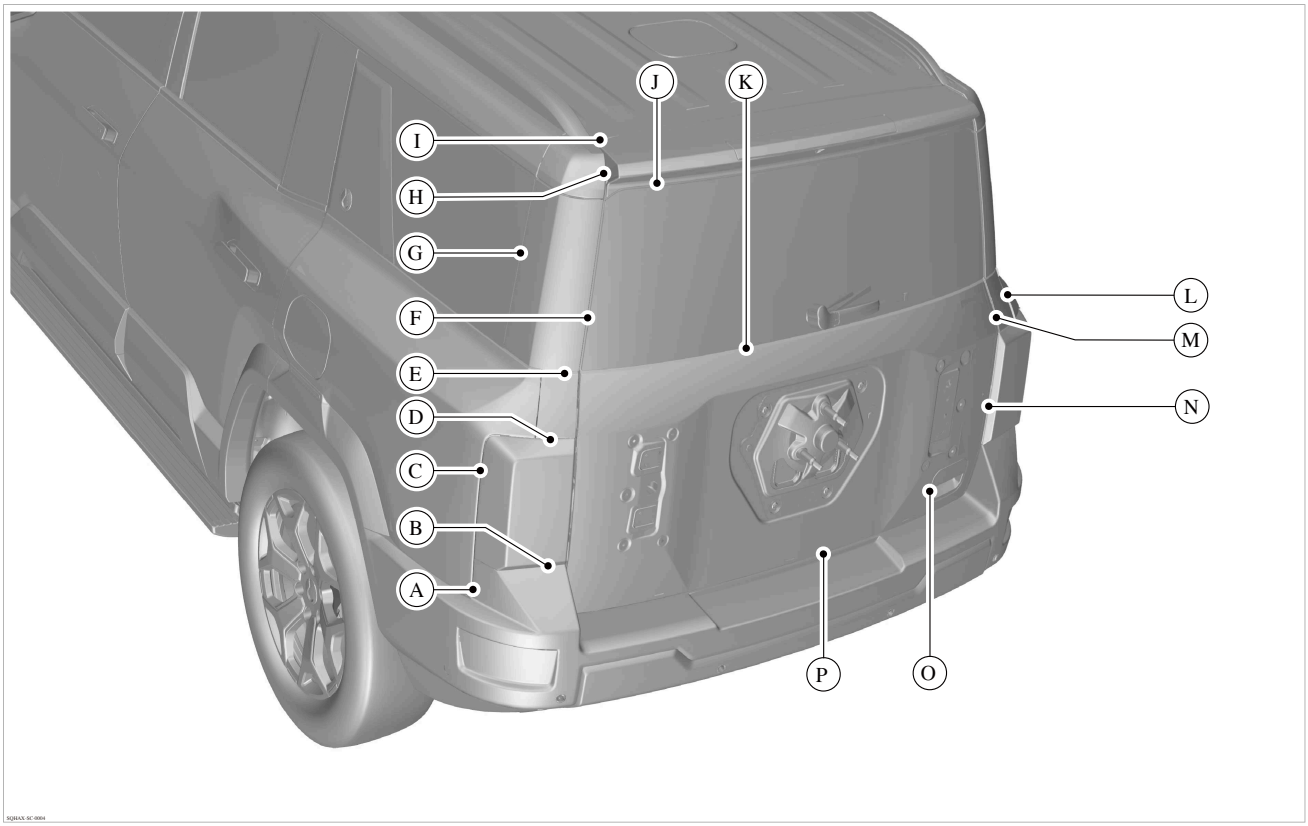
Rear

Reminder

– The data on the left and right sides of the vehicle body are consistent.

– For the meanings of **clearance, flushness and tolerance**, refer to Terms

– A feeler gauge can be used as a measuring tool. Be careful during measurement to avoid scratching the paint s urface.



Position	Location name	Clearance (mm)	Flushness (mm)
A	Side panel and rear bumper	0.5 Tolerance: (-0.5, 0.5)	-
B	Rear combination lamp and r ear bumper	2.0 Tolerance: ±1.2	-
C	Side Body and Rear Combin ation Lamp	1.5 Tolerance: ±1.2	-
D	Rear Combination Lamphold er and Rear Combination La mp	1.5 Tolerance: ±1.2	-
E	D pillar trim and rear combin ation lamp trim	3.0 Tolerance: ±1.2	-

Position	Location name	Clearance (mm)	Flushness (mm)
F	D-pillar trim and rear windshield	6.0 Tolerance: ±1.5	2.2 Tolerance: ±1.5
G	Side window glass and D-pillar trim panel	2.0 Tolerance: ±1.2	2.0 Tolerance: ±1.2
H	D-pillar trim panel and rear spoiler	6.0 Tolerance: ±1.5	1.7-2.0 Tolerance: ±1.5
I	Top Cover and Rear Spoiler	6.5 Tolerance: ±1.5 Parallelism tolerance: 1.5	-2.0 Tolerance: ±1.5
J	Rear spoiler and rear windshield	3.0 Tolerance: ±1.5 Parallelism tolerance: 1.5	1.5 Tolerance: ±1.5
K	Rear Windshield and Back Door	3.0 Tolerance: ±1.2	-
L	Rear combination lamp trim and side panel	0.5 Tolerance: (-0.5,0.7)	-1.0 Tolerance: (-0.7,1.0)
M	Tailgate and rear combination lamp garnish	6.0 Tolerance: ±1.2 Parallelism tolerance: 1.2 Left and right difference: 1.2	-1.0 Tolerance: ±1.2
N	Tailgate and Rear Combination Lamp	6.0 Tolerance: ±1.2 Parallelism tolerance: 1.2 Left and right difference: 1.2	-
O	Back door and back door handle	2.0 Tolerance: ±0.5	-0.5 Tolerance: ±0.5
P	Tailgate and rear bumper	7.0 Tolerance: ±2.0	-

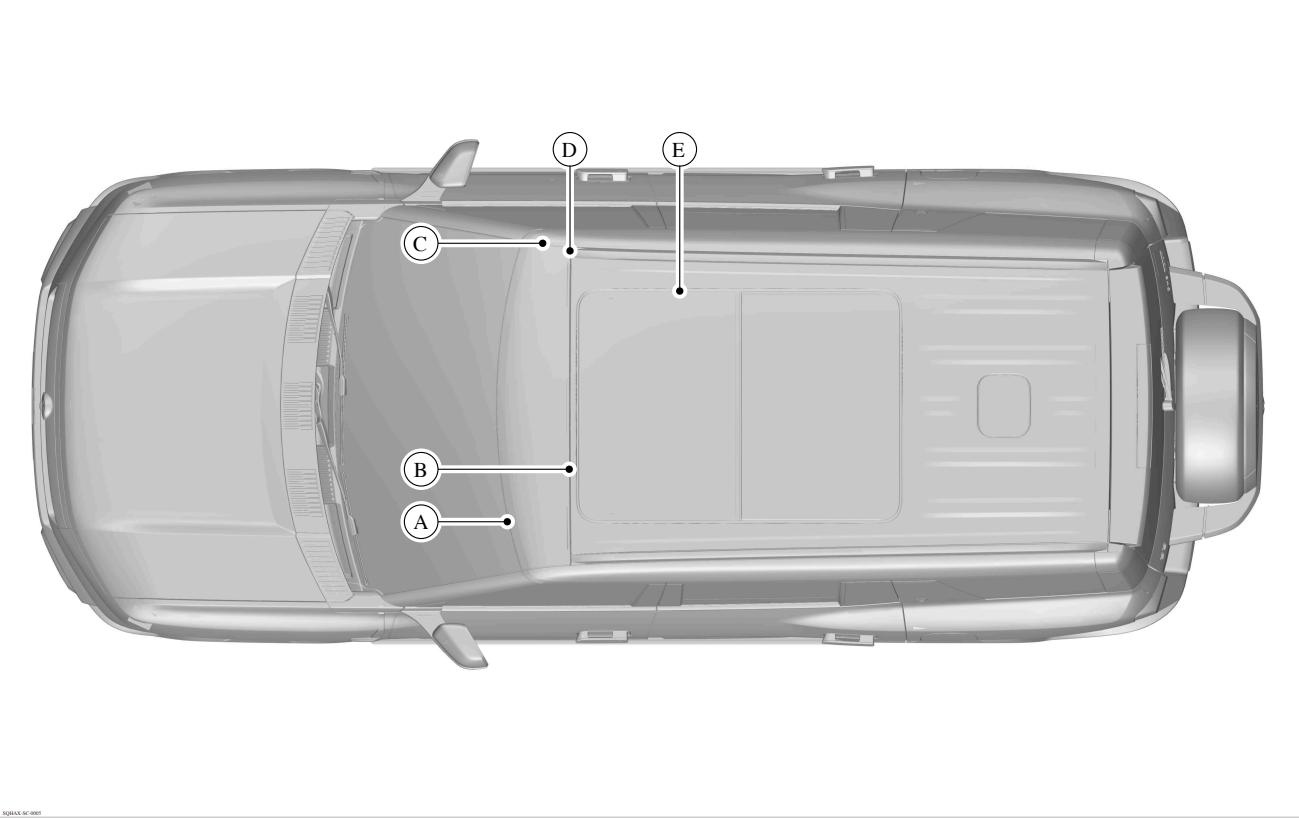
Roof

Reminder

– The data on the left and right sides of the vehicle body are consistent.

– For the meanings of **clearance, flushness and tolerance**, refer to Terms

– A feeler gauge can be used as a measuring tool. Be careful during measurement to avoid scratching the paint s urface.



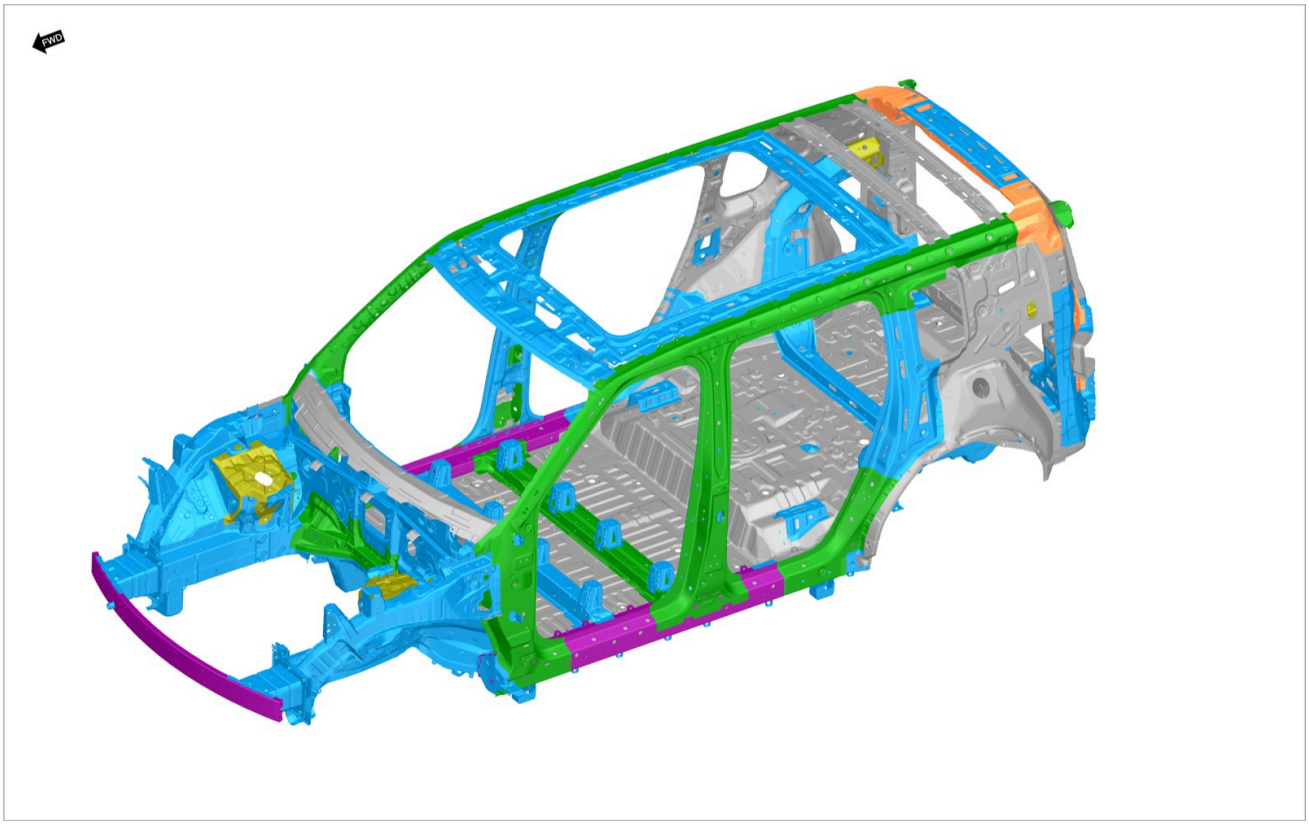
Position	Location name	Clearance (mm)	Flushness (mm)
A	Front Windshield Area Top C over Trim Panel	4.0 Tolerance: ±1.2	-2.0 Tolerance: ±1.2
B	Top cover trim and top cover	2.5 Tolerance: ±1.2	1.0 Tolerance: ±1.2
C	Top cover trim panel and side wall	3.0 Tolerance: ±1.2	-
D	Top cover trim plate and top cover trim strip	3.0 Tolerance: ±1.2	-
E	Top Cover and Sunroof Glas s	-	-0.5 Tolerance: ±1.5

车身材料

方程豹 豹8 采用高强度钢以及铝合金混合车体结构，其采用的材料如下：

危险

- 禁止对热成型钢进行切割、缩火等方式修复，若材质为热成型钢的部件变形，则需要进行更换处理。
- 维修时只能使用“比亚迪”提供的原厂零部件。



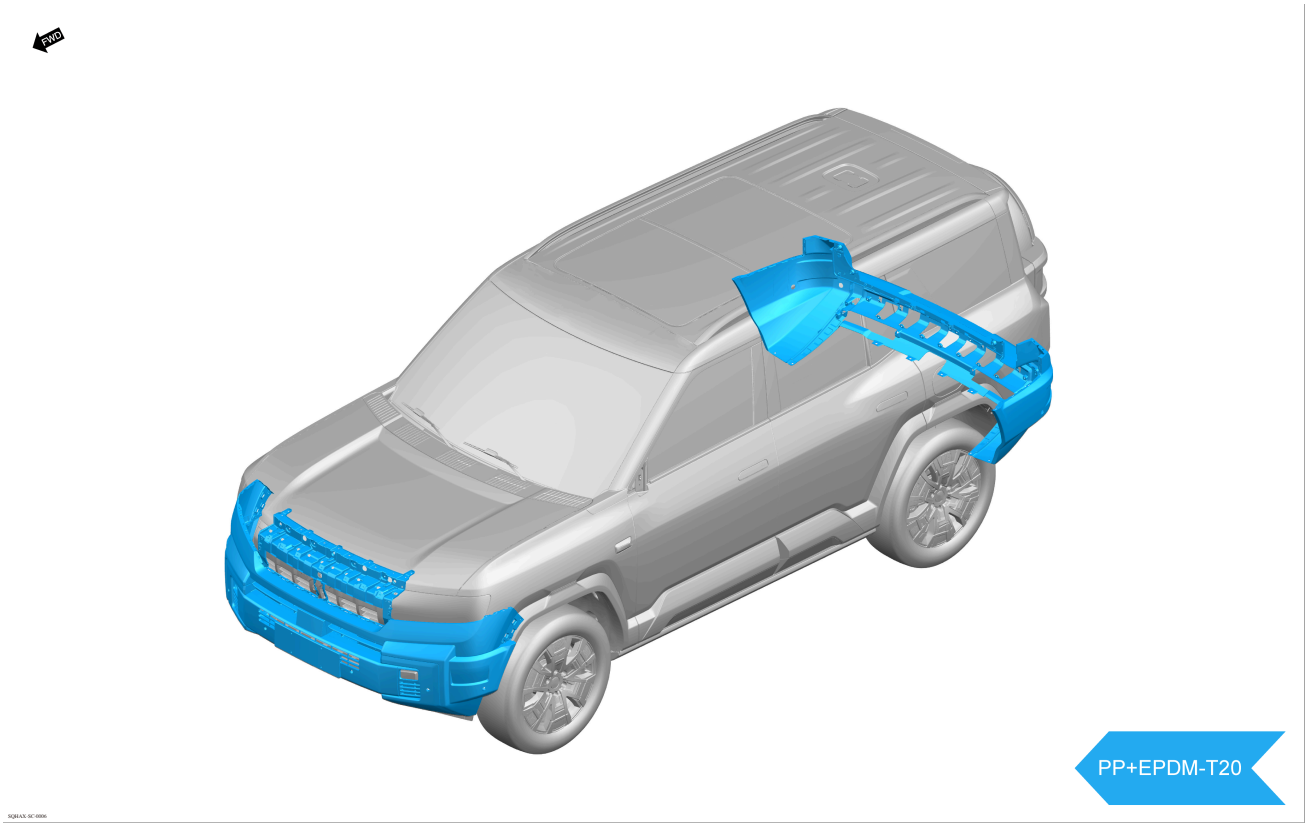
车身用料对照表：

低碳钢	中强度钢	高强度钢
超高强度钢	热成型钢	铝合金

Materials used for bumpers

Reminder

This article introduces the materials used for bumpers. If you need to repair the bumper, you can refer to Repair too ls for plastic parts



The front and rear bumpers of the Fangchengbao B8 are composed of **80% polypropylene (PP) and 20% ethylene prop ylene diene monomer (EPMD)**.

- **PP**: It’s the abbreviation for "Polypropylene".
- **EPDM**: is the abbreviation for “Ethylene-Propylene-Diene Monomer,” representing EPDM rubber.
- **T20**: This designation refers to the percentage content of EPDM in the blend, i.e., 20% EPDM mixed with 80% PP.

碰撞力传递路径

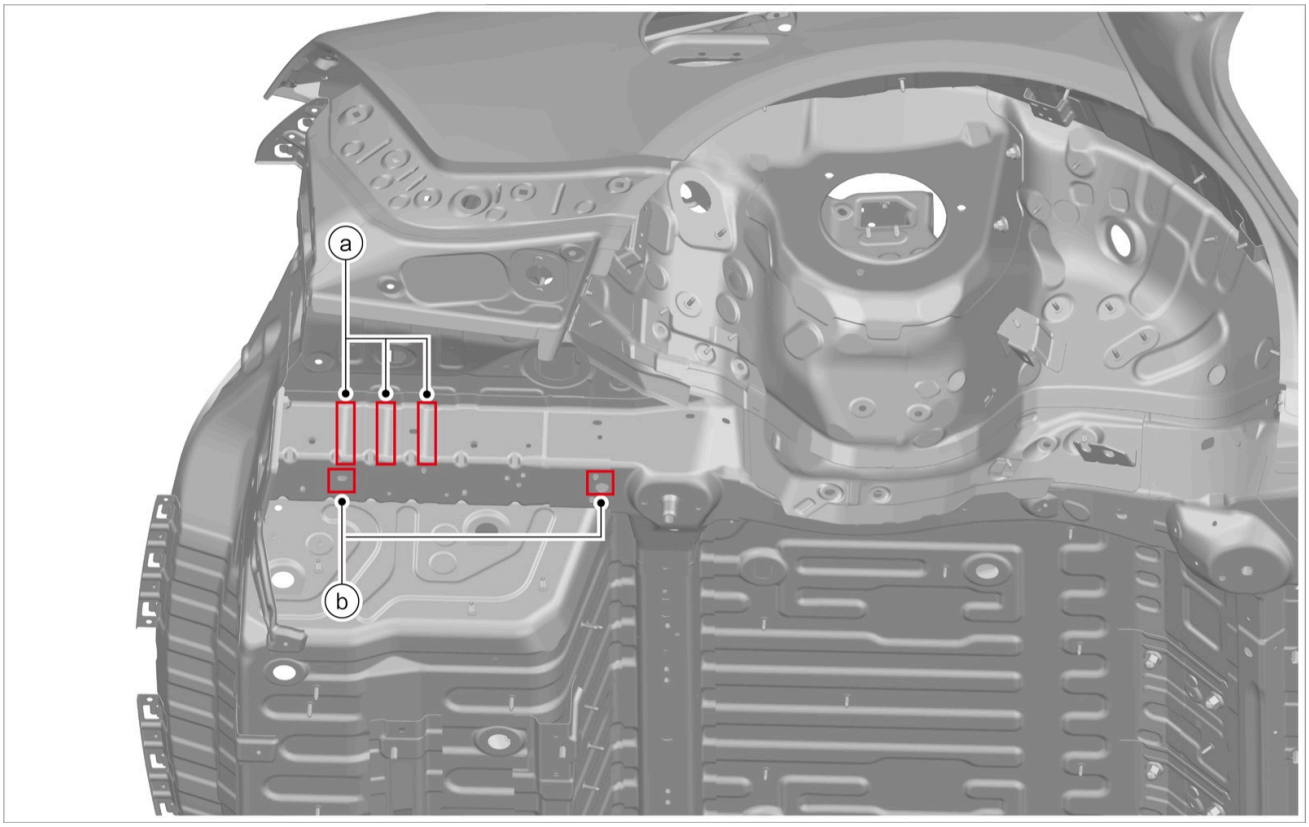
认识吸能装置

为尽可能的保证乘员安全，车辆都设计有相应的吸能装置，从而尽可能地缓冲碰撞力。

– **特性**：
  - 为了更好的保护乘客人身安全，通过应力变化设计撞击力的导向。
  - 吸能结构受力后，通过易变形的方式，吸收巨大撞击力。
  - 经过车身前部与后部吸能结构缓冲后，减轻惯性冲击力以及乘客舱变形的可能性，以便有效的保护乘客的安全。
  - 此种设计将使撞击力按照预定的设计传导。
  - 在车身的前后部位都有此种设计。
– **设计**：一般综合使用折纸和孔洞结构设计。

a：折纸结构

b：孔洞结构

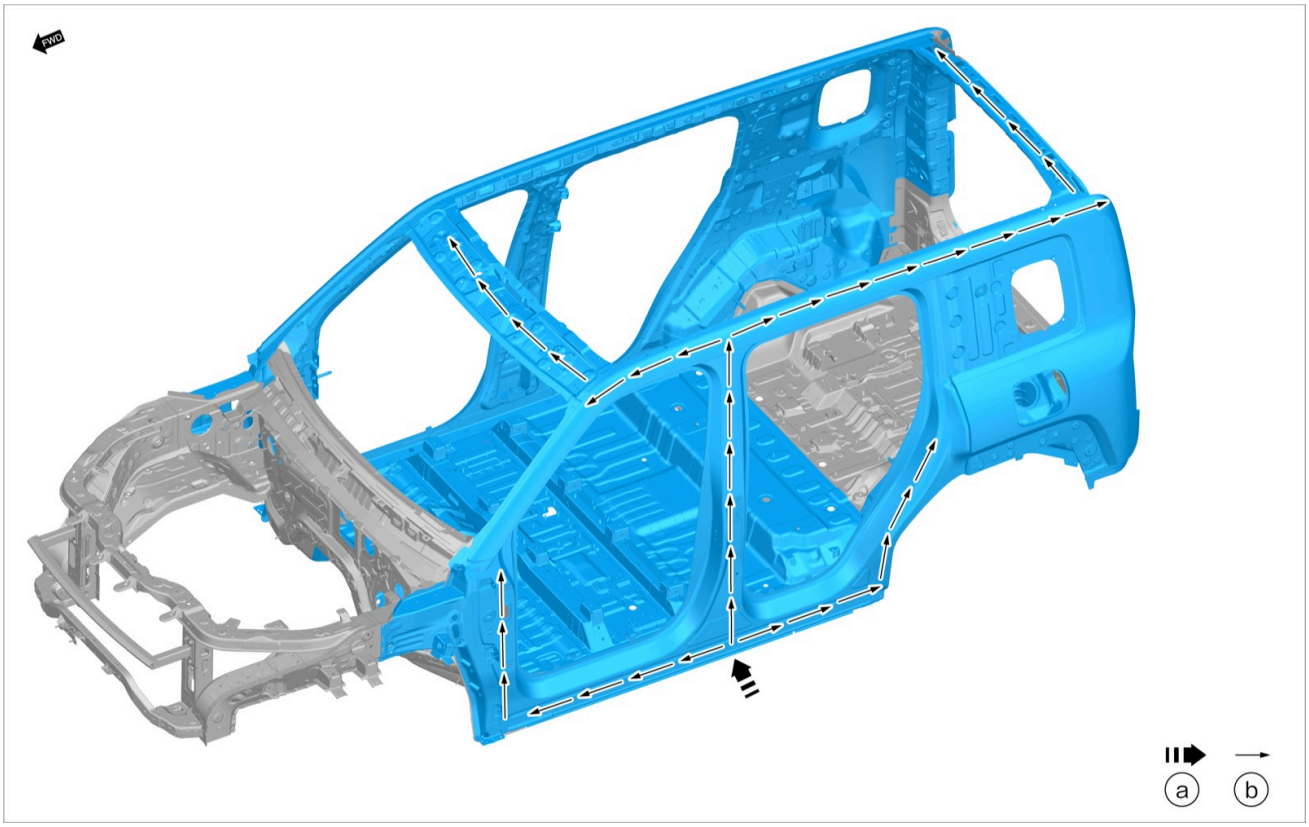


侧向碰撞

– 整体的框架形式，同时具备承载性能，维持整车弯扭刚度，分散前部、侧面碰撞能量，优良的减震隔音性能。
– 所有板件形成重要的支撑以保护乘客安全的作用，车身立柱加强板与门槛板内加强板都是采用超高强度钢板制成。
– 了解碰撞路径上的相应部件参见前舱概览、侧围概览、顶盖概览、地板概览。

a：碰撞方向

b：碰撞力传递路径

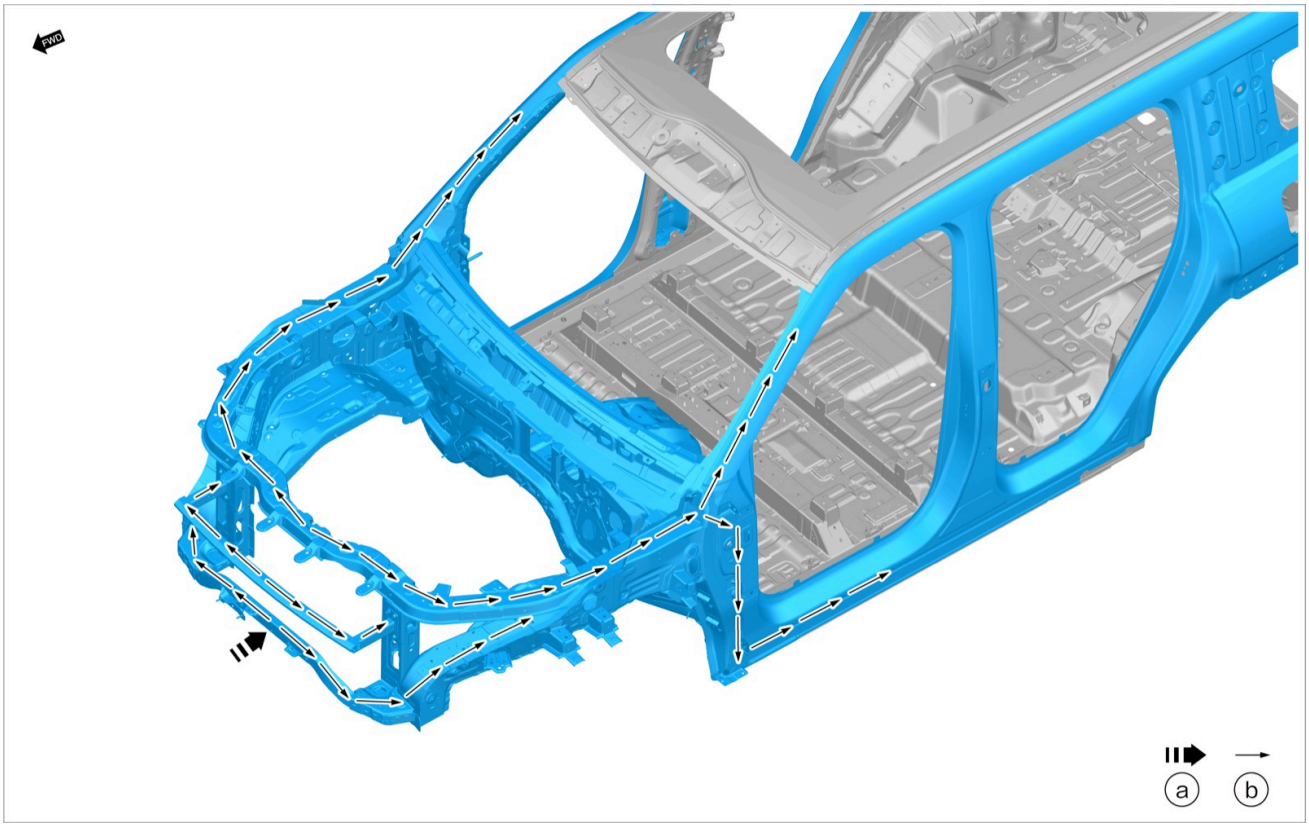


正前方碰撞

- 具有能量缓冲和吸收区域，以提高碰撞中的安全特性。
- 具有正确的能量传递和分散路径。
- 了解碰撞路径上的相应部件参见前舱概览、侧围概览、顶盖概览、地板概览。

a：碰撞方向

b：碰撞力传递路径

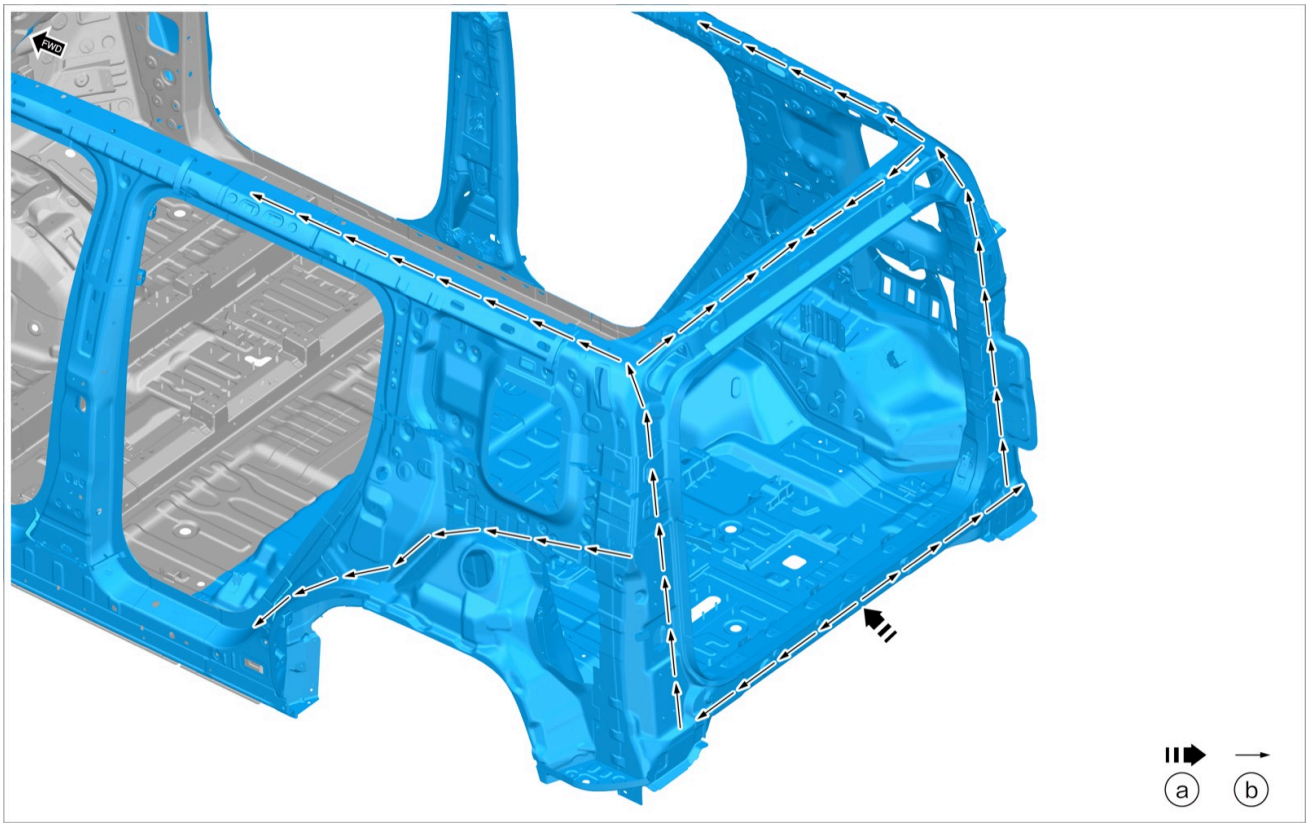


正后方碰撞

- 具有能量缓冲和吸收区域，以提高碰撞中的安全特性。
- 具有正确的能量传递和分散路径。
- 了解碰撞路径上的相应部件参见侧围概览、顶盖概览、地板概览、后围概览。

a：碰撞方向

b：碰撞力传递路径



Position of foam molded part

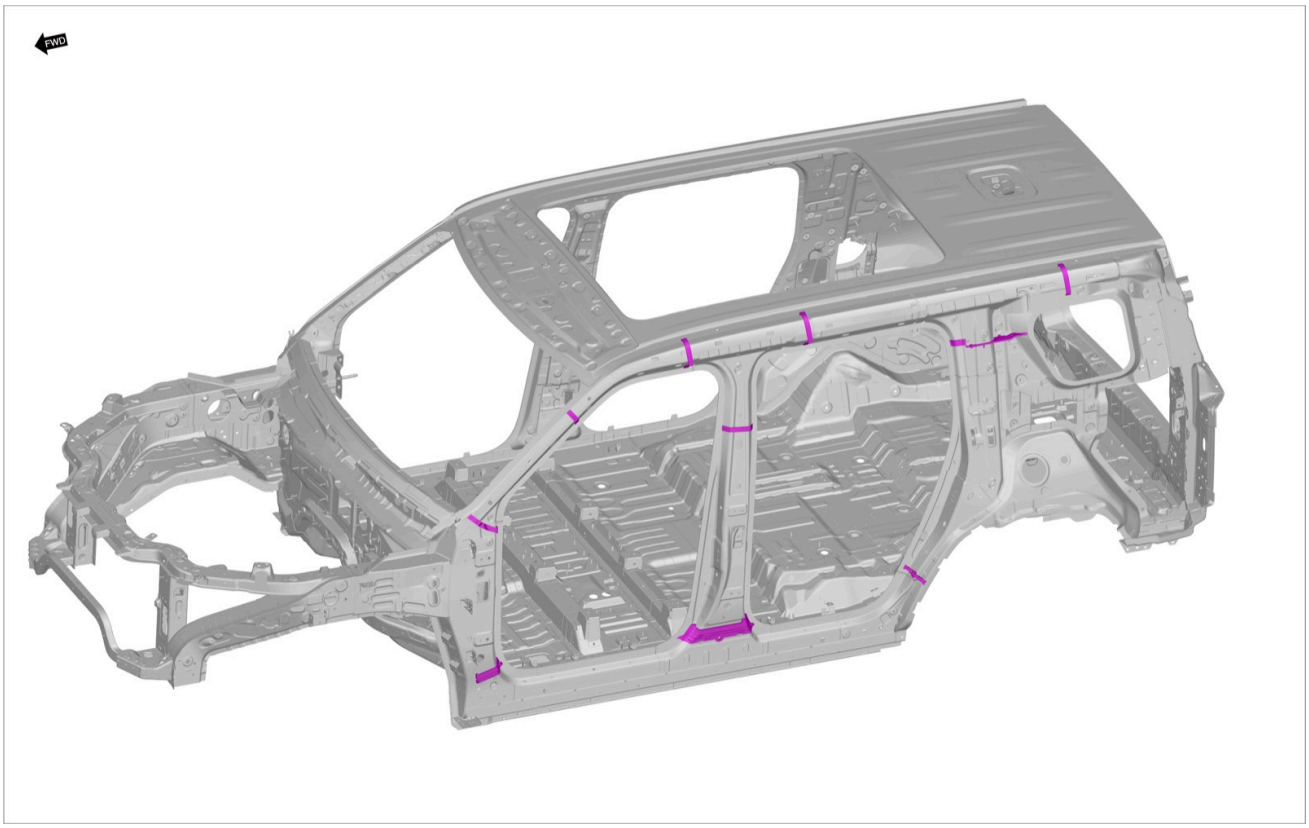
The primary function of the foam molded part is to control the vehicle's NVH (Noise, Vibration, and Harshness). Vehicles w ithout this component installed may experience excessive wind noise and other noises such as tinnitus while driving.

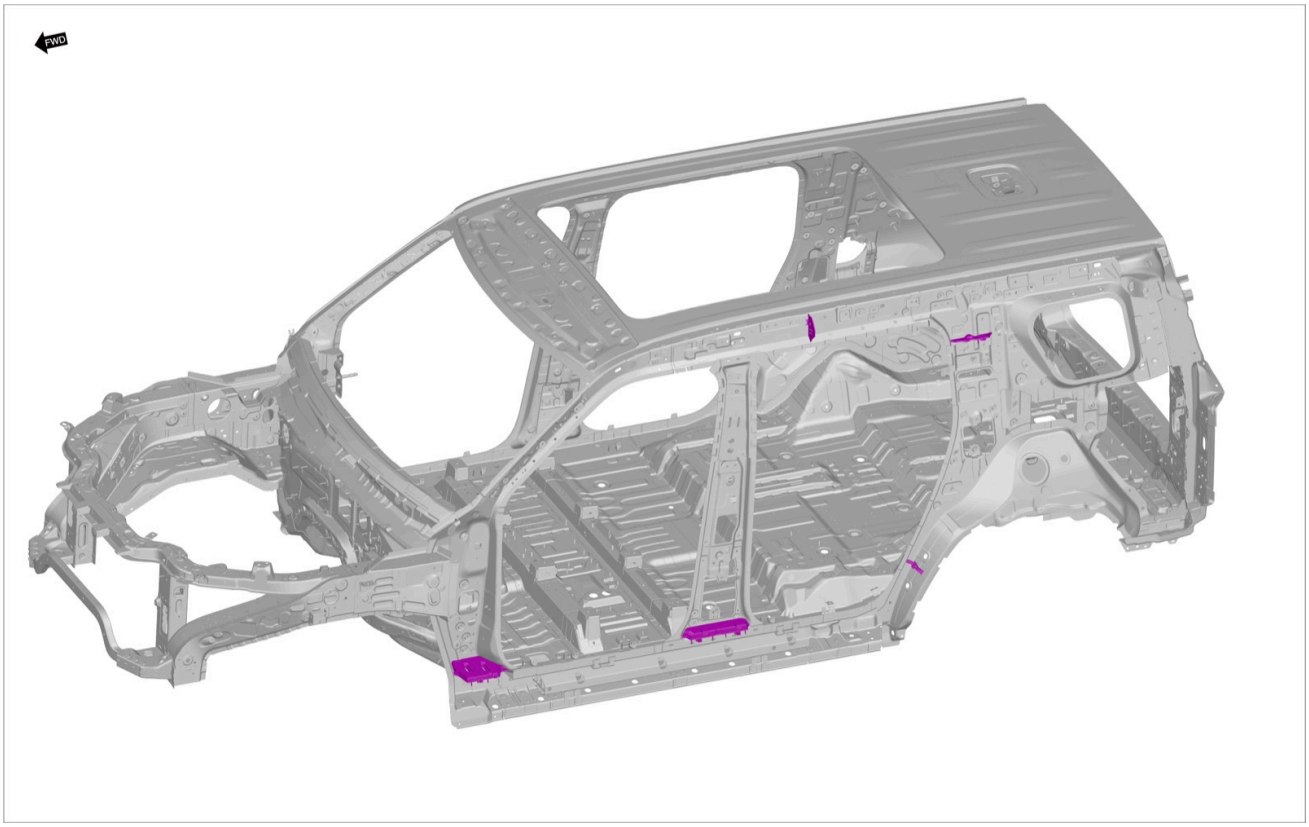
Caution

After repairing the area involving such material, replace it; otherwise, the possible noise will affect the driving comfo rt of the vehicle.

Reminder

The positions on the left and right sides are similar, so this topic takes the left one as an example.



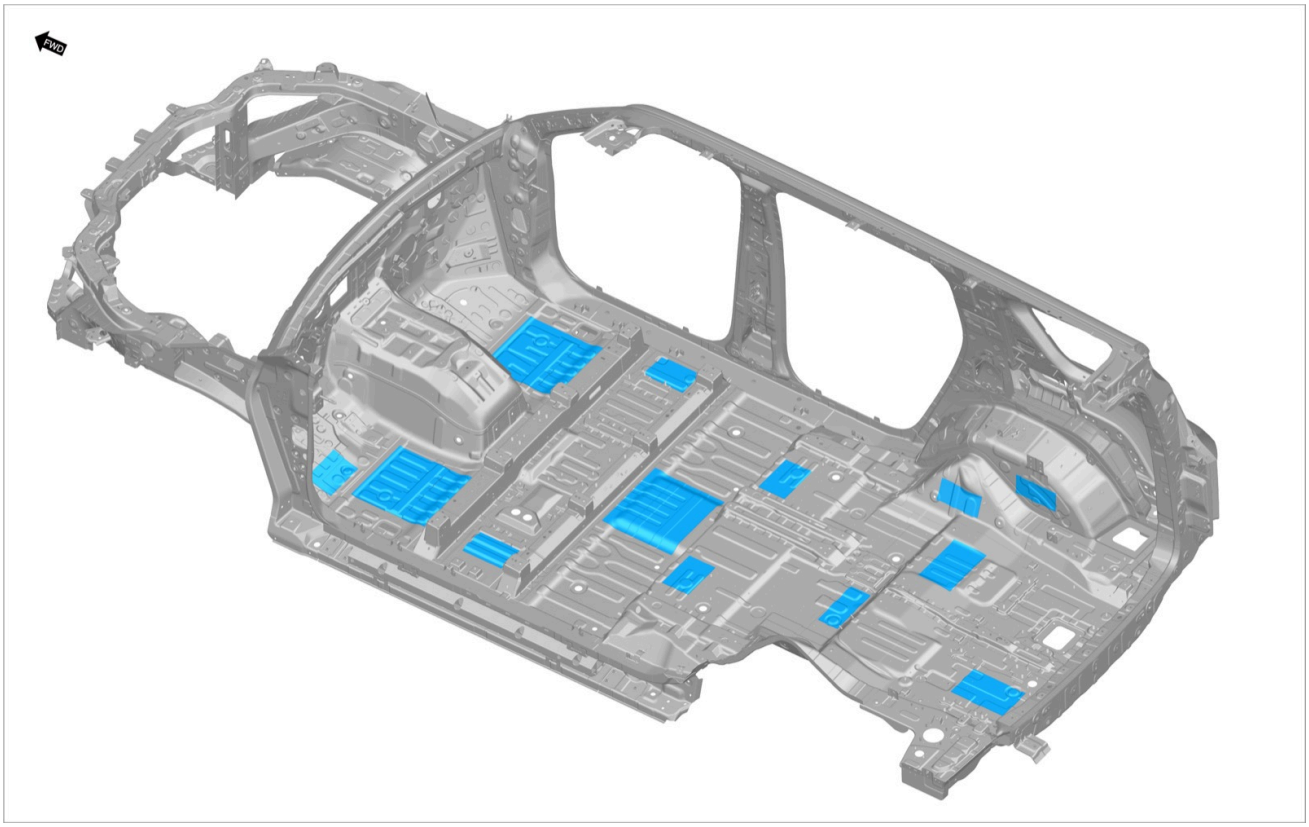

FWD

Positions of anti-vibration rubber sheets

The main function of the damping film is to control vehicle NVH (Noise, Vibration, and Harshness). This material can be ins talled through spraying, rolling, or brushing.

⚠ Caution

After repairing the area involving such material, replace it; otherwise, the possible noise will affect the driving comfo rt of the vehicle.



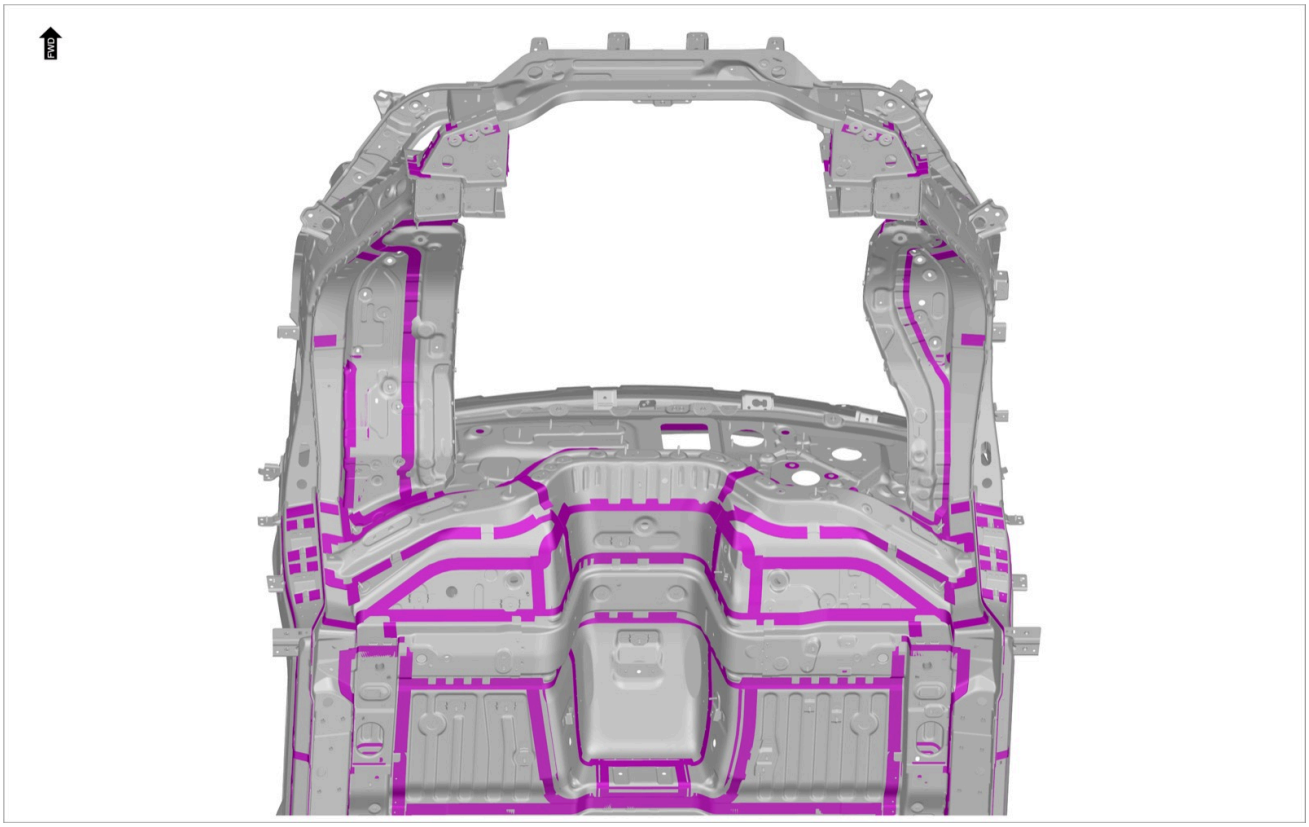
Application position of sealant

In the process of vehicle repair, it is very important to use correct sealants. They can not only assist the bonding between components, but also prevent wind noise, water leakage, exhaust gas and dust from entering the vehicle, serving as a barrier against corrosion.

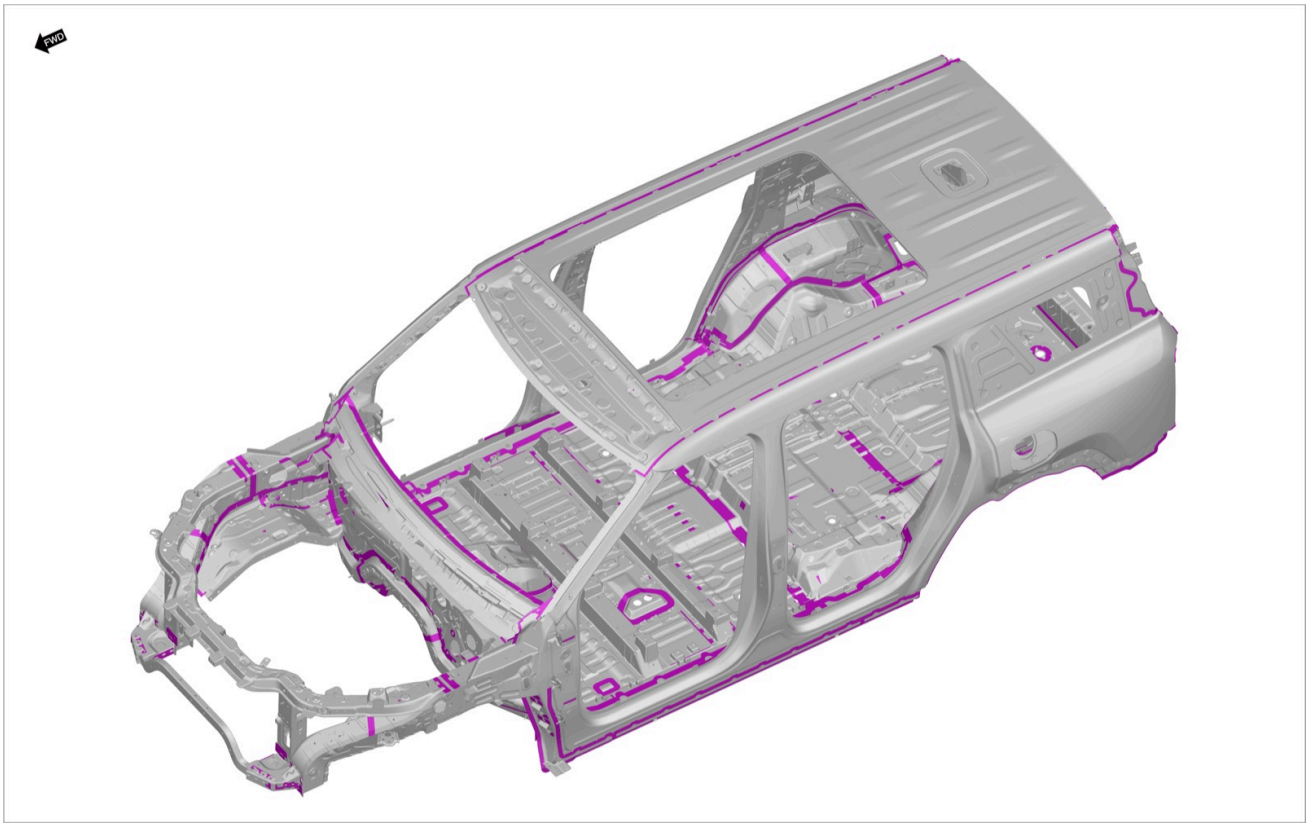
Reminder

The positions on the left and right sides are similar, so this topic takes the left one as an example.

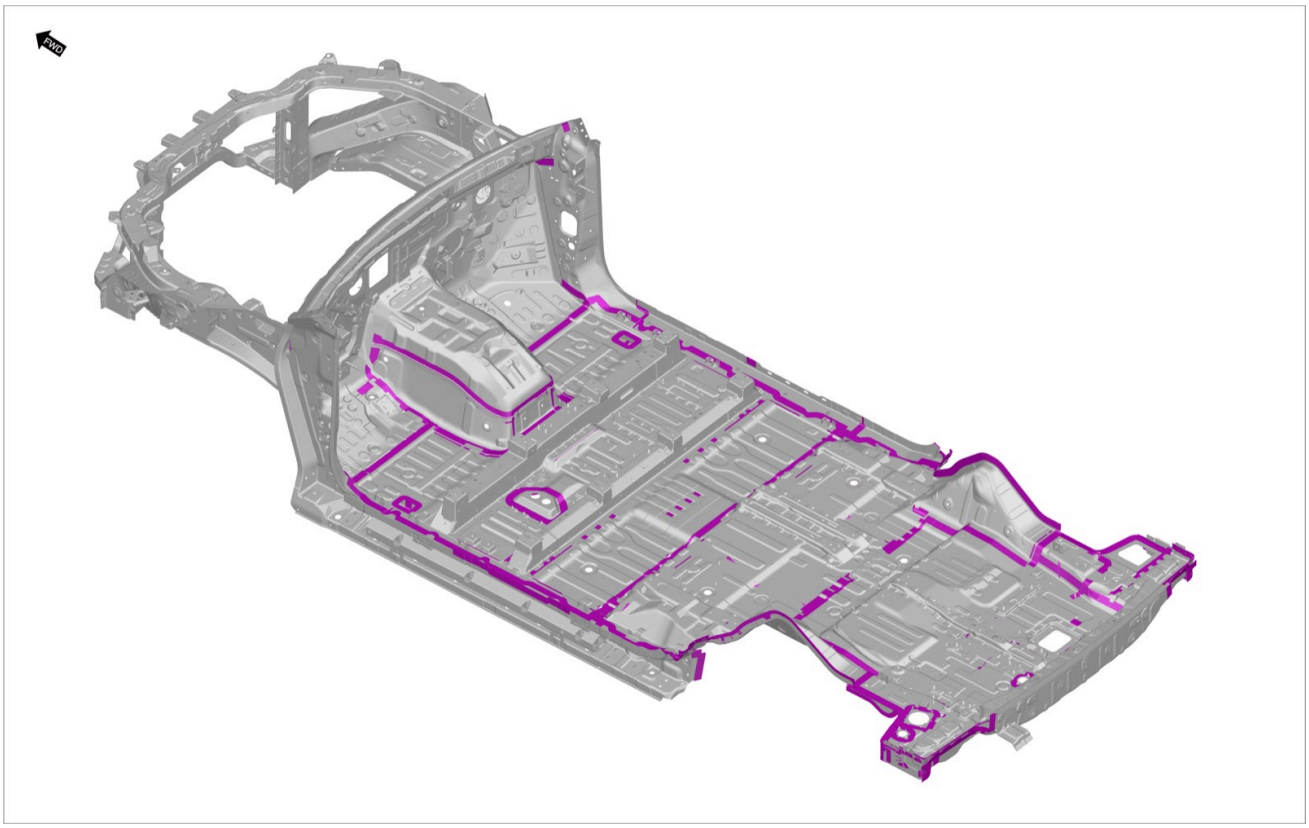
Front compartment

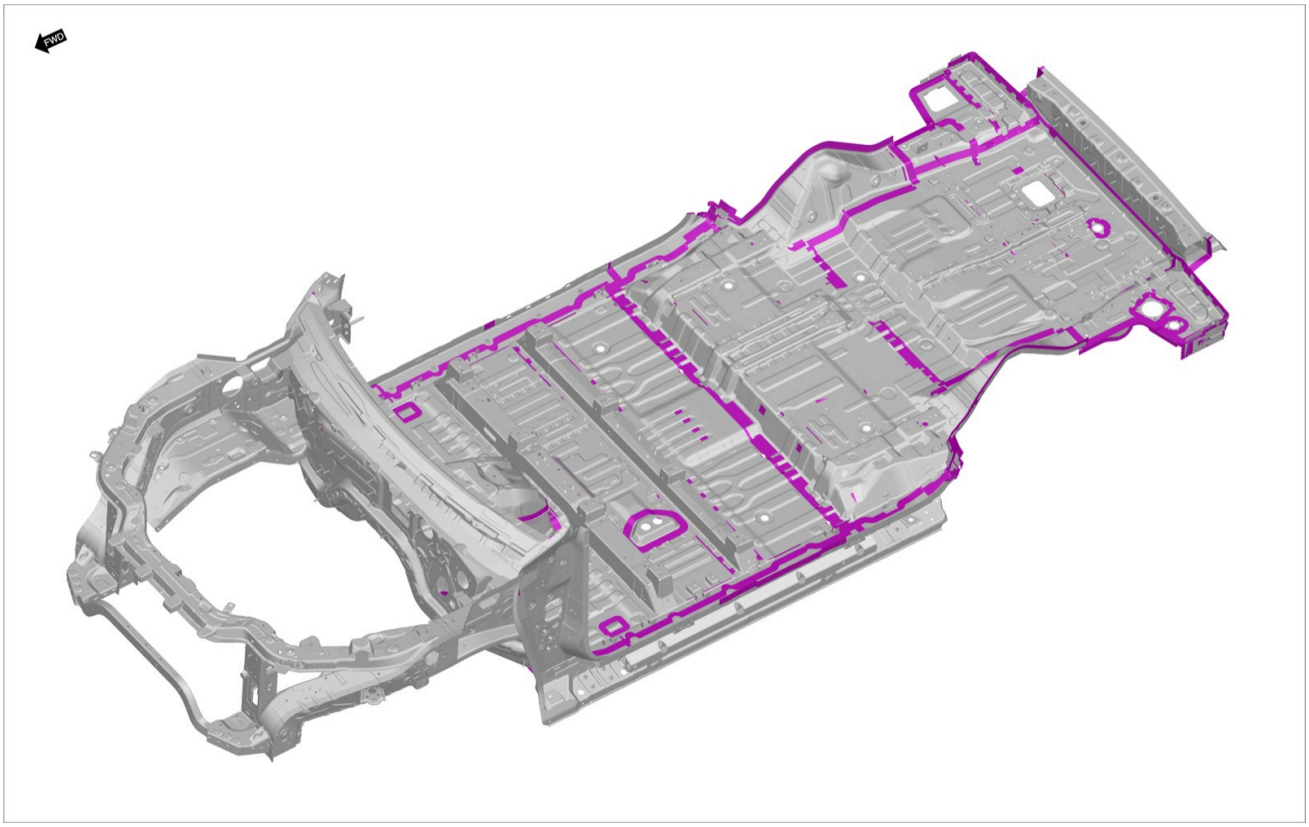


Side wall

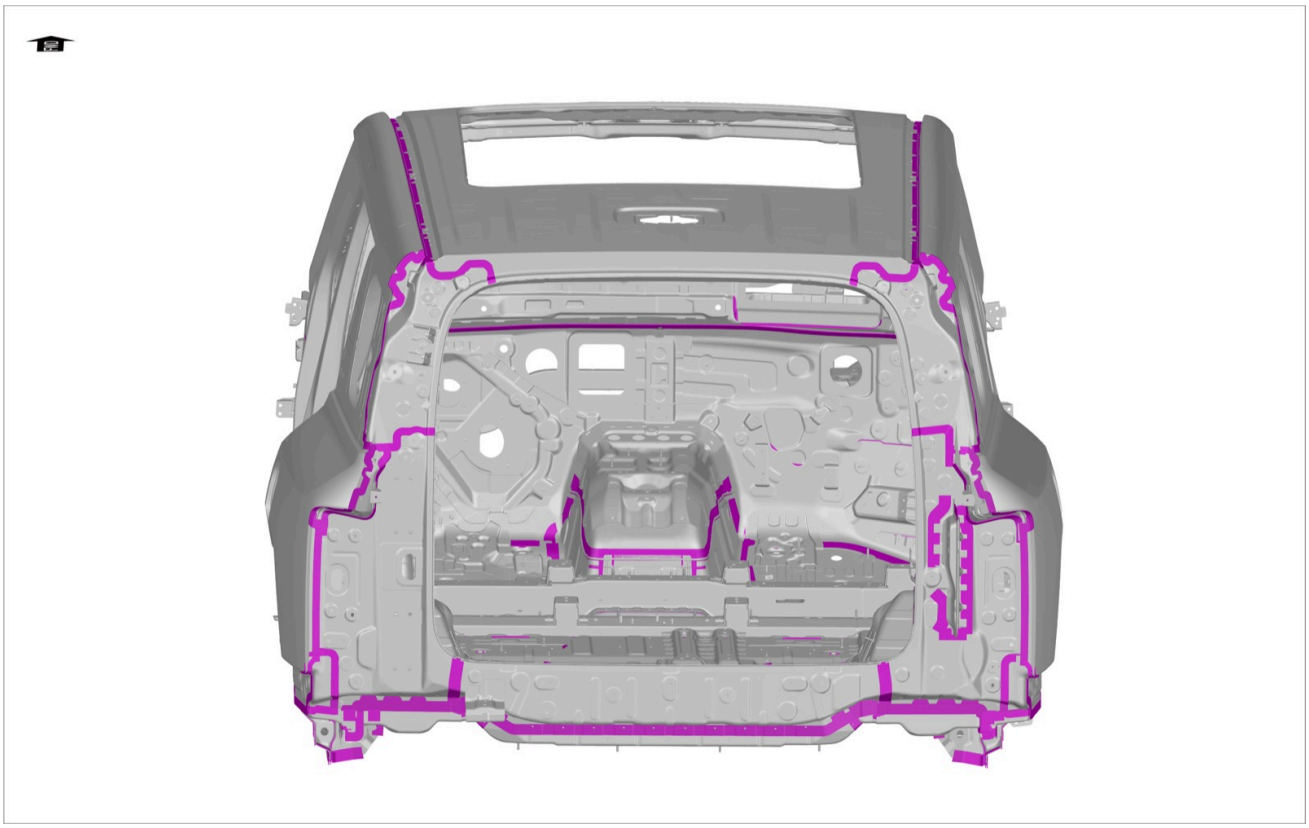


Cab

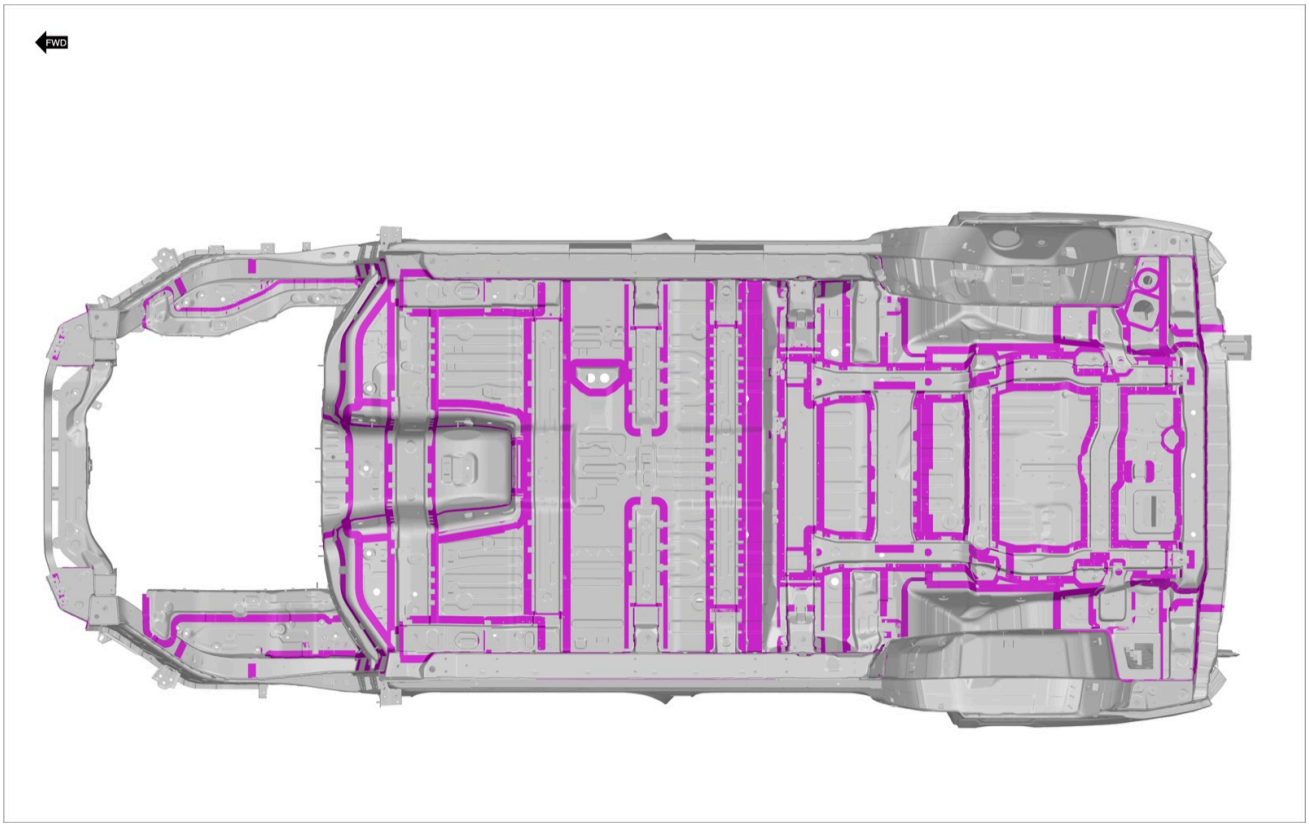




Rear of the vehicle body



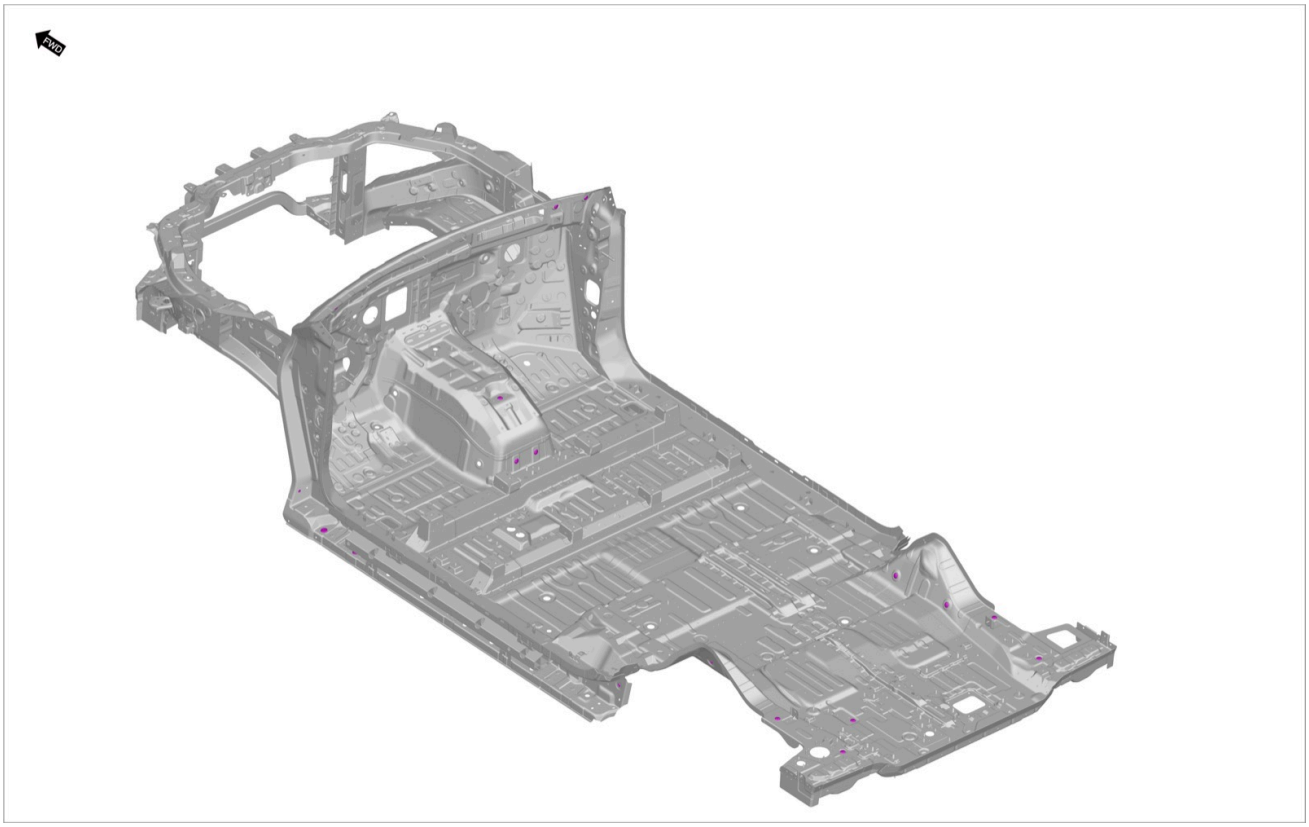
Underbody

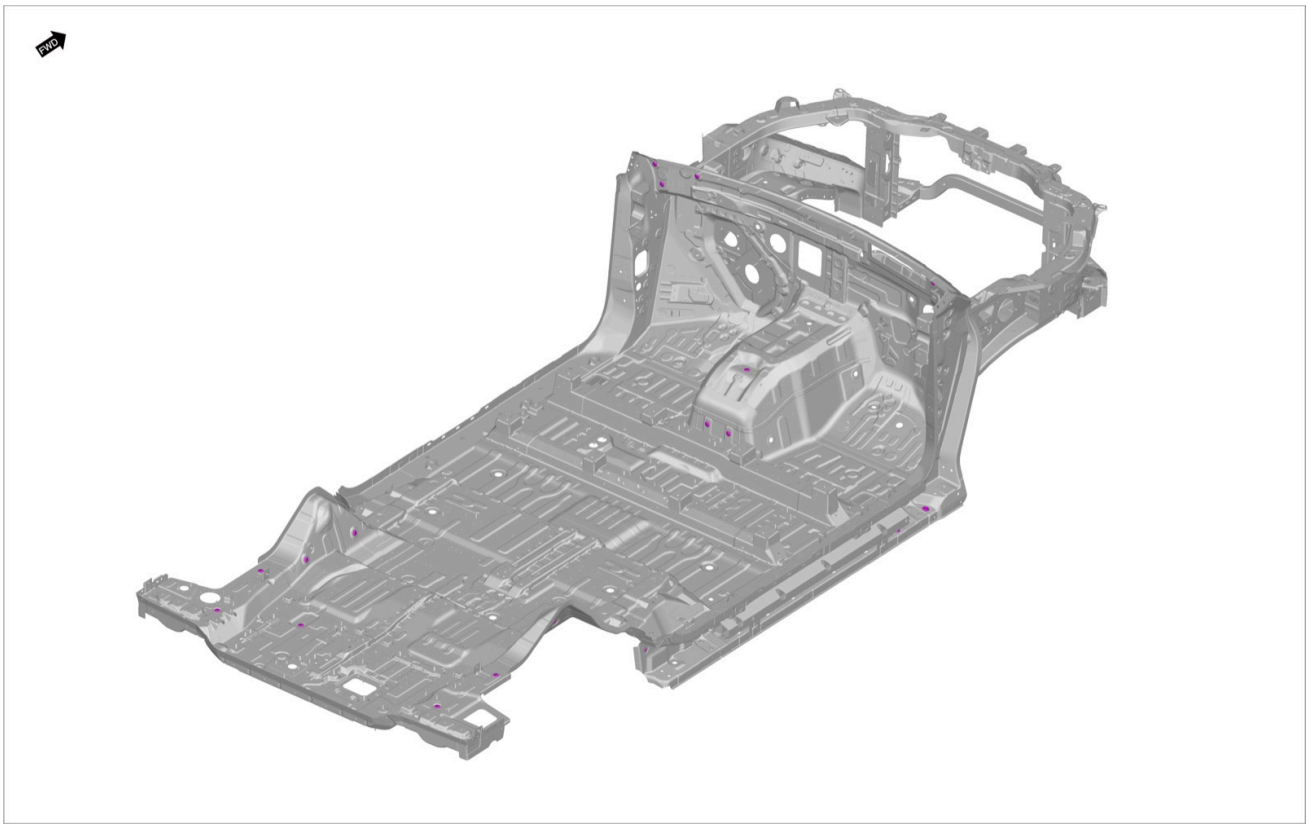

FWD

Body plug cap locations

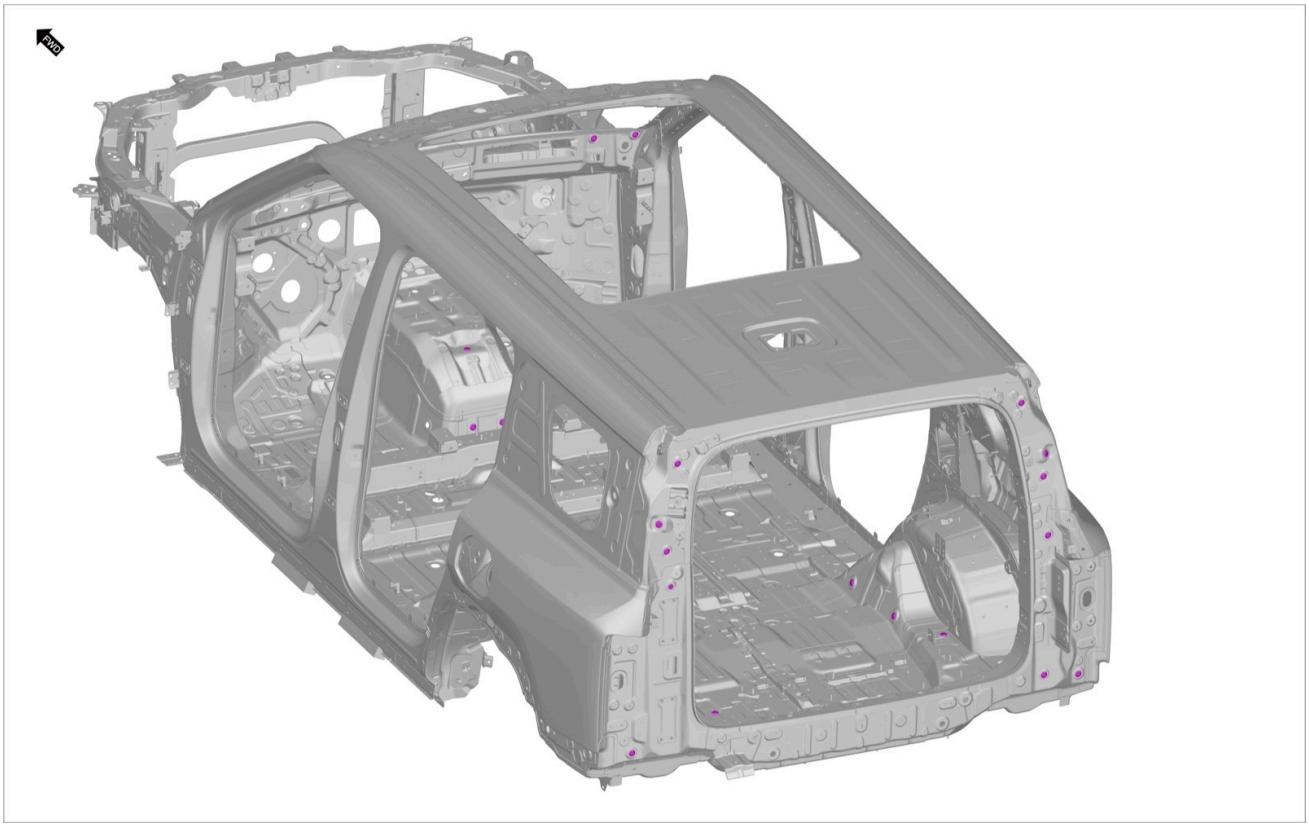
During the vehicle maintenance process, correct installation of plugs is crucial. They serve the purposes of sealing and cor rosion prevention, sound and heat insulation, vibration damping, rust and corrosion prevention, and they contribute to a cle an and tidy appearance in the process of body repair.

Cab

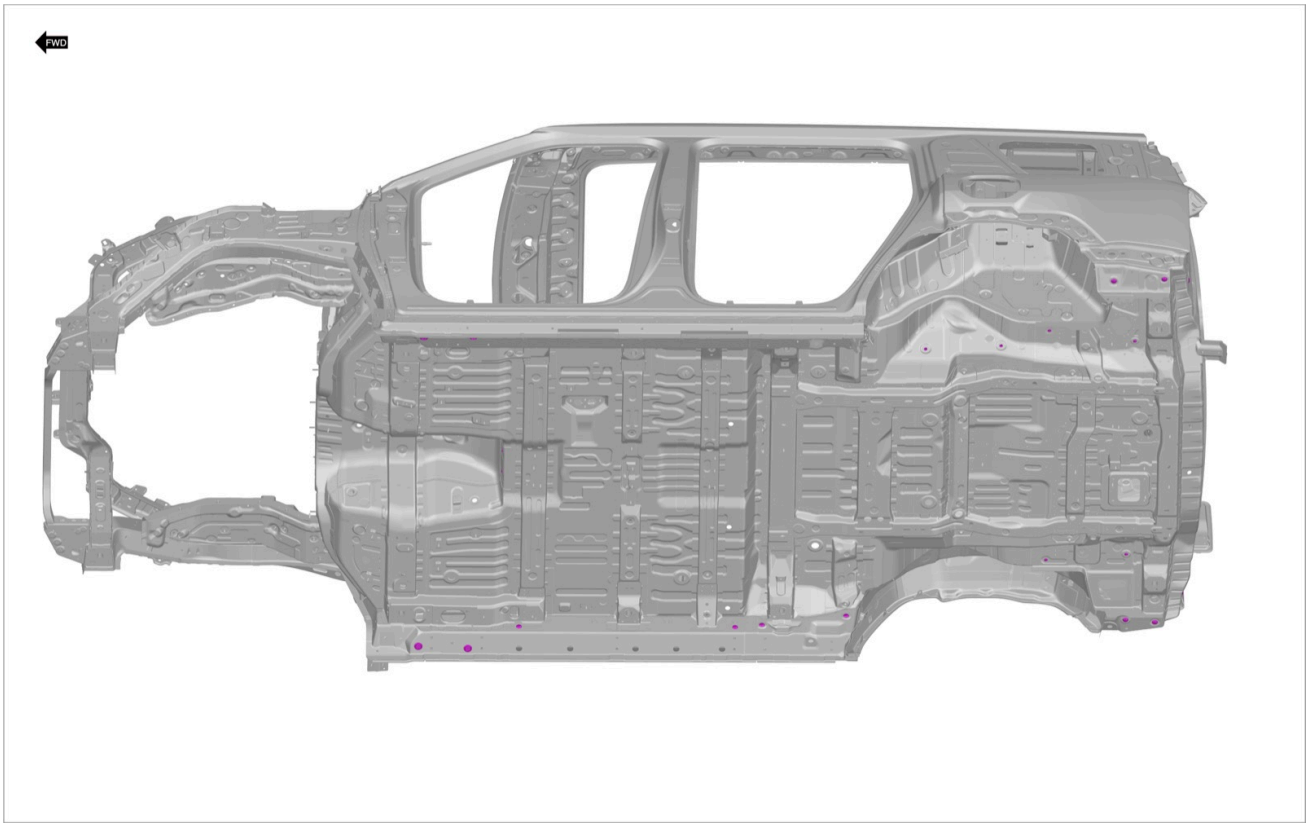


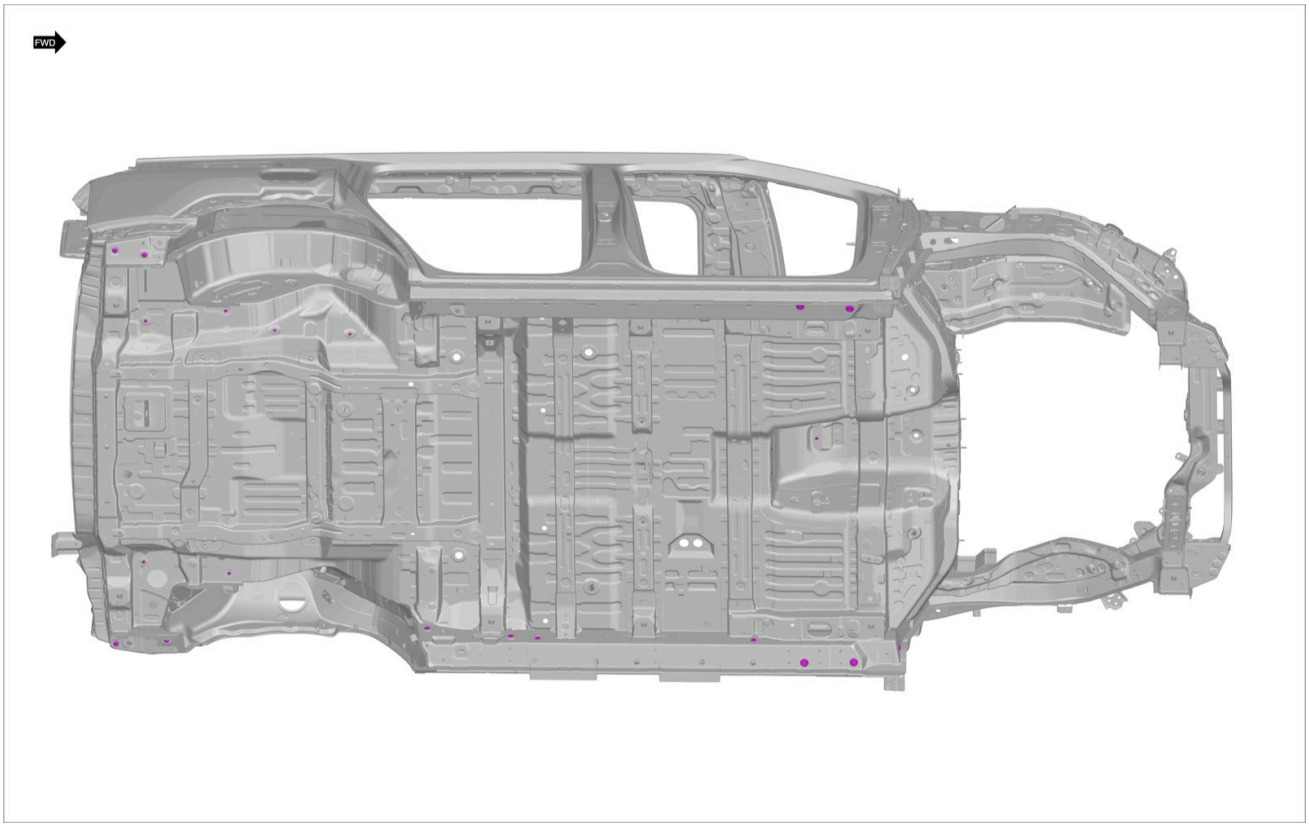


Rear of the vehicle body



Underbody



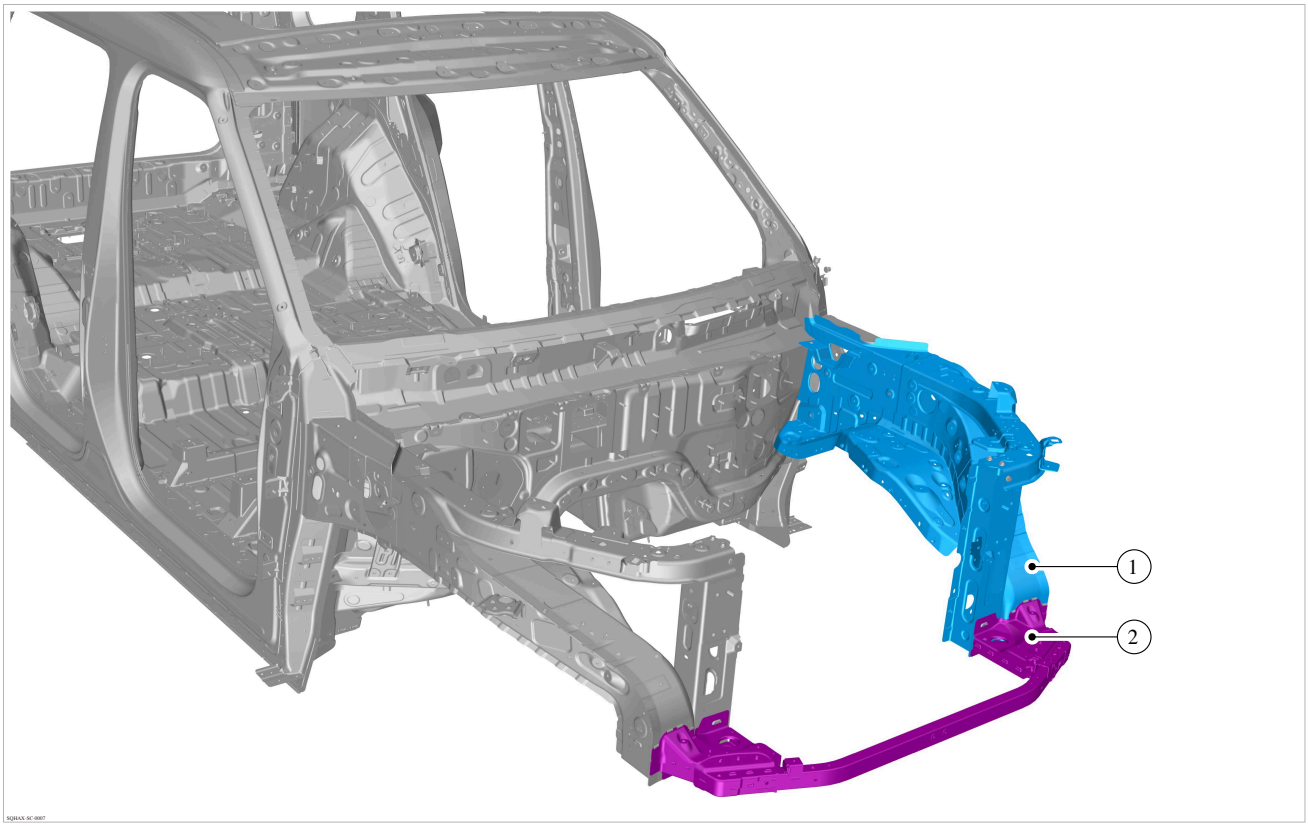

FWD

Component overview

The main purpose of this topic is to help you identify the location and corresponding details of front compartment components that need to be replaced.

Location overview

You can find and confirm the references of components to be repaired through the following figure and table.



S/N	Component name	Refer to document
1	Front wheel housing assembly	Front wheel housing assembly
2	Radiator Lower Crossmember Assembly	Radiator Lower Crossmember Assembly

Front wheel housing assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .

– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .

– **Punching**： Puncher, refer toAuxiliary tools .

– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .

– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .

– **Anti-corrosion**:

  • **Tools**: Spray gun, refer toSpraying tools 。

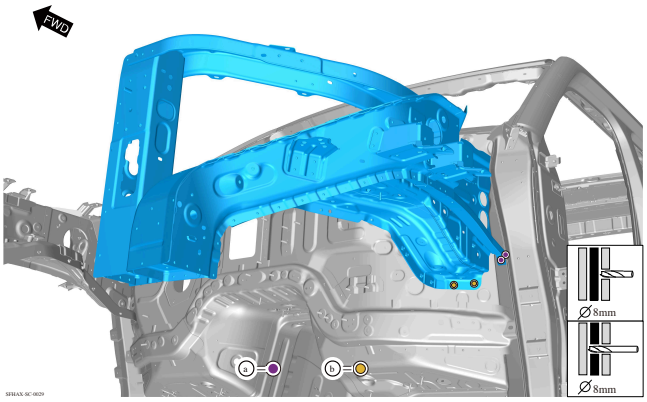
  • **Auxiliary materials**: Refer to Anti-corrosion materials .

    • **Joint surface anti-corrosion**: Zinc powder conductive primer

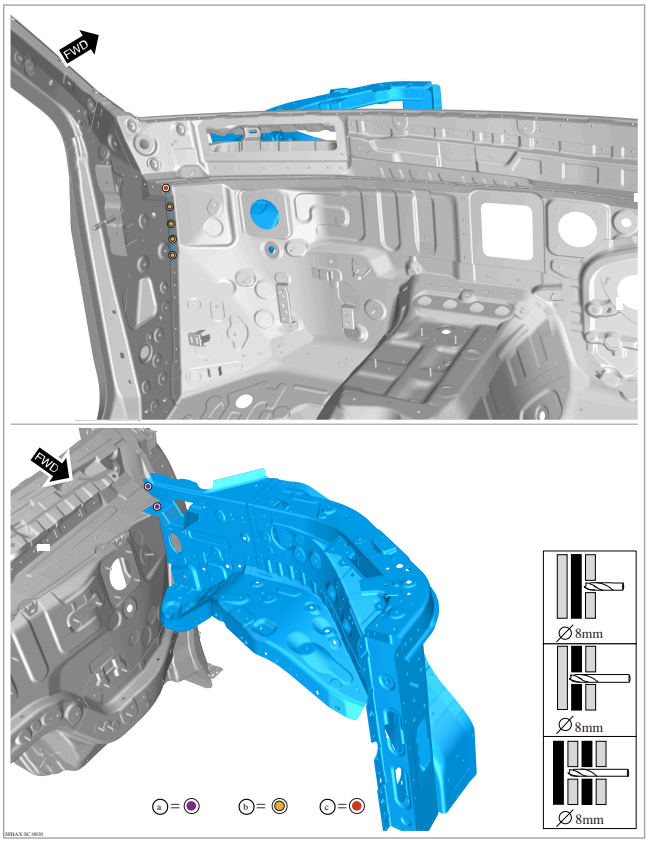
    • **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the radiator lower cross beam assembly. Refer to Radiator Lower Crossmember Assembly
2. Disassemble the front connection plate assembly of the side wall. Refer to Side wall front connecting plate assembly
3. Remove the welding spots.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.



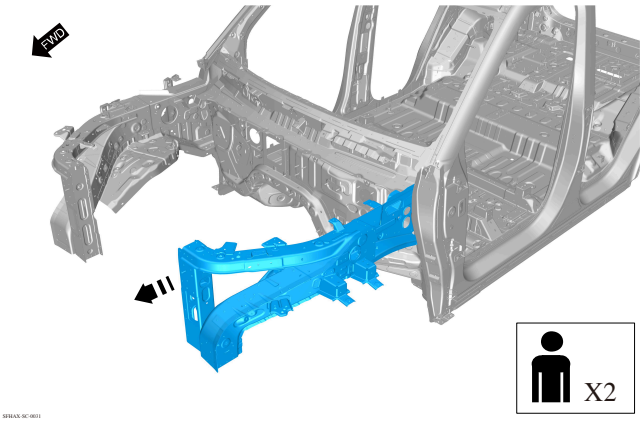
4. Remove the welding spots.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.
   c. Use an 8mm special drill bit to remove 3 layers of weld spots.



5. Disassemble the front wheel cover assembly.

Caution

This step is difficult to be performed and requires the cooperation of many people.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

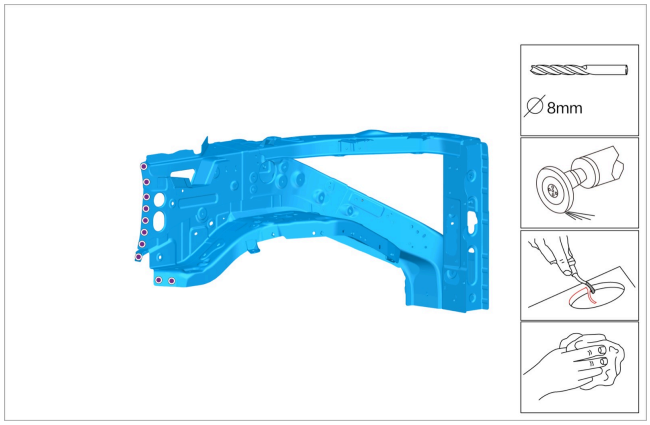
Caution

- During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
- When welding, the original welding spots should be avoided.
- During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance bet ween welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot weldin g and Gas shielded welding .
- To reduce welding slag splashing, the zinc powder conductive primer at the hole position can be removed with steel wire before metal active gas welding.
- It is recommended to use the tack cloth and degreasing cleaner to clean the joint surface.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure Front compartment for correctness, see How to measure and align vehicle body

3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

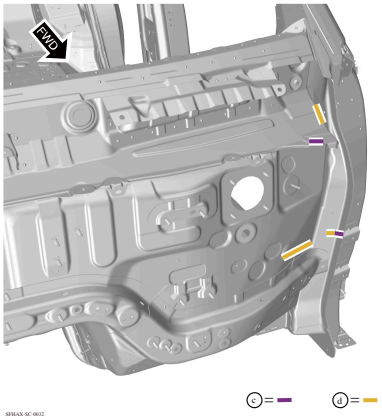
   b. Wipe off the fine dust and other debris on the joint surface.

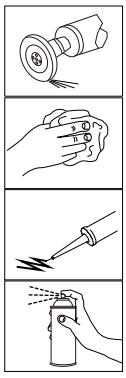
> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.

   d. Spray zinc powder conductive primer on the re-joint surface.

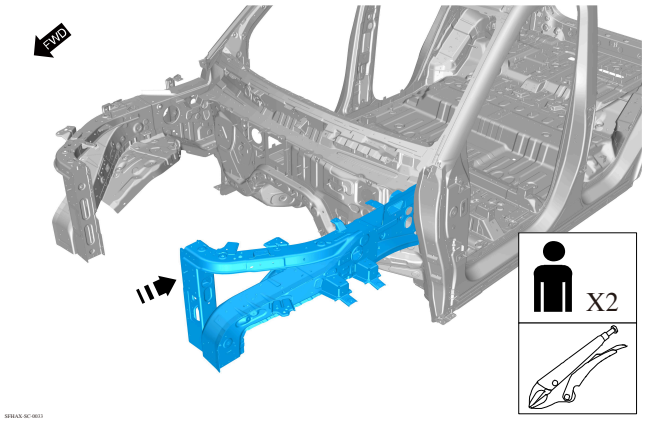
> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



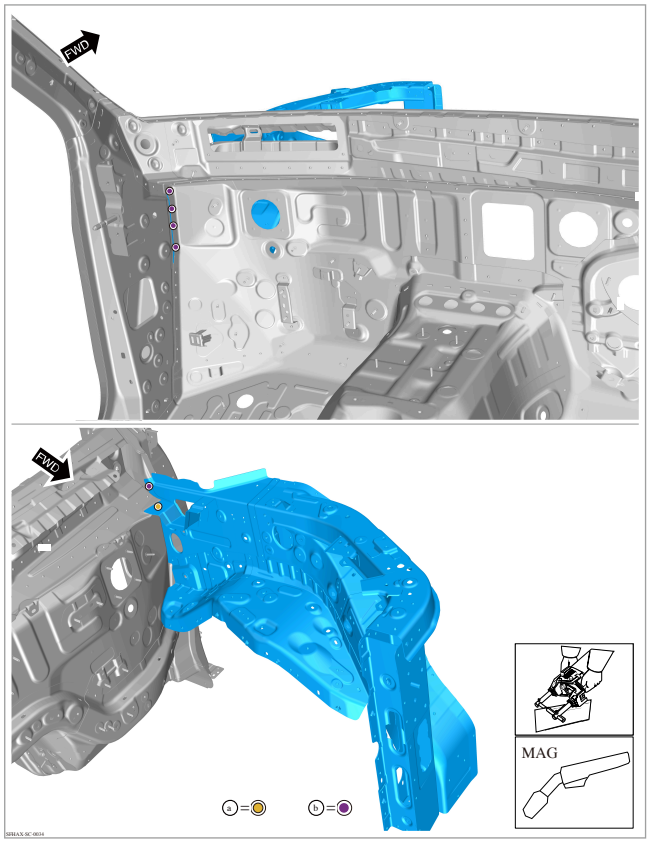


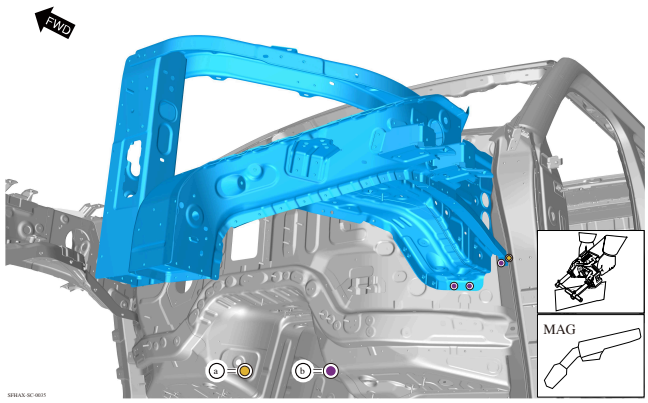
4. Use locking pliers to secure the front wheel cover assembly to the original position.

> **Caution**
>
> This step is difficult to be performed and requires the cooperation of many people.



5. Perform welding.
   a. Use resistance spot welding.
   b. Use metal active gas welding.





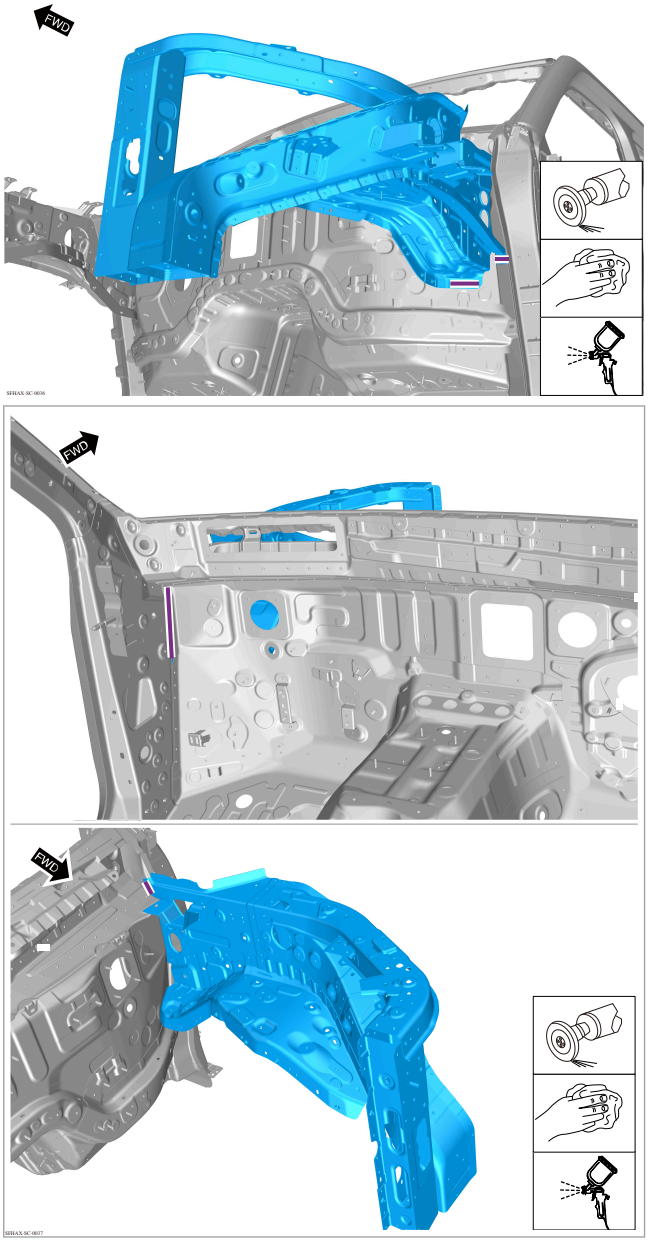
6. Reconfirm whether the forward cabin data is correct, see Front compartment

Reminder

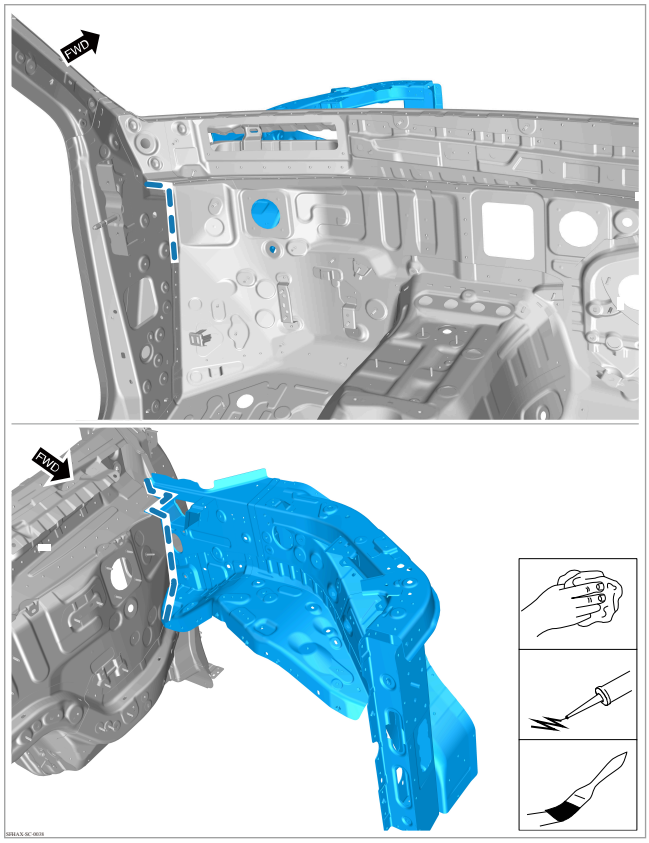
– If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.

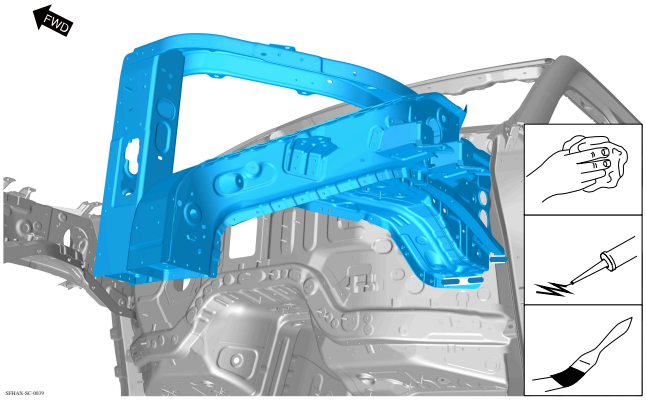
– If the data cannot be repaired through calibration, the component may need to be reinstalled.

7. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



8. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



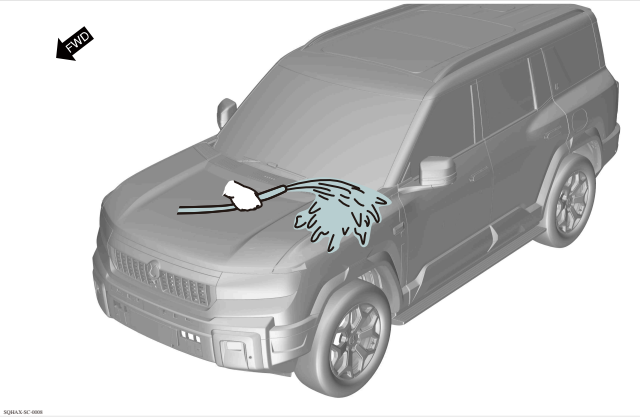


9. Install the front connection plate assembly of the side wall. Refer to 侧围前连接板总成
10. Install the radiator lower cross beam assembly. Refer to Radiator Lower Crossmember Assembly
11. After the vehicle body components are installed, conduct a waterproof test.

⚠ Caution

- Cure the sealant before the waterproof test.
- After the waterproof test, dry and check the tested parts, and carry out anti-corrosion treatment in case of a risk of rust.

- No interior trims need to be installed before the end of waterproof test.
- If there is a problem, find the leaking part and deal with it according to the actual situation.


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Radiator Lower Crossmember Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

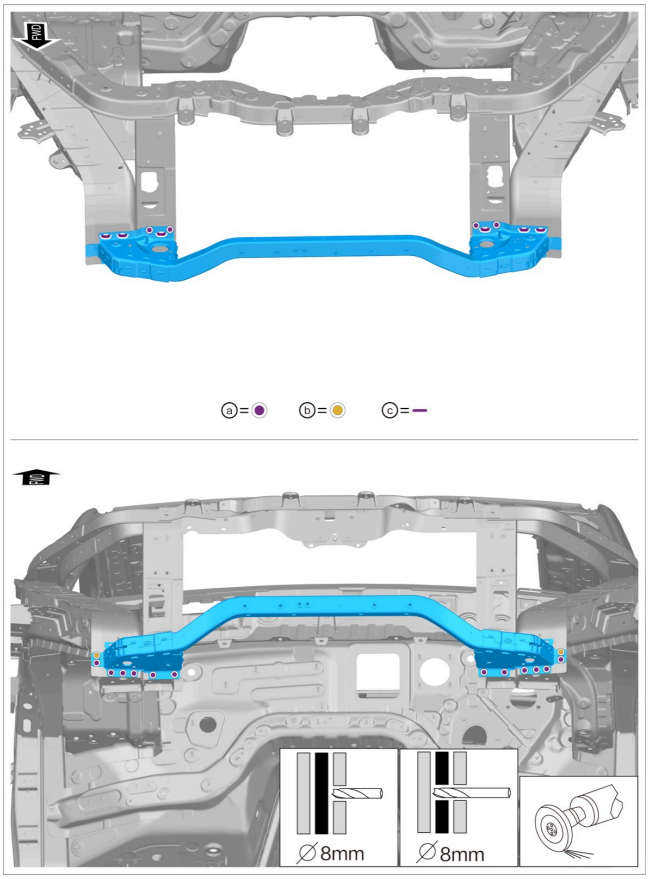
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the radiator lower cross beam assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.
   c. Remove the lower cross member assembly of the water tank using a grinding wheel grinder to clear the continuo us weld.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

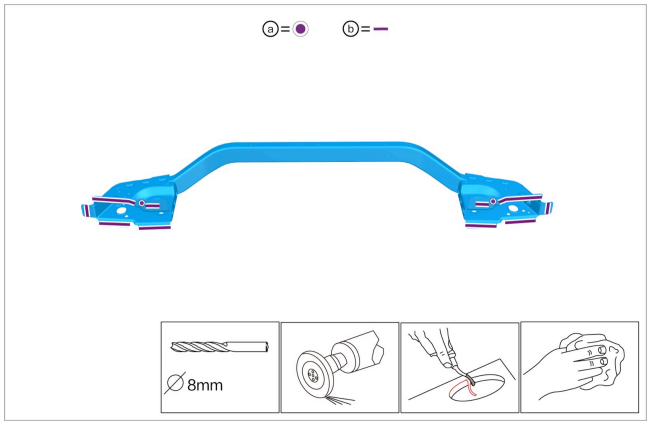
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

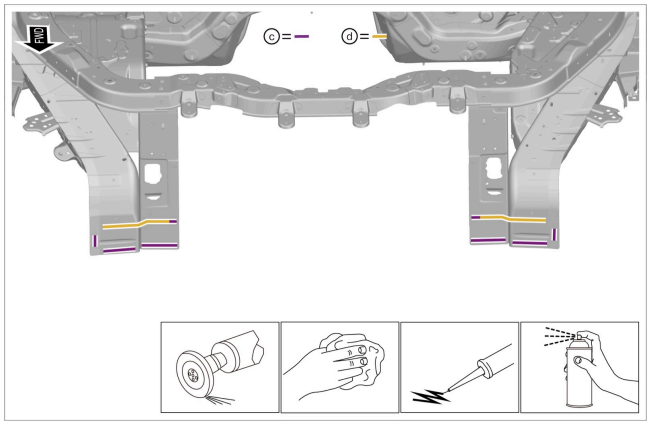


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



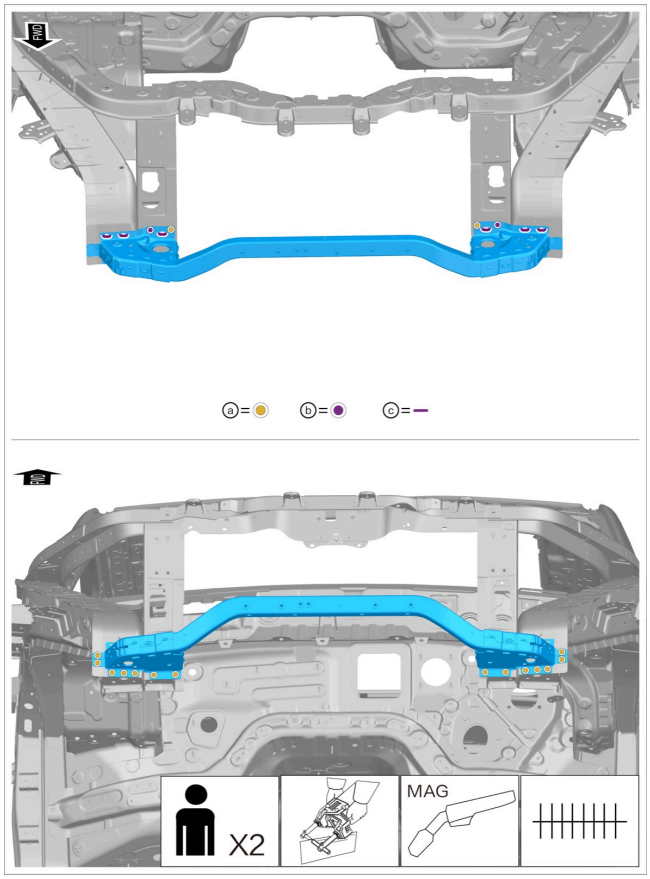
3. Use locking pliers to fix the crossbeam assembly under the water tank to the original position, and perform welding.

> **Caution**
>
> This step is difficult to be performed and requires the cooperation of many people.

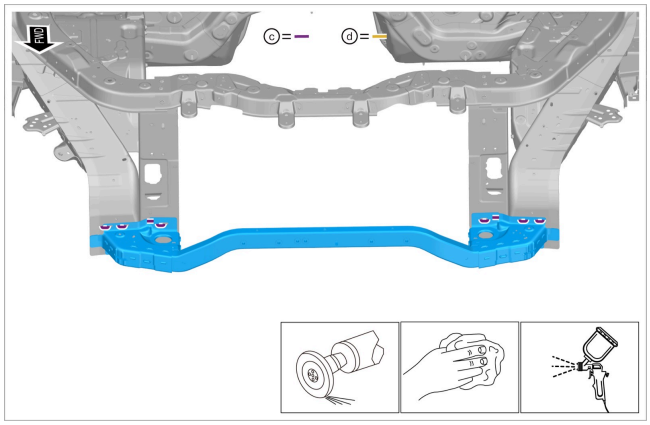
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

> **Caution**
>
> – During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo

t welding and Gas shielded welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



Component overview

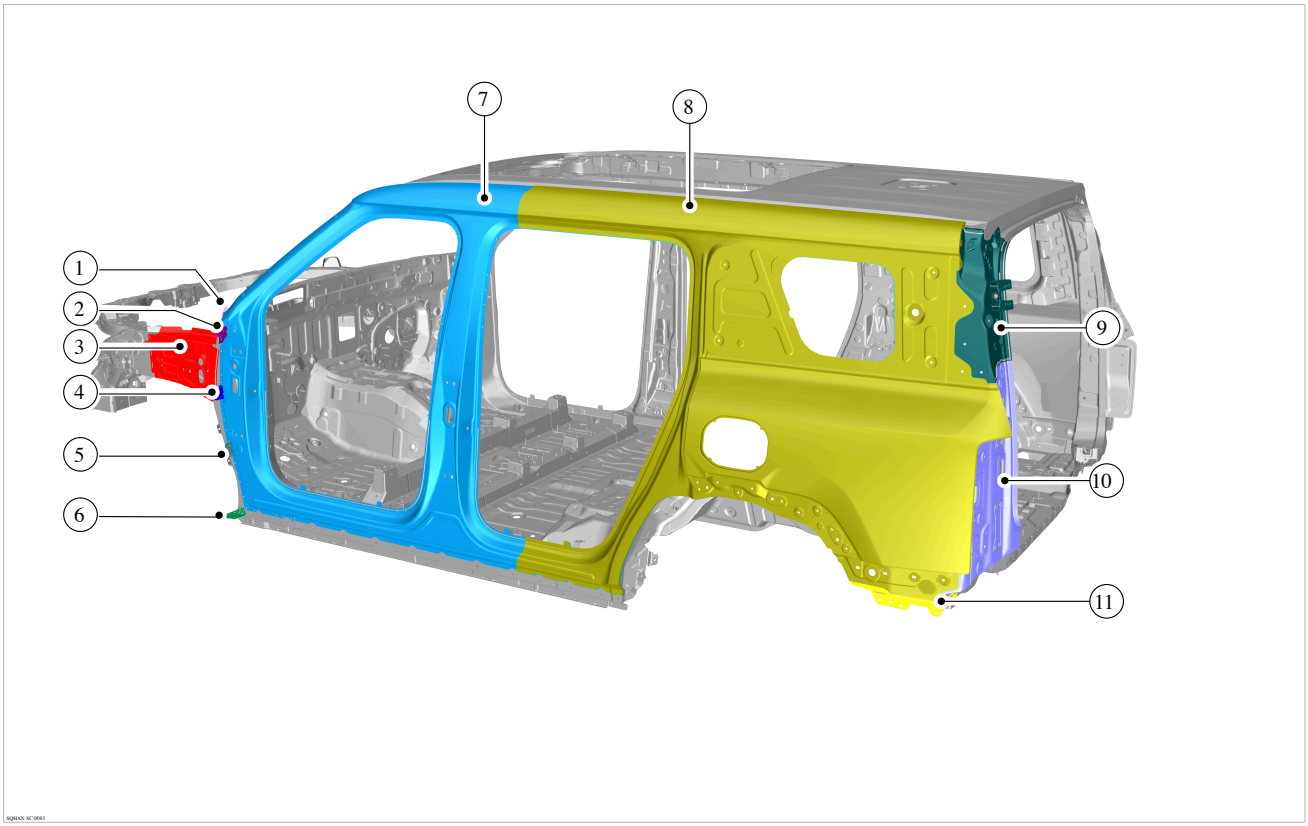
The main purpose of this article is to assist you in confirming the location of the side wall parts that need to be replaced an d the corresponding detailed information.

Table of Contents

- Section I: Side Panel and Bracket
- Section Two: Side wall reinforcement plate
- Part III: Side inner panel and sill

Side Outer Panel and Bracket

You can find and confirm the reference materials for **side wall panel and bracket** through the diagram and table below.

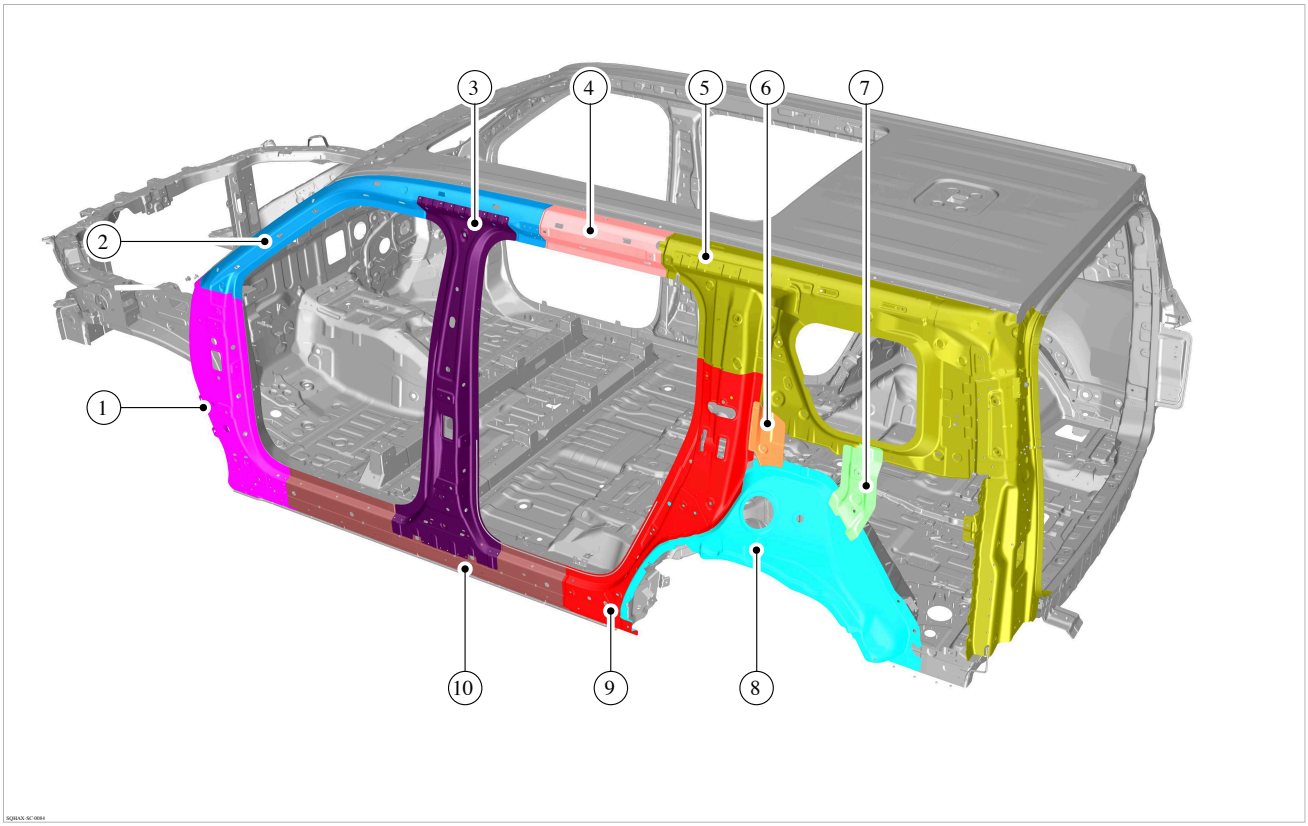


S/N	Component name	Refer to document
1	Bracket IV mounted on fender	Bracket IV mounted on fender
2	Fender upper mounting bracket	Fender upper mounting bracket
3	Front Side Member Connection Plate	Front side member connecting plate
4	Fender rear middle bracket	Fender rear middle bracket
5	Fender rear upper bracket	Fender rear upper bracket
6	Fender rear lower bracket	Fender rear lower bracket
7	Front section of the side outer panel	Front section of the side outer panel
8	Rear Section of Side Outer Panel	Rear Section of Side Outer Panel

S/N	Component name	Refer to document
9	Afterflow Trough	Rear Trough Assembly
10	Taillight Mounting Panel	Tail Light Socket Panel Assembly
11	Rear Lower Closing Panel of Side Outer Panel	Rear Lower Closing Panel of Side Outer Panel

Side wall reinforcement plate

You can use the following diagram and table to find and confirm the reference materials for the **side reinforcement plate** .

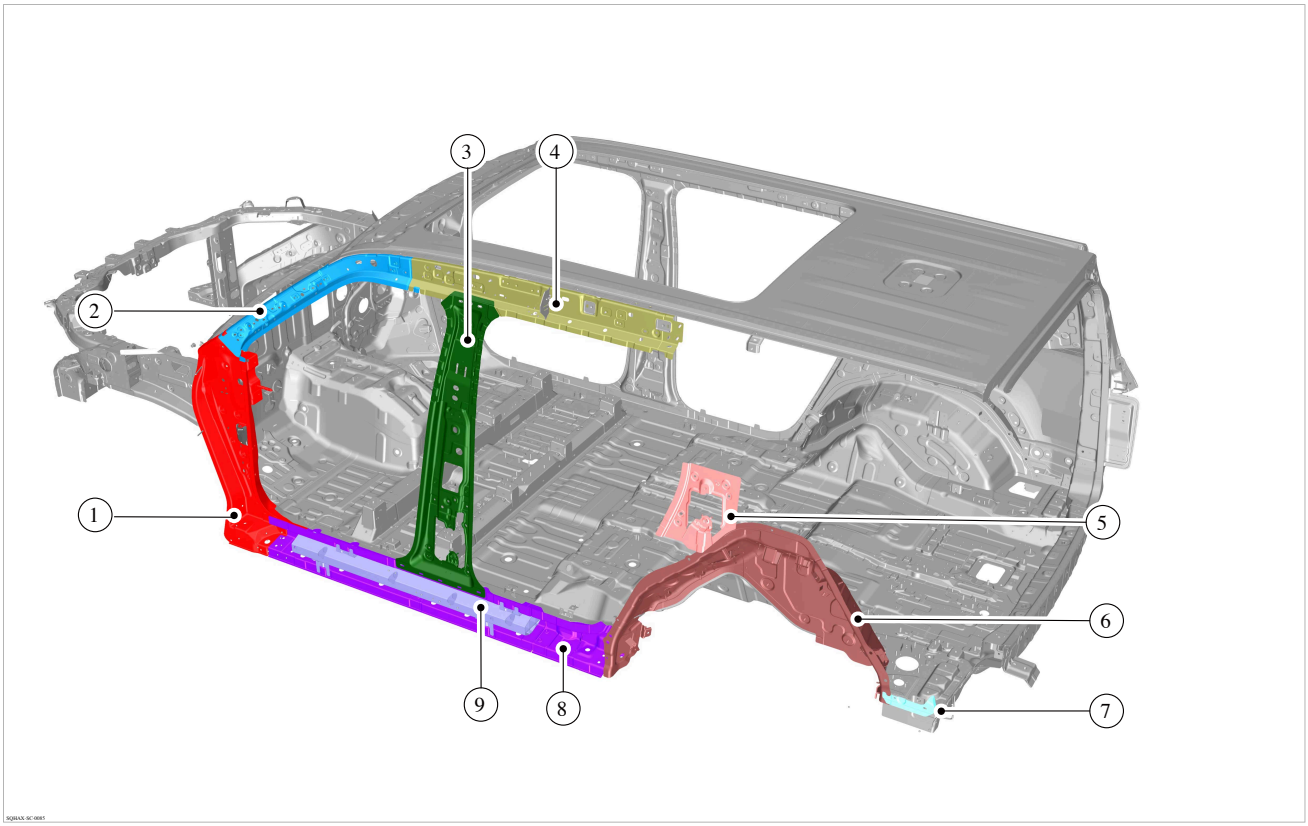


S/N	Component name	Refer to document
1	A-pillar reinforcement plate assembly	A-pillar reinforcement plate assembly
2	Upper section of A-pillar reinforcement p late	Upper Section Assembly of A-Pillar Rein forcement Plate
3	B-pillar reinforcement plate assembly	B-pillar reinforcement plate assembly
4	Front Section of Side Roof Reinforceme nt Plate	Front Section of Side Roof Reinforceme nt Plate
5	C and D-pillars assembly	C and D-pillars assembly
6	Front side member connecting plate	Front side member connecting plate
7	Rear side panel connection plate	Rear side panel connection plate
8	Rear wheel housing outer panel	Rear Wheel Cover Outer Panel Assembl y

S/N	Component name	Refer to document
9	C-pillar reinforcement plate	C-pillar reinforcement assembly
10	Door sill reinforcement plate	Door sill reinforcement plate assembly

Inner side panel and sill

You can refer to the following image and table to find and confirm the reference materials for the **side enclosing panel and threshold** .



S/N	Component name	Refer to document
1	A-pillar inner panel assembly	A-pillar inner panel assembly
2	Upper section of the A-pillar inner panel	Upper section of the A-pillar inner panel
3	B-pillar inner panel assembly	B-pillar inner panel assembly
4	Inner Panel of Side Roof Frame	Inner Panel of Side Roof Frame
5	Side Wall Bracket II	Side Wall Bracket II Assembly
6	Rear Wheelhouse Inner Panel Assembly	Rear Wheelhouse Inner Panel Assembly
7	CD Column Connection Bracket	CD Column Connection Bracket
8	Threshold inner panel	Door sill inner panel assembly
9	Sill Reinforcing Beam	Door sill reinforcement beam assembly

Upper Section Assembly of A-Pillar Reinforcement Plate

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .

– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .

– **Punching**： Puncher, refer toAuxiliary tools .

– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .

– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .

– **Anti-corrosion**:

  • **Tools**: Spray gun, refer toSpraying tools 。

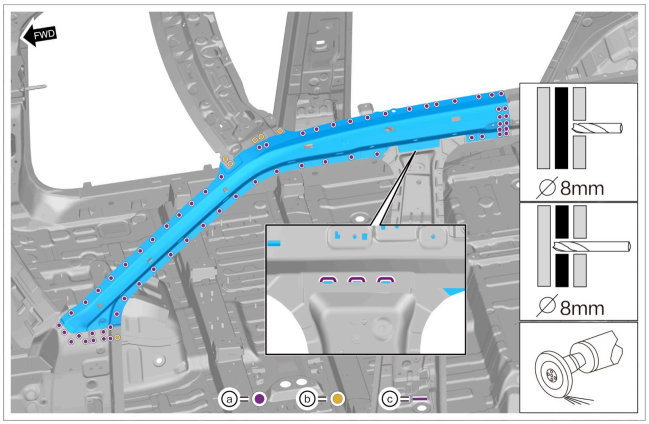
  • **Auxiliary materials**: Refer to Anti-corrosion materials .

    • **Joint surface anti-corrosion**: Zinc powder conductive primer

    • **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Disassemble the top cover assembly.Roof cover assembly
6. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
7. Disassemble the B-pillar reinforcement assembly. Refer to B-pillar reinforcement plate assembly
8. Disassemble the upper assembly of the A-pillar reinforcement plate.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.
   c. Use a grinding wheel grinder to remove the continuous weld and remove the upper assembly of the A-pillar reinfo rcement plate.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

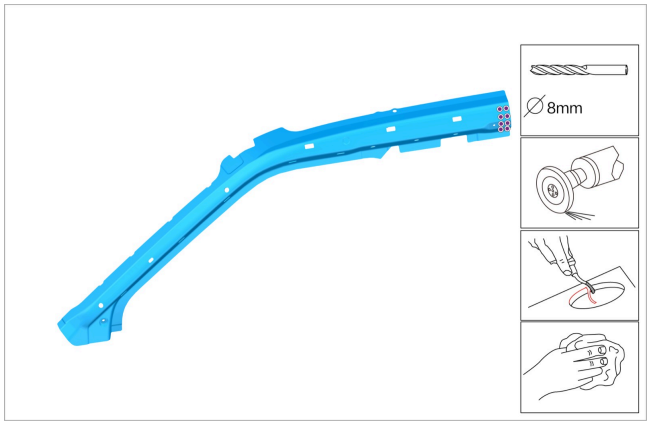
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure 前门及车顶 for correctness, see How to measure and align vehicle body
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

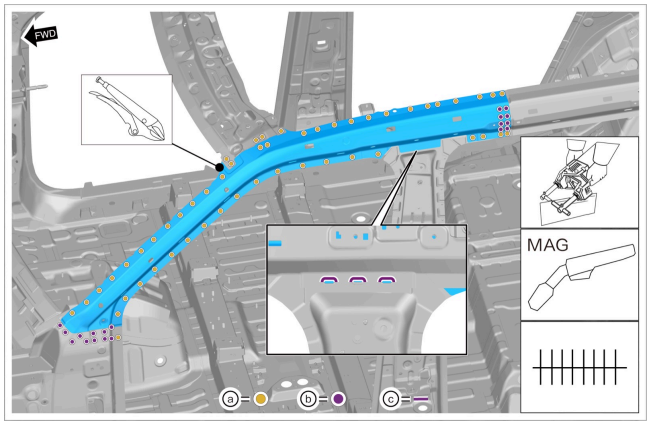
   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



4. Use locking pliers to fix the upper assembly of the A-pillar reinforcement plate to its original position and weld it.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

> **Caution**
>
> – During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot welding and Gas shielded welding .

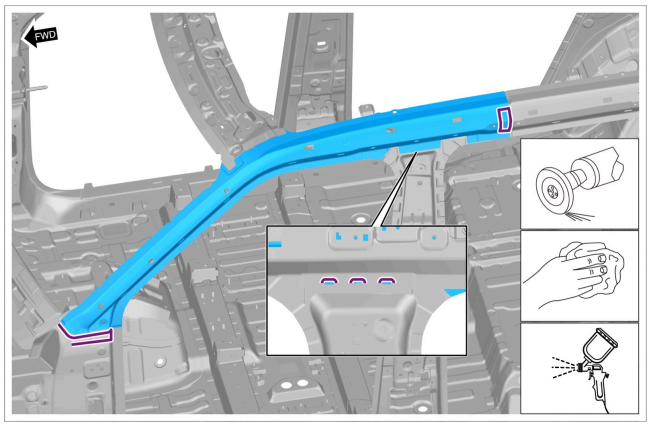


5. Re-confirm to check whether the side wall data is correct, see 前门及车顶

Reminder

- If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
- If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Install the B-pillar reinforcement panel assembly. Refer to B-pillar reinforcement plate assembly
8. Install the front section of the side outer panel. Refer to 侧围外板前段
9. Install the top cover assembly.Roof cover assembly
10. Install the fender upper bracket.Fender rear upper bracket
11. Install the fender rear middle bracket. Fender rear middle bracket
12. Install the mounting bracket on the fender.Fender upper mounting bracket
13. Install the fender mounting bracket IV.Bracket IV mounted on fender

A-pillar reinforcement plate assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

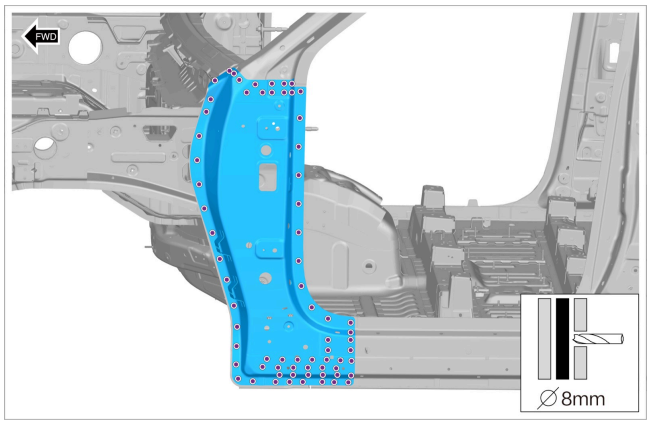
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Remove the lower bracket after the fender. Fender rear lower bracket
6. Disassemble the front connecting plate assembly of the side wall.侧围前连接板总成
7. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
8. Use an 8mm special drill bit to remove one layer of weld spots and remove the A-pillar reinforcement assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

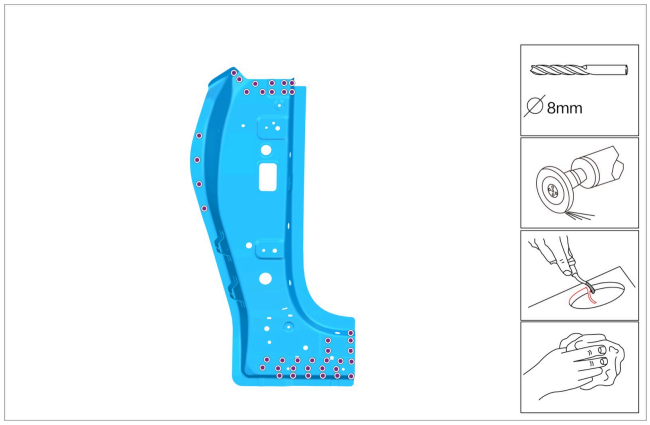
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

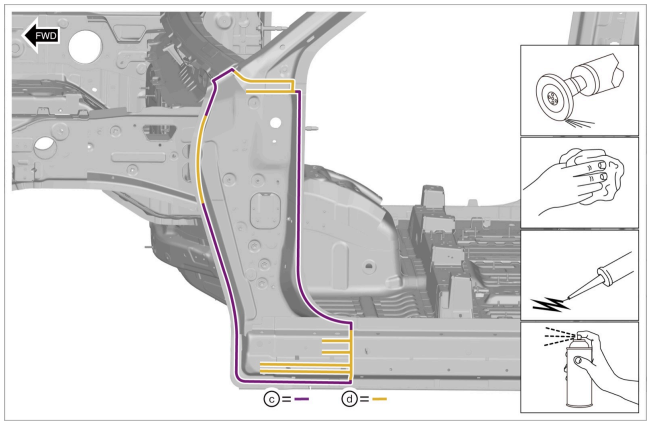


2. Secure the prepared parts to the vehicle body and measure 前门及车顶 for correctness, see How to measure and align vehicle body
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

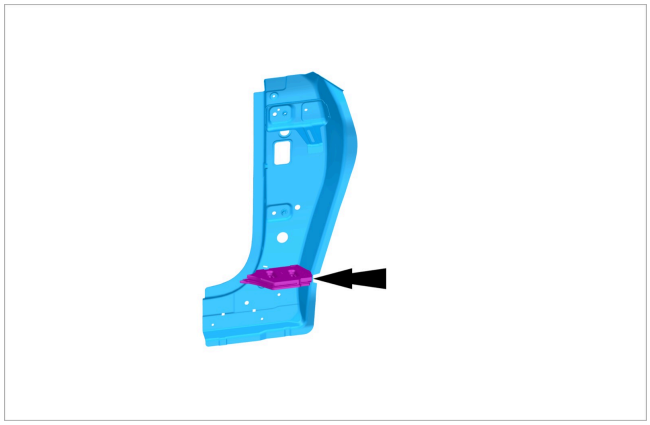
> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



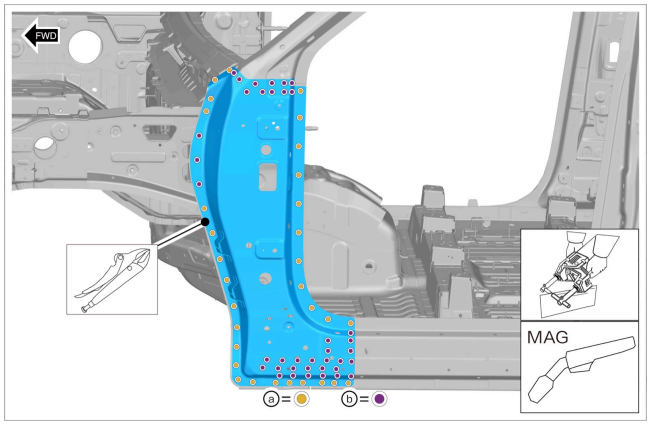
4. Install new blocking pieces.



5. Use locking pliers to fix the A-pillar reinforcement assembly to its original position and weld it.
   a. Use resistance spot welding.
   b. Use metal active gas welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot welding and Gas shielded welding .

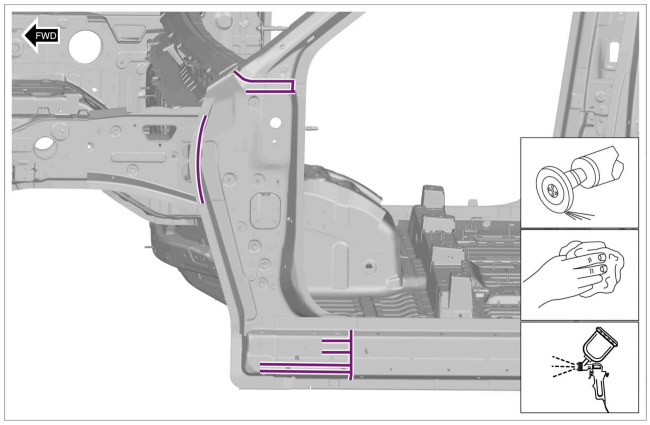


6. Re-confirm to check whether the side wall data is correct, see 前门及车顶

Reminder

– If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
– If the data cannot be repaired through calibration, the component may need to be reinstalled.

7. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



8. Install the front section of the side outer panel. Refer to 侧围外板前段
9. Install the front connecting plate assembly of the side panel.侧围前连接板总成
10. Install the fender lower bracket.Fender rear lower bracket
11. Install the fender upper bracket.Fender rear upper bracket
12. Install the fender rear middle bracket. Fender rear middle bracket
13. Install the mounting bracket on the fender.Fender upper mounting bracket
14. Install the fender mounting bracket IV.Bracket IV mounted on fender

Upper section of the A-pillar inner panel

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

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Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

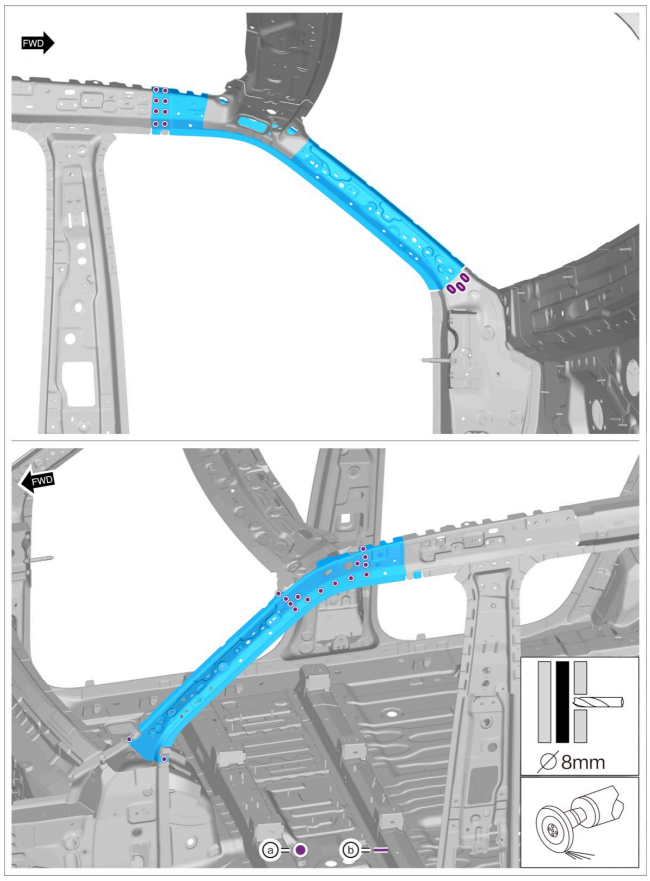
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Disassemble the top cover assembly.Roof cover assembly
6. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
7. Disassemble the B-pillar reinforcement assembly. Refer to B-pillar reinforcement plate assembly
8. Disassemble the upper assembly of the A-pillar reinforcement plate. Refer to Upper Section Assembly of A-Pillar Reinf orcement Plate
9. Remove the upper section of the A-pillar inner panel.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use a grinding wheel grinder to remove continuous welds and take off the upper section of the A-pillar inner pane l.



Installation

⚠ Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

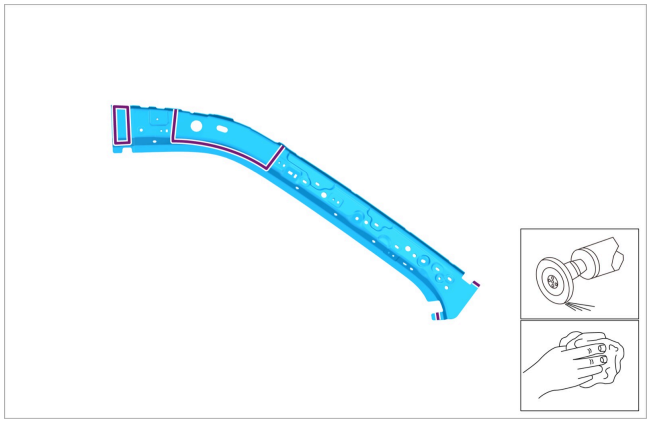
⚠ Caution

- During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
- When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure 前门及车顶 for correctness, see How to measure and align vehicle body

3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

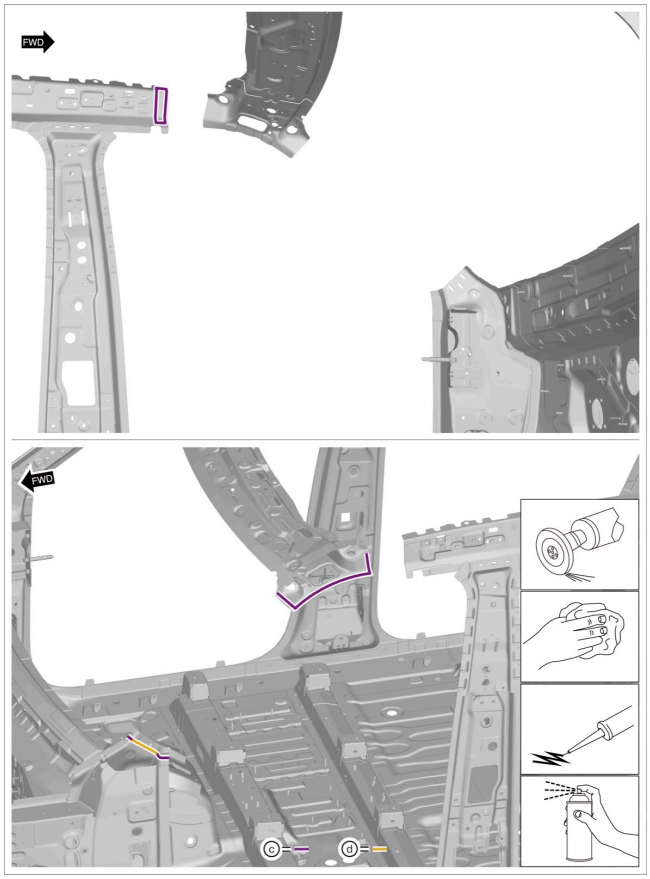
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.

   d. Spray zinc powder conductive primer on the re-joint surface.

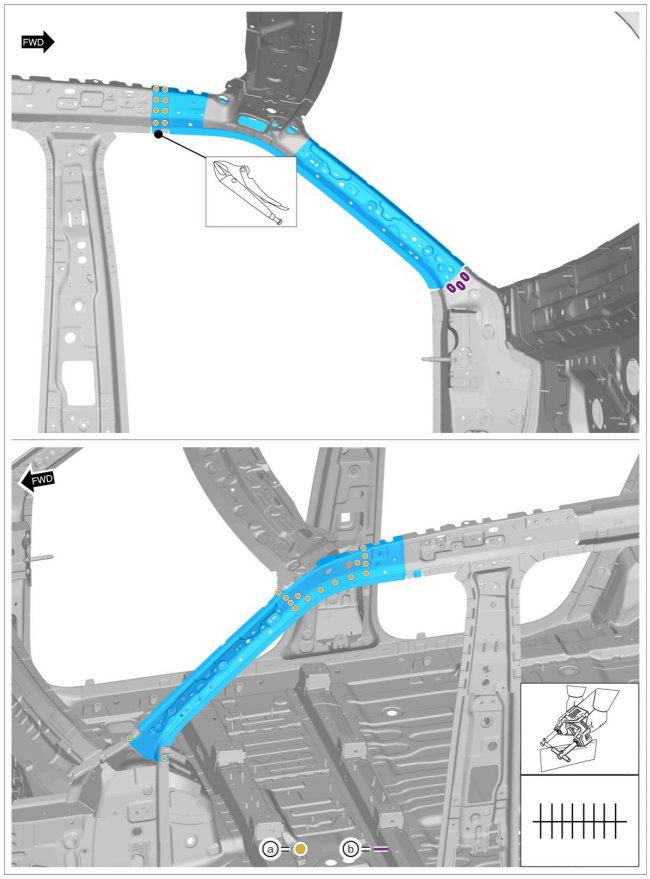
> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



4. Use locking pliers to secure the upper section of the A-pillar inner panel to its original position and weld it.
   a. Use resistance spot welding.
   b. Use continuous seam welding.

⚠ Caution

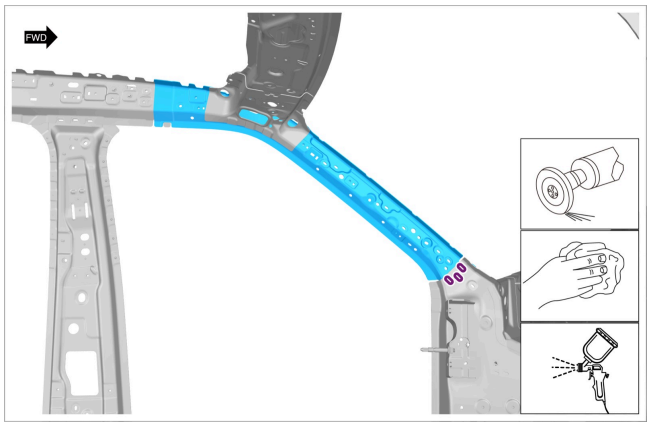
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot welding and Gas shielded welding .



5. Re-confirm to check whether the side wall data is correct, see 前门及车顶

> **Reminder**
>
> – If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
>
> – If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Install the upper assembly of the A-pillar reinforcement plate. Refer to Upper Section Assembly of A-Pillar Reinforcement Plate
8. Install the B-pillar reinforcement panel assembly. Refer to B-pillar reinforcement plate assembly
9. Install the front section of the side outer panel. Refer to 侧围外板前段
10. Install the top cover assembly.Roof cover assembly

11. Install the fender upper bracket.Fender rear upper bracket
12. Install the fender rear middle bracket. Fender rear middle bracket
13. Install the mounting bracket on the fender.Fender upper mounting bracket
14. Install the fender mounting bracket IV.Bracket IV mounted on fender

A-pillar inner panel assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

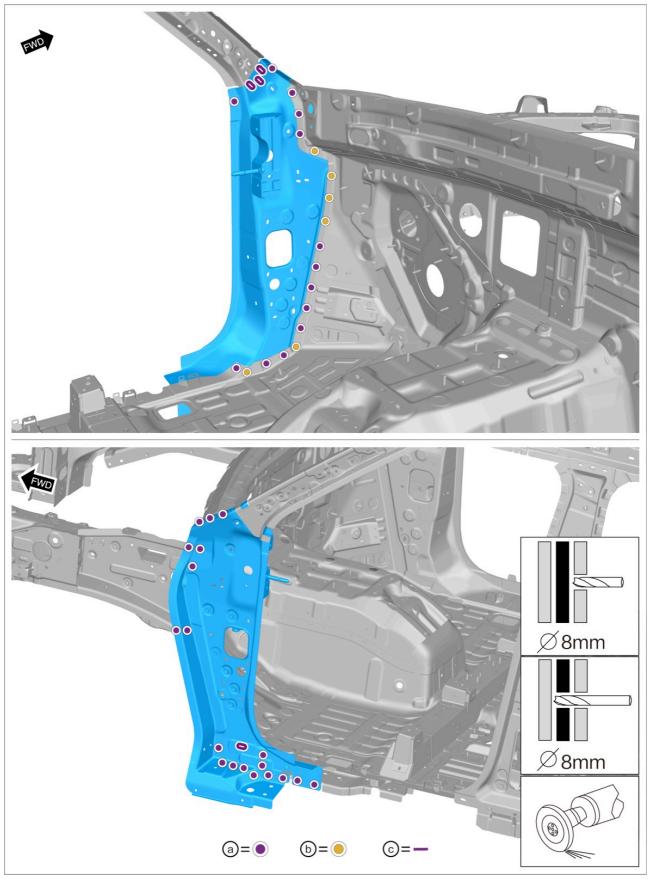
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Remove the lower bracket after the fender. Fender rear lower bracket
6. Disassemble the front connecting plate assembly of the side wall.侧围前连接板总成
7. Disassemble the top cover assembly.Roof cover assembly
8. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
9. Remove the rear section of the side panel. Refer to Rear Section of Side Outer Panel
10. Disassemble the B-pillar reinforcement assembly. Refer to B-pillar reinforcement plate assembly
11. Disassemble the upper assembly of the A-pillar reinforcement plate. Refer to Upper Section Assembly of A-Pillar Reinforcement Plate
12. Disassemble the A-pillar reinforcement assembly. Refer to A-pillar reinforcement plate assembly
13. Disassemble threshold reinforcement plate assembly. Refer to Door sill reinforcement plate assembly
14. Disassemble the assembly of the C-pillar reinforcement plate. Refer to C-pillar reinforcement assembly
15. Remove the lower closing plate after disassembling the side wall outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
16. Remove the rear side wall connecting plate. Refer to Rear side panel connection plate
17. Remove the rear wheel cover outer panel assembly. Refer to Rear Wheel Cover Outer Panel Assembly
18. Disassemble the sill reinforcement beam assembly. Refer to Door sill reinforcement beam assembly
19. Disassemble the inside sill panel assembly. Refer to Door sill inner panel assembly
20. Disassemble the A-pillar inner panel assembly.
    a. Remove 1 layer of welding spots with an 8 mm special drill bit.
    b. Use an 8mm special drill bit to remove 2 layers of weld spots.
    c. Remove continuous welds using a grinding wheel grinder and take off the A-pillar inner panel assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

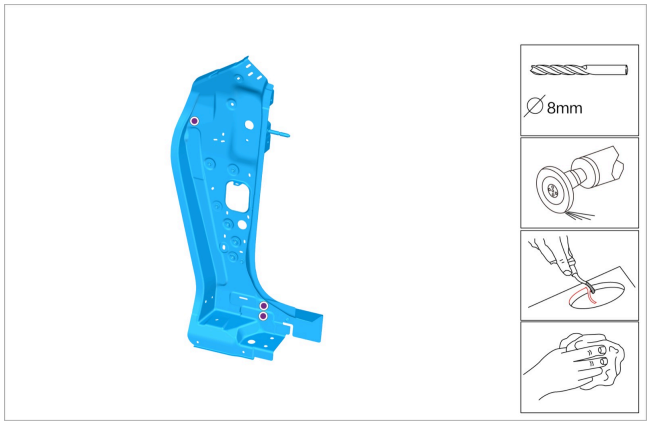
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

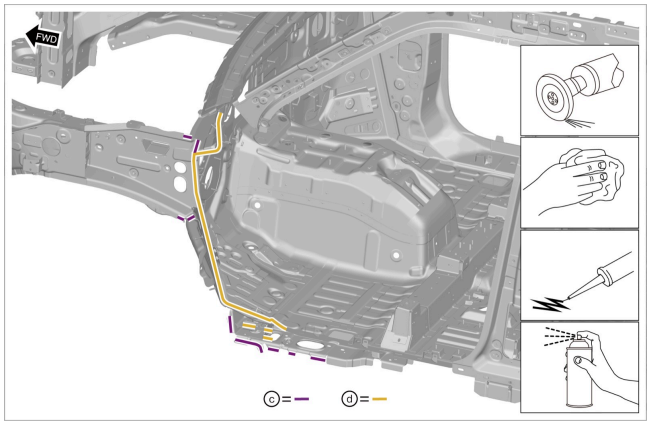


2. Secure the prepared parts to the vehicle body and measure 前门及车顶 for correctness, see How to measure and align vehicle body
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

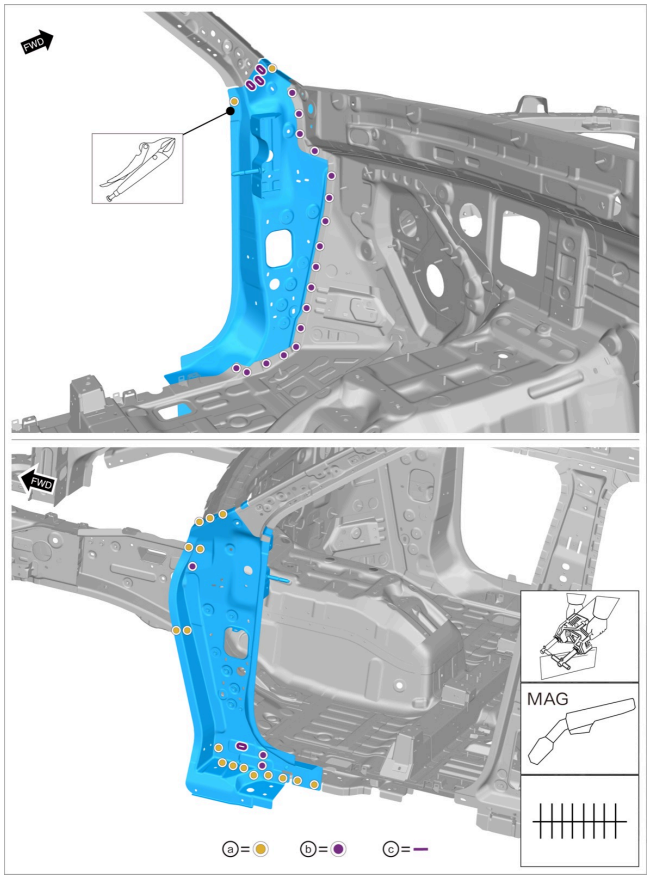
   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



4. Fix the A-pillar inner panel assembly to the original position using locking pliers and weld it.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

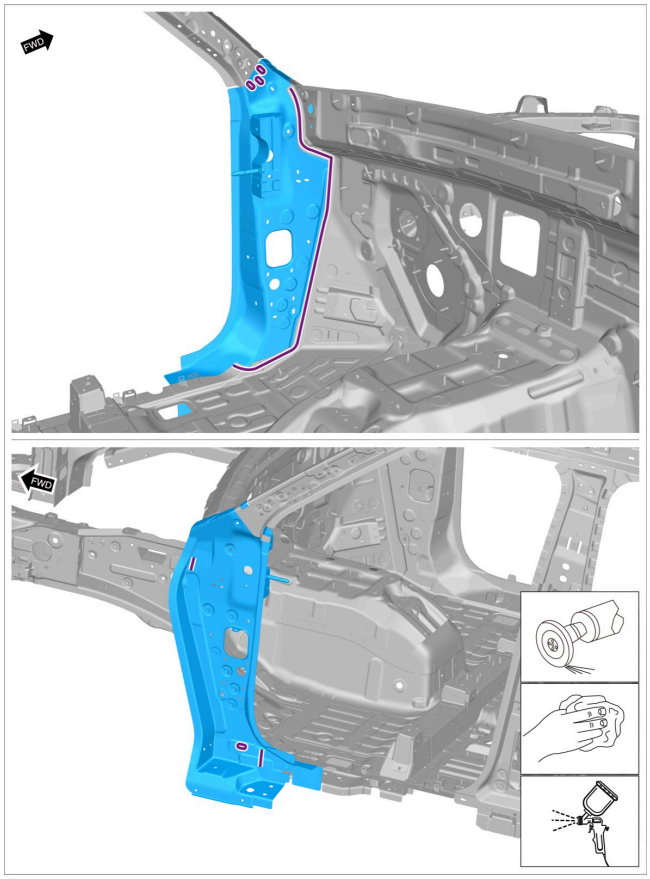
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>
> – During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot welding and Gas shielded welding .



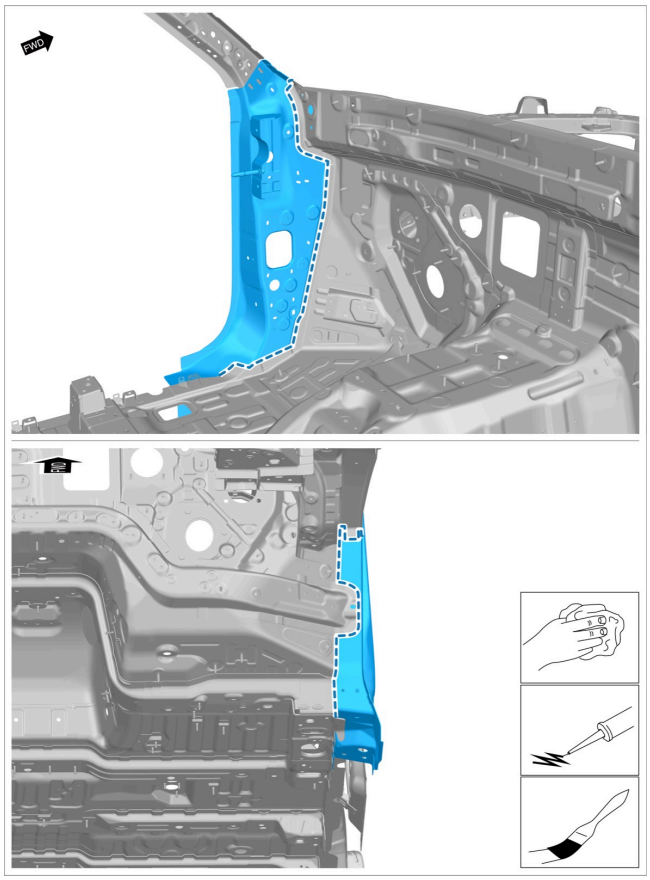
5. Re-confirm to check whether the side wall data is correct, see 前门及车顶

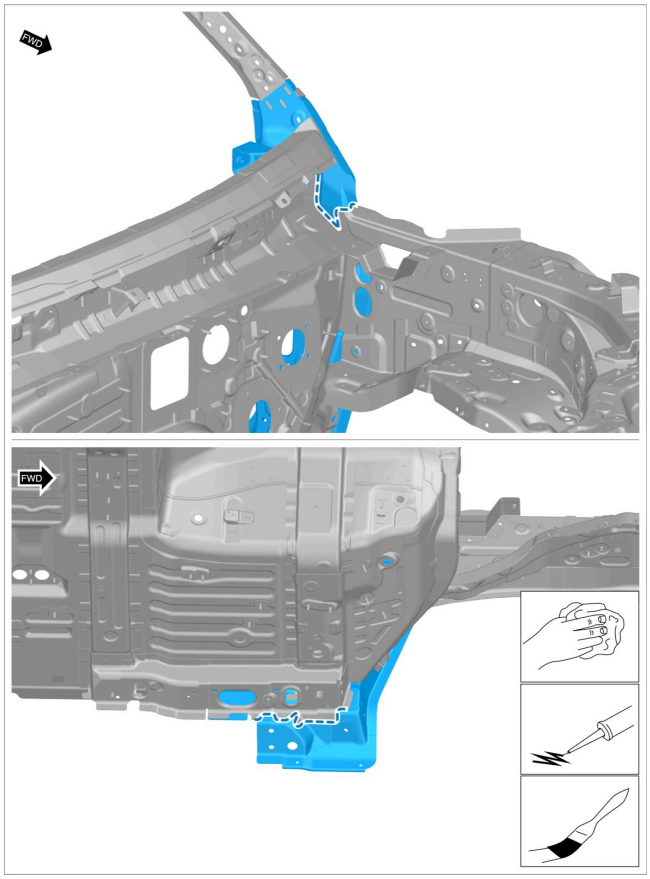
> **Reminder**
>
> – If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
>
> – If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.





8. Install the threshold inner plate assembly. Refer to Door sill inner panel assembly
9. Install the threshold reinforcement beam assembly. Refer to Door sill reinforcement beam assembly
10. Install the rear wheel cover outer panel assembly. Refer to Rear Wheel Cover Outer Panel Assembly
11. Install the rear side connection plate. Refer to Rear side panel connection plate
12. Install the lower closure panel of the rear side outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
13. Install C pillar reinforcement panel assembly. Refer to C-pillar reinforcement assembly
14. Install the threshold reinforcement panel assembly. Refer to Door sill reinforcement plate assembly
15. Install the A-pillar reinforcement assembly. Refer to A-pillar reinforcement plate assembly
16. Install the upper assembly of the A-pillar reinforcement plate. Refer to Upper Section Assembly of A-Pillar Reinforcement Plate
17. Install the B-pillar reinforcement panel assembly. Refer to B-pillar reinforcement plate assembly
18. Install the rear section of the side outer panel. Refer to Rear Section of Side Outer Panel
19. Install the front section of the side outer panel. Refer to 侧围外板前段
20. Install the top cover assembly.Roof cover assembly
21. Install the front connecting plate assembly of the side panel.侧围前连接板总成
22. Install the fender lower bracket.Fender rear lower bracket
23. Install the fender upper bracket.Fender rear upper bracket
24. Install the fender rear middle bracket. Fender rear middle bracket
25. Install the mounting bracket on the fender.Fender upper mounting bracket
26. Install the fender mounting bracket IV.Bracket IV mounted on fender

B-pillar reinforcement plate assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

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Operation tools and auxiliary materials

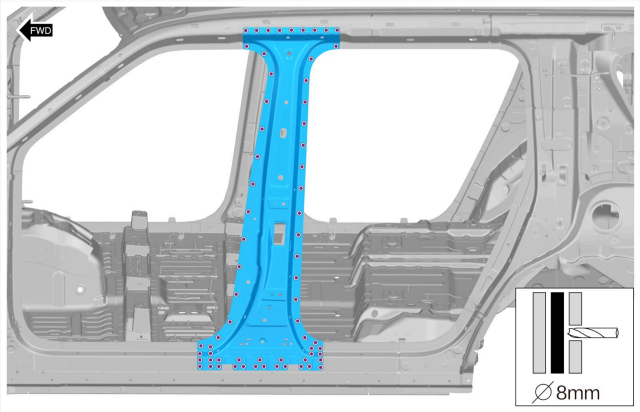
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
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– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
6. Use a special 8mm drill bit to remove the first layer of weld spots and remove the B-pillar reinforcement assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

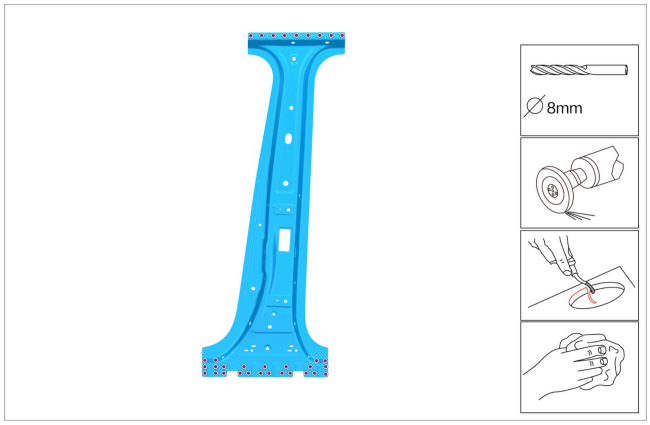
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– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Fix the prepared parts to the car body and measure 前门及车顶 , 后门 for accuracy, see How to measure and align vehicle body

3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

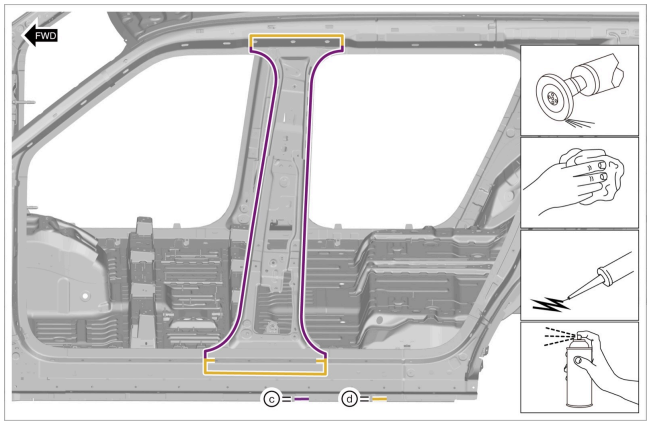
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

Caution

Do not spray it too thick to avoid affecting the welding quality.



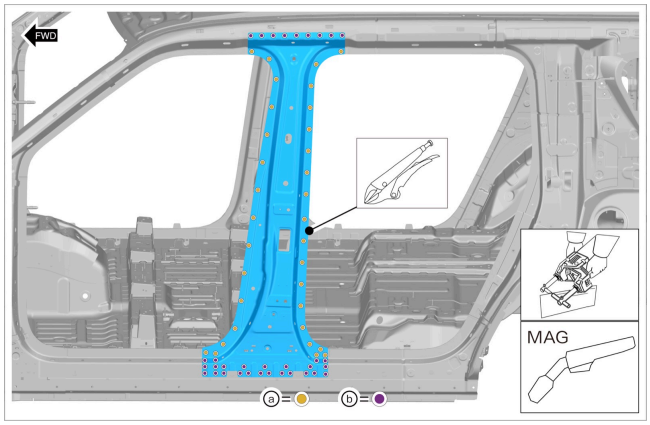
4. Install new blocking pieces.



5. Use locking pliers to secure the B-pillar reinforcement plate assembly to the original position and weld.
   a. Use resistance spot welding.
   b. Use metal active gas welding.

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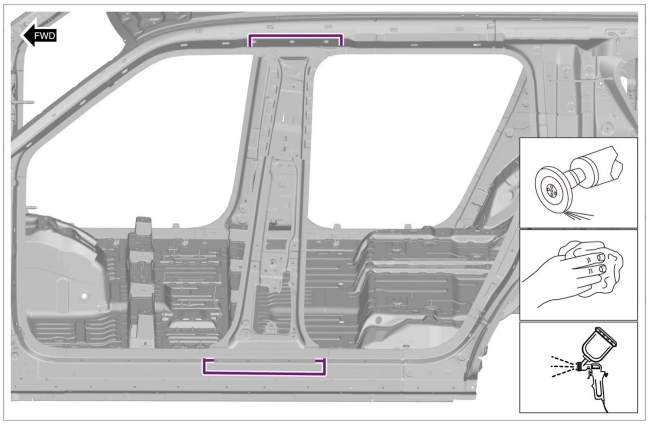


6. Please confirm again to check whether the side wall data is correct, see 前门及车顶 , 后门

Reminder

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7. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



8. Install the front section of the side outer panel. Refer to 侧围外板前段
9. Install the fender upper bracket.Fender rear upper bracket
10. Install the fender rear middle bracket. Fender rear middle bracket
11. Install the mounting bracket on the fender.Fender upper mounting bracket
12. Install the fender mounting bracket IV.Bracket IV mounted on fender

B-pillar inner panel assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

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Operation tools and auxiliary materials

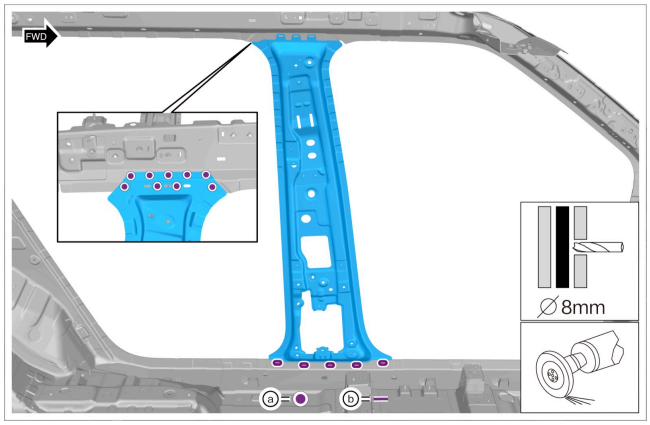
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    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Disassemble the top cover assembly.Roof cover assembly
6. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
7. Disassemble the B-pillar reinforcement assembly. Refer to B-pillar reinforcement plate assembly
8. Disassemble the upper assembly of the A-pillar reinforcement plate. Refer to Upper Section Assembly of A-Pillar Reinf orcement Plate
9. Disassemble the B-pillar interior panel assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use a grinding wheel grinder to remove continuous welds and remove the B-pillar inner panel assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

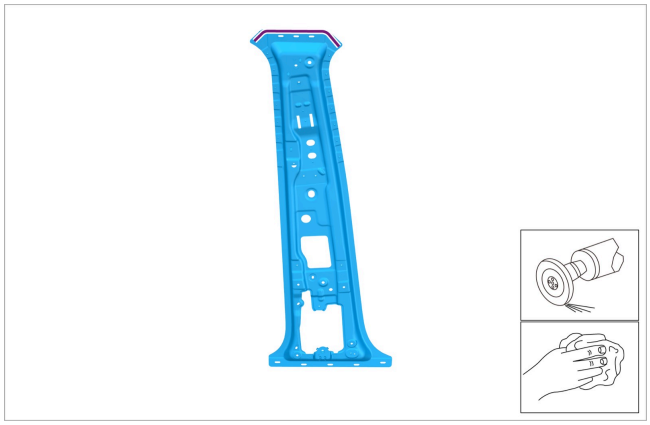
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

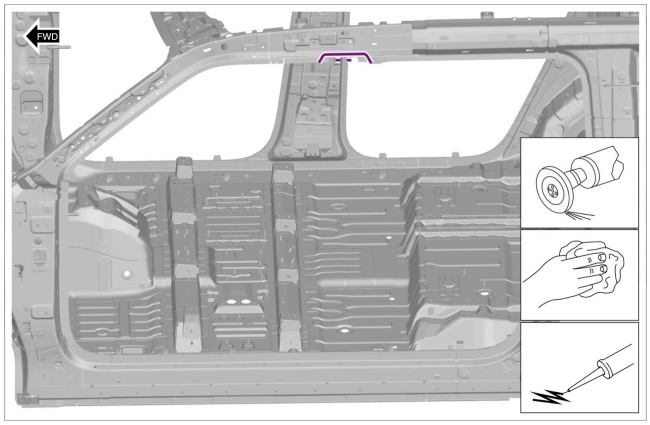
Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Fix the prepared parts to the car body and measure 前门及车顶 , 后门 for accuracy, see How to measure and align vehicle body
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

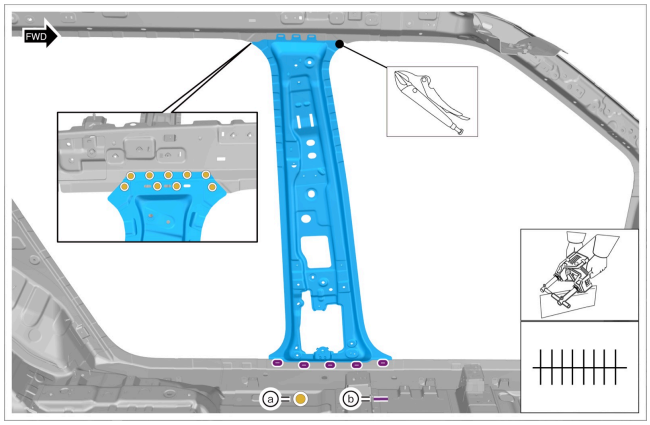
> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.



4. Use locking pliers to fix the B-pillar inner panel assembly to the original position and perform welding.
   a. Use resistance spot welding.
   b. Use continuous seam welding.

> **Caution**
>
> – During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot welding and Gas shielded welding .

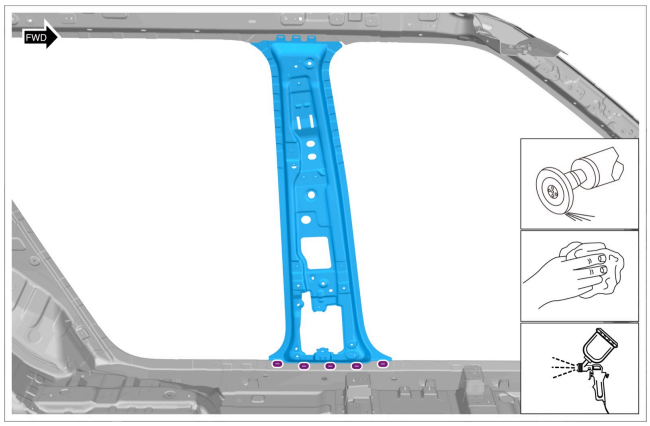


5. Please confirm again to check whether the side wall data is correct, see 前门及车顶 , 后门

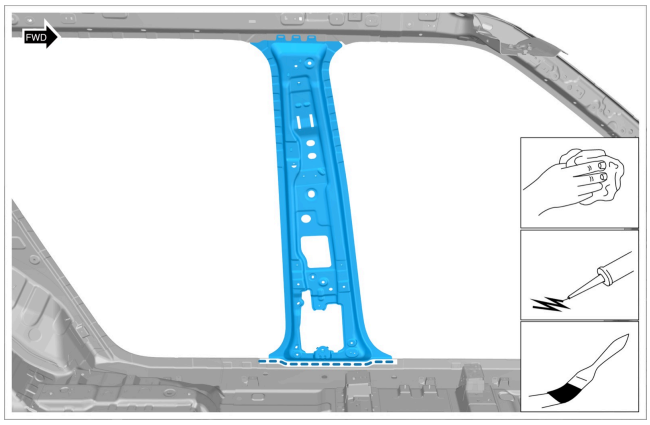
Reminder

- If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
- If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



8. Install the upper assembly of the A-pillar reinforcement plate. Refer to Upper Section Assembly of A-Pillar Reinforcement Plate
9. Install the B-pillar reinforcement panel assembly. Refer to B-pillar reinforcement plate assembly
10. Install the front section of the side outer panel. Refer to 侧围外板前段
11. Install the top cover assembly.Roof cover assembly
12. Install the fender upper bracket.Fender rear upper bracket
13. Install the fender rear middle bracket. Fender rear middle bracket
14. Install the mounting bracket on the fender.Fender upper mounting bracket
15. Install the fender mounting bracket IV.Bracket IV mounted on fender

CD Column Connection Bracket

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

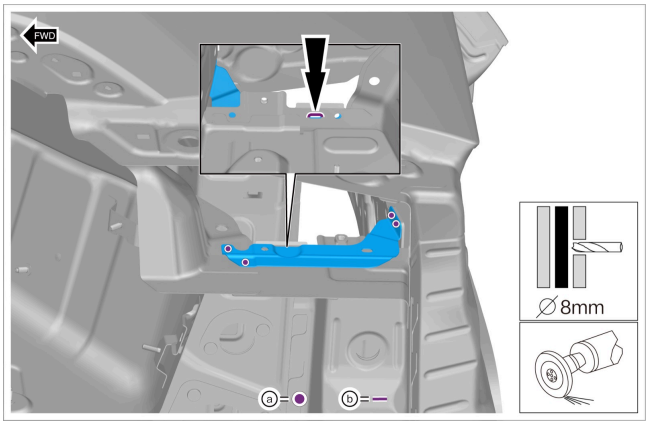
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the lower closing plate after disassembling the side wall outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
2. Disassemble the CD pillar connection bracket.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use a grinding wheel grinder to remove continuous welds and detach the CD column connection bracket.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

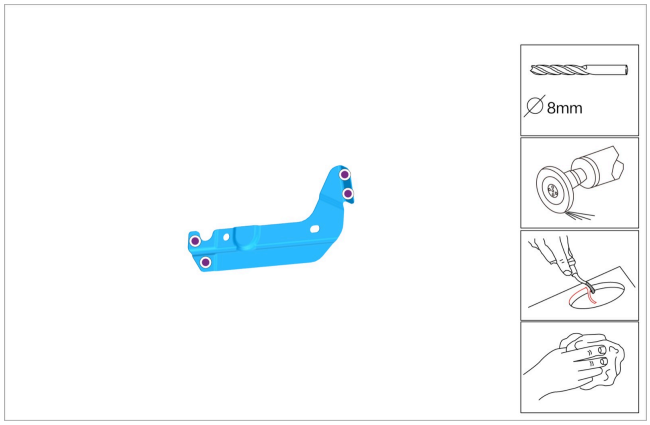
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis of the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

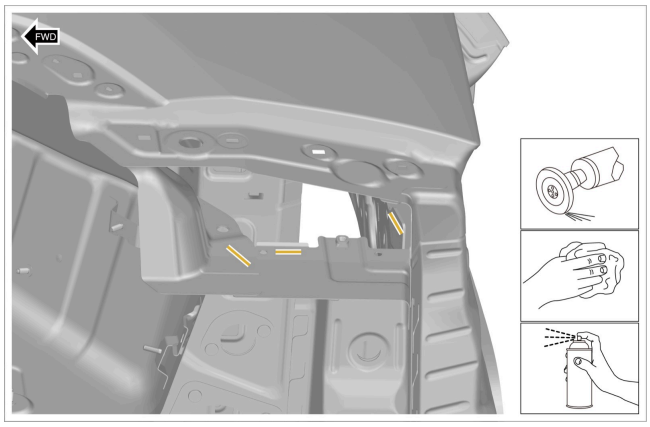
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Spray zinc powder conductive primer on the re-joint surface.

Caution

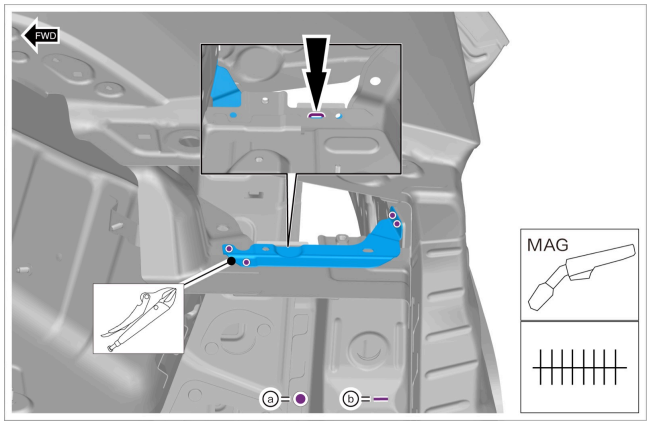
Do not spray it too thick to avoid affecting the welding quality.



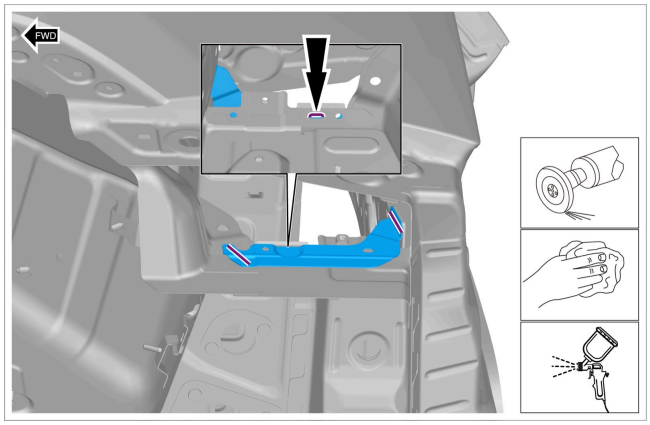
3. Use locking pliers to fix the CD column connecting bracket to the original position and perform welding.
   a. Use metal active gas welding.
   b. Use continuous seam welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Install the lower closure panel of the rear side outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel

C and D-pillars assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

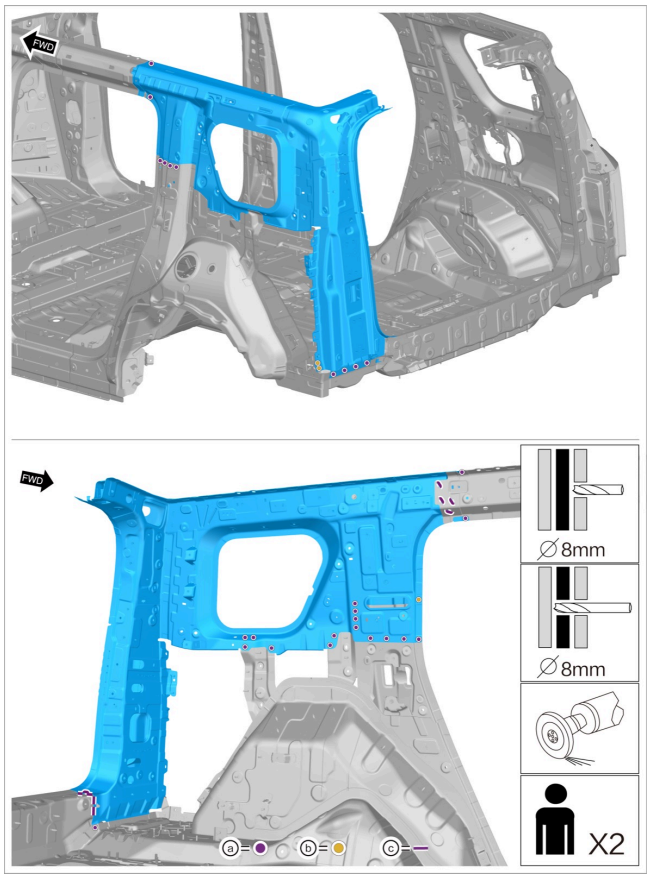
– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the top cover assembly.Roof cover assembly
2. Remove the crossbeam assembly after disassembling the top cover.Roof cover rear cross beam assembly
3. Remove the rear section of the side panel. Refer to Rear Section of Side Outer Panel
4. Remove the lower closing plate after disassembling the side wall outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
5. Disassemble the water channel assembly. Refer to Rear Trough Assembly
6. Remove the rear taillight housing assembly after disassembly. Refer to Tail Light Socket Panel Assembly
7. Disassemble the CD pillar assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.
   c. Use a grinding wheel grinder to remove continuous welds and remove the CD pillar assembly.

⚠ Caution

This step is difficult to be performed and requires the cooperation of many people.



Installation

⚠ Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

⚠ Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure 背门 for correctness, see How to measure and align vehi cle body
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

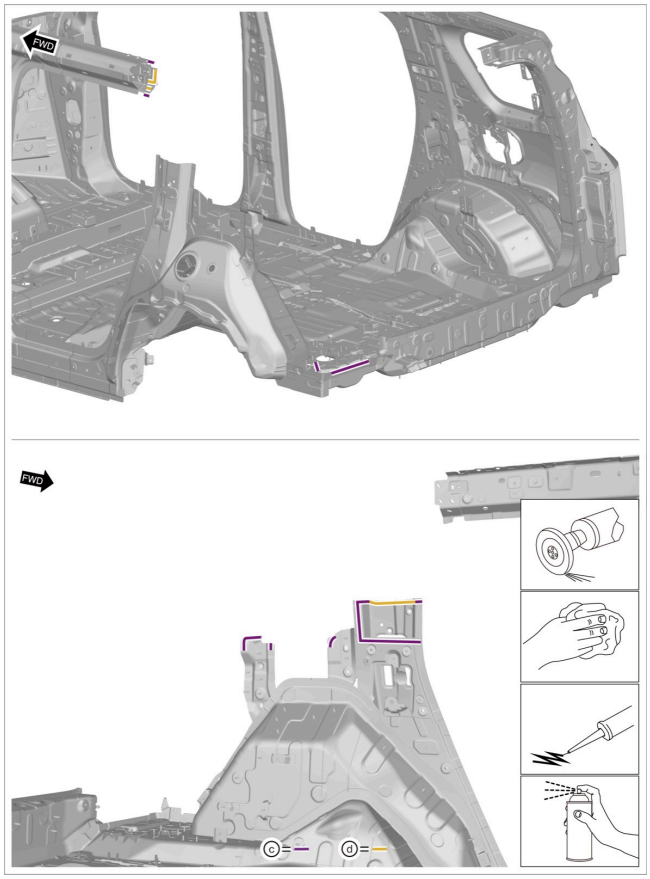
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

Caution

Do not spray it too thick to avoid affecting the welding quality.



4. Use locking pliers to secure the CD post assembly to its original position and weld.

⚠ Caution

This step is difficult to be performed and requires the cooperation of many people.

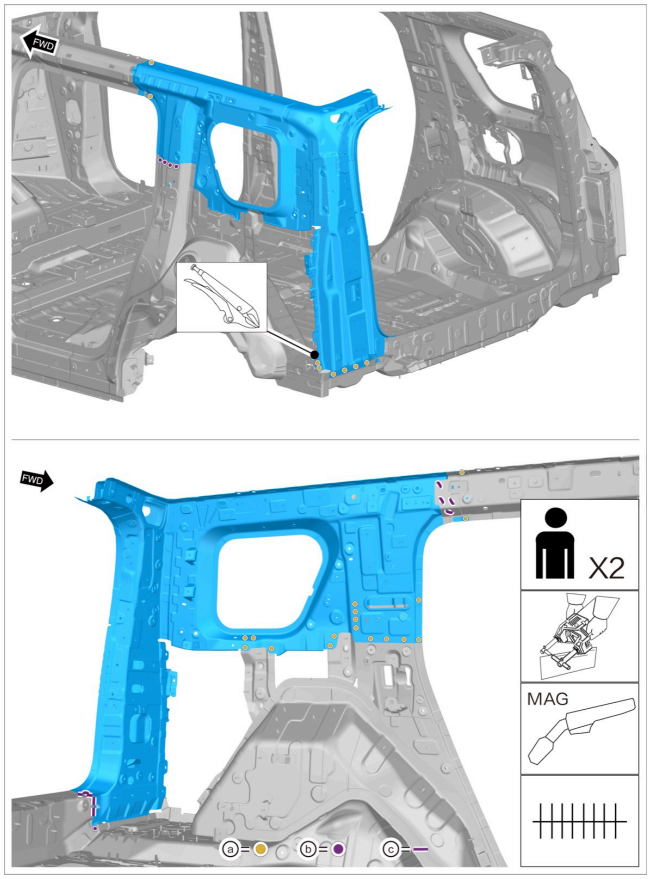
a. Use resistance spot welding.

b. Use metal active gas welding.

c. Use continuous seam welding.

⚠ Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .

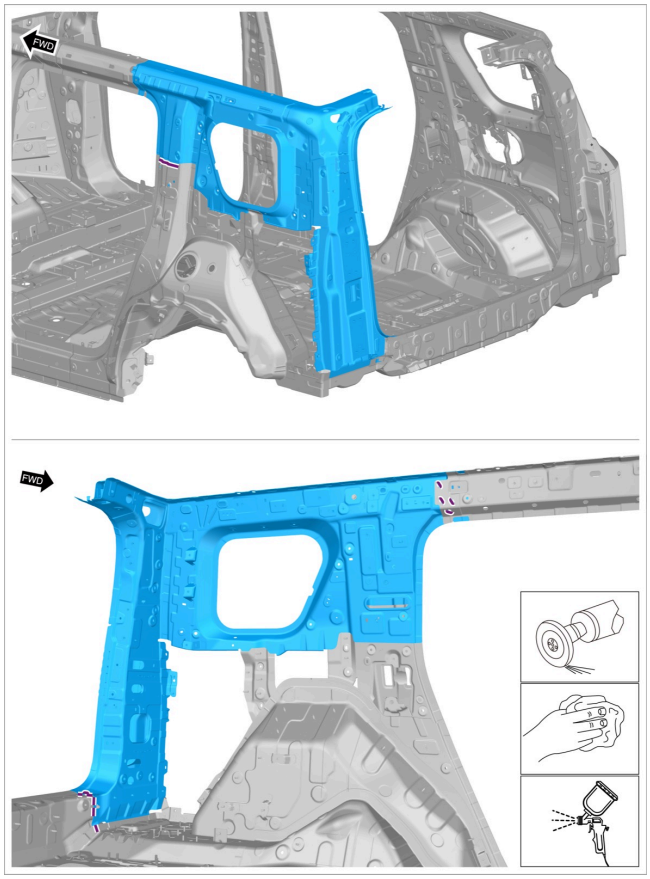


5. Re-confirm to check whether the side wall data is correct, see 背门

Reminder

- If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
- If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Install the rear taillight mounting assembly. Refer to Tail Light Socket Panel Assembly
8. Install the trough assembly after installation. Refer to Rear Trough Assembly
9. Install the lower closure panel of the rear side outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
10. Install the rear section of the side outer panel. Refer to Rear Section of Side Outer Panel
11. Install the top cover beam assembly.Roof cover rear cross beam assembly
12. Install the top cover assembly.Roof cover assembly

C-pillar reinforcement assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

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– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the rear section of the side panel. Refer to Rear Section of Side Outer Panel
2. Disassemble the assembly of the C-pillar reinforcement plate.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use a special 8mm drill bit to remove two layers of weld spots and remove the C-pillar reinforcement assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

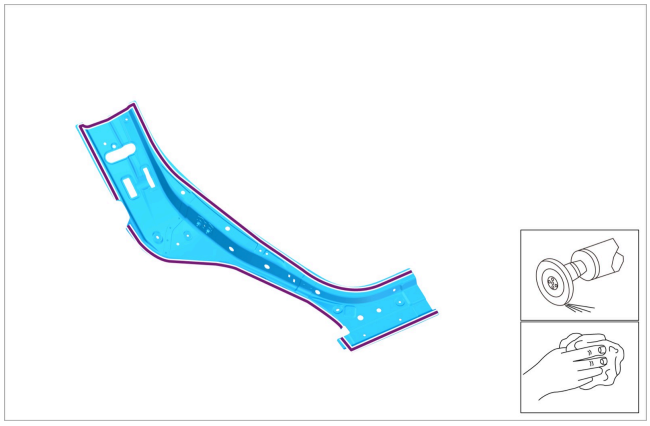
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure 后门 for correctness, see How to measure and align vehi cle body

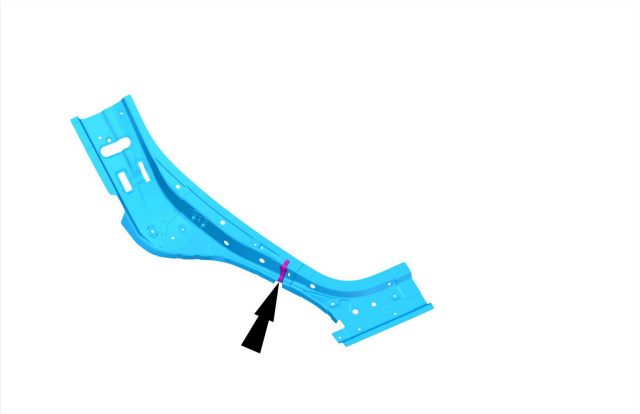
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.

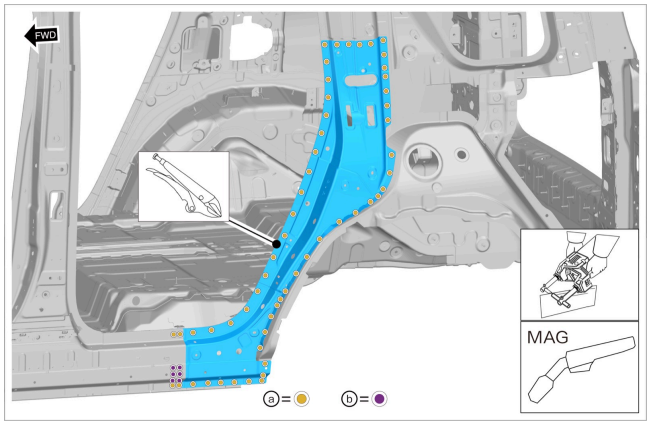


4. Install new blocking pieces.



5. Fix the C-pillar reinforcement assembly to the original position using locking pliers and perform welding.
   a. Use resistance spot welding.
   b. Use metal active gas welding.

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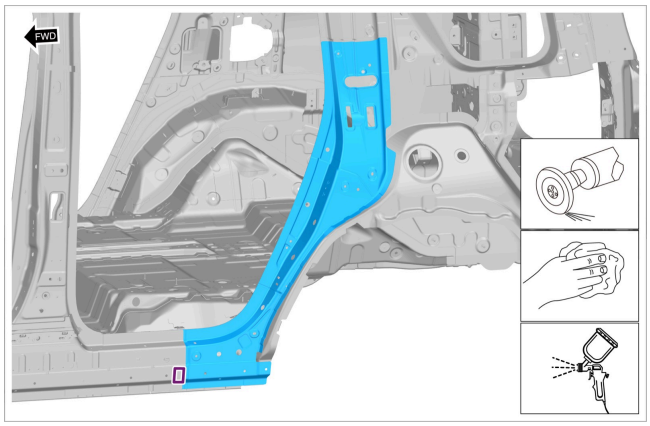


6. Re-confirm to check whether the side wall data is correct, see 后门

Reminder

- If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
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7. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



8. Install the rear section of the side outer panel. Refer to Rear Section of Side Outer Panel

Front Section of Side Roof Reinforcement Plate

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

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– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .

– **Punching**： Puncher, refer toAuxiliary tools .

– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .

– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .

– **Anti-corrosion**:

  • **Tools**: Spray gun, refer toSpraying tools 。

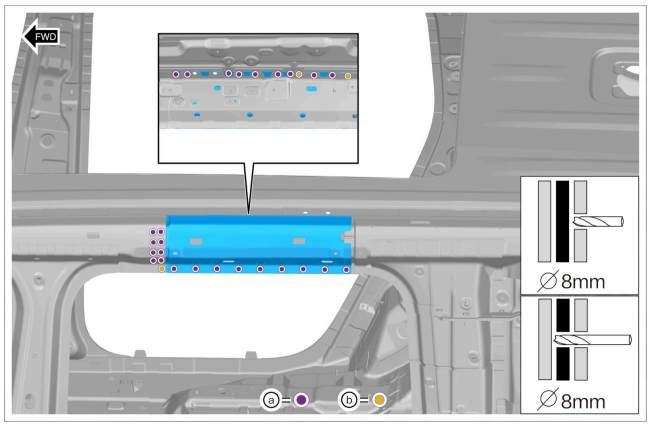
  • **Auxiliary materials**: Refer to Anti-corrosion materials .

    • **Joint surface anti-corrosion**: Zinc powder conductive primer

    • **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the rear section of the side panel. Refer to Rear Section of Side Outer Panel
2. Disassemble the front section of the side roof frame reinforcement plate.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove the two layers of weld spots and take off the front section of the side top frame reinforcement plate.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

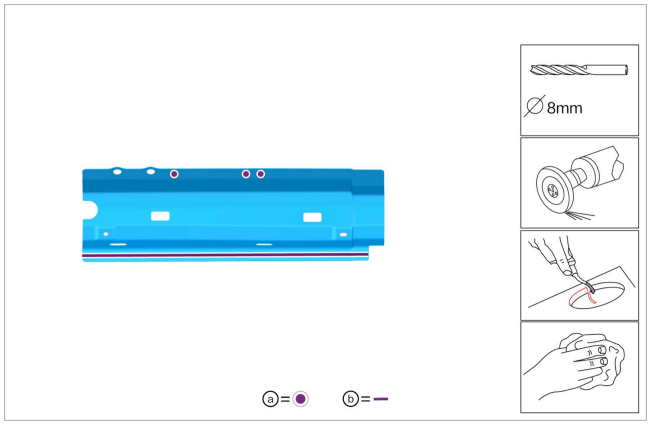
Caution

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1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

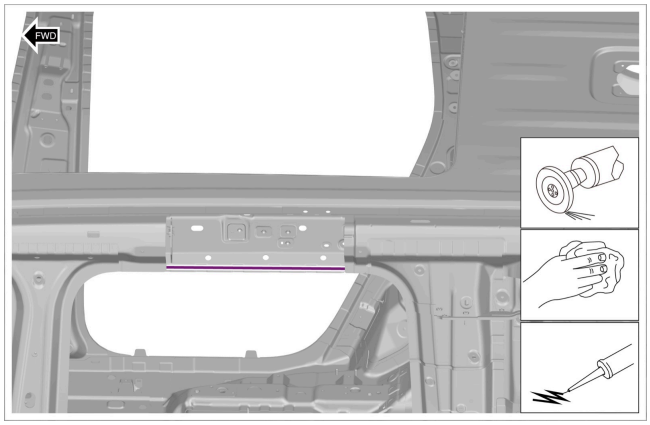


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

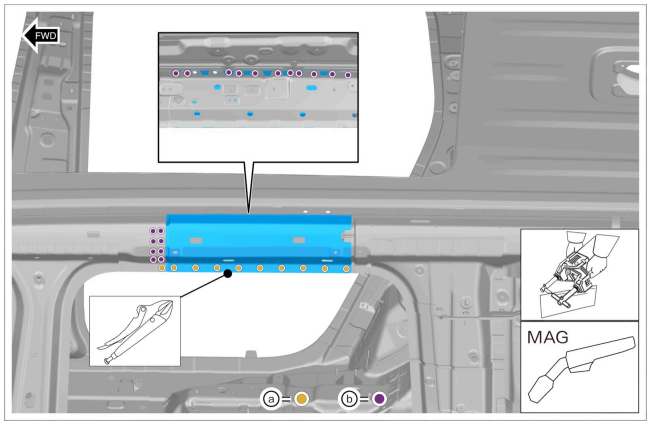
   c. Apply structural adhesive on the joint surface.



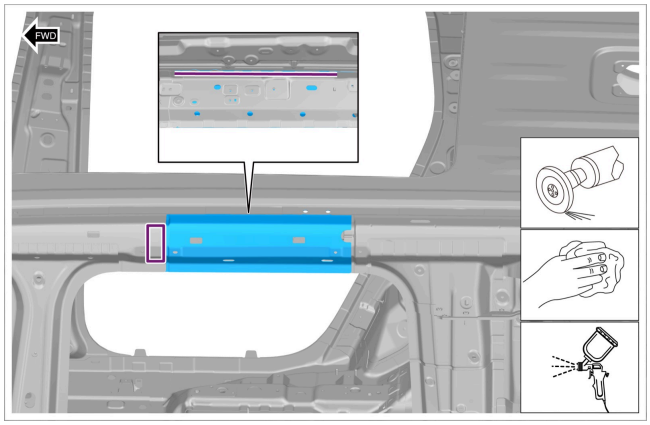
3. Use locking pliers to secure the CD post assembly to its original position and weld.
   a. Use resistance spot welding.
   b. Use metal active gas welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Install the rear section of the side outer panel. Refer to Rear Section of Side Outer Panel

Inner Panel of Side Roof Frame

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .

– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .

– **Punching**： Puncher, refer toAuxiliary tools .

– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .

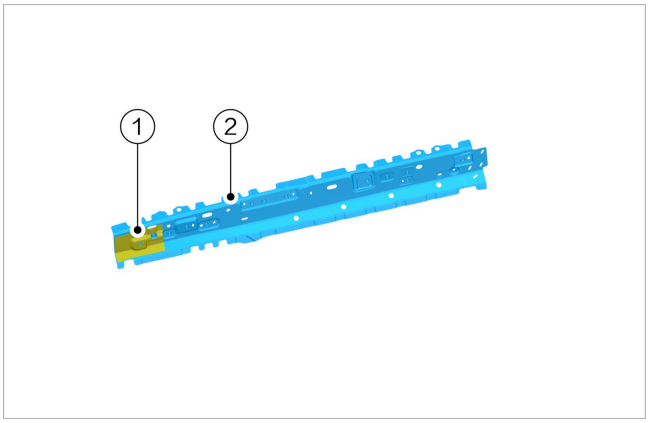
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .

– **Anti-corrosion**:

  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Description

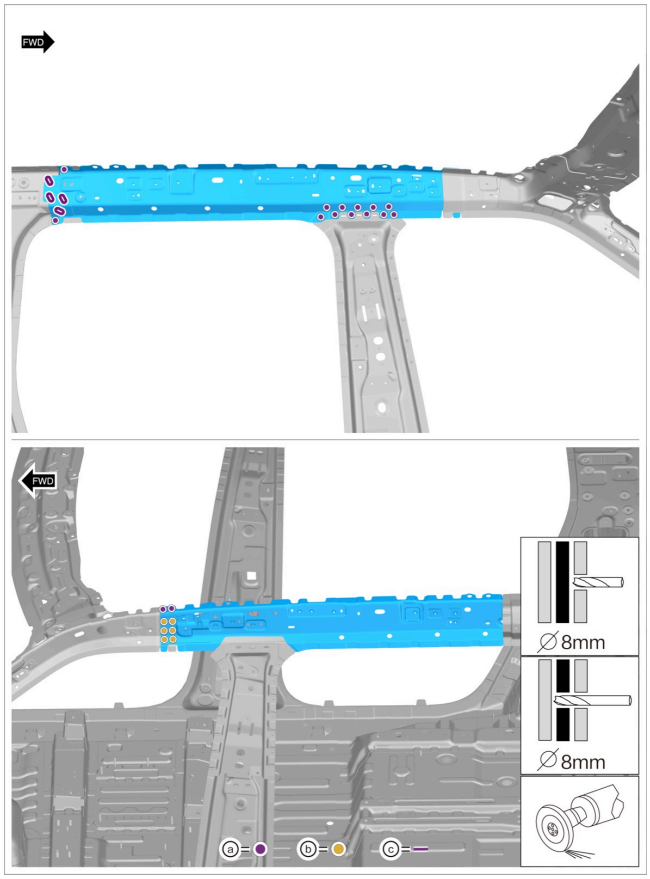
Reinforcement plate of the inner panel of the side roof rail and A-pillar inner panel in the following diagram.



S/N	Component name
1	Inner panel reinforcement plate of the A-pillar
2	Inner Panel of Side Roof Frame

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Disassemble the top cover assembly.Roof cover assembly
6. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
7. Remove the rear section of the side panel. Refer to Rear Section of Side Outer Panel
8. Disassemble the B-pillar reinforcement assembly. Refer to B-pillar reinforcement plate assembly
9. Disassemble the upper assembly of the A-pillar reinforcement plate. Refer to Upper Section Assembly of A-Pillar Reinf orcement Plate
10. Disassemble side top frame inner panel.
    a. Remove 1 layer of welding spots with an 8 mm special drill bit.
    b. Use an 8mm special drill bit to remove 2 layers of weld spots.
    c. Use a grinding wheel grinder to remove continuous welds and take off the side top frame inner panel.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

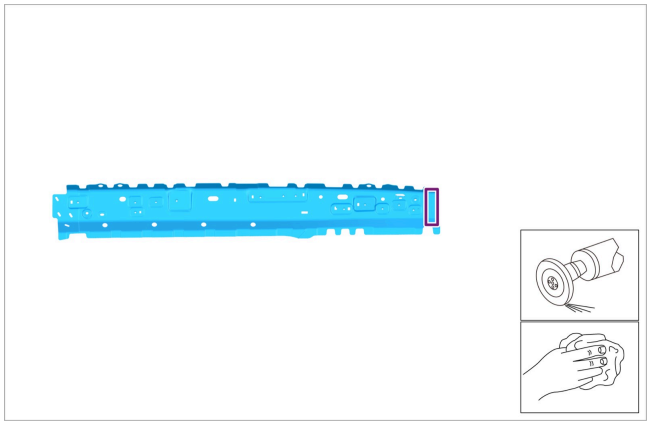
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

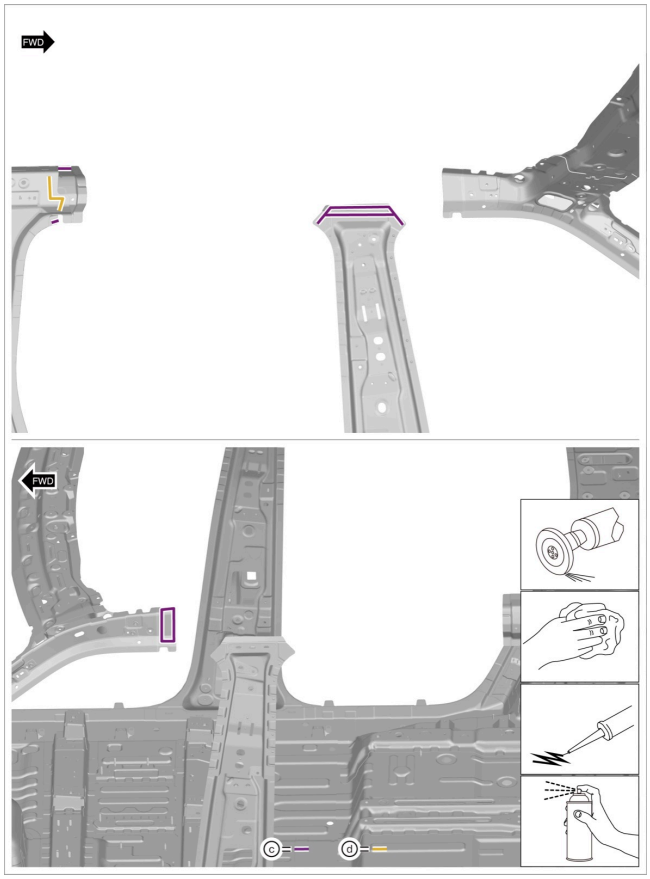


2. Secure the prepared parts to the vehicle body and measure 前门及车顶 for correctness, see How to measure and align vehicle body
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

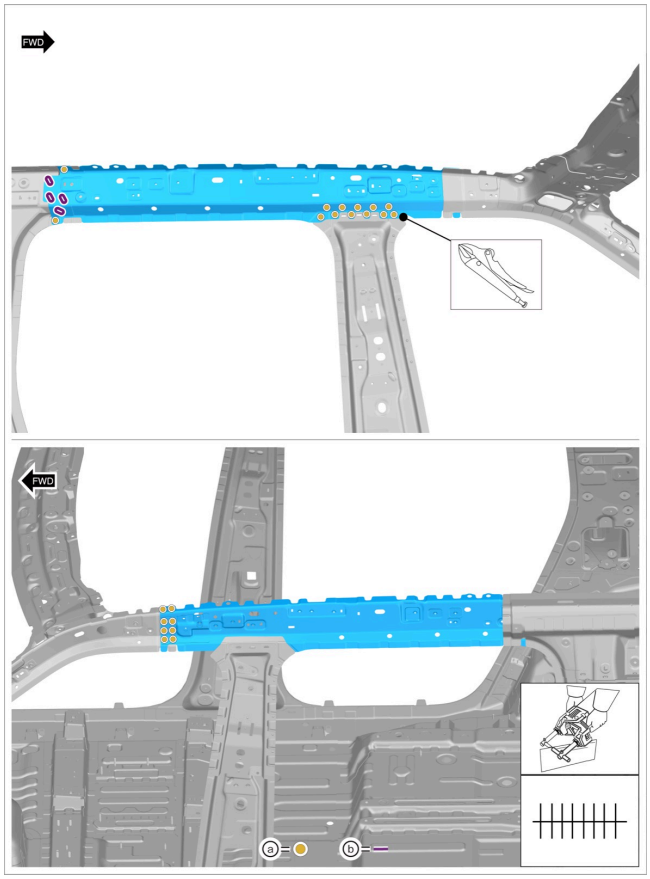
> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



4. Use locking pliers to secure the side top frame inner panel to its original position and weld it.
   a. Use resistance spot welding.
   b. Use continuous seam welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot welding and Gas shielded welding .

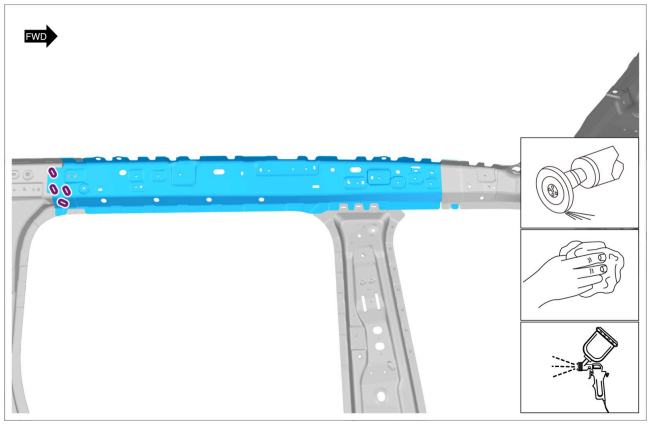


5. Re-confirm to check whether the side wall data is correct, see 前门及车顶

Reminder

– If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
– If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Install the upper assembly of the A-pillar reinforcement plate. Refer to Upper Section Assembly of A-Pillar Reinforcem ent Plate
8. Install the B-pillar reinforcement panel assembly. Refer to B-pillar reinforcement plate assembly
9. Install the rear section of the side outer panel. Refer to Rear Section of Side Outer Panel
10. Install the front section of the side outer panel. Refer to 侧围外板前段
11. Install the top cover assembly.Roof cover assembly
12. Install the fender upper bracket.Fender rear upper bracket
13. Install the fender rear middle bracket. Fender rear middle bracket
14. Install the mounting bracket on the fender.Fender upper mounting bracket
15. Install the fender mounting bracket IV.Bracket IV mounted on fender

Side wall front connecting plate assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

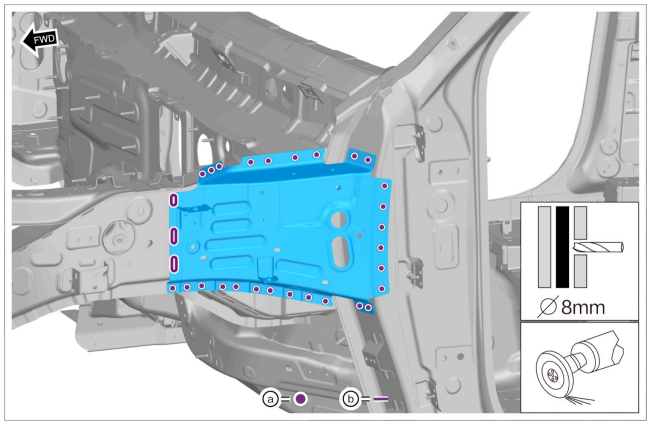
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the front connection plate assembly of the side wall.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.
   c. Use a grinding wheel to remove continuous welds and remove the side wall front connecting plate assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

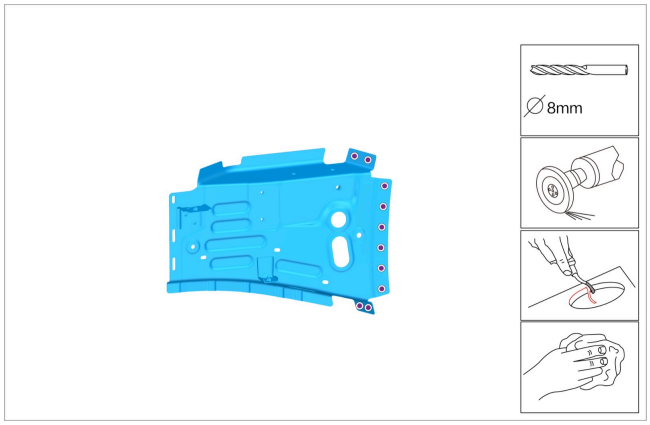
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

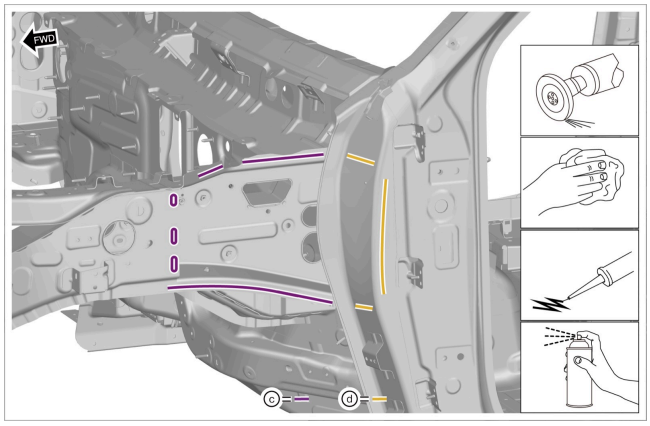
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

Caution

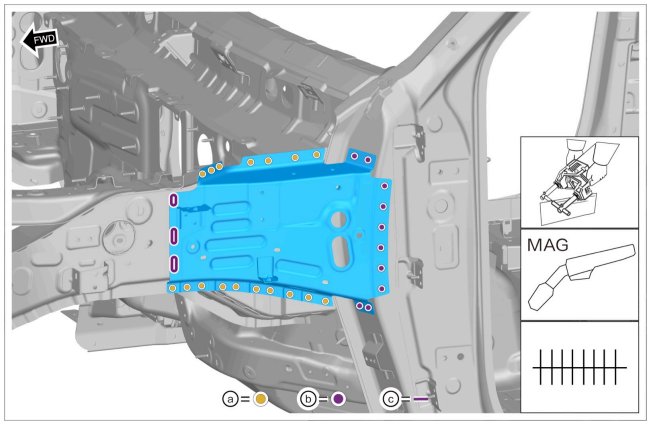
Do not spray it too thick to avoid affecting the welding quality.



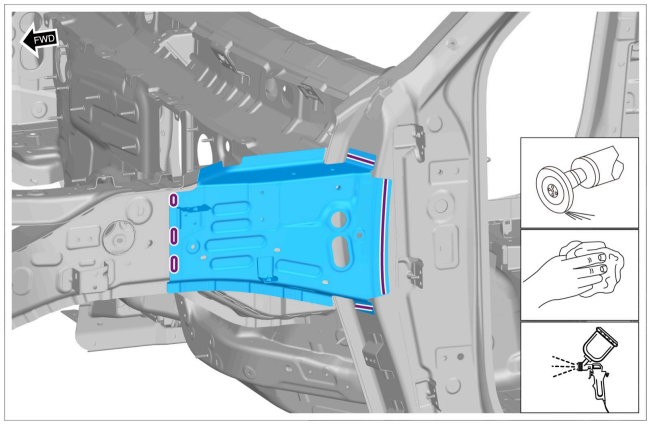
3. Use locking pliers to secure the CD post assembly to its original position and weld.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

Caution

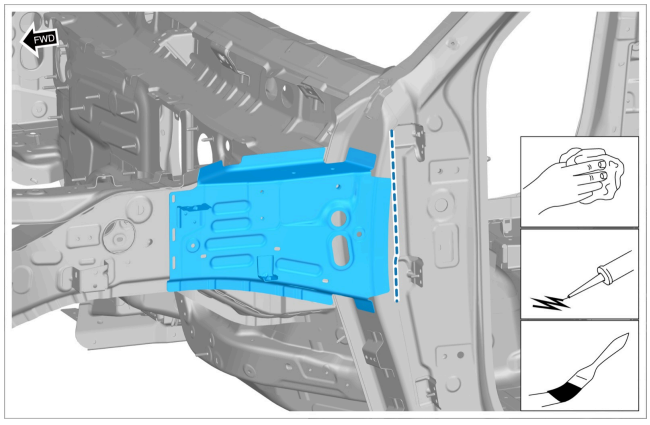
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



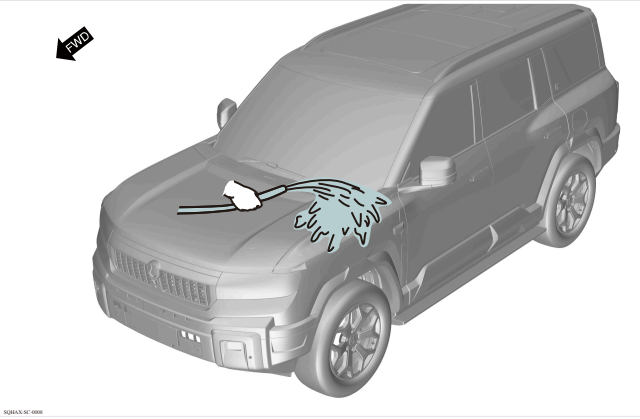
6. After the vehicle body components are installed, conduct a waterproof test.

⚠ Caution

- Cure the sealant before the waterproof test.
- After the waterproof test, dry and check the tested parts, and carry out anti-corrosion treatment in case of a risk of rust.

– No interior trims need to be installed before the end of waterproof test.

– If there is a problem, find the leaking part and deal with it according to the actual situation.



Front section of the side outer panel

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

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Operation tools and auxiliary materials

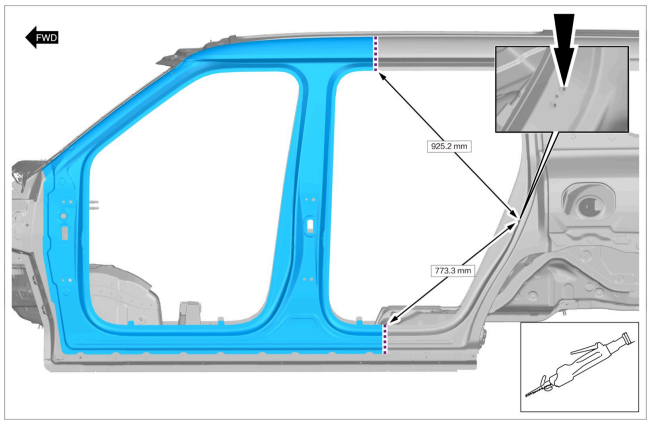
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

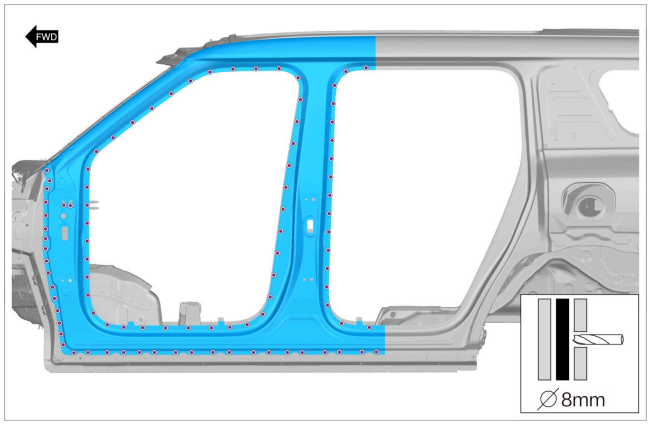
– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

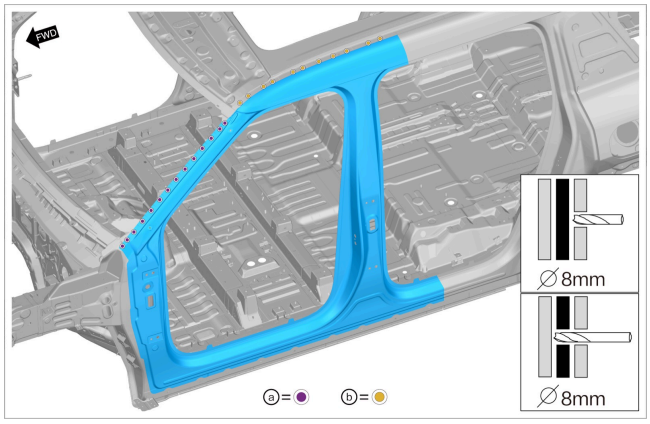
1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Cut the marked area with a pneumatic saw.



6. Remove 1 layer of welding spots with an 8 mm special drill bit.



7. Remove the welding spots.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of welding spots.

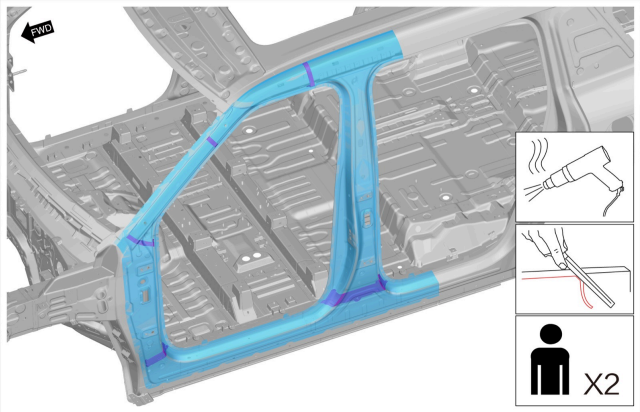


8. After heating the NVH blocking sheet with a hot air gun, remove the front section of the side panel and clean the burrs from the cutting edges of the body sheet metal.

> **⚠ Caution**
>
> The heating temperature must not exceed 180°C

Caution

This step is difficult to be performed and requires the cooperation of many people.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

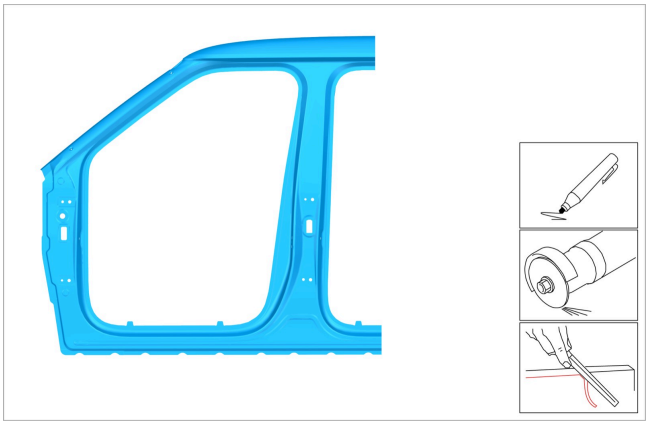
Caution

- During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
- When welding, the original welding spots should be avoided.
- During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance bet ween welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot weldin g and Gas shielded welding .
- To reduce welding slag splashing, the zinc powder conductive primer at the hole position can be removed with steel wire before metal active gas welding.
- It is recommended to use the tack cloth and degreasing cleaner to clean the joint surface.

1. Prepare a new component.
   a. Order the front section of side wall outer panel, mark and cut the required components by comparing with the cutt ing area of actual vehicle, and remove burrs on the cutting edge.

      Caution

      Before cutting, carefully measure and check the dimensions of required materials to ensure normal loadin g.



b. Use a special drill bit to create holes at the welding positions of the new component.

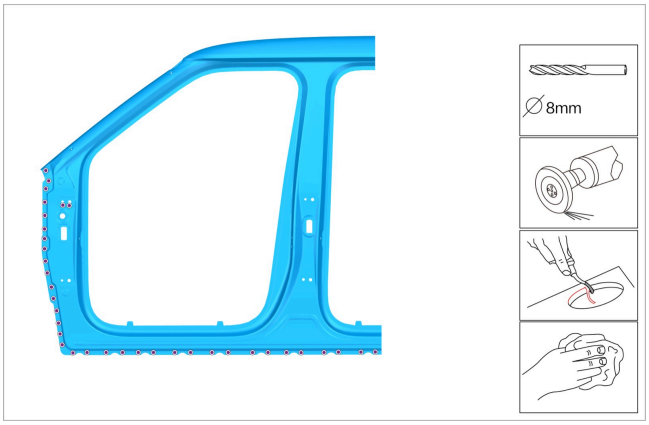
c. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

d. Remove burrs in the circular hole.

e. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure 前门及车顶 for correctness, see How to measure and align vehicle body

3. Handle the joint surface.

a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Apply structural adhesive on the joint surface.

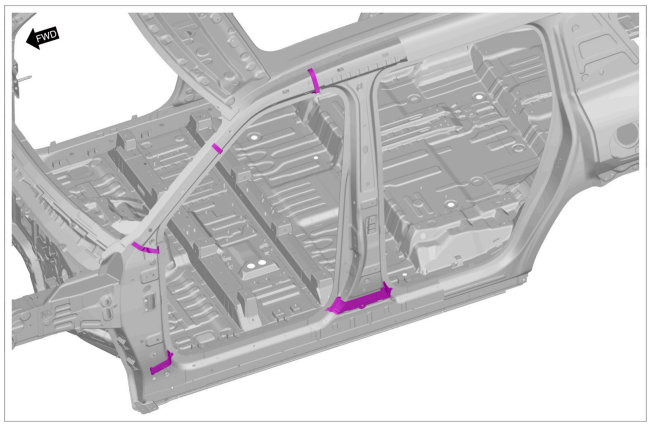
d. Spray the joint surface with zinc powder conductive primer.

Caution

Do not spray it too thick to avoid affecting the welding quality.

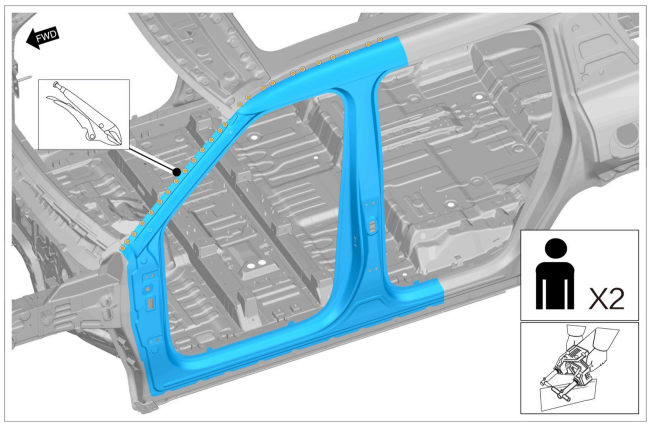


4. Install new NVH blockers.

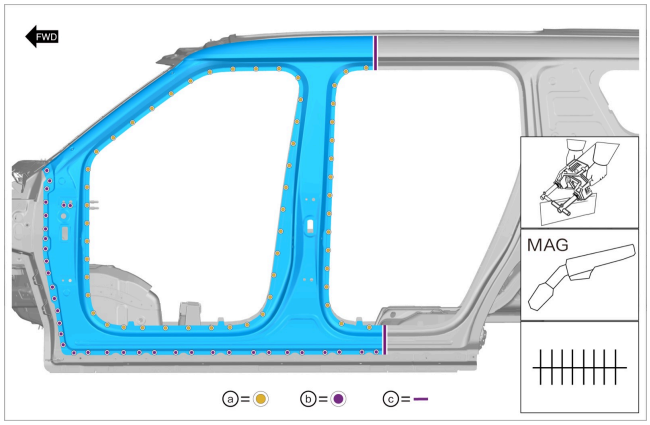


5. After using a locking plier to secure the front section of the side outer panel to its original position, perform resistance spot welding.

> **⚠ Caution**
>
> This step is difficult to be performed and requires the cooperation of many people.



6. Perform welding.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

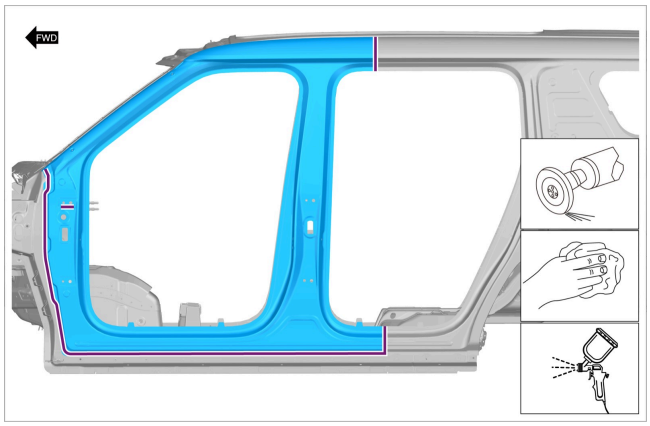


7. Re-confirm to check whether the side wall data is correct, see 前门及车顶

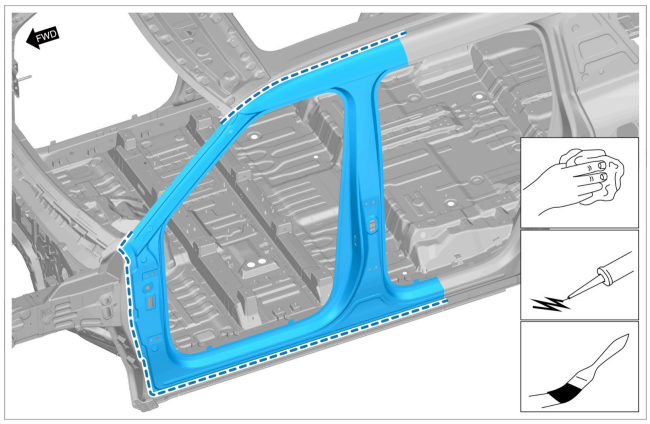
Reminder

- If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
- If the data cannot be repaired through calibration, the component may need to be reinstalled.

8. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



9. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



10. After the vehicle body components are installed, conduct a waterproof test.

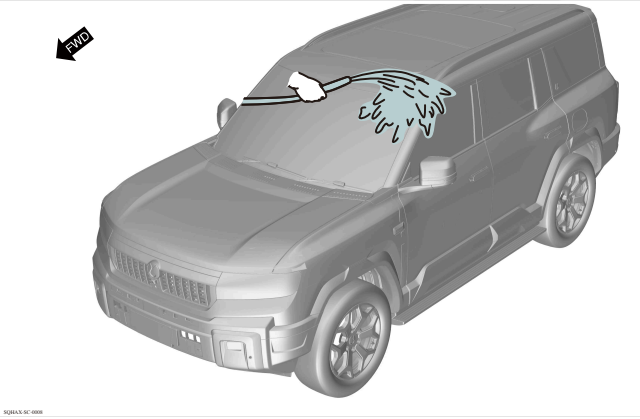
Caution

– Cure the sealant before the waterproof test.

– After the waterproof test, dry and check the tested parts, and carry out anti-corrosion treatment in case of a risk of rust.

– No interior trims need to be installed before the end of waterproof test.

– If there is a problem, find the leaking part and deal with it according to the actual situation.



11. Install the fender upper bracket.Fender rear upper bracket
12. Install the fender rear middle bracket. Fender rear middle bracket
13. Install the mounting bracket on the fender.Fender upper mounting bracket
14. Install the fender mounting bracket IV.Bracket IV mounted on fender

Rear Section of Side Outer Panel

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .

– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .

– **Punching**： Puncher, refer toAuxiliary tools .

– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .

– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .

– **Anti-corrosion**:

  • **Tools**: Spray gun, refer toSpraying tools 。

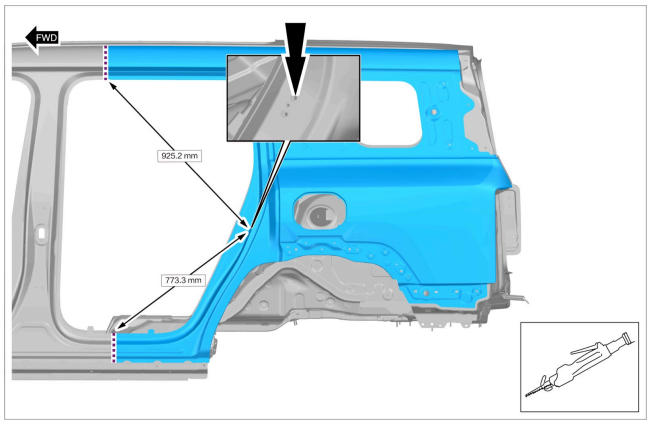
  • **Auxiliary materials**: Refer to Anti-corrosion materials .

    • **Joint surface anti-corrosion**: Zinc powder conductive primer

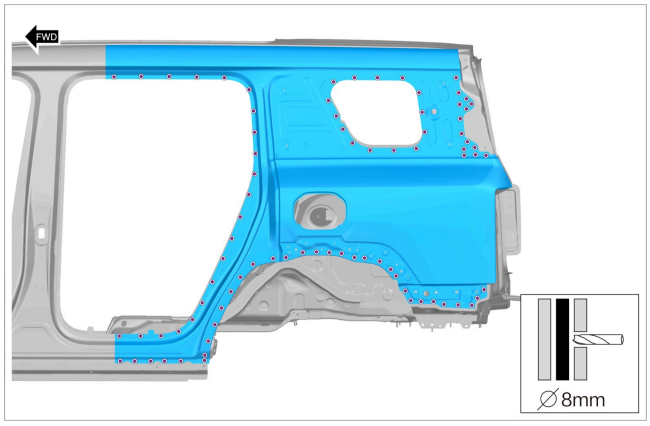
    • **Anti-corrosion of welding surface** Anti-rust primer

Removal

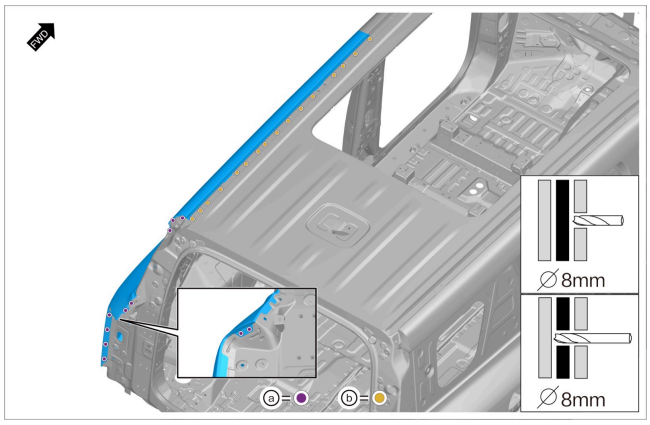
1. Cut the marked area with a pneumatic saw.



2. Remove 1 layer of welding spots with an 8 mm special drill bit.



3. Remove the welding spots.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of welding spots.



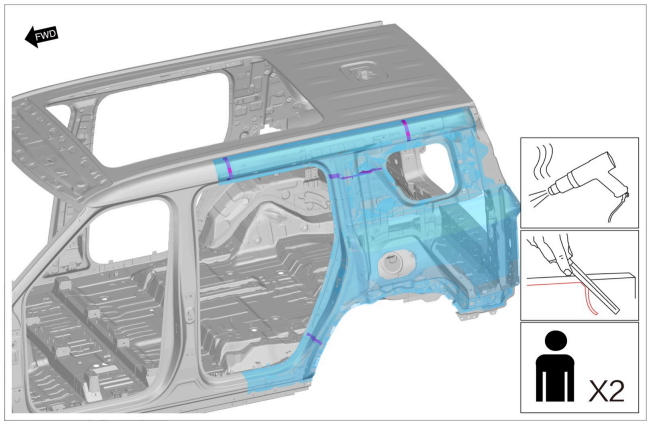
4. After heating the NVH baffle with a hot air gun, remove the rear section of the side outer panel and clean the burrs fro m the cutting edges of the body panels.

Caution

The heating temperature must not exceed 180°C

Caution

This step is difficult to be performed and requires the cooperation of many people.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

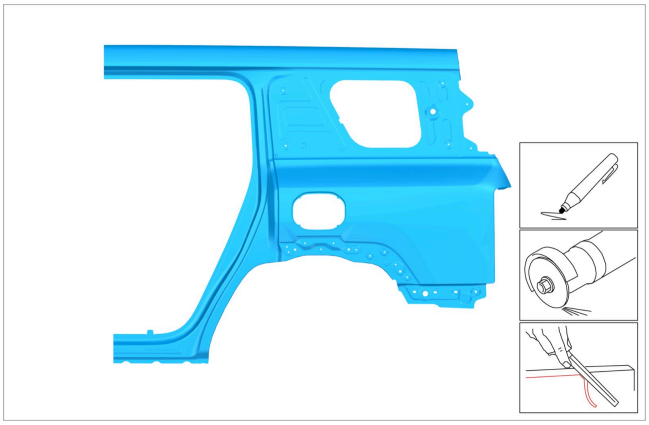
Caution

- During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
- When welding, the original welding spots should be avoided.
- During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance bet ween welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spot weldin g and Gas shielded welding .
- To reduce welding slag splashing, the zinc powder conductive primer at the hole position can be removed with steel wire before metal active gas welding.
- It is recommended to use the tack cloth and degreasing cleaner to clean the joint surface.

1. Prepare a new component.
   a. Order the rear section of side wall outer panel, mark and cut the required components by comparing with the cutti ng area of actual vehicle, and remove burrs on the cutting edge.

Caution

Before cutting, carefully measure and check the dimensions of required materials to ensure normal loadin g.



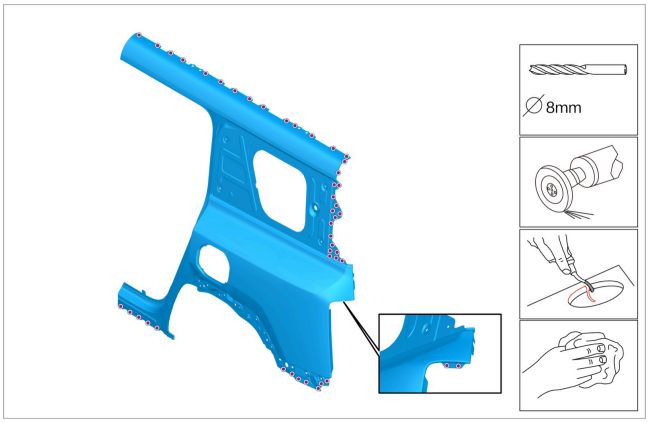
b. Use a special drill bit to create holes at the welding positions of the new component.

c. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

d. Remove burrs in the circular hole.

e. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure 后门 for correctness, see How to measure and align vehi cle body

3. Handle the joint surface.

a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

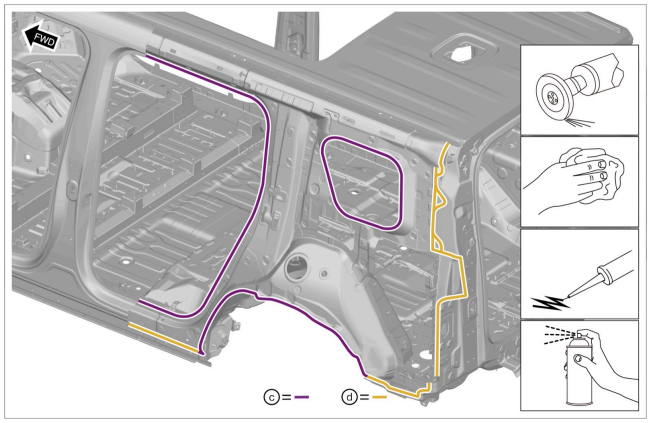
b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

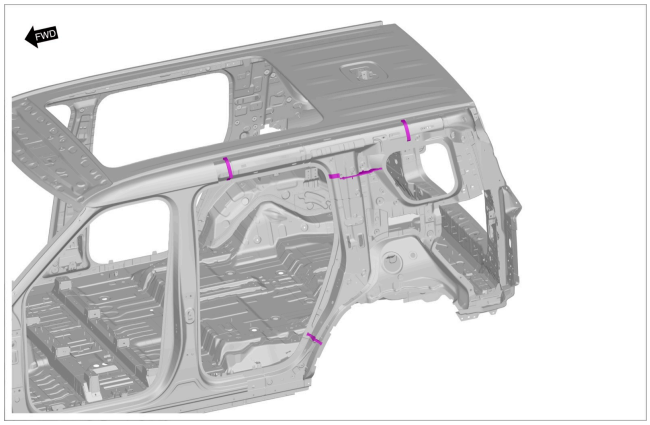
c. Apply structural adhesive on the joint surface.

d. Spray the joint surface with zinc powder conductive primer.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



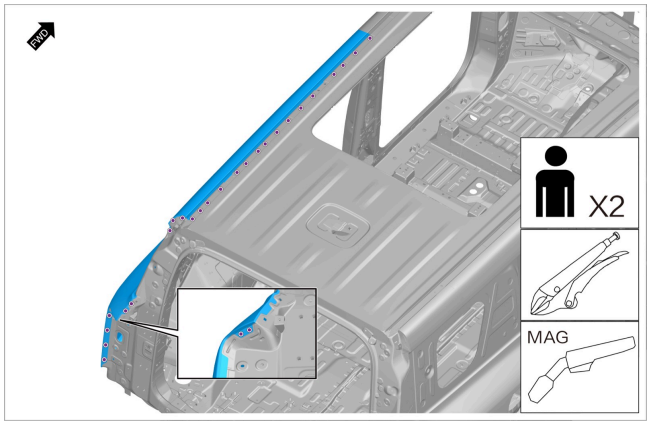
4. Install new NVH blockers.



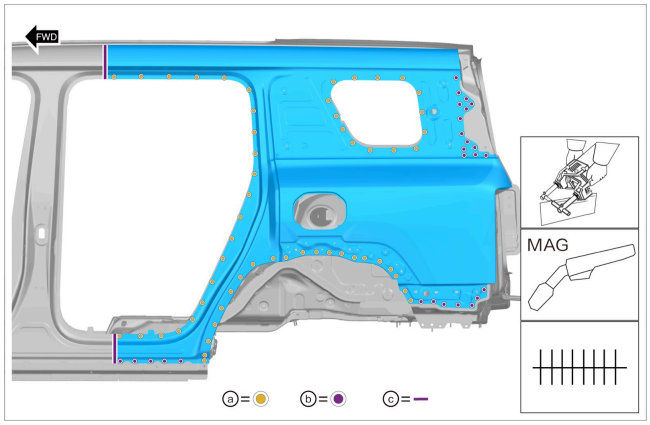
5. After securing the rear section of the side wall panel to its original position using locking pliers, weld it using metal acti ve gas welding.

Caution

This step is difficult to be performed and requires the cooperation of many people.



6. Perform welding.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

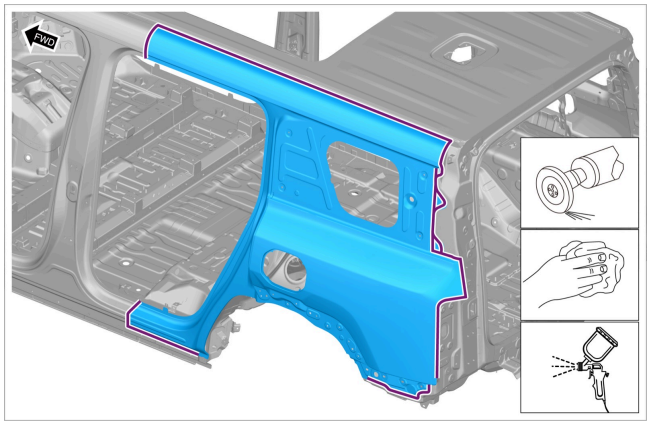


7. Re-confirm to check whether the side wall data is correct, see 后门

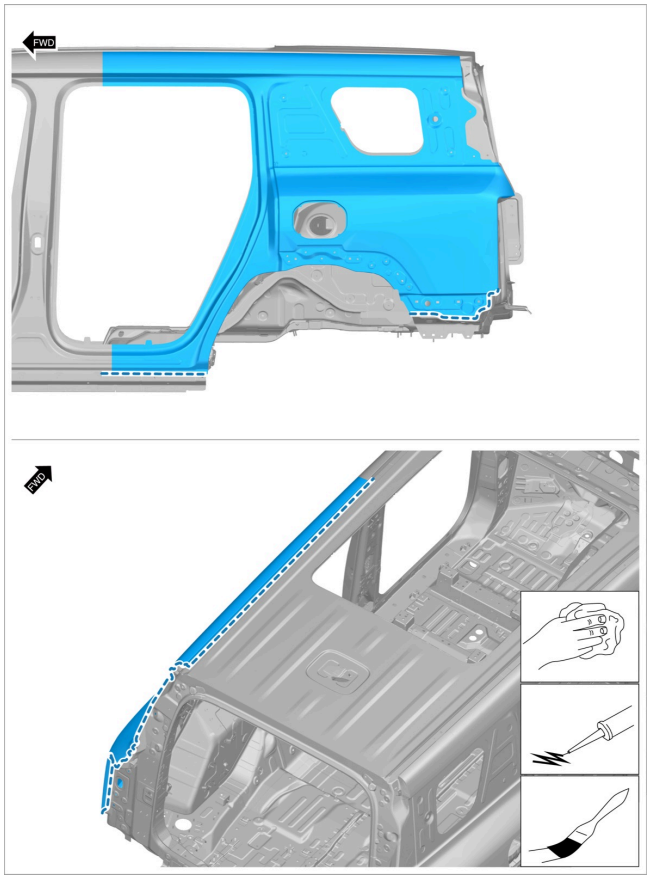
Reminder

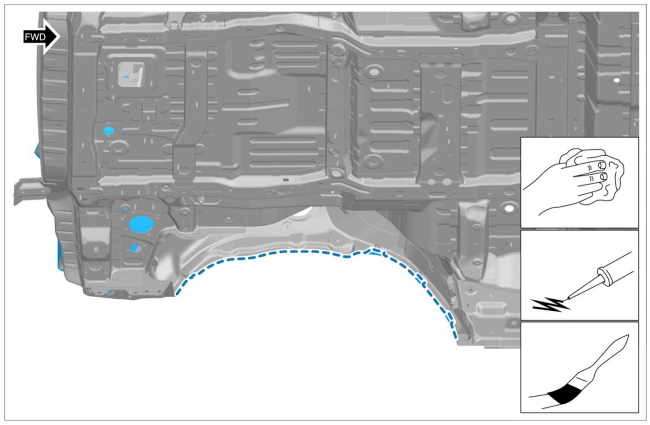
- If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
- If the data cannot be repaired through calibration, the component may need to be reinstalled.

8. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



9. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



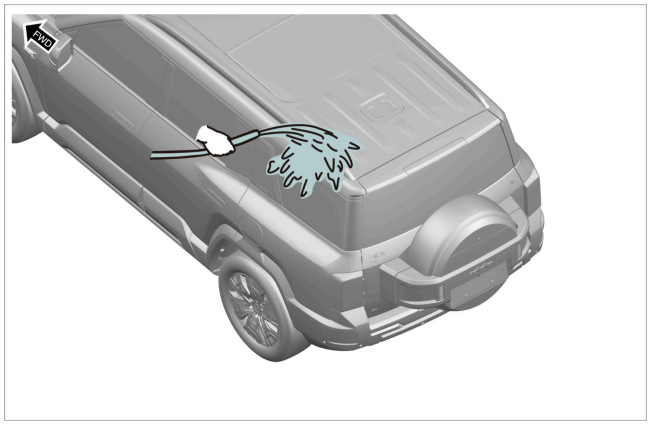


10. After the vehicle body components are installed, conduct a waterproof test.

Caution

- Cure the sealant before the waterproof test.
- After the waterproof test, dry and check the tested parts, and carry out anti-corrosion treatment in case of a risk of rust.

- No interior trims need to be installed before the end of waterproof test.
- If there is a problem, find the leaking part and deal with it according to the actual situation.



Rear Lower Closing Panel of Side Outer Panel

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .

– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .

– **Punching**： Puncher, refer toAuxiliary tools .

– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .

– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .

– **Anti-corrosion**:

  • **Tools**: Spray gun, refer toSpraying tools 。

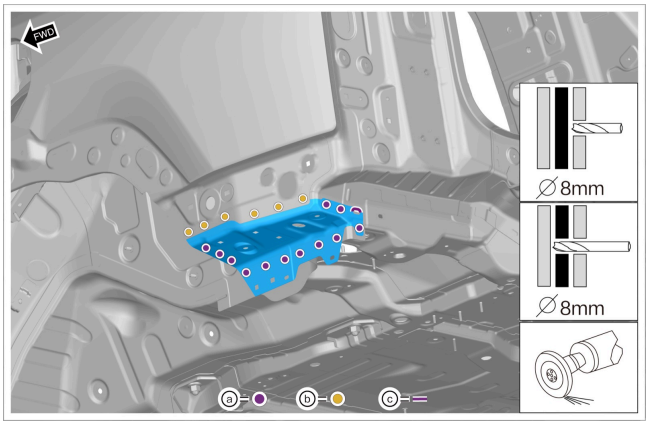
  • **Auxiliary materials**: Refer to Anti-corrosion materials .

    • **Joint surface anti-corrosion**: Zinc powder conductive primer

    • **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the lower closing plate after disassembling the side wall outer panel.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.
   c. Use a grinding wheel grinder to remove the continuous weld and remove the under-sealing plate of the side pane l outer plate.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

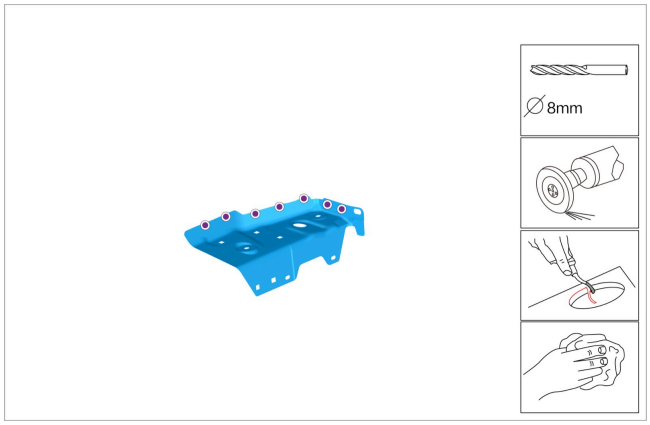
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

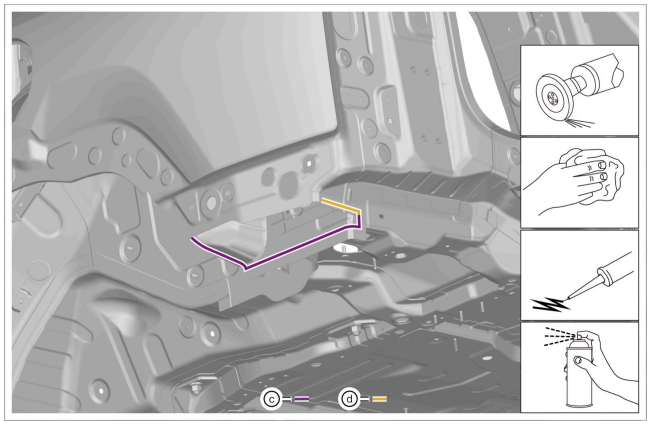


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

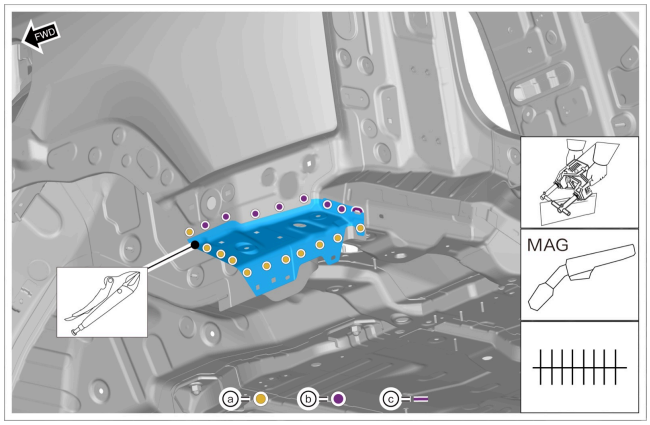
   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.

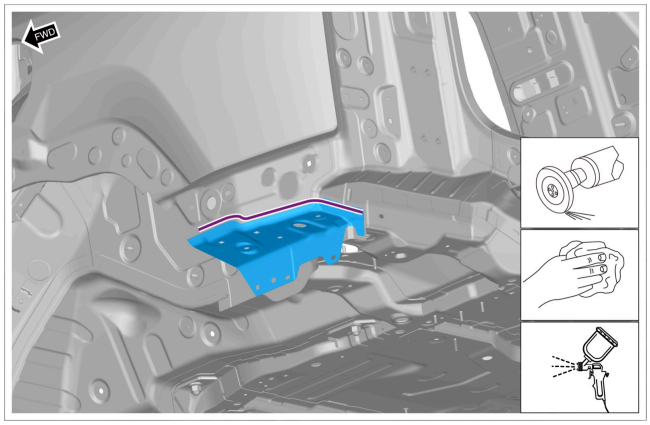


3. Use locking pliers to fix the rear lower closing panel of the side outer panel to its original position, and weld it.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

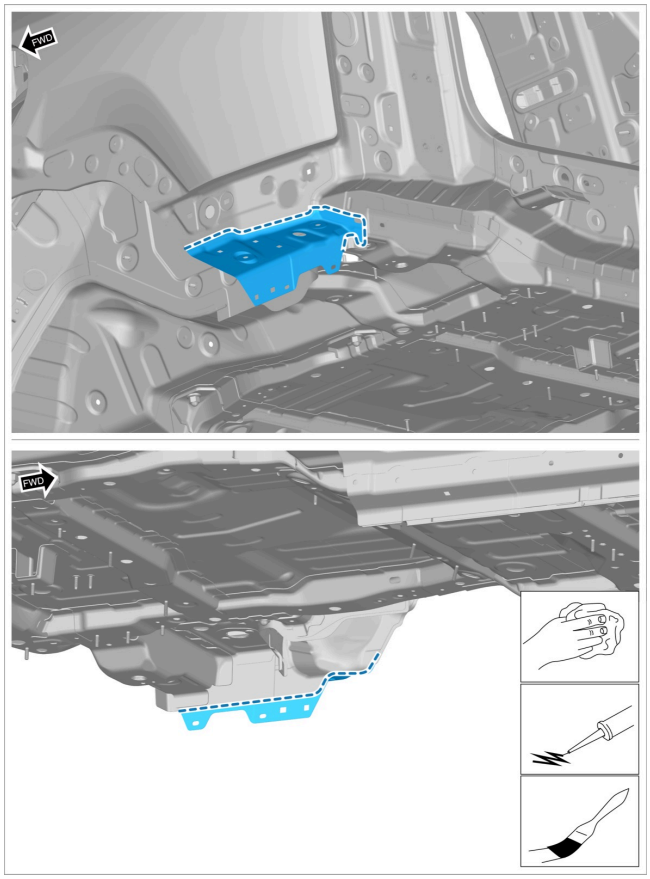
> **Caution**
>
> – During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.

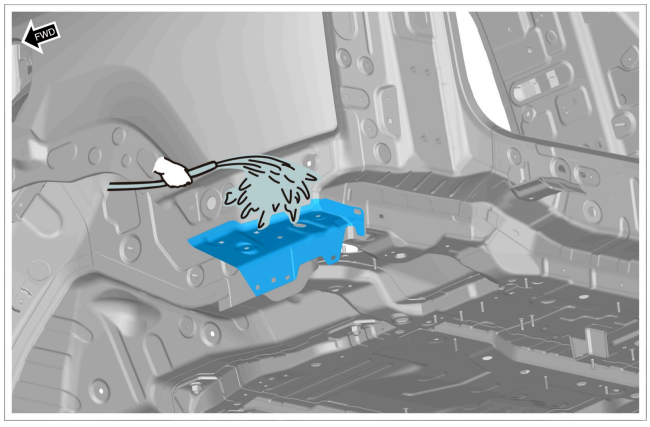


6. After the vehicle body components are installed, conduct a waterproof test.

Caution

- Cure the sealant before the waterproof test.
- After the waterproof test, dry and check the tested parts, and carry out anti-corrosion treatment in case of a risk of rust.

- No interior trims need to be installed before the end of waterproof test.
- If there is a problem, find the leaking part and deal with it according to the actual situation.



Side Wall Bracket II Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

Reminder

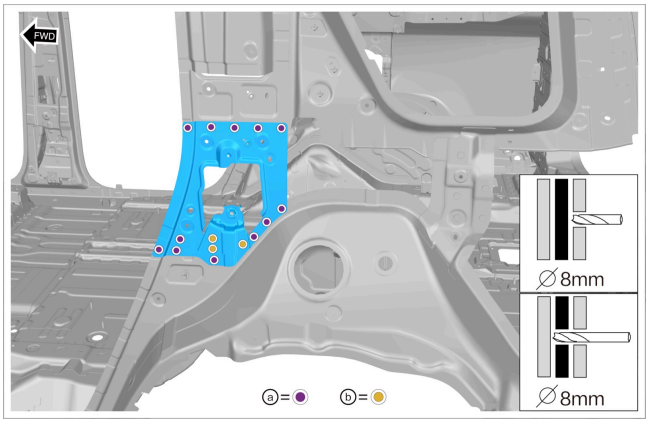
The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the rear section of the side panel.Rear Section of Side Outer Panel
2. Remove the front side wall connecting plate. Refer to Front side member connecting plate
3. Disassemble the assembly of the C-pillar reinforcement plate. Refer to C-pillar reinforcement assembly
4. Disassemble the side wall bracket II assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.

b. Use a special 8mm drill bit to remove the two layers of welds, and remove the side wall bracket II assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

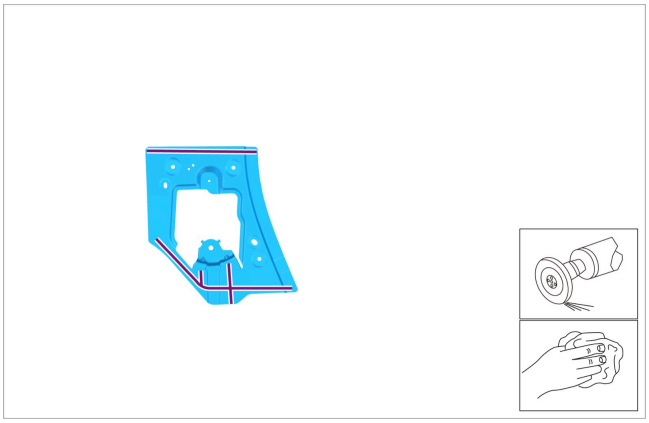
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

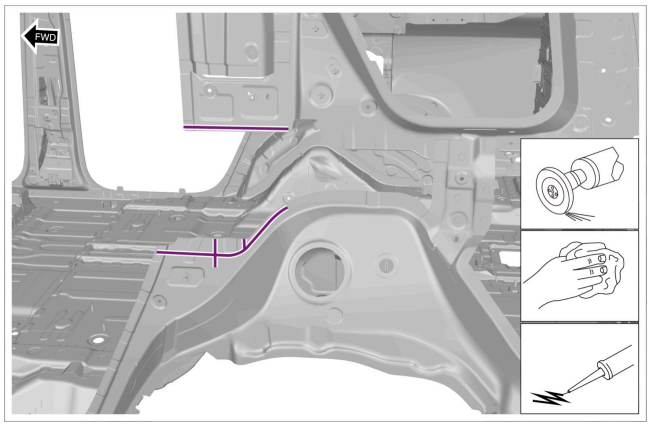


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

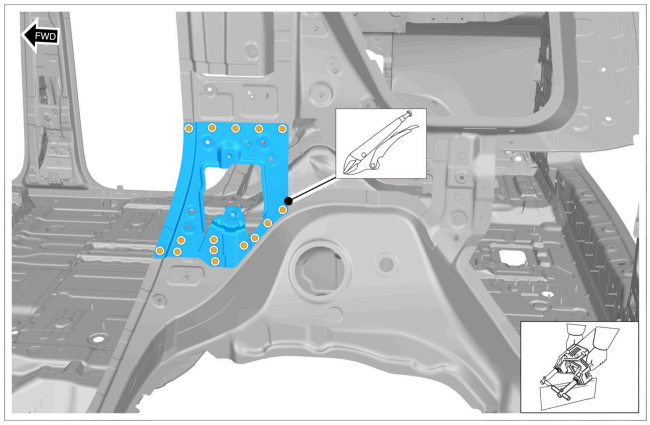
c. Apply structural adhesive on the joint surface.



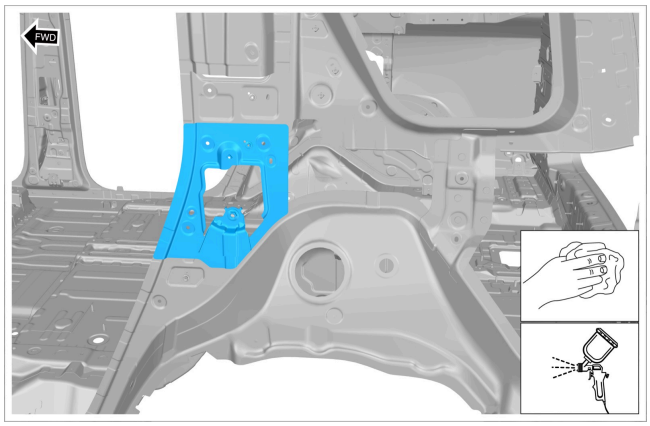
3. Use locking pliers to secure the side wall bracket II assembly to the original position, and perform resistance spot wel ding for welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   b. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Install C pillar reinforcement panel assembly. Refer to C-pillar reinforcement assembly
6. Install the front side connecting plate. Refer to Front side member connecting plate
7. Install the rear section of the side wall panel.Rear Section of Side Outer Panel

Rear side panel connection plate

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

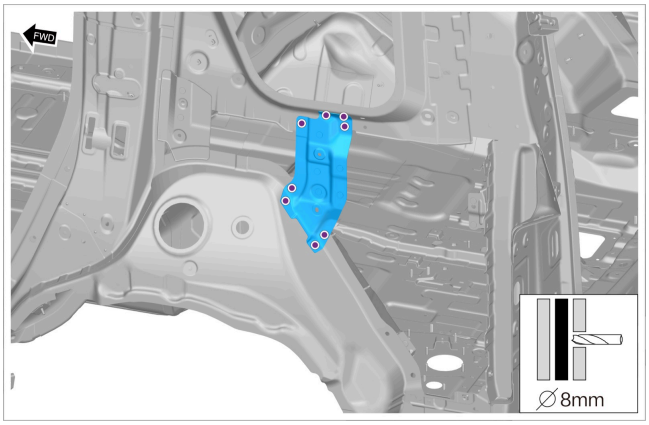
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the rear section of the side panel.Rear Section of Side Outer Panel
2. Use a special 8mm drill bit to remove one layer of weld spots and take off the rear sidewall connecting plate.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

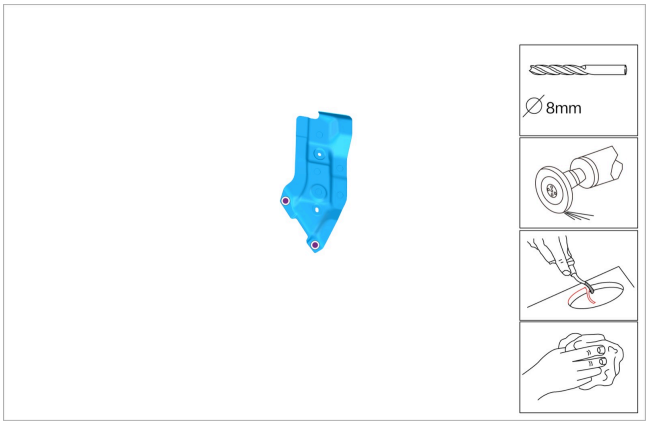
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

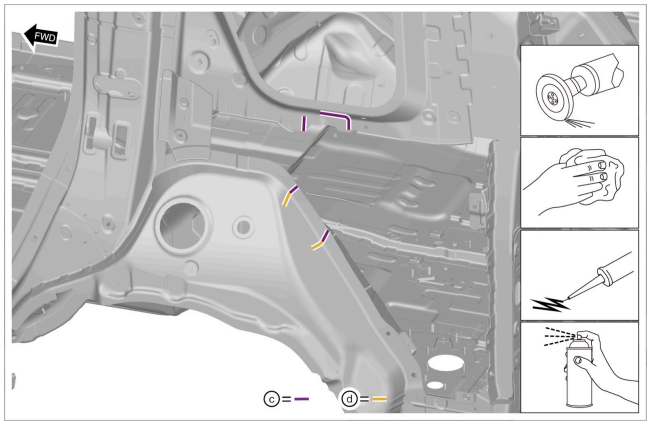
Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Apply structural adhesive on the joint surface.

d. Spray zinc powder conductive primer on the re-joint surface.

Caution

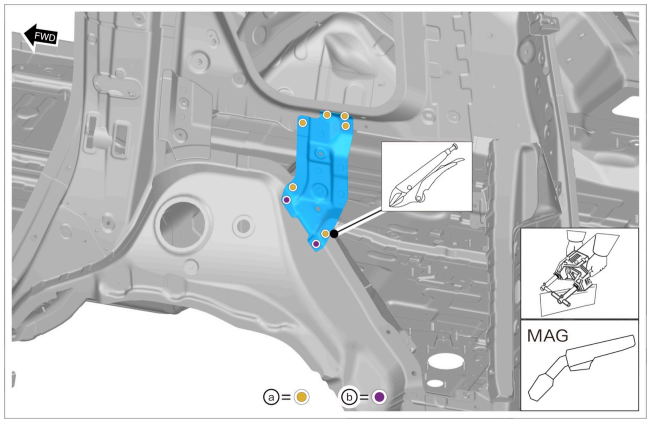
Do not spray it too thick to avoid affecting the welding quality.



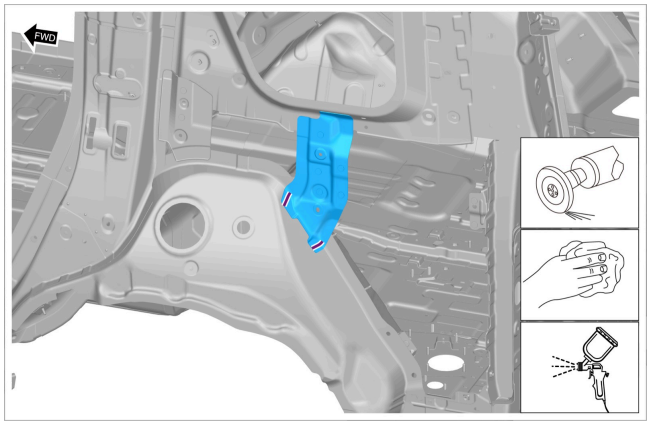
3. Use locking pliers to secure the rear side panel joint plate to its original position and weld it.
   a. Use resistance spot welding.
   b. Use metal active gas welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Install the rear section of the side wall panel.Rear Section of Side Outer Panel

Rear Trough Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

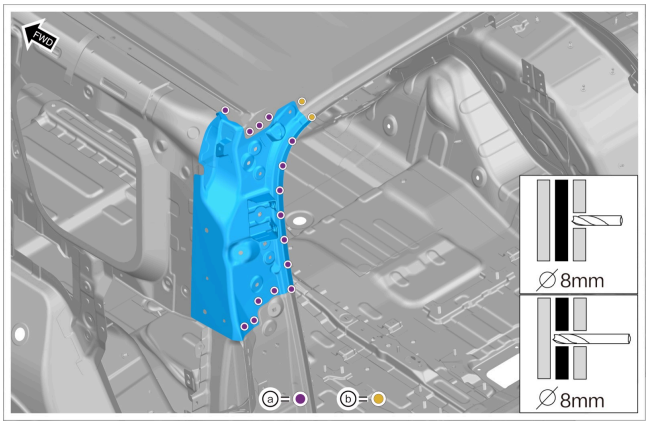
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the rear section of the side panel.Rear Section of Side Outer Panel
2. Disassemble the water channel assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use a special 8mm drill bit to remove two layers of weld spots and take down the rear water trough assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

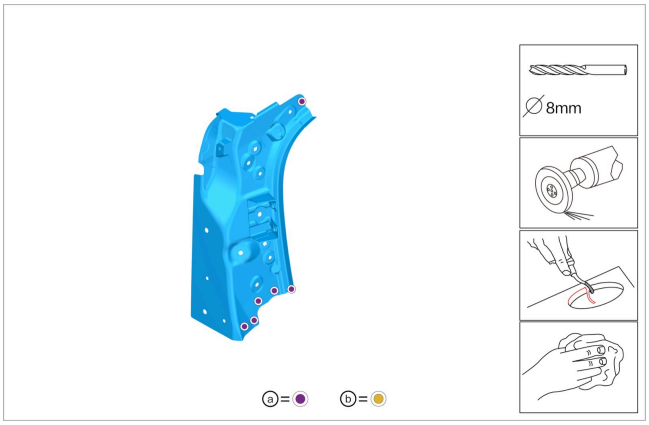
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure 背门 for correctness, see How to measure and align vehi cle body
3. Handle the joint surface.

a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

Reminder

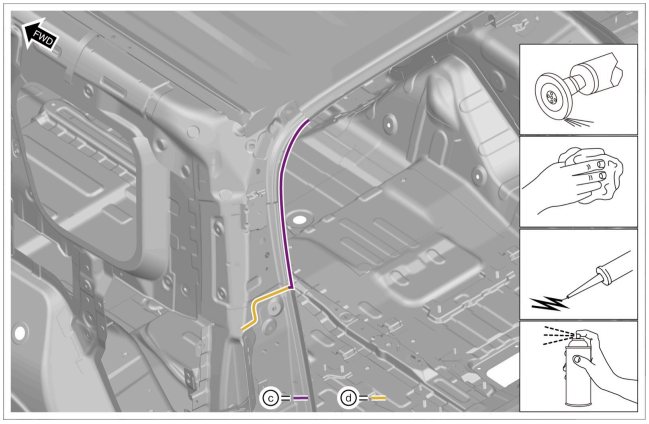
Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Apply structural adhesive on the joint surface.

d. Spray zinc powder conductive primer on the re-joint surface.

Caution

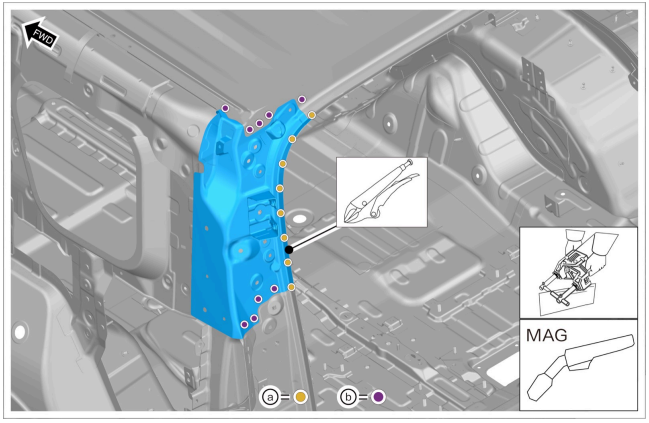
Do not spray it too thick to avoid affecting the welding quality.



4. Fix the rear trough assembly to its original position using locking pliers and weld it.
   a. Use resistance spot welding.
   b. Use metal active gas welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



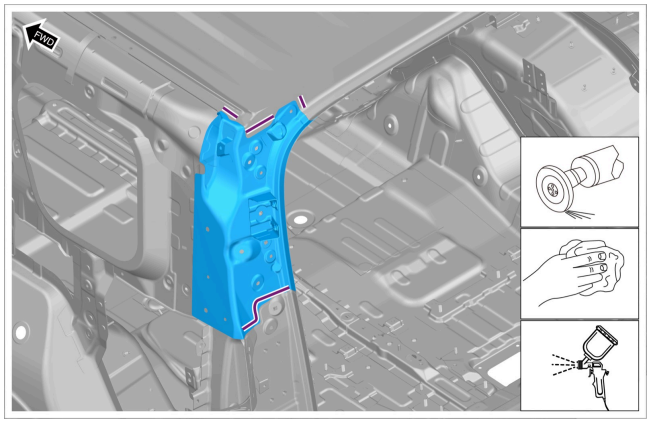
5. Confirm again whether the data of the back door dimensions is correct, see 背门

Reminder

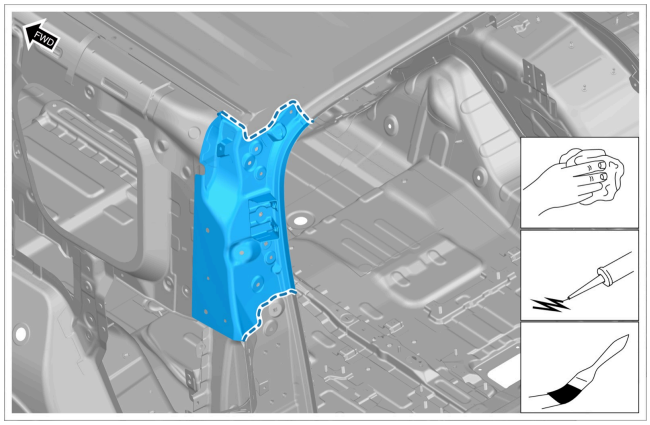
– If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.

– If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



8. Install the rear section of the side wall panel.Rear Section of Side Outer Panel

Rear Wheelhouse Inner Panel Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

Reminder

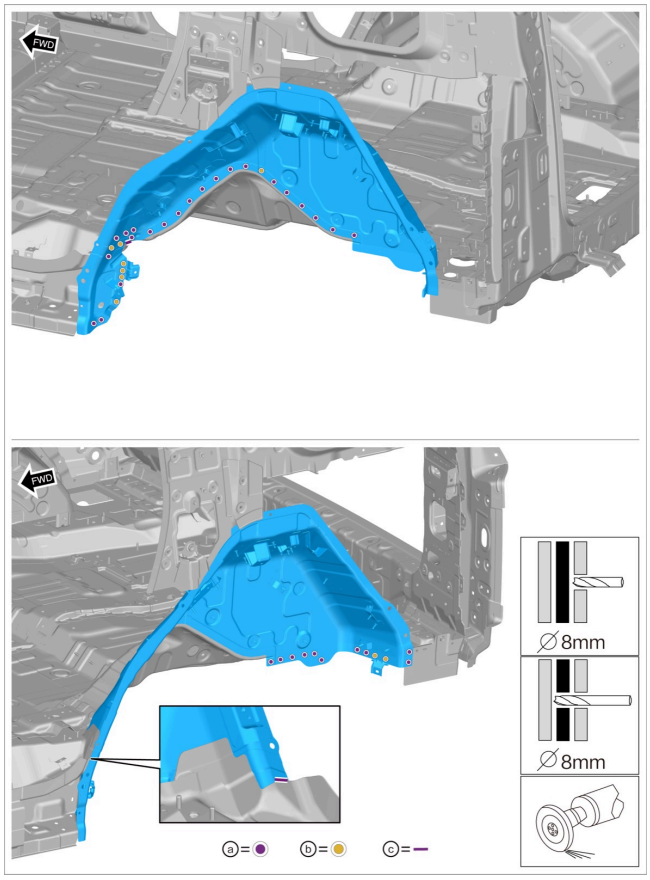
The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the rear section of the side panel.Rear Section of Side Outer Panel
2. Remove the lower closing plate after disassembling the side wall outer panel. Refer to Rear Lower Closing Panel of Si de Outer Panel
3. Disassemble the rear side wall connecting plate.Rear side panel connection plate
4. Disassemble the assembly of the C-pillar reinforcement plate. Refer to C-pillar reinforcement assembly

5. Remove the rear wheel cover outer panel assembly. Refer to Rear Wheel Cover Outer Panel Assembly
6. Disassemble the rear wheel housing inner panel assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.
   c. Use a grinding wheel grinder to remove continuous welding and remove the rear wheel arch inner panel assembl y.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

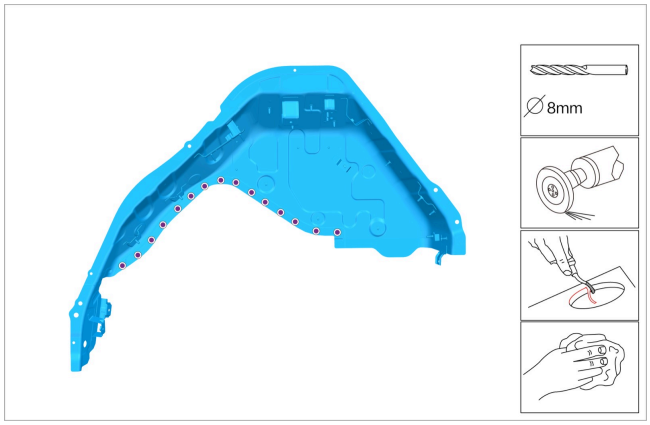
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

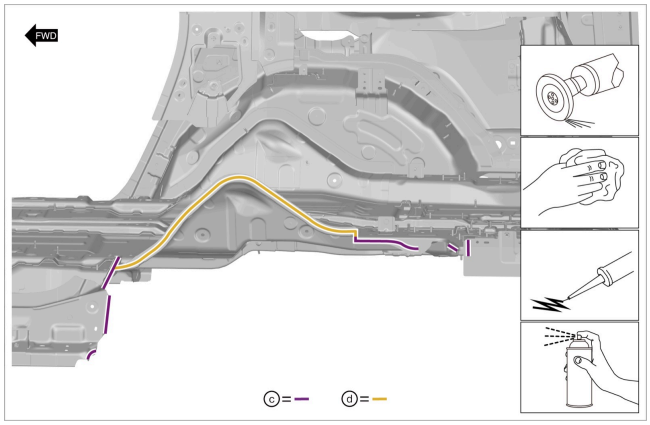
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

Caution

Do not spray it too thick to avoid affecting the welding quality.

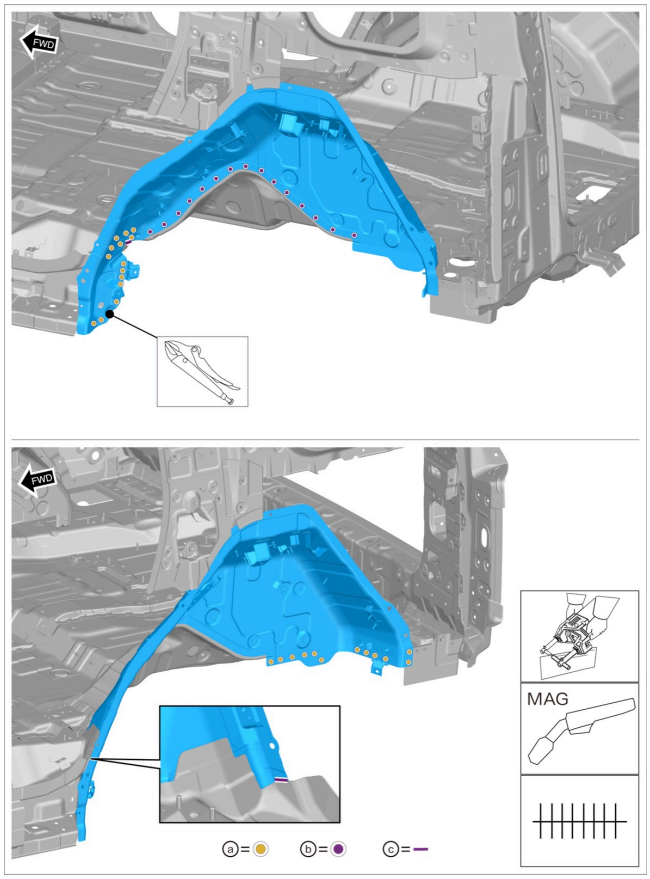


3. Use locking pliers to secure the rear wheel housing inner panel assembly to the original position and weld it.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

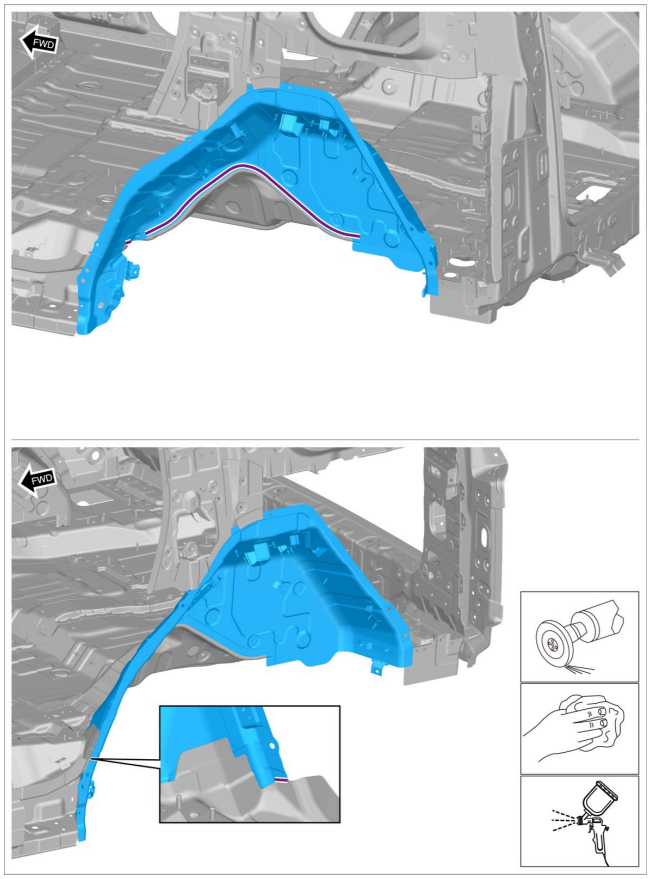
Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo

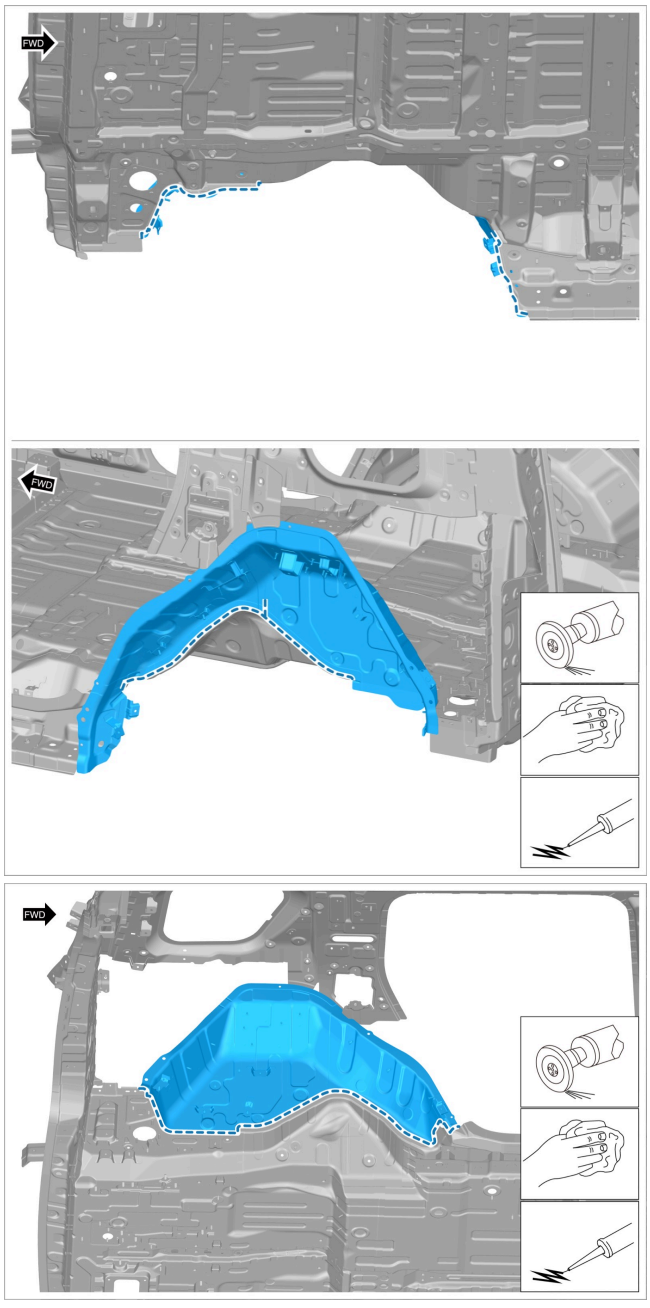
t welding and Gas shielded welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



6. Install the rear wheel cover outer panel assembly. Refer to Rear Wheel Cover Outer Panel Assembly
7. Install C pillar reinforcement panel assembly. Refer to C-pillar reinforcement assembly
8. Install the rear side panel connection plate.Rear side panel connection plate
9. Install the lower closure panel of the rear side outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
10. Install the rear section of the side wall panel.Rear Section of Side Outer Panel

Rear Wheel Cover Outer Panel Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

Reminder

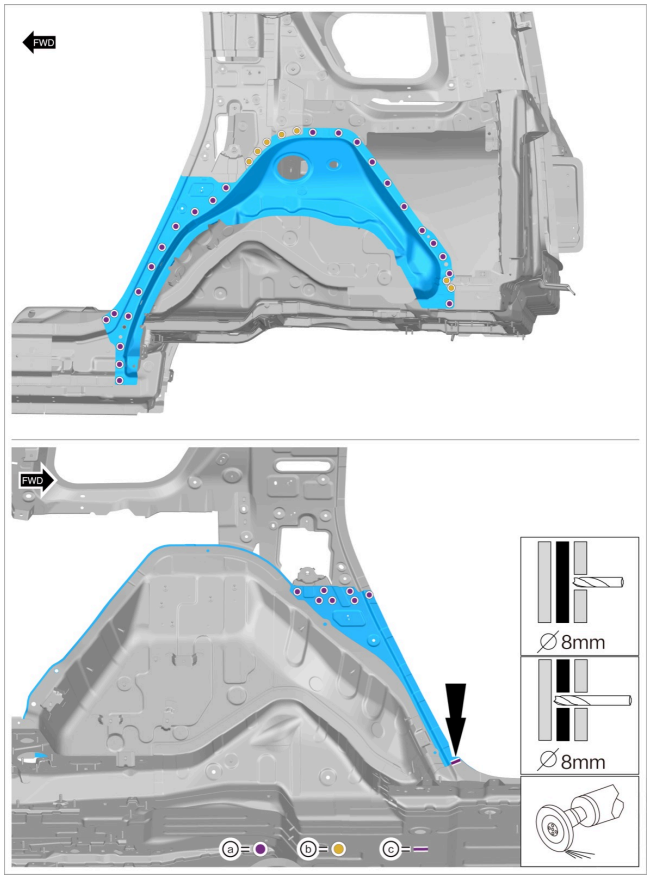
The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
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– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the rear section of the side panel.Rear Section of Side Outer Panel
2. Remove the lower closing plate after disassembling the side wall outer panel. Refer to Rear Lower Closing Panel of Si de Outer Panel
3. Disassemble the rear side wall connecting plate.Rear side panel connection plate
4. Disassemble the assembly of the C-pillar reinforcement plate. Refer to C-pillar reinforcement assembly

5. Remove the rear wheel cover outer panel assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use a special 8mm drill bit to remove 2 layers of weld spots and remove the rear wheel housing outer panel asse mbly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

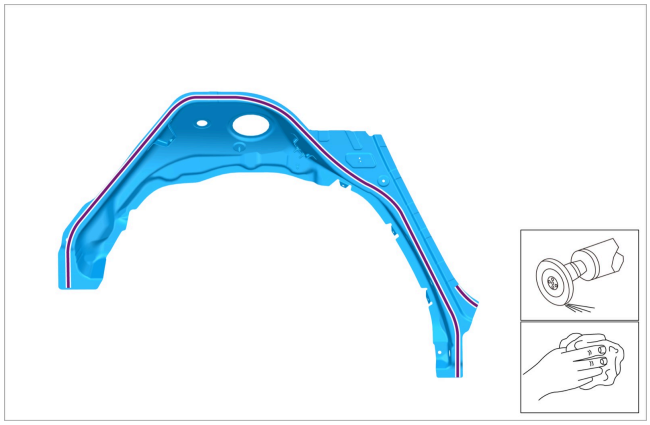
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

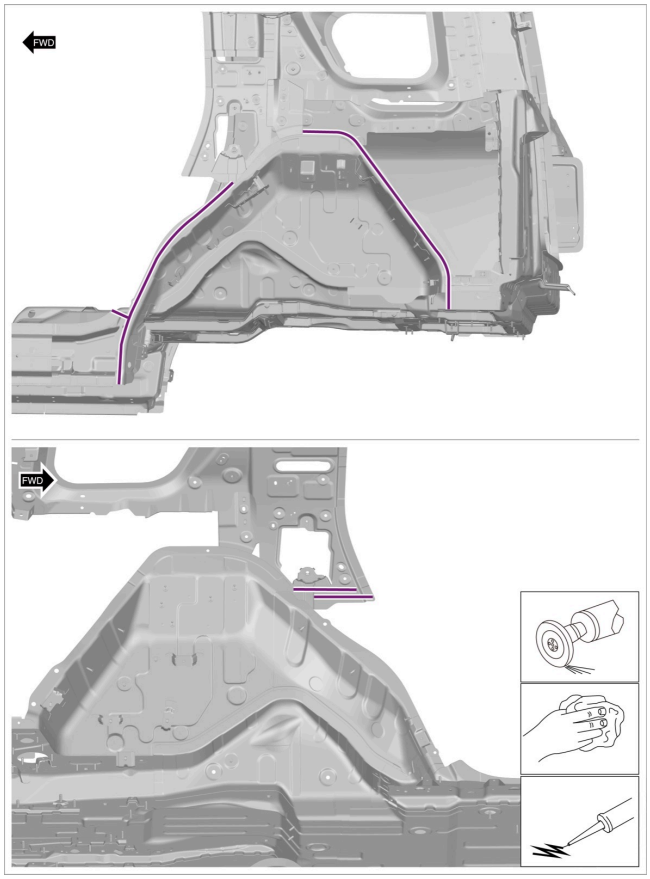


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.

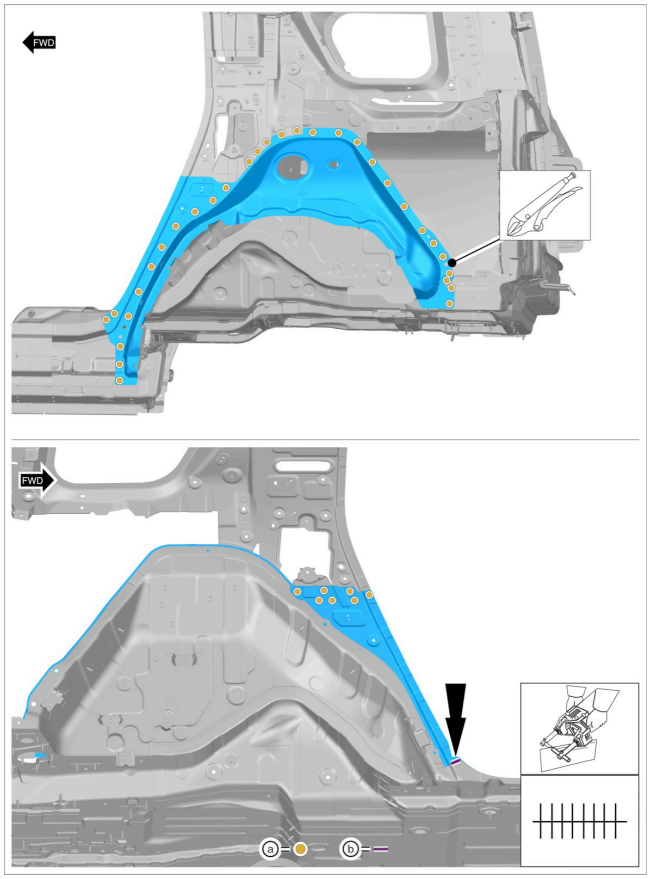


3. Use locking pliers to fix the rear wheel cover outer plate assembly to the original position, and perform welding.
   a. Use resistance spot welding.
   b. Use continuous seam welding.

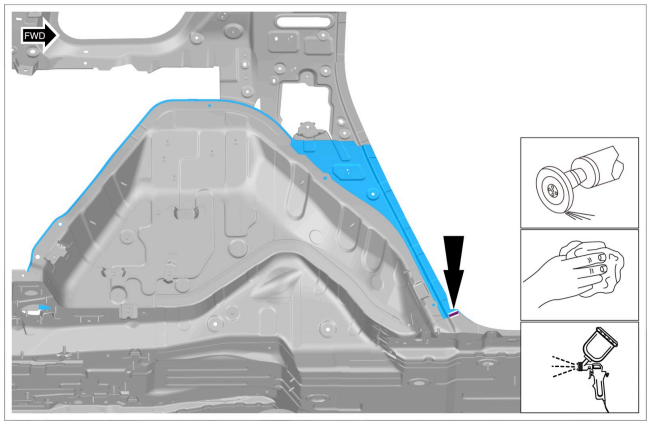
Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo

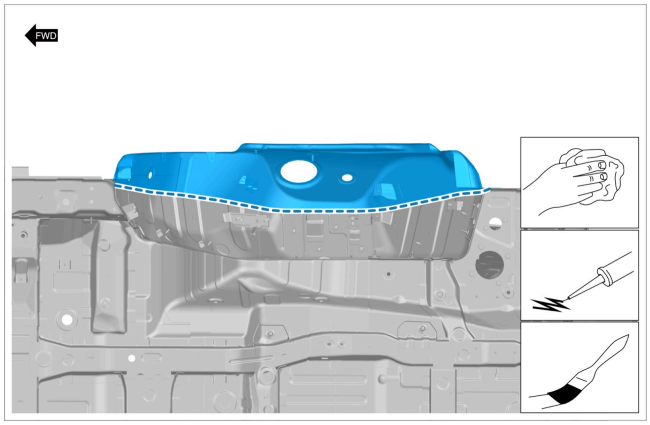
t welding and Gas shielded welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



6. Install C pillar reinforcement panel assembly. Refer to C-pillar reinforcement assembly
7. Install the rear side panel connection plate.Rear side panel connection plate
8. Install the lower closure panel of the rear side outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
9. Install the rear section of the side wall panel.Rear Section of Side Outer Panel

Tail Light Socket Panel Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

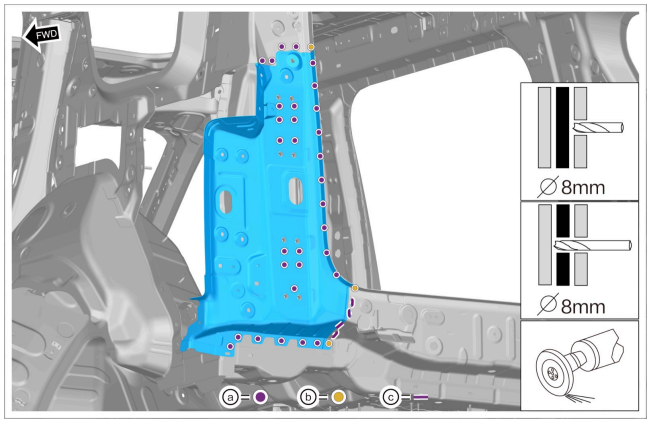
– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the rear section of the side panel.Rear Section of Side Outer Panel
2. Remove the lower closing plate after disassembling the side wall outer panel. Refer to Rear Lower Closing Panel of Si de Outer Panel
3. Remove the rear taillight housing assembly after disassembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.

b. Use an 8mm special drill bit to remove 2 layers of weld spots.

c. Use a grinding wheel grinder to remove the continuous weld and take off the rear taillight seat panel assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

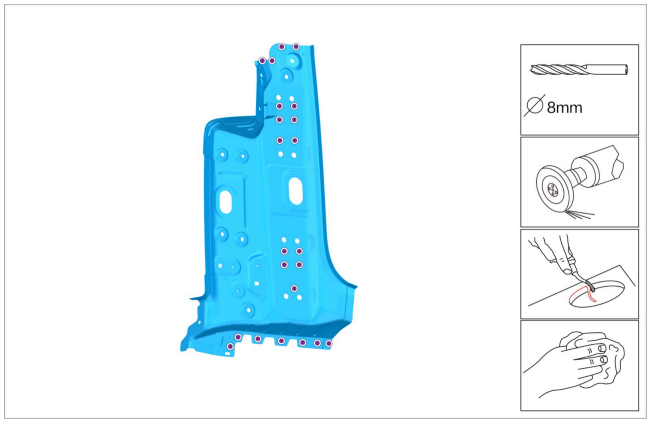
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure 背门 for correctness, see How to measure and align vehi cle body

3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

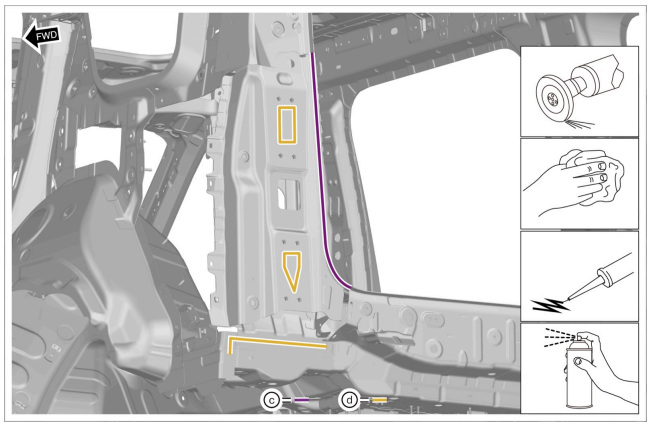
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.

   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.

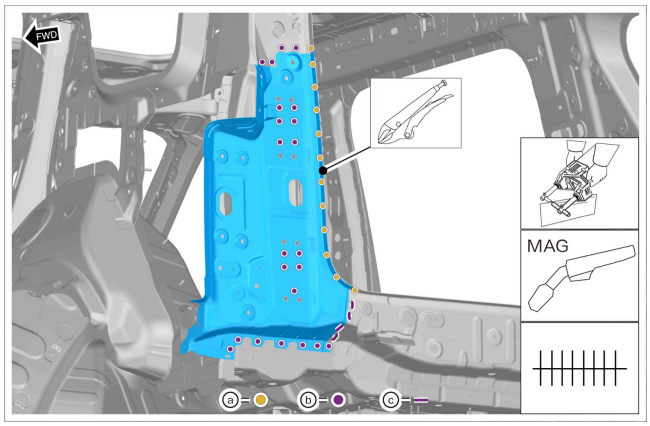


4. Fix the rear trough assembly to its original position using locking pliers and weld it.
   a. Use resistance spot welding.

   b. Use metal active gas welding.

   c. Use continuous seam welding.

> **Caution**
>
> – During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .

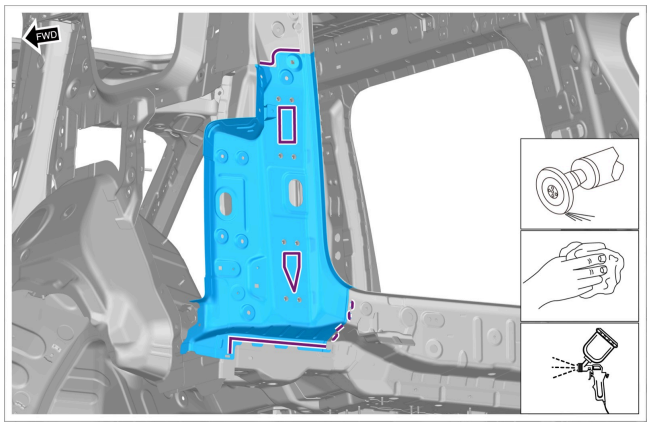


5. Confirm again whether the data of the back door dimensions is correct, see 背门

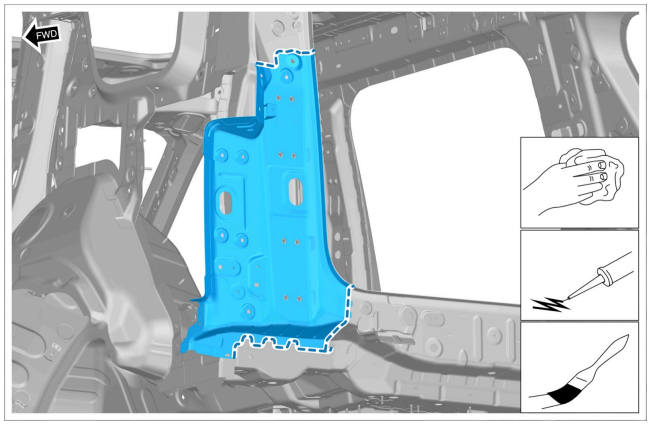
Reminder

- If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
- If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



8. Install the lower closure panel of the rear side outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
9. Install the rear section of the side wall panel.Rear Section of Side Outer Panel

Door sill reinforcement plate assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .
- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

- The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.
- There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

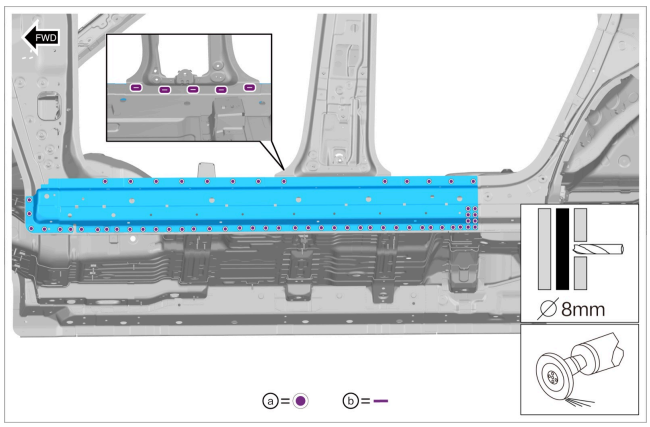
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

- **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
- **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
- **Punching**： Puncher, refer toAuxiliary tools .
- **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
- **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
- **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Remove the lower bracket after the fender. Fender rear lower bracket
6. Disassemble the front connecting plate assembly of the side wall.侧围前连接板总成
7. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
8. Remove the rear section of the side panel. Refer to Rear Section of Side Outer Panel
9. Disassemble the B-pillar reinforcement assembly. Refer to B-pillar reinforcement plate assembly
10. Disassemble the A-pillar reinforcement assembly. Refer to A-pillar reinforcement plate assembly
11. Disassemble threshold reinforcement plate assembly.
    a. Remove 1 layer of welding spots with an 8 mm special drill bit.
    b. Use a grinding wheel grinder to remove the continuous weld and remove the threshold reinforcement plate asse mbly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

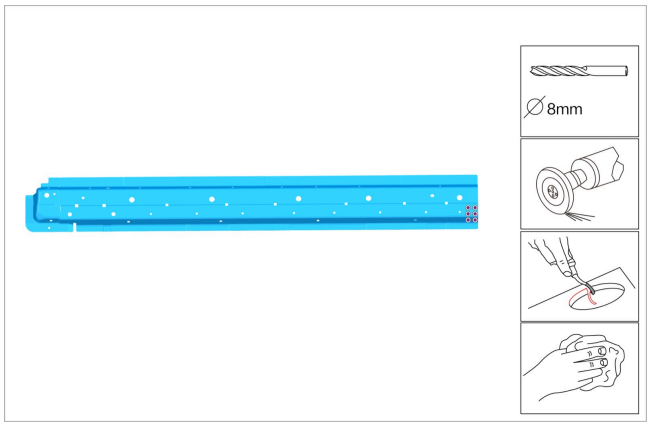
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
    a. Use a special drill bit to create holes at the welding positions of the new component.
    b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
    c. Remove burrs in the circular hole.
    d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Fix the prepared parts to the car body and measure 前门及车顶 , 后门 for accuracy, see How to measure and align v ehicle body
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

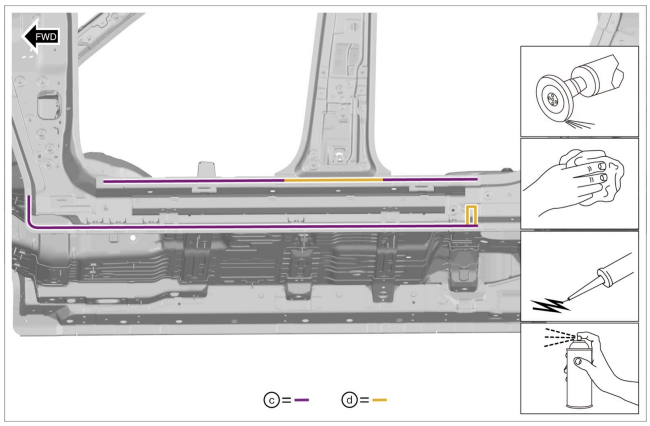
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

Caution

Do not spray it too thick to avoid affecting the welding quality.

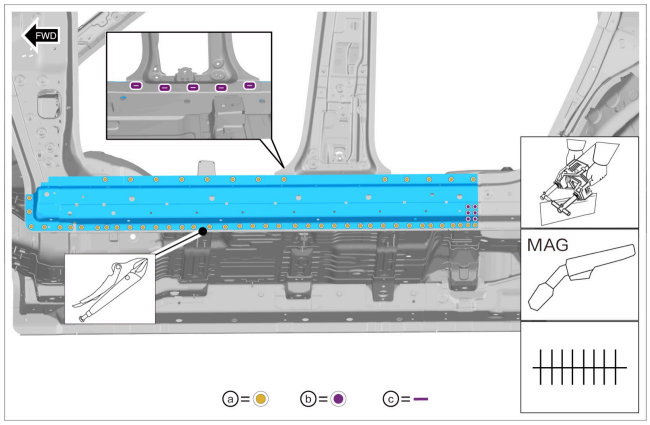


4. Use locking pliers to fix the threshold reinforcement plate assembly to its original position and perform welding.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo

t welding and Gas shielded welding .

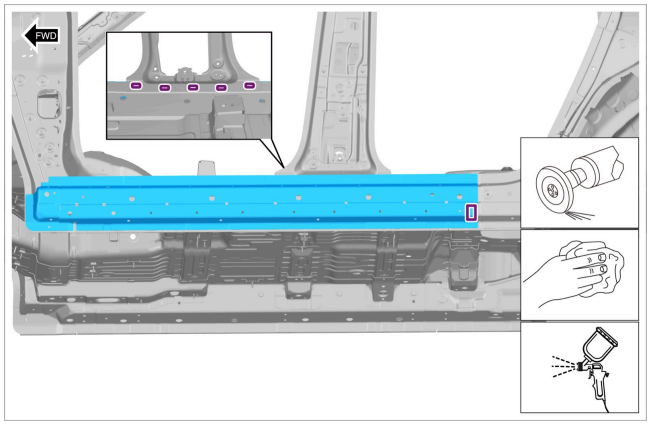


5. Please confirm again to check whether the side wall data is correct, see 前门及车顶 , 后门

Reminder

- If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
- If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Install the A-pillar reinforcement assembly. Refer to A-pillar reinforcement plate assembly
8. Install the B-pillar reinforcement panel assembly. Refer to B-pillar reinforcement plate assembly
9. Install the rear section of the side outer panel. Refer to Rear Section of Side Outer Panel
10. Install the front section of the side outer panel. Refer to 侧围外板前段
11. Install the front connecting plate assembly of the side panel.侧围前连接板总成
12. Install the fender lower bracket.Fender rear lower bracket
13. Install the fender upper bracket.Fender rear upper bracket
14. Install the fender rear middle bracket. Fender rear middle bracket
15. Install the mounting bracket on the fender.Fender upper mounting bracket
16. Install the fender mounting bracket IV.Bracket IV mounted on fender

Door sill reinforcement beam assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

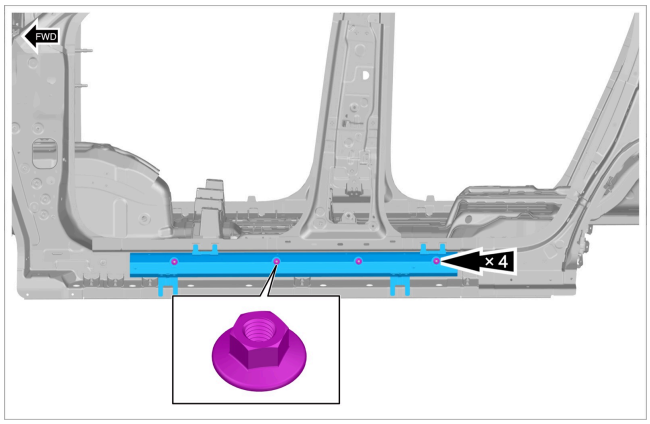
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

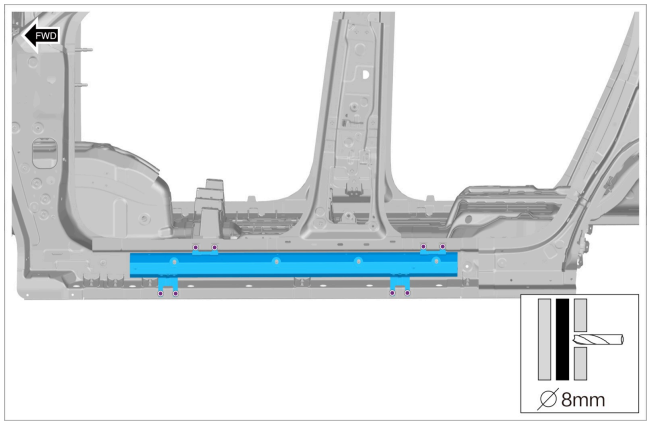
– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Remove the lower bracket after the fender. Fender rear lower bracket
6. Disassemble the front connecting plate assembly of the side wall.侧围前连接板总成
7. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
8. Remove the rear section of the side panel. Refer to Rear Section of Side Outer Panel
9. Disassemble the B-pillar reinforcement assembly. Refer to B-pillar reinforcement plate assembly
10. Disassemble the A-pillar reinforcement assembly. Refer to A-pillar reinforcement plate assembly
11. Disassemble threshold reinforcement plate assembly. Refer to Door sill reinforcement plate assembly
12. Remove 4 fixing nuts.



13. Use a special 8mm drill bit to remove one layer of weld spots and take off the threshold reinforcement beam assembl y.



Installation

⚠ Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

⚠ Caution

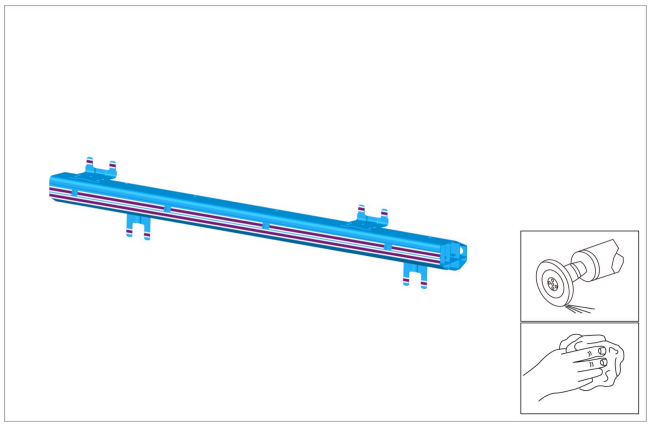
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

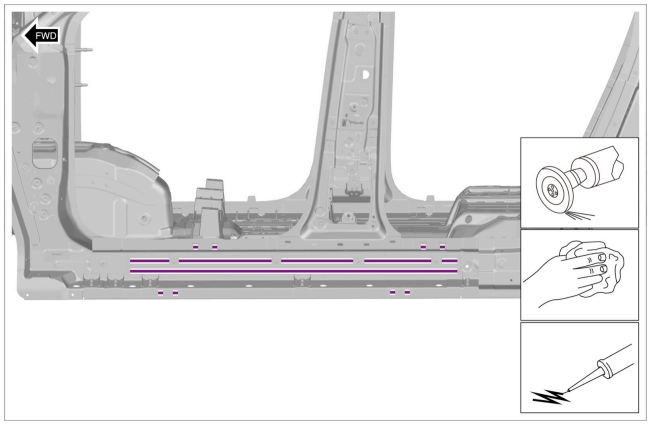


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

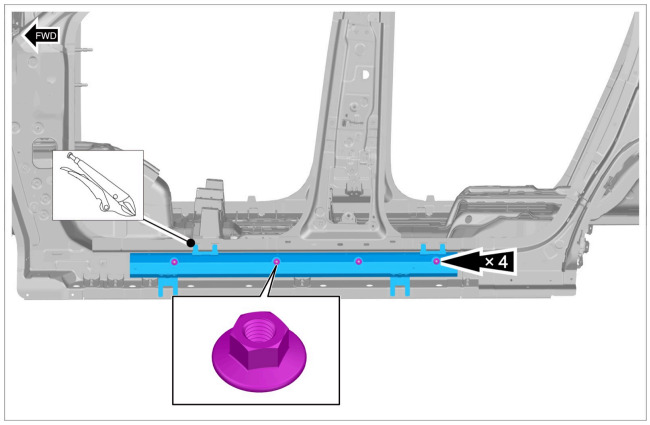
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.



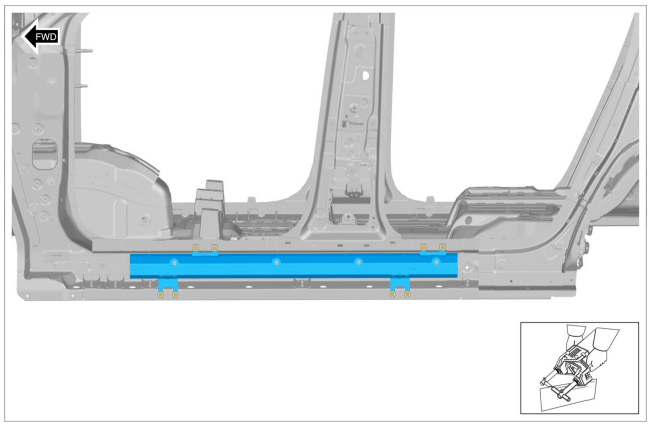
3. Use locking pliers to fix the threshold reinforcement beam assembly back to its original position and install 4 fastening nuts.



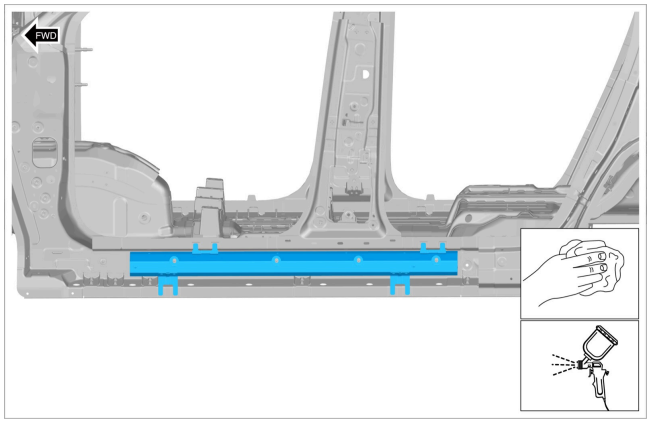
4. Use resistance spot welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding .



5. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   b. Apply anti-rust primer to prevent corrosion on the surface of components.



6. Install the threshold reinforcement panel assembly. Refer to Door sill reinforcement plate assembly
7. Install the A-pillar reinforcement assembly. Refer to A-pillar reinforcement plate assembly
8. Install the B-pillar reinforcement panel assembly. Refer to B-pillar reinforcement plate assembly
9. Install the rear section of the side outer panel. Refer to Rear Section of Side Outer Panel
10. Install the front section of the side outer panel. Refer to 侧围外板前段

11. Install the front connecting plate assembly of the side panel.侧围前连接板总成
12. Install the fender lower bracket.Fender rear lower bracket
13. Install the fender upper bracket.Fender rear upper bracket
14. Install the fender rear middle bracket. Fender rear middle bracket
15. Install the mounting bracket on the fender.Fender upper mounting bracket
16. Install the fender mounting bracket IV.Bracket IV mounted on fender

Door sill inner panel assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .

– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .

– **Punching**： Puncher, refer toAuxiliary tools .

– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .

– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .

– **Anti-corrosion**:

  • **Tools**: Spray gun, refer toSpraying tools 。

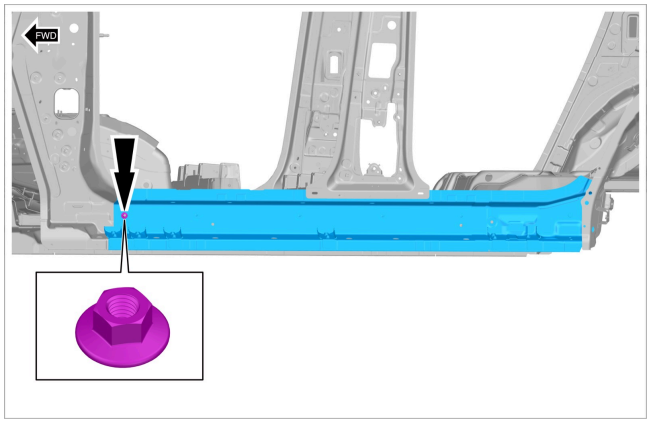
  • **Auxiliary materials**: Refer to Anti-corrosion materials .

    • **Joint surface anti-corrosion**: Zinc powder conductive primer

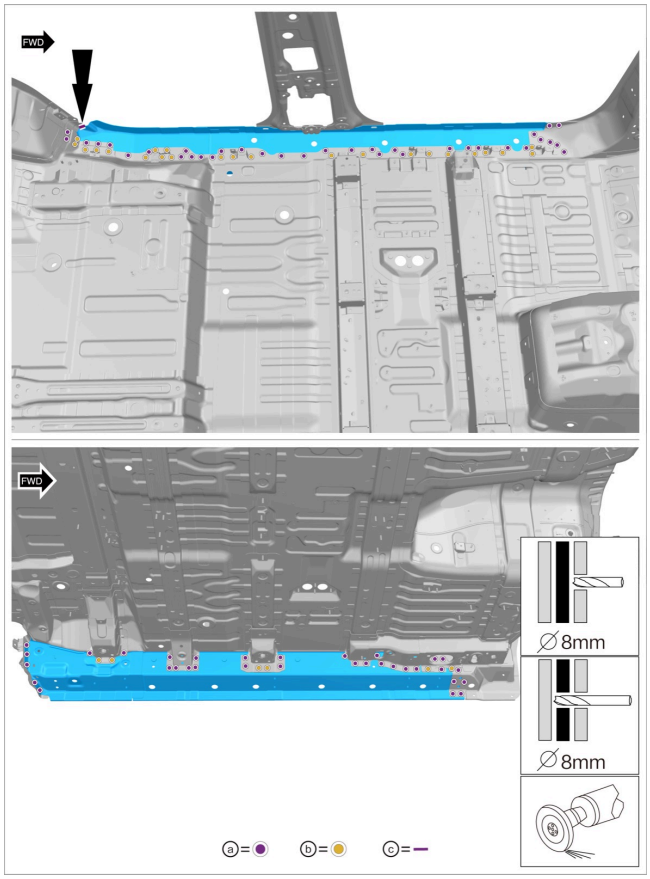
    • **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the mounting bracket IV on the fender. Bracket IV mounted on fender
2. Remove the mounting bracket on the fender. Fender upper mounting bracket
3. Remove the middle bracket after disassembling the fender.Fender rear middle bracket
4. Remove the upper bracket behind the fender. Fender rear upper bracket
5. Remove the lower bracket after the fender. Fender rear lower bracket
6. Disassemble the front connecting plate assembly of the side wall.侧围前连接板总成
7. Disassemble the front section of the side outer panel. Refer to 侧围外板前段
8. Remove the rear section of the side panel. Refer to Rear Section of Side Outer Panel
9. Disassemble the B-pillar reinforcement assembly. Refer to B-pillar reinforcement plate assembly
10. Disassemble the A-pillar reinforcement assembly. Refer to A-pillar reinforcement plate assembly
11. Disassemble threshold reinforcement plate assembly. Refer to Door sill reinforcement plate assembly
12. Disassemble the assembly of the C-pillar reinforcement plate. Refer to C-pillar reinforcement assembly
13. Remove the lower closing plate after disassembling the side wall outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
14. Remove the rear side wall connecting plate. Refer to Rear side panel connection plate
15. Remove the rear wheel cover outer panel assembly. Refer to Rear Wheel Cover Outer Panel Assembly
16. Disassemble the sill reinforcement beam assembly. Refer to Door sill reinforcement beam assembly
17. Remove 1 fixing nut.



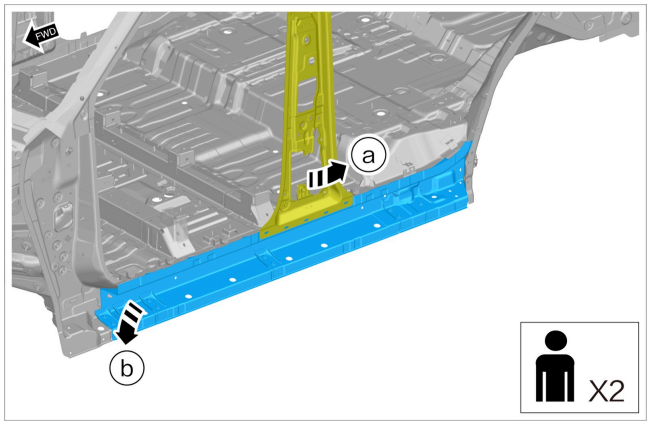
18. Remove the welding spots.
    a. Remove 1 layer of welding spots with an 8 mm special drill bit.
    b. Use an 8mm special drill bit to remove 2 layers of weld spots.
    c. Remove the welding spots formed by continuous seam welding with an abrasive wheel grinder.



19. Disassemble the threshold inner panel assembly in order.

Caution

This step is difficult to be performed and requires the cooperation of many people.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

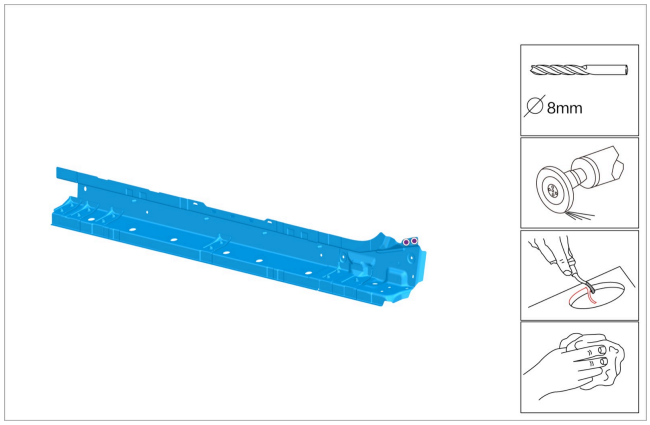
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Fix the prepared parts to the car body and measure 前门及车顶 , 后门 for accuracy, see How to measure and align v ehicle body
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

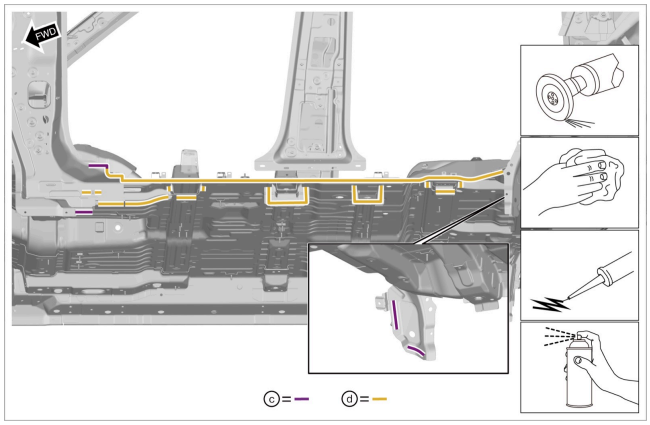
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

Caution

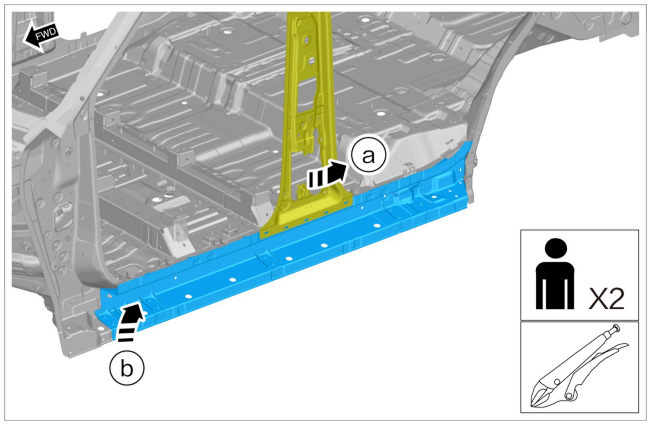
Do not spray it too thick to avoid affecting the welding quality.



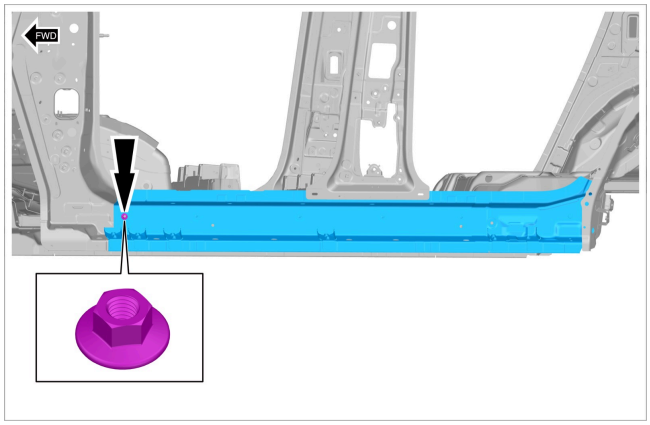
4. Fix the threshold inner panel assembly back to its original position in order, and secure it with locking pliers.

Caution

This step is difficult to be performed and requires the cooperation of many people.



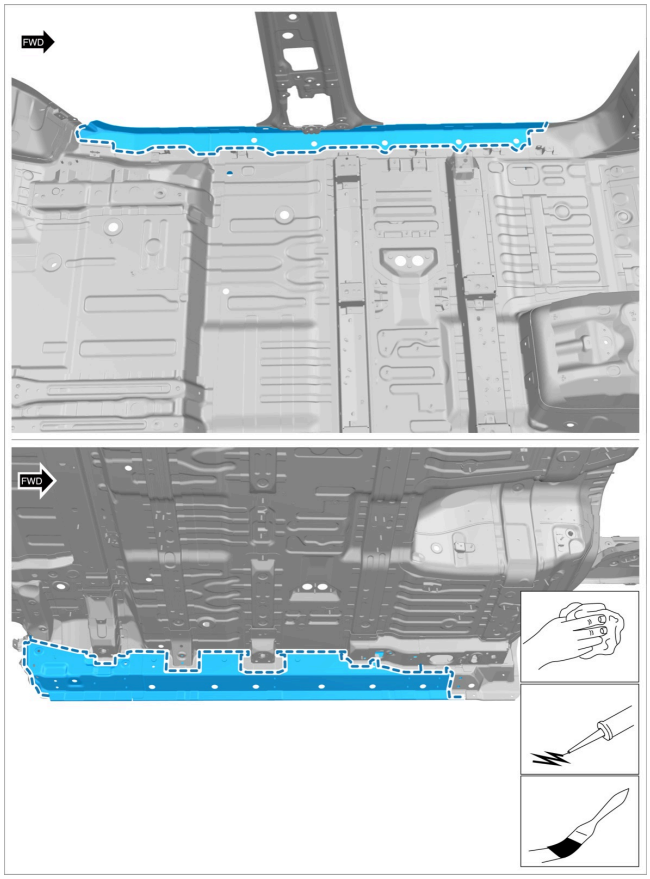
5. Install 1 fixed nut.



6. Perform welding.
   a. Use resistance spot welding.
   b. Use metal active gas welding.
   c. Use continuous seam welding.

Caution

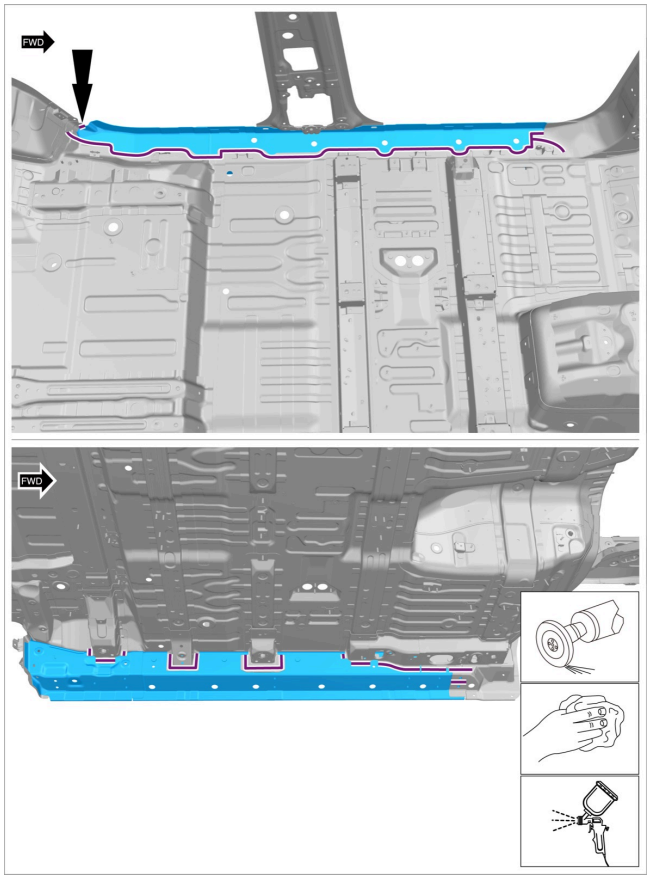
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



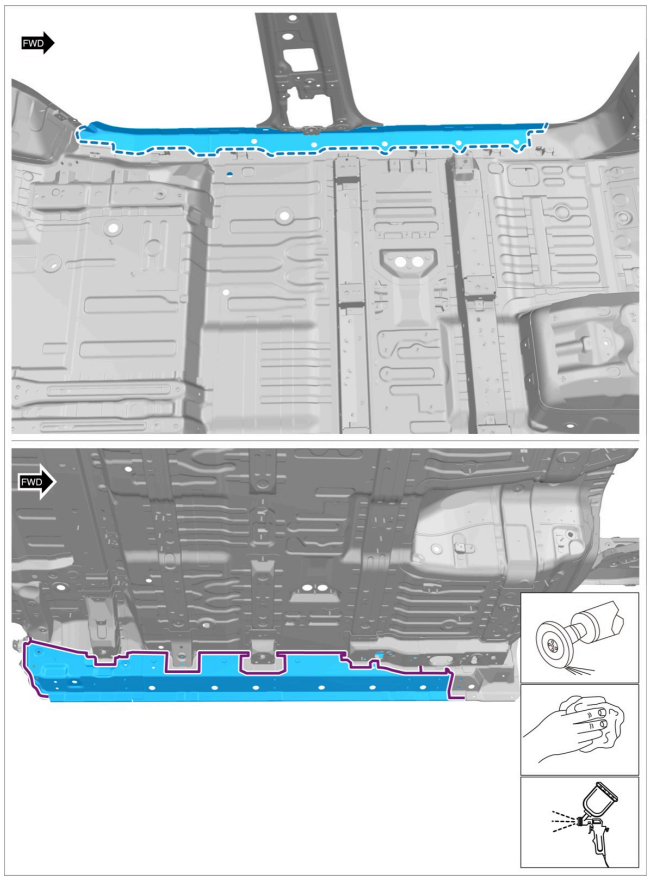
7. Please confirm again to check whether the side wall data is correct, see 前门及车顶 , 后门

> **Reminder**
>
> – If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.
> – If the data cannot be repaired through calibration, the component may need to be reinstalled.

8. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



9. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



10. Install the threshold reinforcement beam assembly. Refer to Door sill reinforcement beam assembly
11. Install the rear wheel cover outer panel assembly. Refer to Rear Wheel Cover Outer Panel Assembly
12. Install the rear side connection plate. Refer to Rear side panel connection plate
13. Install the lower closure panel of the rear side outer panel. Refer to Rear Lower Closing Panel of Side Outer Panel
14. Install C pillar reinforcement panel assembly. Refer to C-pillar reinforcement assembly
15. Install the threshold reinforcement panel assembly. Refer to Door sill reinforcement plate assembly
16. Install the A-pillar reinforcement assembly. Refer to A-pillar reinforcement plate assembly
17. Install the B-pillar reinforcement panel assembly. Refer to B-pillar reinforcement plate assembly
18. Install the rear section of the side outer panel. Refer to Rear Section of Side Outer Panel
19. Install the front section of the side outer panel. Refer to 侧围外板前段
20. Install the front connecting plate assembly of the side panel.侧围前连接板总成
21. Install the fender lower bracket.Fender rear lower bracket
22. Install the fender upper bracket.Fender rear upper bracket
23. Install the fender rear middle bracket. Fender rear middle bracket
24. Install the mounting bracket on the fender.Fender upper mounting bracket
25. Install the fender mounting bracket IV.Bracket IV mounted on fender

Front side member connecting plate

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

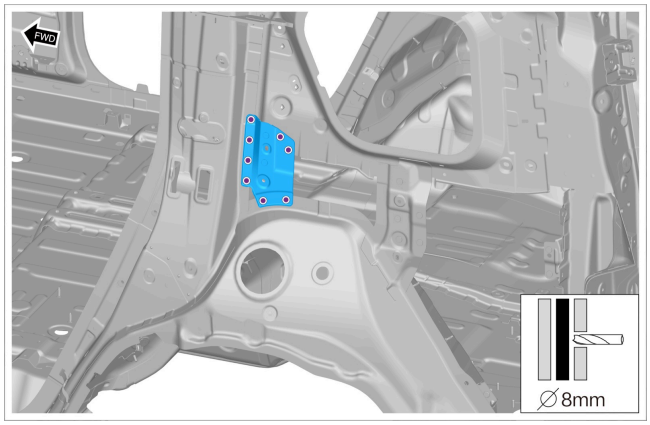
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the rear section of the side panel.Rear Section of Side Outer Panel
2. Use a specialized 8mm drill bit to remove one layer of weld spots and remove the front side wall connecting plate.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

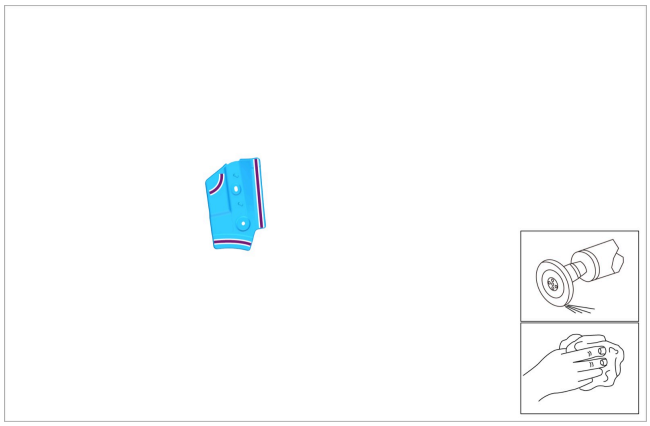
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



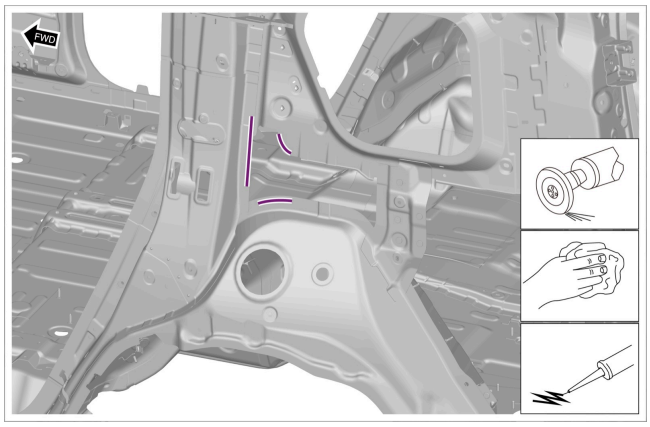
2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

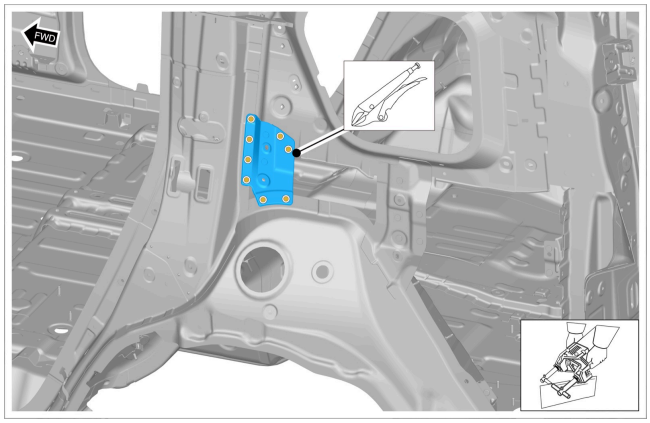
c. Apply structural adhesive on the joint surface.



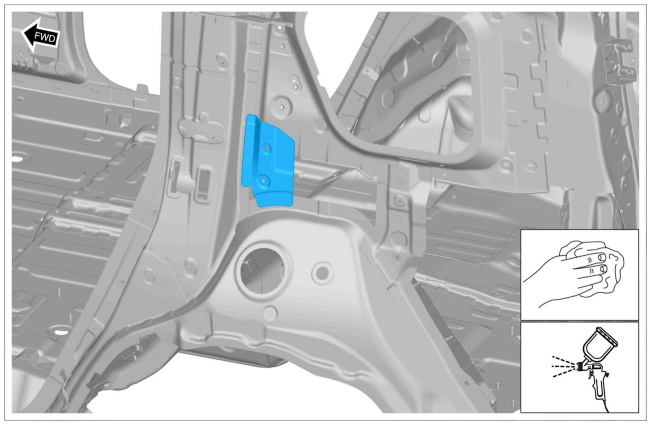
3. Use locking pliers to fix the front side member connection plate to its original position, and weld it using resistance spo t welding.

⚠ Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   b. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Install the rear section of the side wall panel.Rear Section of Side Outer Panel

Fender rear upper bracket

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

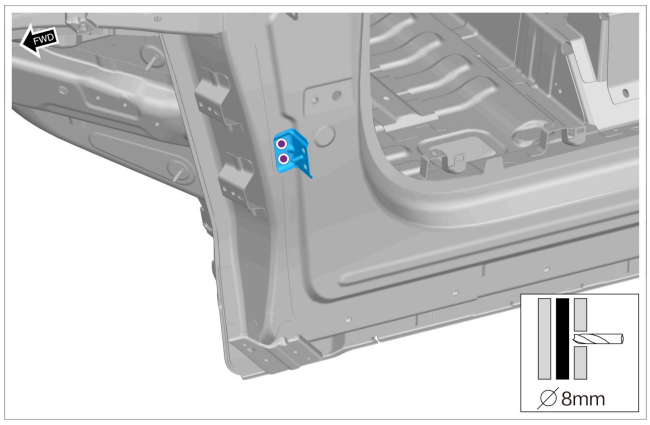
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Use a special 8mm drill bit to remove the weld spots on one layer and take off the upper rear bracket of the fender.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

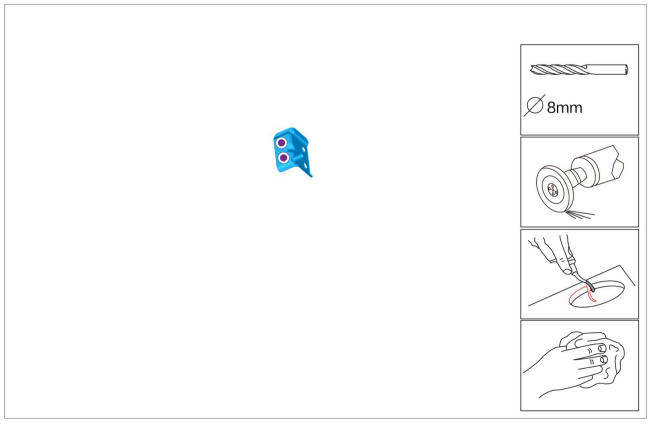
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

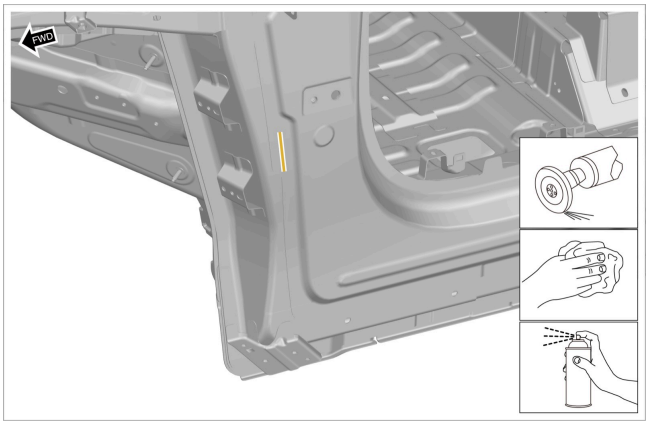
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

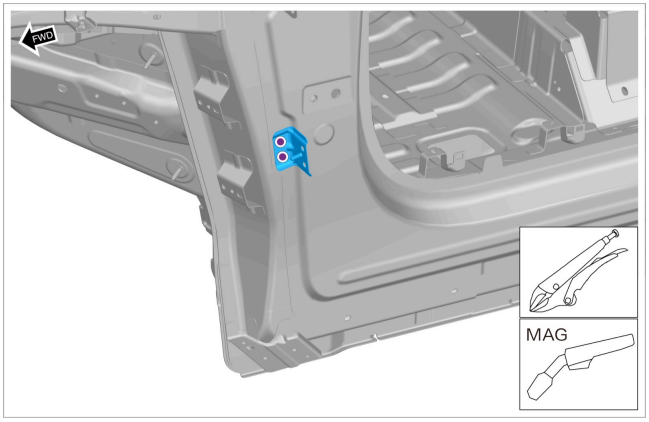
Do not spray it too thick to avoid affecting the welding quality.



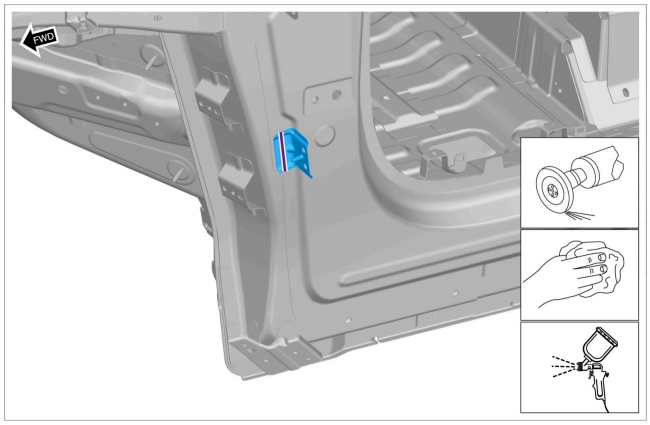
3. Use locking pliers to fix the rear upper bracket of the fender to the original position and weld with metal active gas wel ding.

Caution

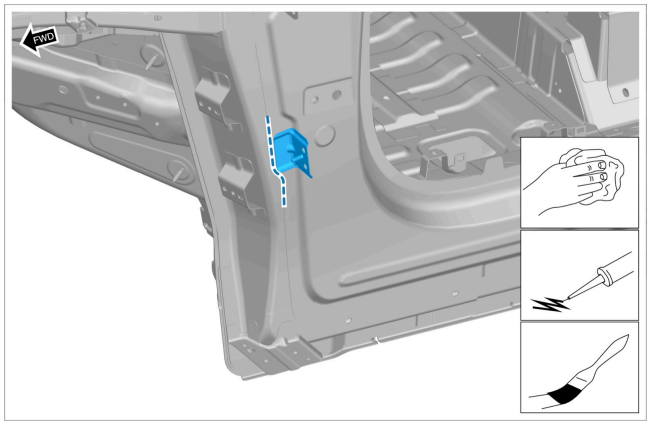
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



Fender rear lower bracket

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

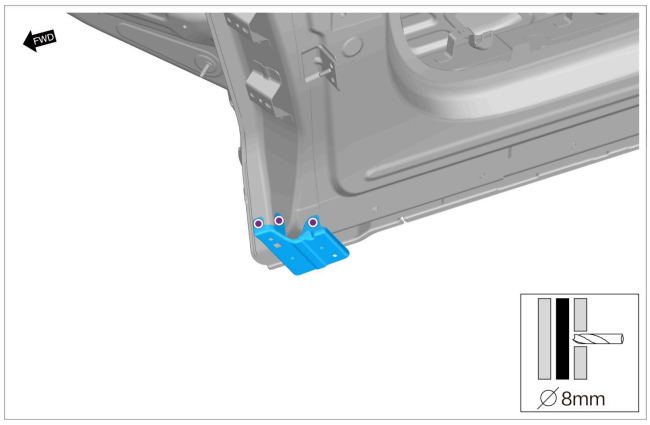
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Use a special 8mm drill bit to remove one layer of weld spots and remove the lower bracket of the fender.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

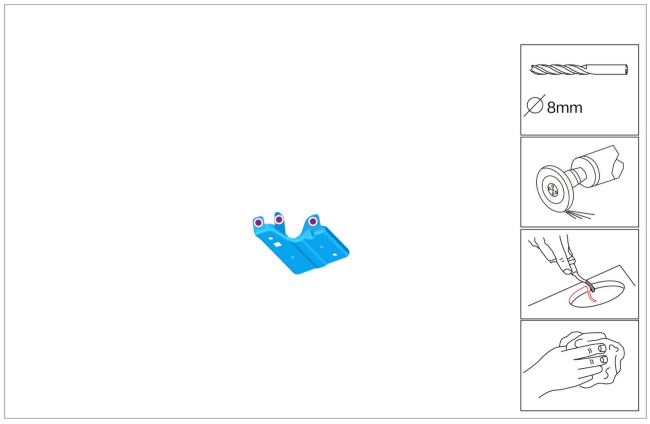
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

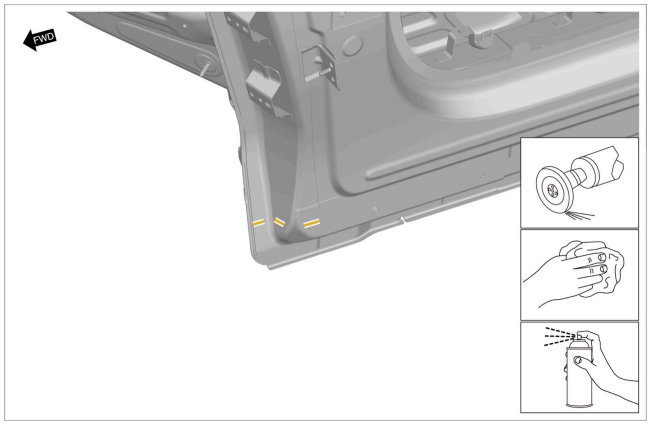
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

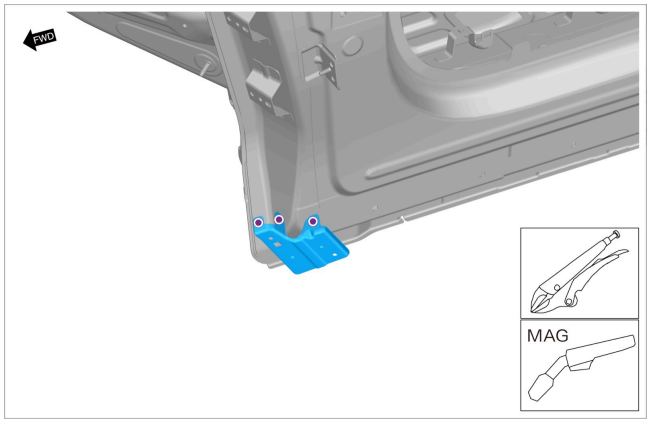
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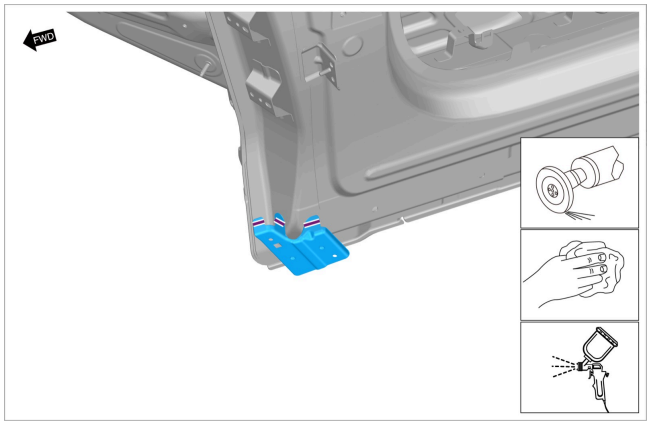
3. Use locking pliers to secure the fender rear lower bracket to its original position and weld using metal active gas welding.

Caution

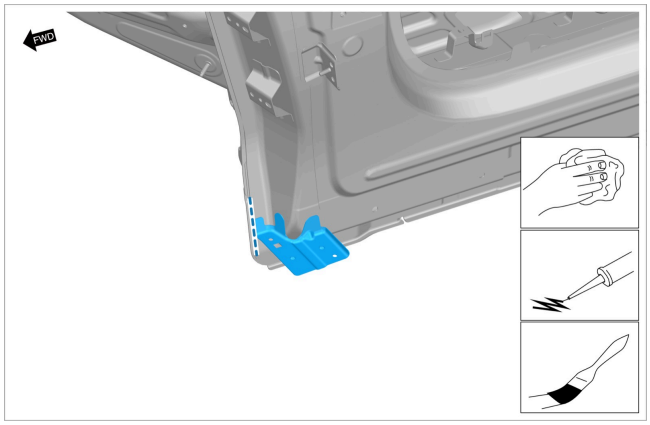
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded welding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



Fender rear middle bracket

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

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Operation tools and auxiliary materials

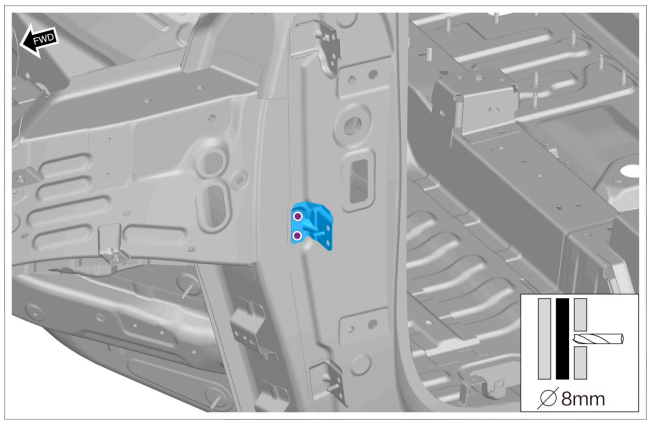
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– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Using a dedicated 8mm drill bit, remove one layer of weld spots, and take off the bracket behind the fender.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

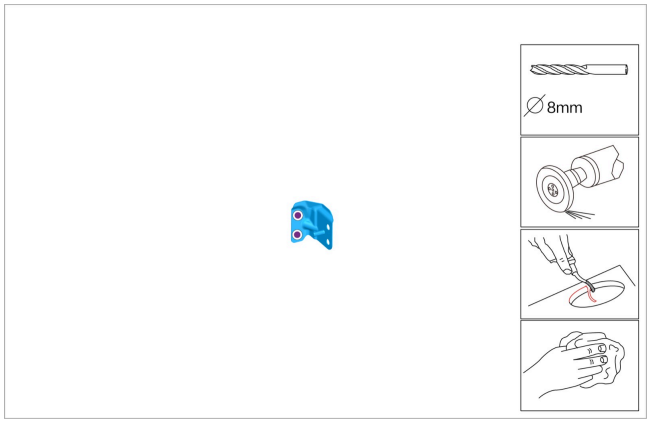
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

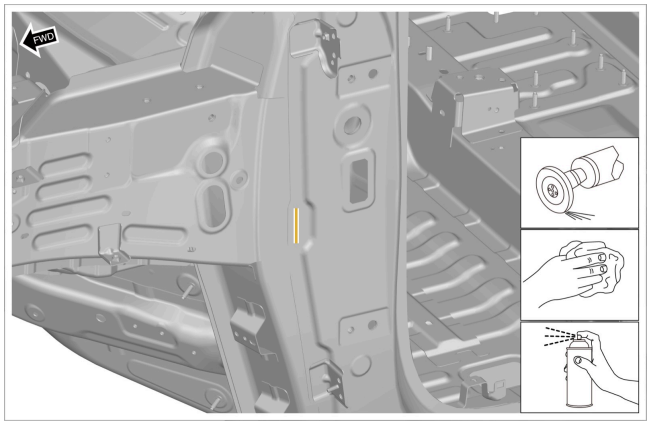
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

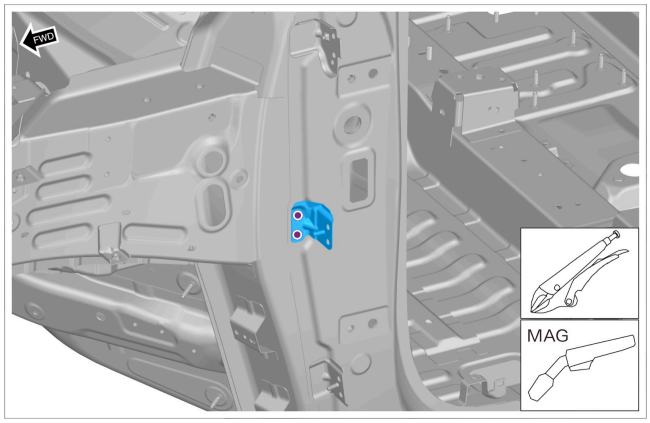
Do not spray it too thick to avoid affecting the welding quality.



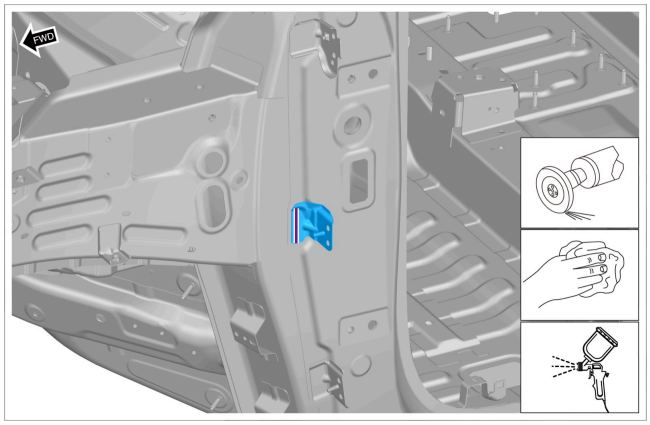
3. Use locking pliers to secure the rear middle bracket of the fender to its original position, and weld it using metal active gas welding.

Caution

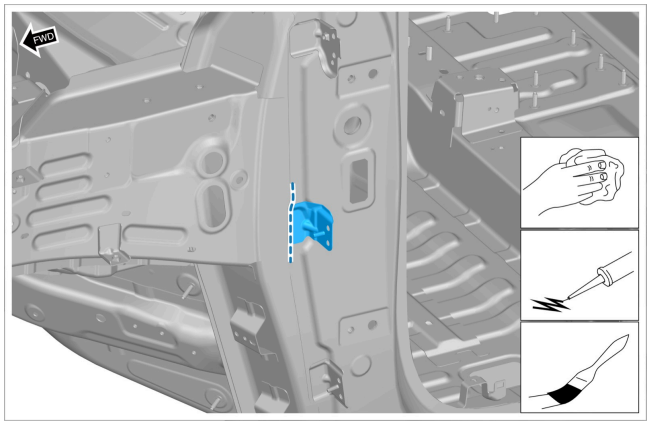
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



Fender upper mounting bracket

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

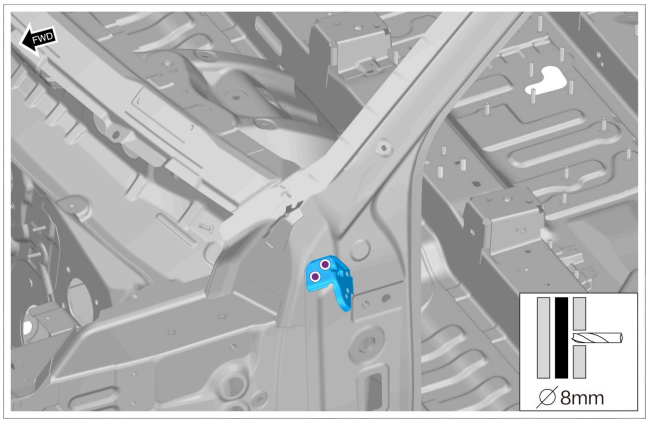
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Use an 8mm special drill bit to remove one layer of weld spots and take off the mounting bracket on the fender.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

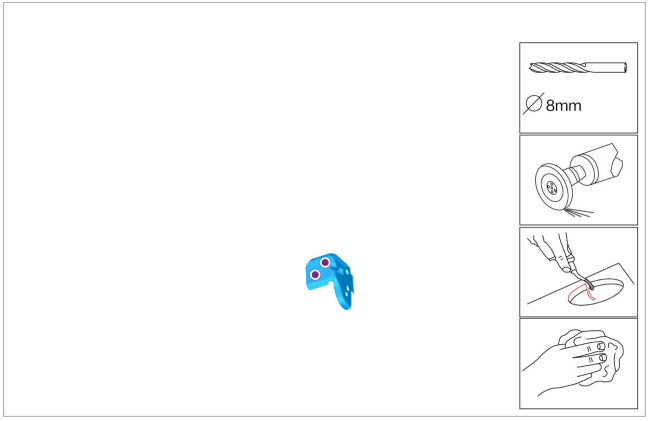
Caution

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– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

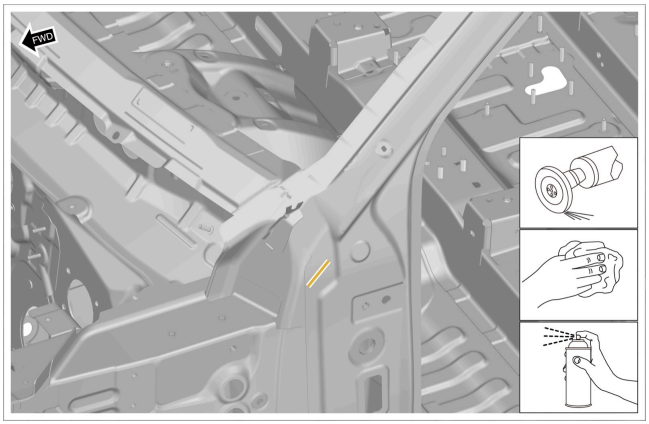
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

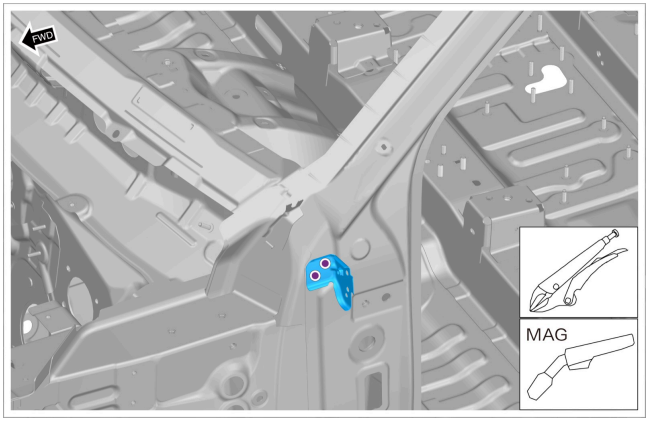
Do not spray it too thick to avoid affecting the welding quality.



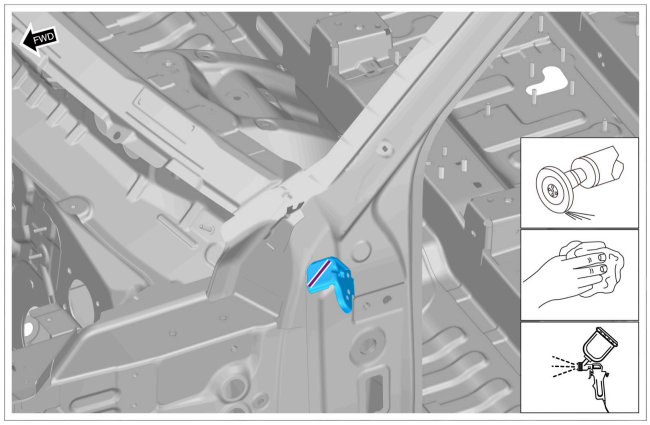
3. Use locking pliers to secure the mounting bracket on the fender to the original position and weld using metal active ga s welding.

Caution

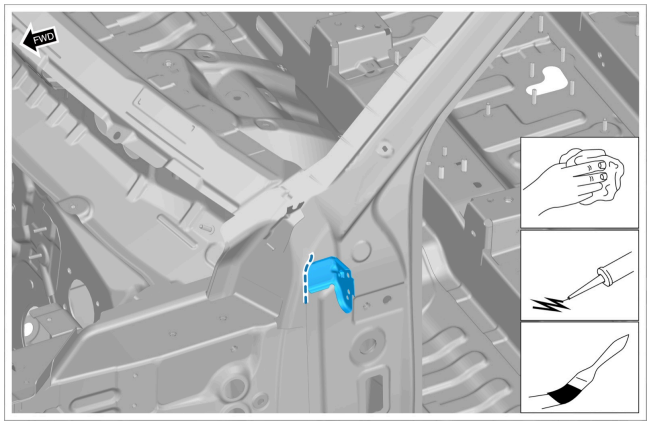
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



Bracket IV mounted on fender

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

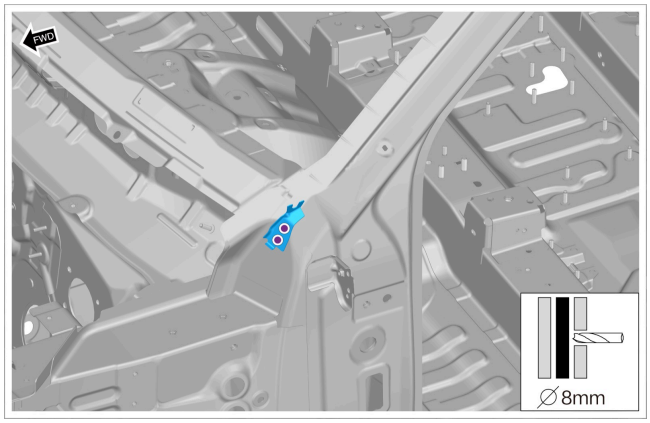
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Use a dedicated 8mm drill bit to remove one layer of weld points and take down the mounting bracket IV on the fende r.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

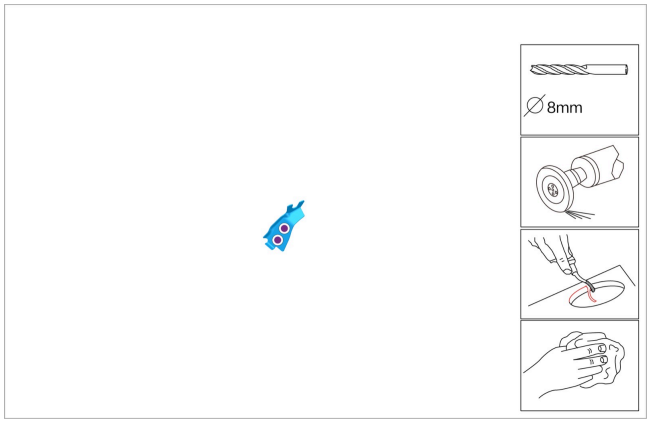
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.

a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

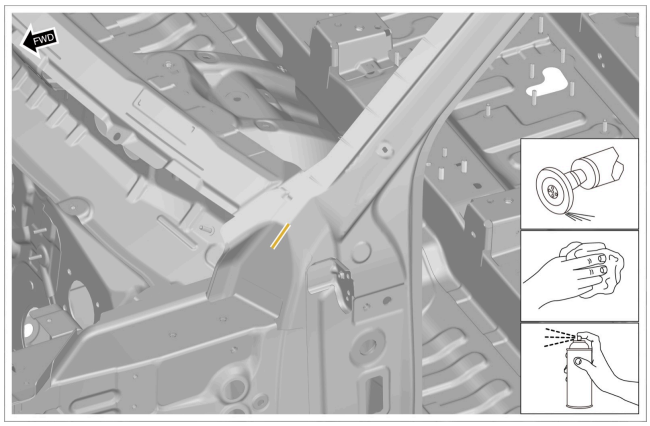
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

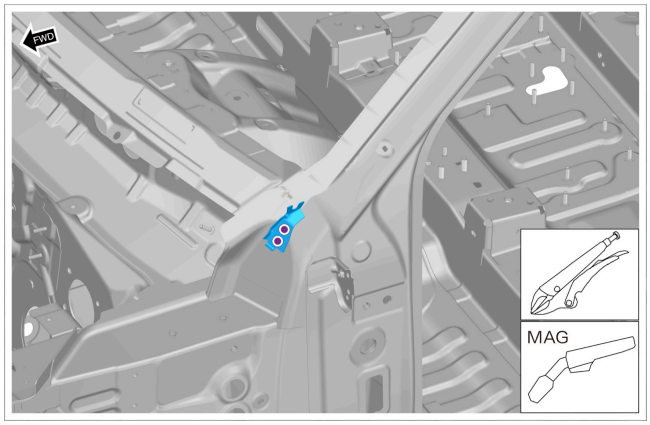
Do not spray it too thick to avoid affecting the welding quality.



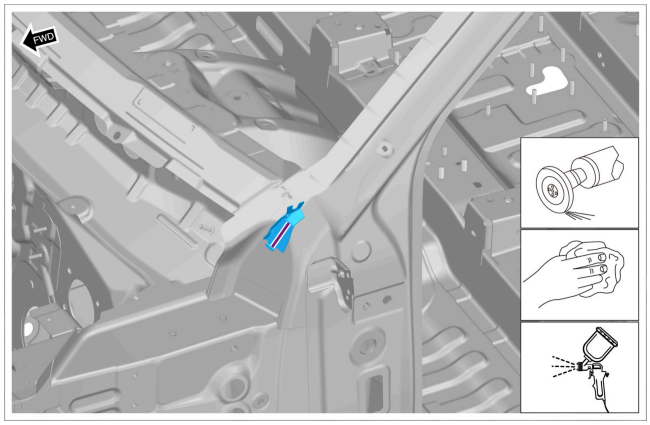
3. Use locking pliers to fix the mounting bracket IV on the fender to the original position and weld it with metal active gas welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.

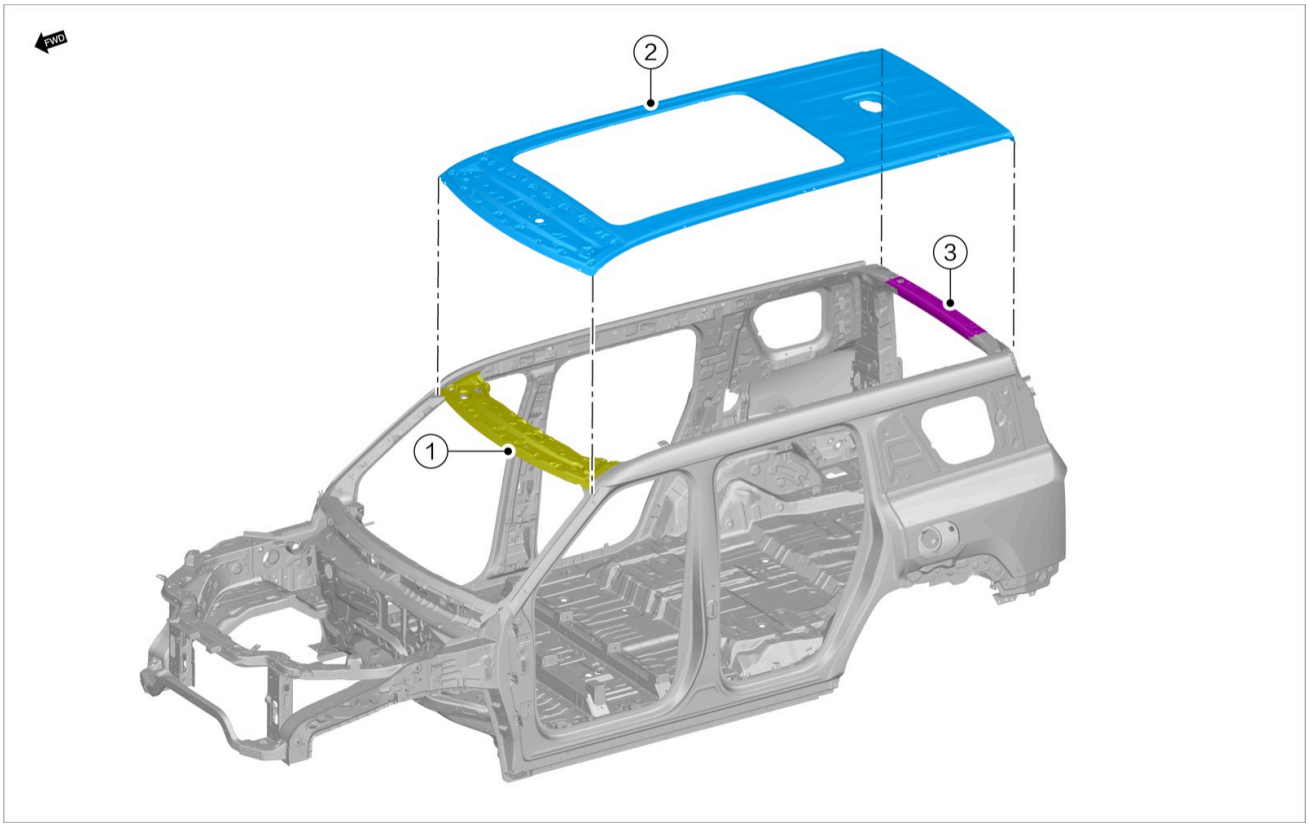

FWD

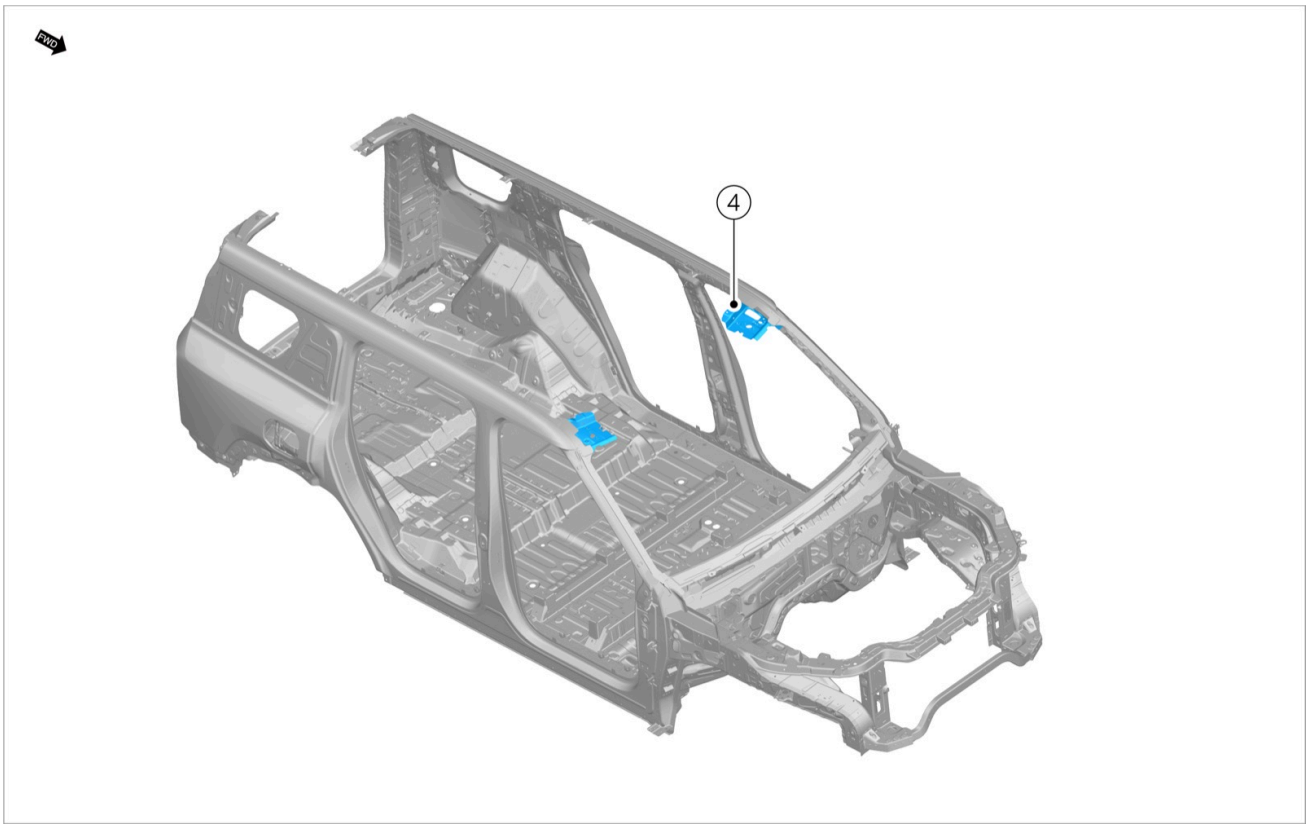
Component overview

The main purpose of this topic is to help you identify the location and corresponding details of roof cover components that need to be replaced.

Location overview

You can find and confirm the references of components to be repaired through the following figure and table.





S/N	Component name	Refer to document
1	Roof cover front cross beam assembly	Roof cover front cross beam assembly
2	Roof cover assembly	Roof cover assembly
3	Roof cover rear cross beam assembly	Roof cover rear cross beam assembly
4	Roof cover front cross beam connecting plate	Roof cover front cross beam connecting plate

Roof cover rear cross beam assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

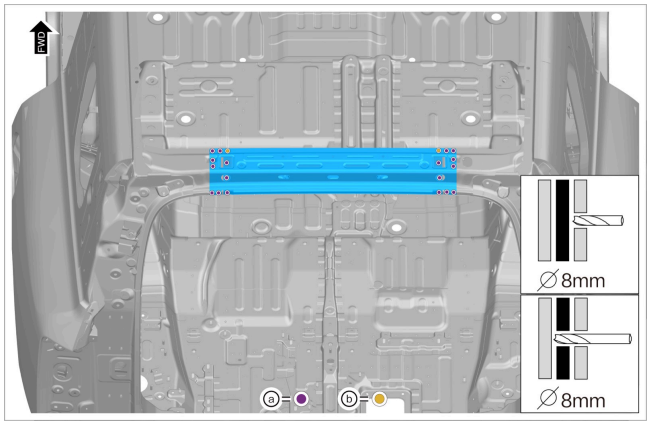
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the top cover assembly.Roof cover assembly
2. Disassemble the roof cover rear cross beam assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove the two layers of welds, and then remove the top cover crossbeam assem bly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

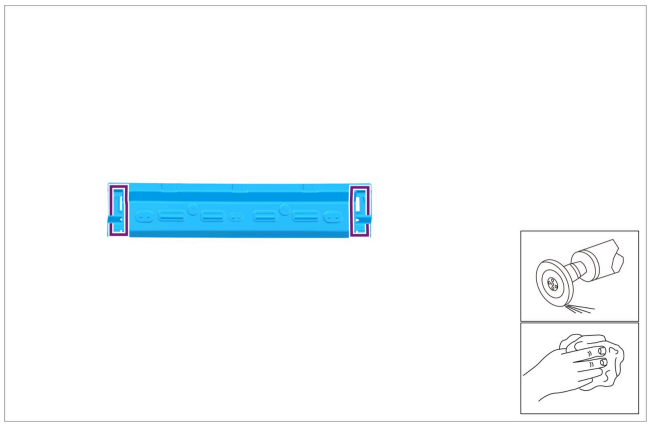
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

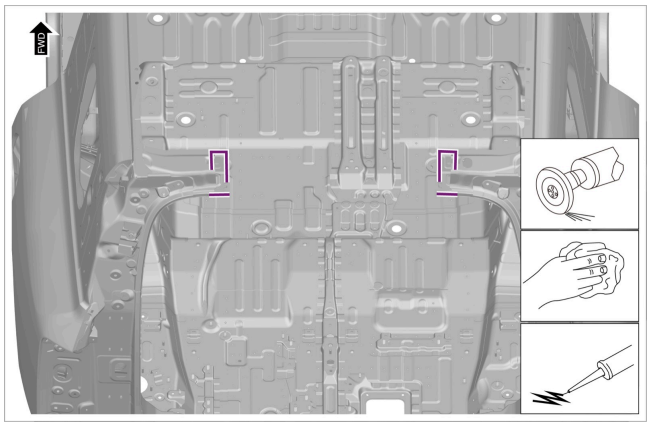


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Apply structural adhesive on the joint surface.

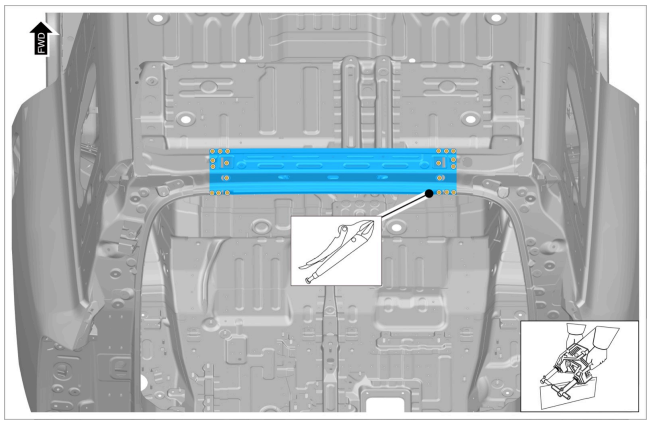


3. Secure the prepared parts to the vehicle body and measure 背门 for correctness, see How to measure and align vehi cle body

4. Use locking pliers to fix the top cover rear beam assembly to the original position, and use resistance spot welding to weld it.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding .



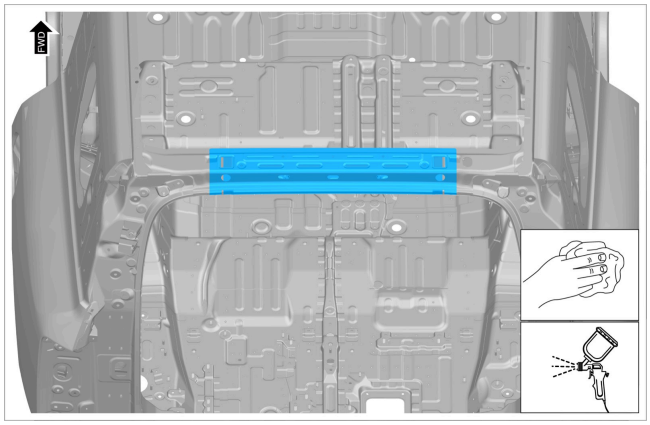
5. Reconfirm whether the top cover data is correct, refer to 背门

Reminder

– If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.

– If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   b. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Install the top cover assembly.Roof cover assembly

Roof cover front cross beam connecting plate

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

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– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

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Operation tools and auxiliary materials

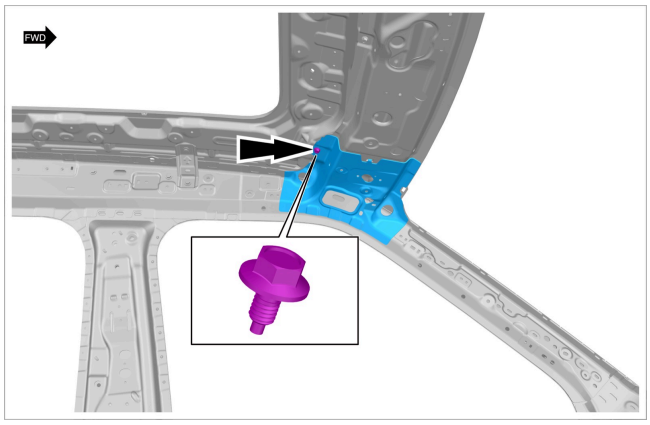
Reminder

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– **Punching**： Puncher, refer toAuxiliary tools .
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– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove 1 fixing bolt.



2. Use a special 8mm drill bit to remove one layer of weld spots and remove the front crossbeam connection plate of the top cover.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

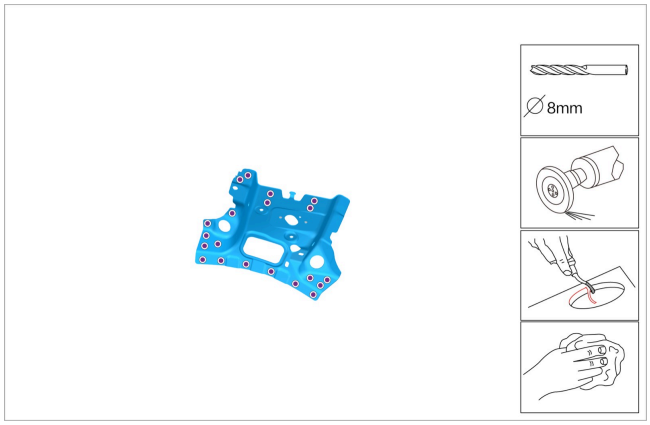
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– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

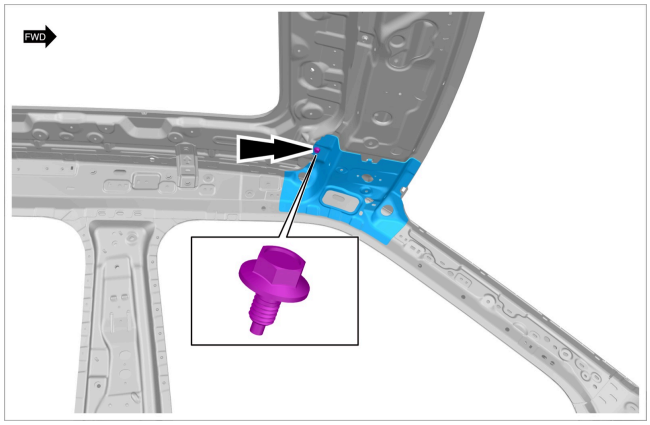
> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



3. After installing the very bright connection plate of the top cover to the original position, install one fixing bolt.



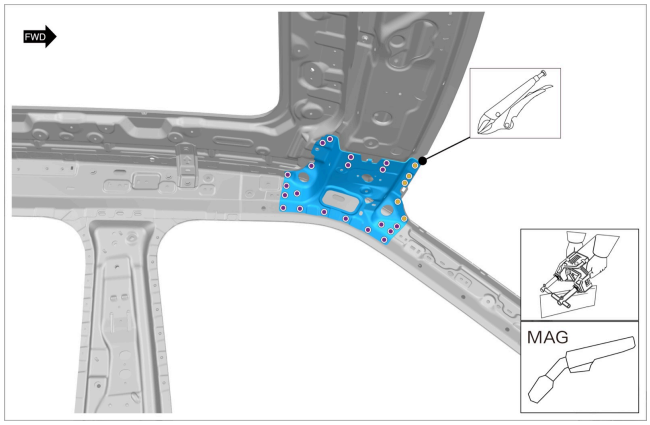
4. Fix with locking pliers and weld.

a. Use resistance spot welding.

b. Use metal active gas welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



5. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



Roof cover front cross beam assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

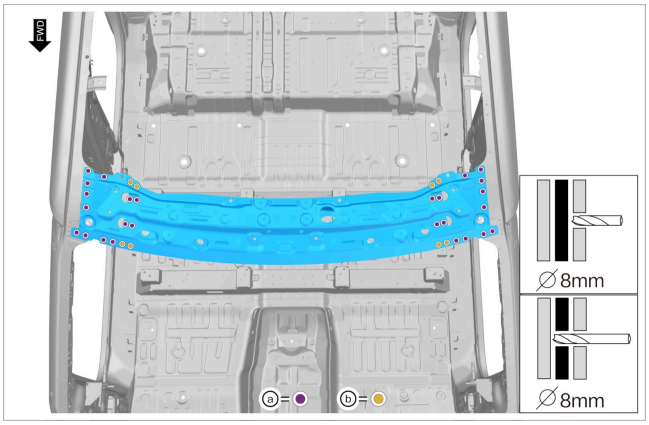
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the top cover assembly.Roof cover assembly
2. Disassemble the front top cover beam assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use a special 8mm drill bit to remove the 2-layer welding points and take off the front cross beam assembly of th e top cover.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

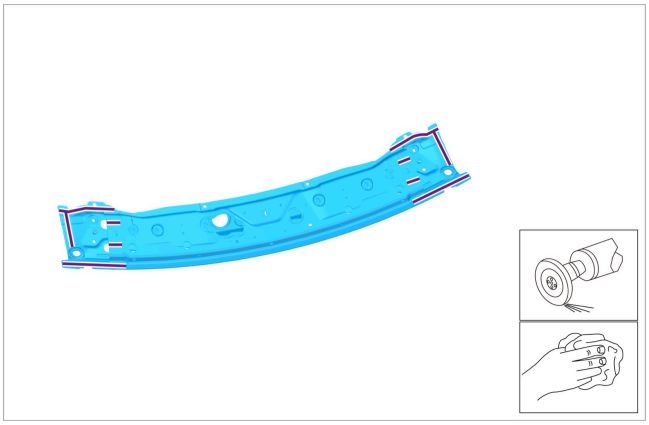
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



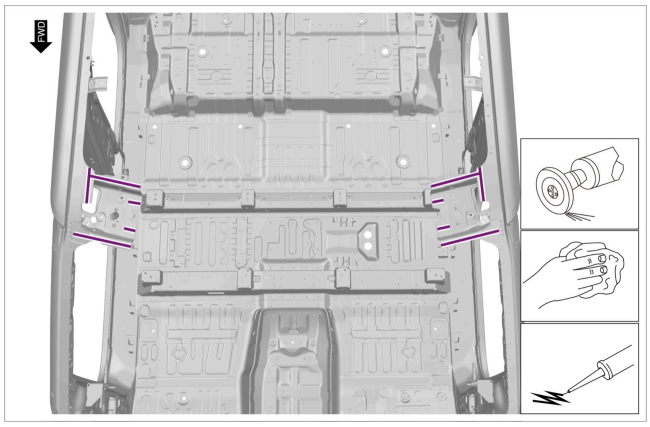
2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Apply structural adhesive on the joint surface.

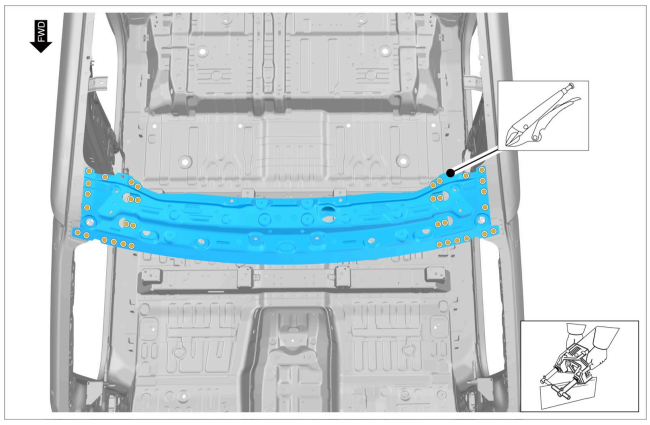


3. Secure the prepared parts to the vehicle body and measure 前门及车顶 for correctness, see How to measure and ali gn vehicle body

4. Use locking pliers to fix the front crossbeam assembly of the top cover to the original position, and weld it using resist ance spot welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding .



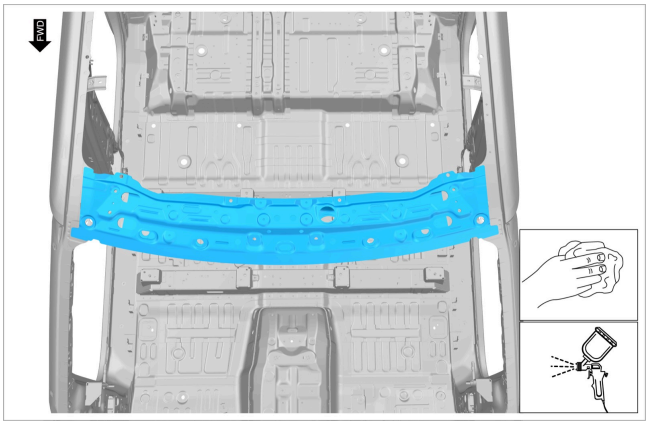
5. Reconfirm whether the top cover data is correct, refer to 前门及车顶

Reminder

– If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.

– If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   b. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Install the top cover assembly.Roof cover assembly

顶盖总成

警告

为避免发生维修事故，在进行作业时，需遵守作业规范及要求。

注意

- 在进行作业前，请仔细阅读并遵守场地安全及车辆防护，详情请参见Site safety and vehicle protection。
- 在进行作业时，请按规定做好安全防护，安全防护的具体事项请参见Sheet metal protection。

温馨提示

- 本文示例图中的圆形图标不表明焊点的具体数量，只表明焊点的大概位置，具体数量请以实车为准。
- 本文中的技术插图内存在多种工艺符号，若需了解其含义可参见Description of diagram。

作业工具及辅料

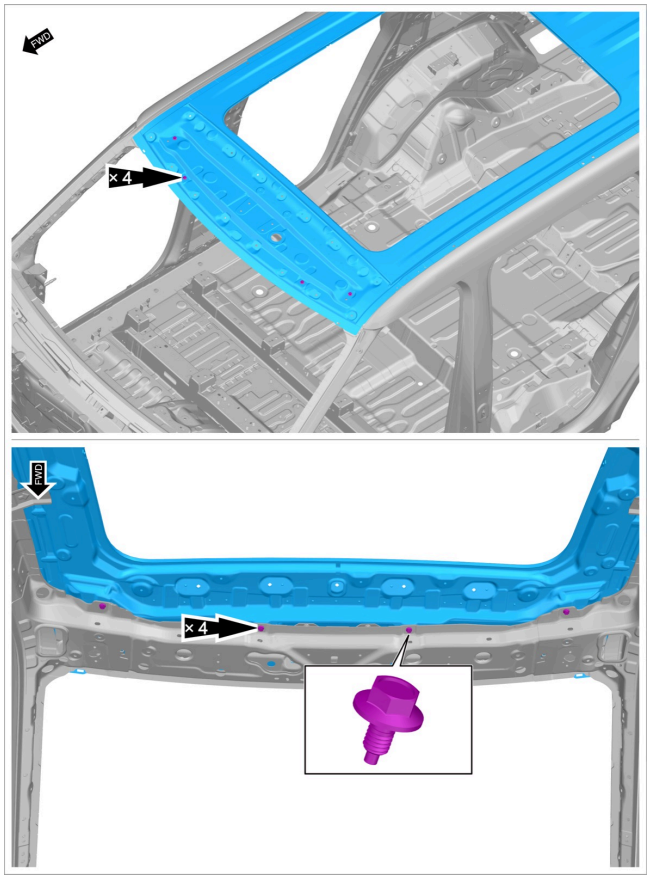
温馨提示

本文所描述到的工具和辅料为建议器材，具体以实际为准。

- **清除焊点**：点焊去除钻、专用钻头，参见Removal of welding spots。
- **清理/修整平面**：砂轮研磨机，参见Grinding tools。
- **打孔**：打孔器，参见Auxiliary tools。
- **清洁**：除油剂、粘尘布，参见Cleaning auxiliary materials。
- **焊接**：电阻点焊机、气体保护焊机，参见Welding tools。
- **防腐**：
  - **工具**：喷枪，参见Spraying tools。
  - **辅料**：参见防腐材料。
    - **接合面防腐**：锌粉导电底漆
    - **焊接面防腐**：防锈底漆

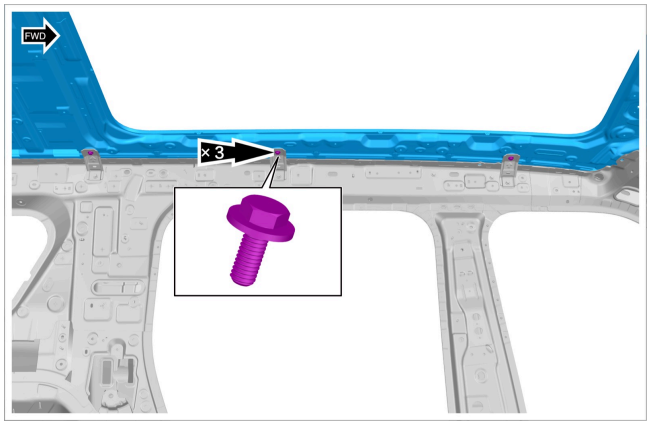
拆卸

1. 拆卸8个固定螺栓。

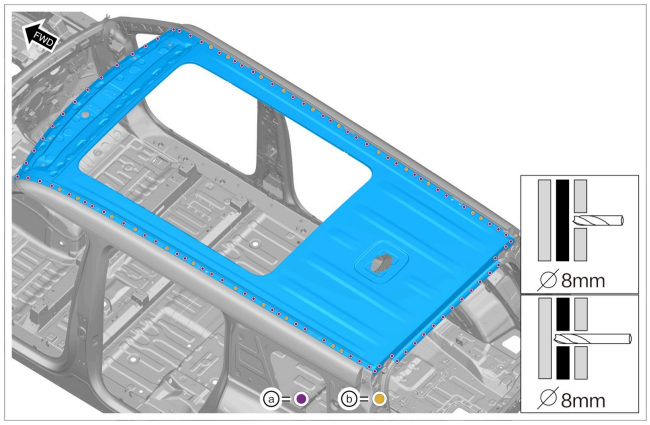


2. 拆卸3个固定螺栓。

> **注意**
>
> 两侧执行相同操作。



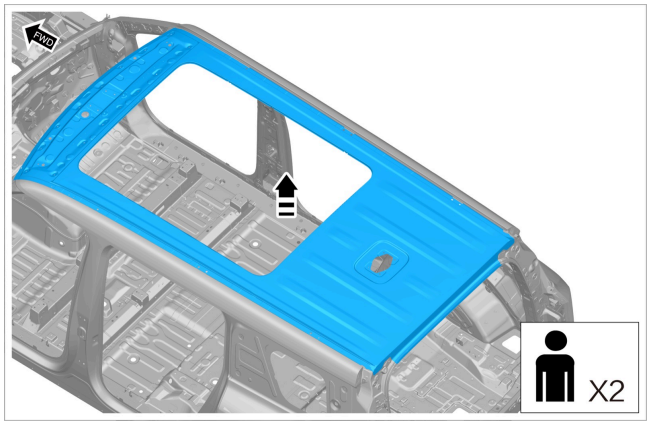
3. 清除焊点。
   a. 使用 8mm 专用钻头，清除1层焊点。
   b. 使用 8mm 专用钻头，清除2层焊点。



4. 拆卸顶盖总成。

注意

此步骤较难执行，执行时需多人协作。



安装

注意

在最终装配之前，请您务必做到完全了解所有相关工作步骤，并进行一次试装配。

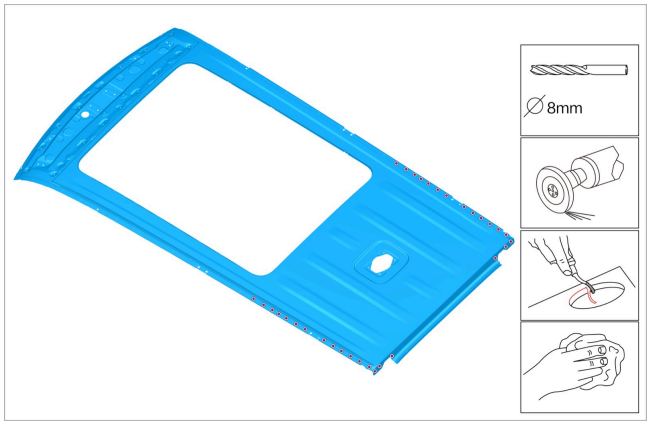
注意

- 安装部件时，焊点数量应在原有焊点数量的基础上增加 30% 左右。
- 焊接时，应避开原有焊点的位置。

1. 准备新部件。
   a. 使用专用钻头，在新部件的焊接位置进行开孔。
   b. 使用砂轮研磨机打磨新部件表面，直至表面露出金属、光滑且平整。
   c. 清除圆孔内的毛刺。
   d. 将接合面上的微尘等杂物擦除。

温馨提示

建议使用辅料：粘尘布和除油清洁剂。



2. 将已经准备好的部件固定至车身，并测量前门及车顶、背门是否正确，参见How to measure and align vehicle body
3. 处理接合面。
   a. 使用砂轮研磨机清理接合面上的残余物，直至表面露出金属、光滑且平整。
   b. 将接合面上的微尘等杂物擦除。

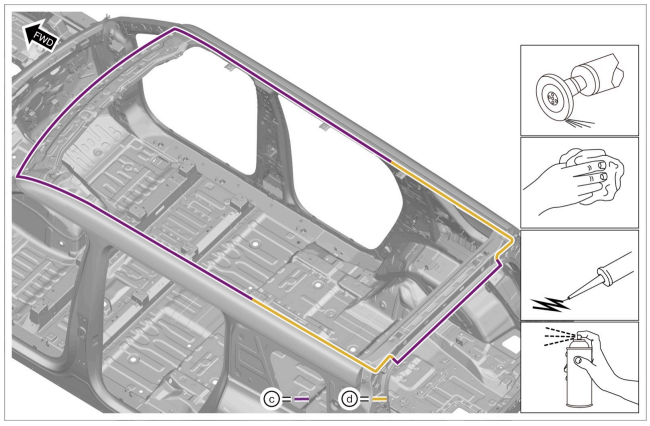
温馨提示

建议使用辅料：粘尘布和除油清洁剂。

   c. 在接合面施涂结构胶。
   d. 再接合面喷涂锌粉导电底漆。

注意

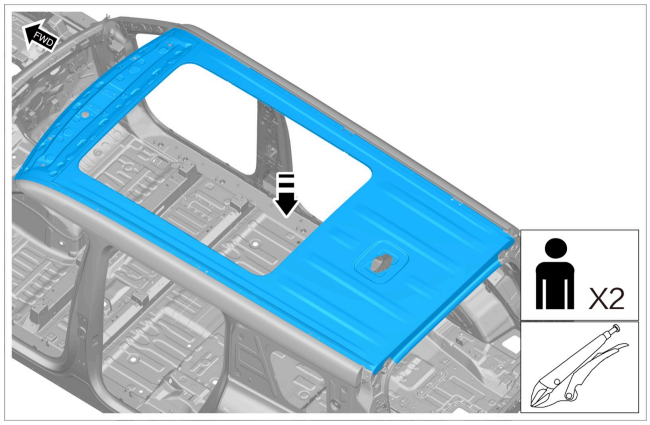
为避免影响焊接质量，请勿喷涂太厚。



4. 使用锁定钳将顶盖总成固定至原始位置。

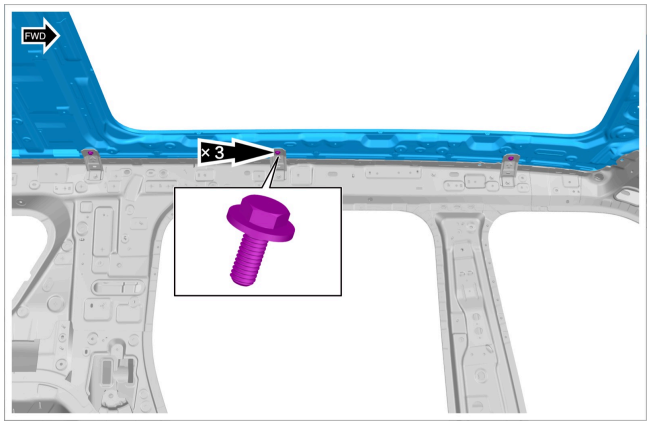
注意

此步骤较难执行，执行时需多人协作。

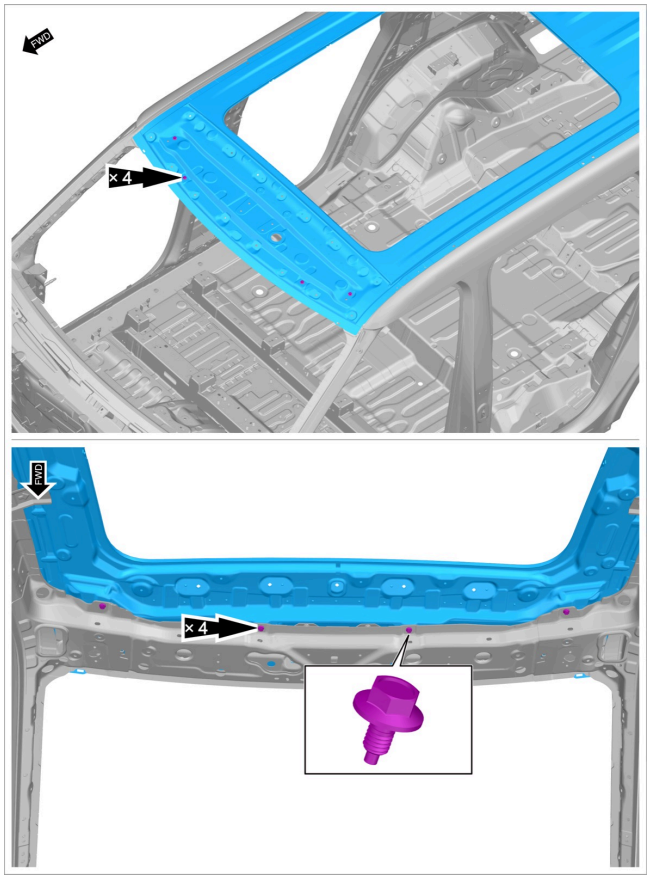


5. 安装3个固定螺栓。

> **注意**
>
> 两侧执行相同操作。

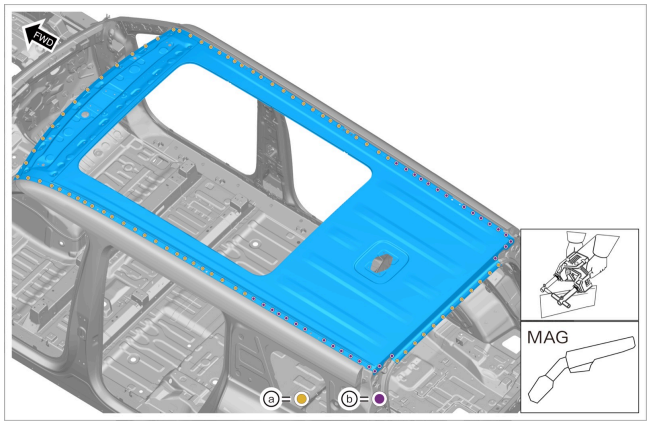


6. 安装8个固定螺栓。



7. 进行焊接。
   a. 使用电阻点焊焊接。
   b. 使用金属活性气体焊焊接。

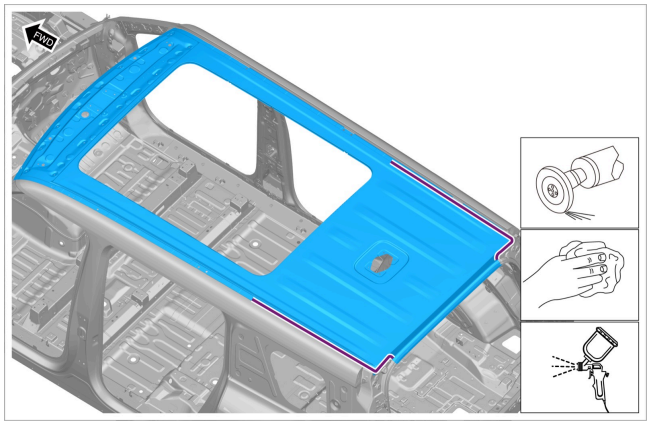
> **注意**
>
> – 焊接时，应进行试焊确认机器调节恰当，**焊点距离＝板厚*10 + 10mm**，焊接方法参见Resistance spot welding、Gas shielded welding。



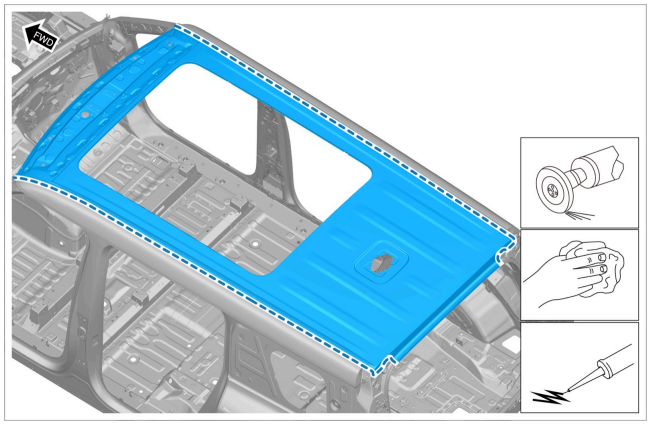
8. 再次确认检查顶盖尺寸数据是否正确，参见前门及车顶、背门

> **温馨提示**
>
> – 若数据存在异常，请参见How to measure and align vehicle body修复车身。
> – 若无法通过校正修复数据，可能需要重新安装部件。

9. 对已焊接的部位进行防腐处理，参见Anti-corrosion treatment。
   a. 对已使用金属活性气体焊部位进行打磨处理，使其光滑且平整。
   b. 使用粘尘布和除油清洗剂去除部件表面污渍。
   c. 使用防锈底漆，对部件表面进行防腐处理。



10. 参考下图位置，在连接处施涂密封胶。
    a. 使用粘尘布和除油清洗剂，清理需施涂胶体的区域，确保该区域无杂物、油污和水渍。
    b. 将密封胶施涂至连接区域。
    c. 使用毛刷将密封胶涂抹均匀。

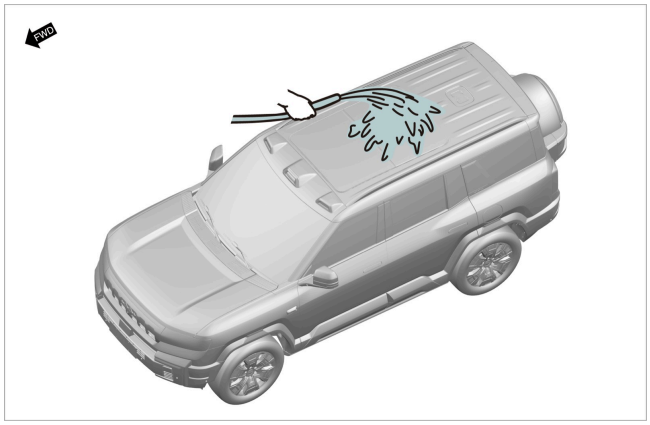


11. 车身部件安装完毕后，需进行防水测试。

⚠ 注意

- 进行防水测试前，密封胶需固化。
- 防水测试后，需干燥并检查测试部位，若存在锈蚀风险，需做防腐处理。

- 防水测试结束前，不需要安装内饰部件。
- 若存在问题，则需要找到漏水部位，根据实际情况进行处理。



Spare Part Overview

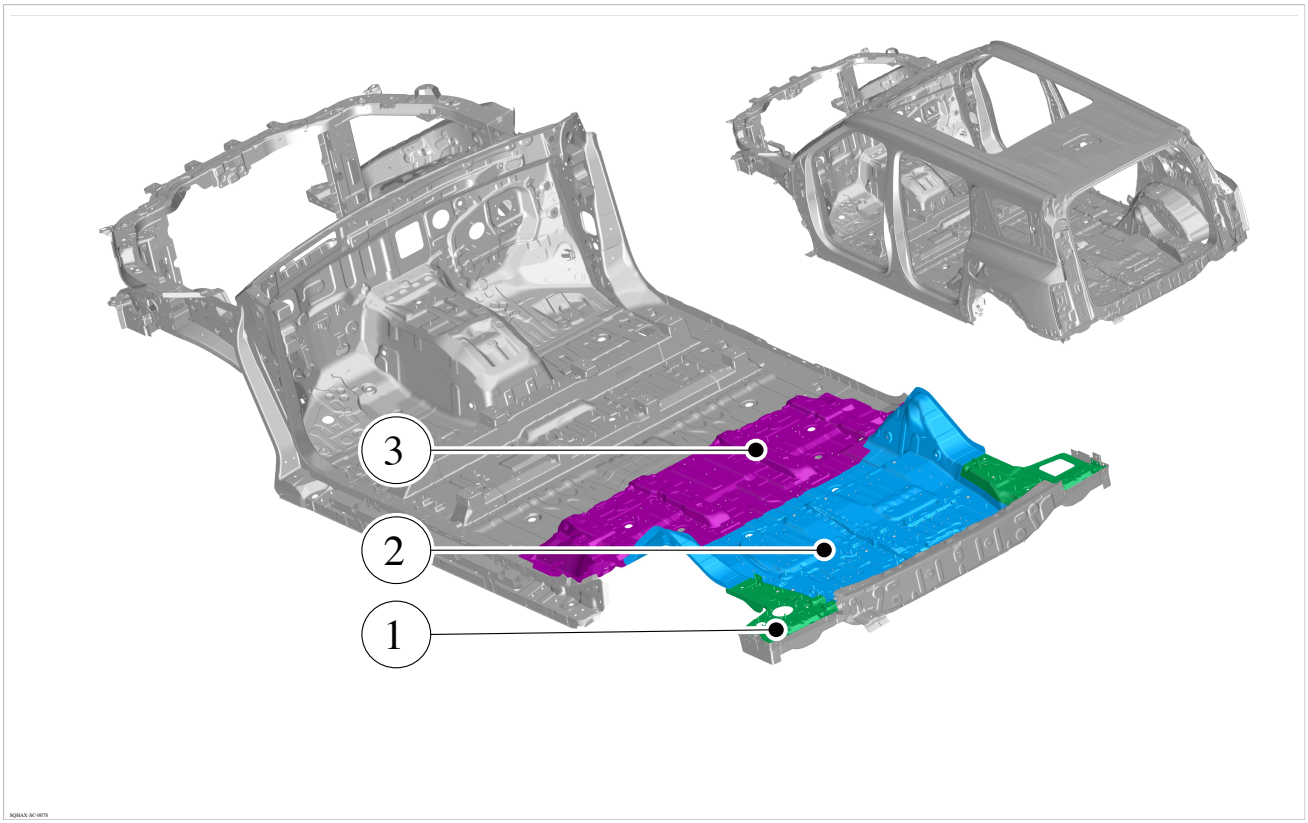
The main purpose of this article is to assist you in identifying the location and corresponding details of the floor parts that n eed to be replaced.

Table of Contents

- Section I: Upper part of the floor
- Section Two: Under the floor

Upper floor

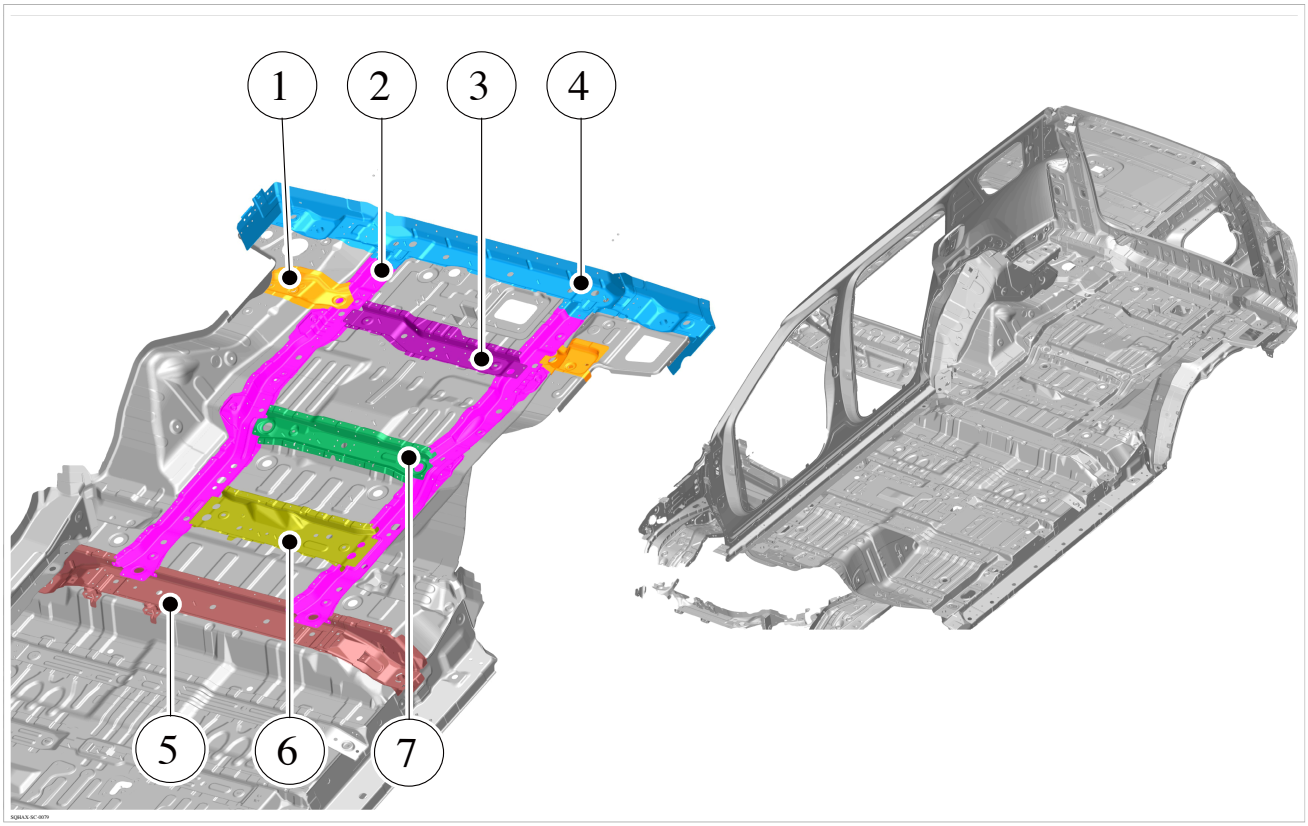
You can find and confirm the reference materials for the upper part of the **floor through the diagram and table below**.



S/N	Component name	Refer to document
1	Rear floor cover panel	Rear Floor Sealing Plate Assembly
2	Rear floor panel	Rear floor panel assembly
3	Middle floor panel	Middle floor panel assembly

Under the floor

You can use the following diagram and table to locate and confirm reference materials under the **floor** .



S/N	Component name	Refer to document
1	Seat Belt Installation Reinforcement Plate	Seat Belt Installation Reinforcement Plate Assembly
2	Rear longitudinal beam	Rear longitudinal beam assembly
3	Floor Beam I	Floor Beam Assembly I
4	Rear floor rear crossmember	Rear Floor Rear Crossmember Assembly
5	Middle Floor Front Crossmember	Middle Floor Front Cross Beam Assembly
6	Rear floor lower cross beam	Rear floor lower cross beam assembly
7	Middle Floor Rear Crossbeam	Rear cross beam assembly of middle floor

Seat Belt Installation Reinforcement Plate Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

- Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .
- During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

- The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.
- There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

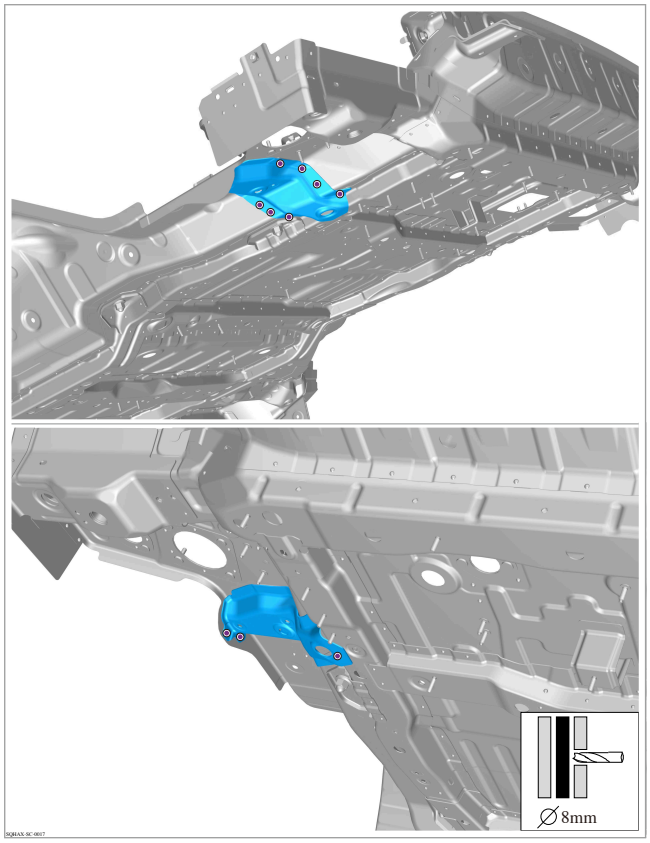
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

- **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
- **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
- **Punching**： Puncher, refer toAuxiliary tools .
- **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
- **Welding**: Gas shielded welder, refer to Welding tools .
- **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble seat belt installation reinforcement plate assembly.
   a. Use an 8mm special drill bit to remove one layer of weld points and remove the seat belt installation reinforceme nt plate assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

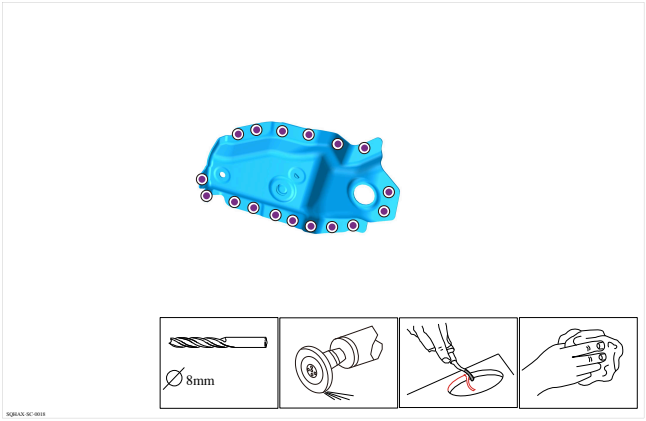
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

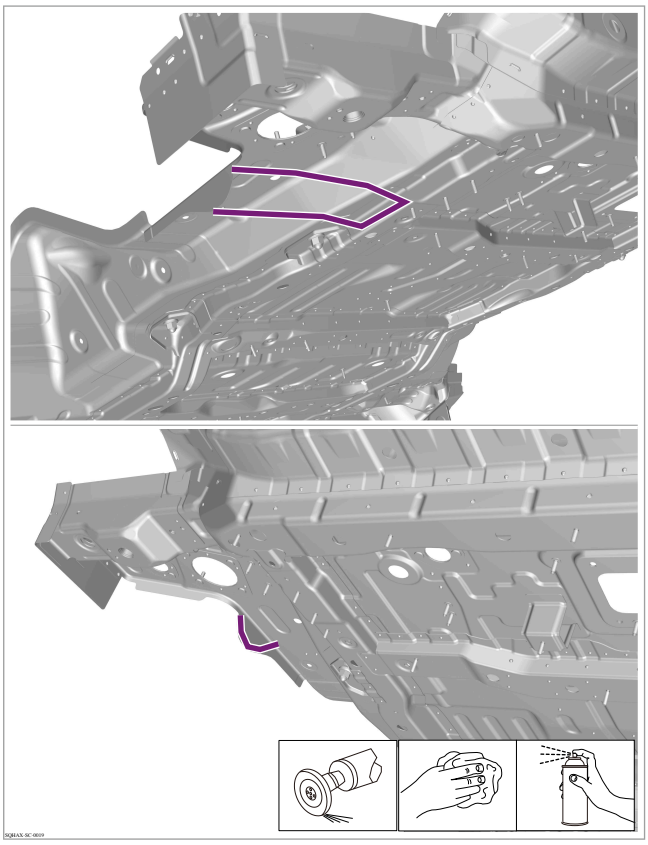
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Spray zinc powder conductive primer on the re-joint surface.

Caution

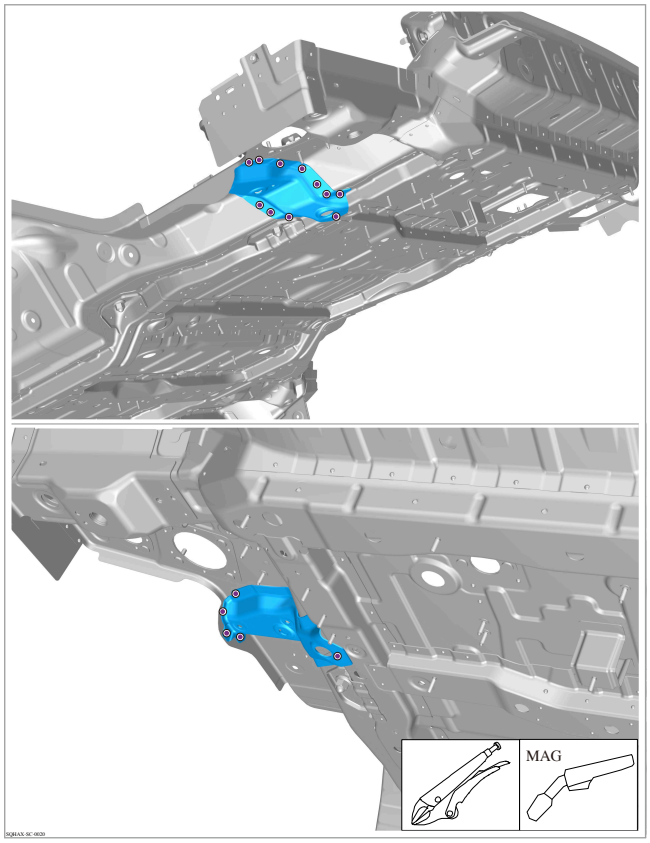
Do not spray it too thick to avoid affecting the welding quality.



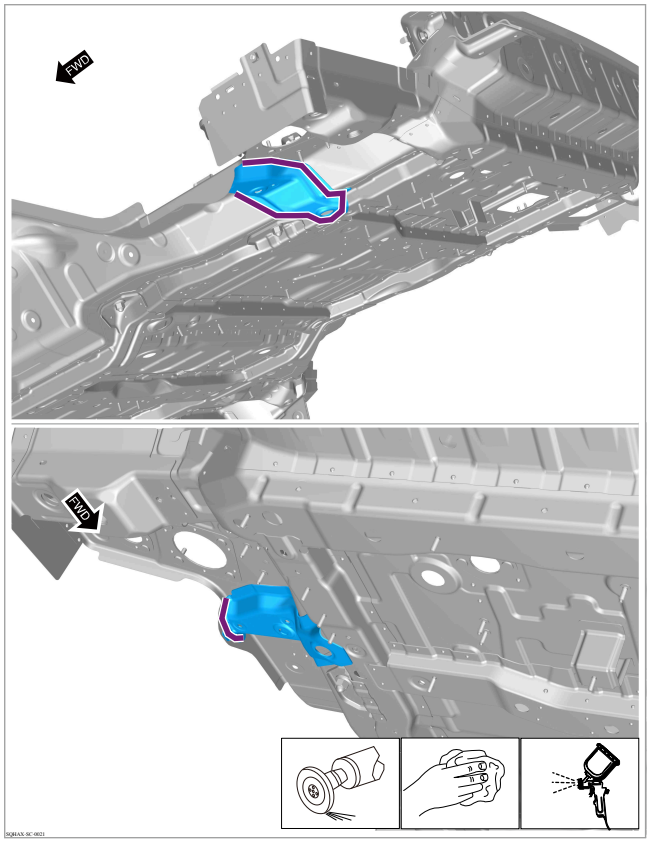
3. Use locking pliers to secure the seat belt installation reinforcement plate assembly in place and perform metal active g as welding.

Caution

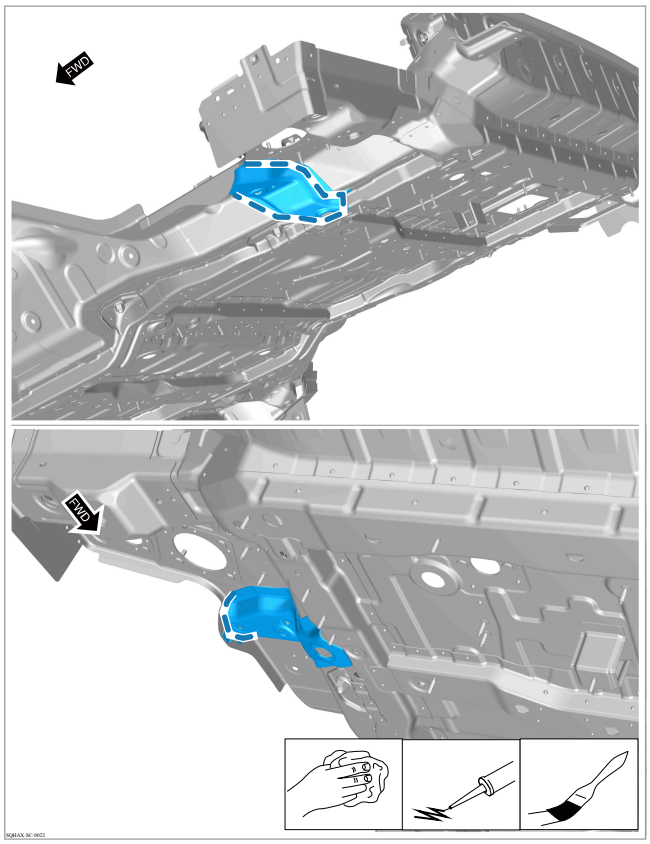
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



Floor Beam Assembly I

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

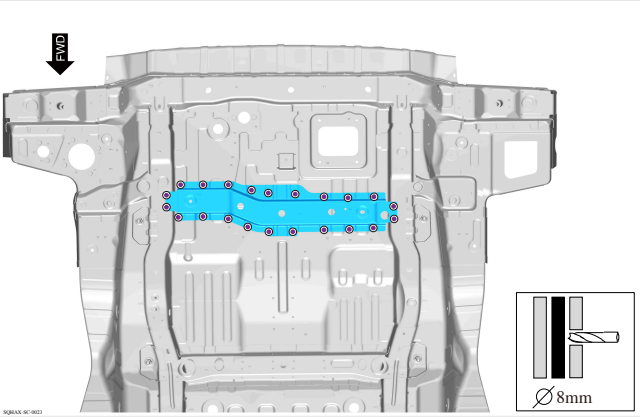
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Use a special 8mm drill bit to remove the first layer of welds and remove the floor beam I assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

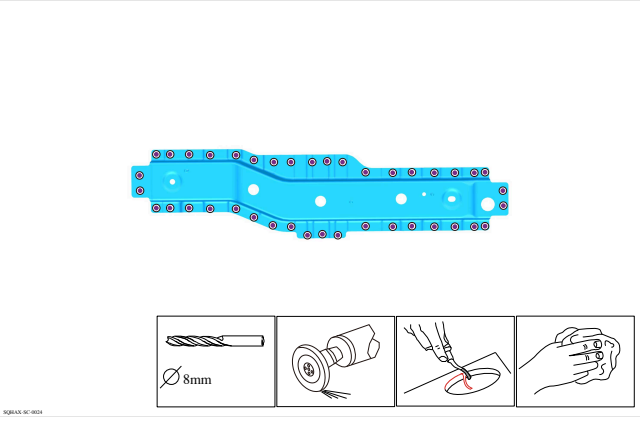
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

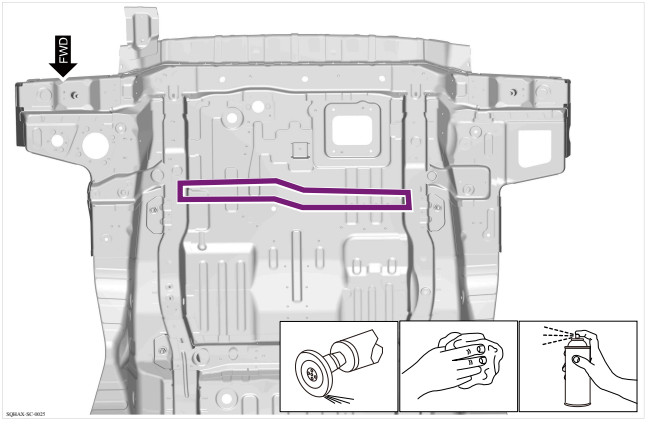
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

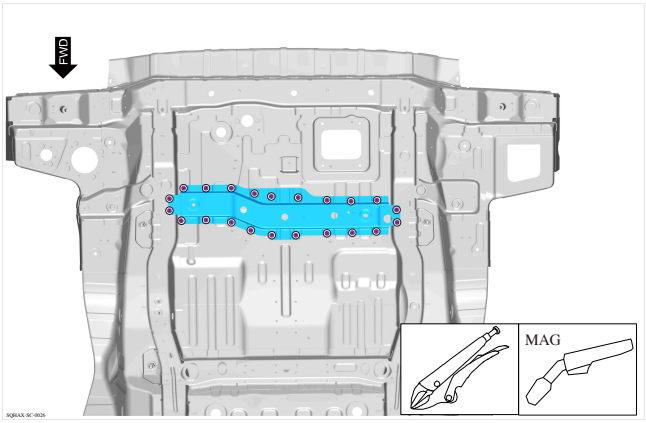
Do not spray it too thick to avoid affecting the welding quality.



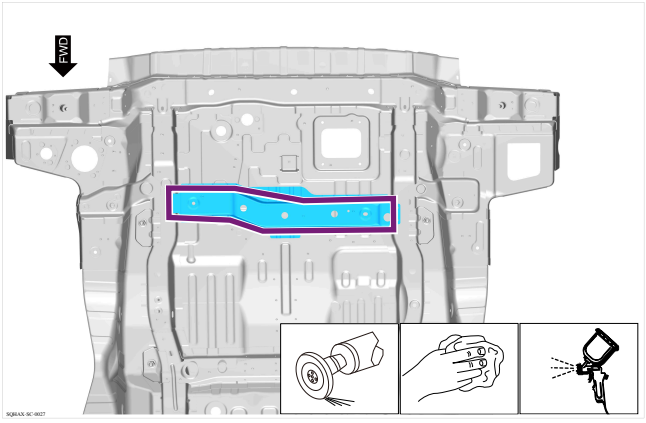
3. Use locking pliers to secure the floor crossbeam assembly I to the original position, and weld it using metal active gas welding.

Caution

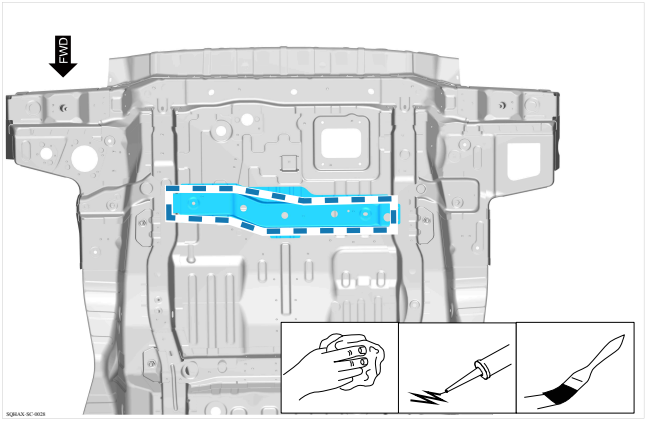
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



Rear Floor Sealing Plate Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

Reminder

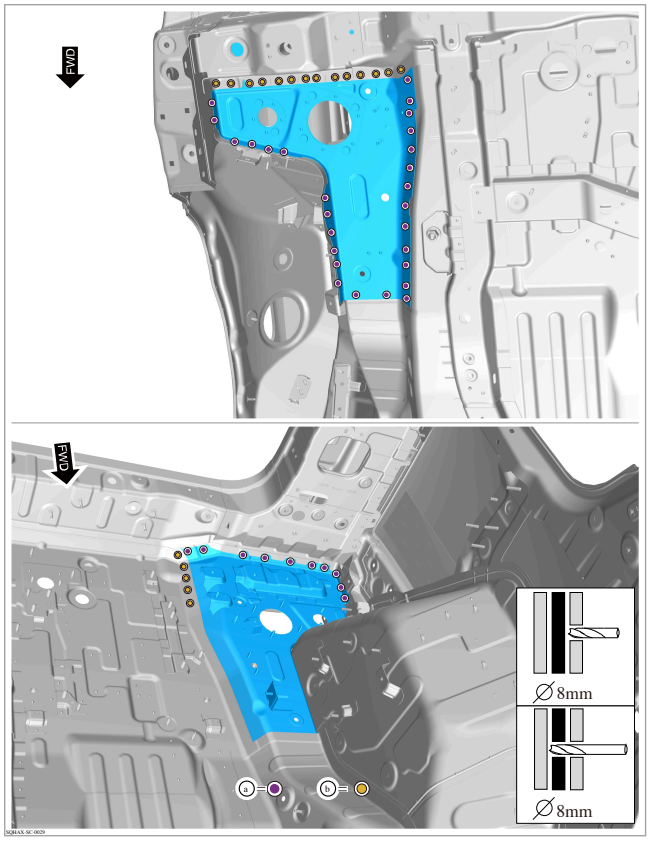
The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble seat belt installation reinforcement plate assembly. Refer to Seat Belt Installation Reinforcement Plate A ssembly
2. Disassemble the floor sealing panel assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.

b. Using an 8mm special drill bit, remove the 2 layers of welds and take out the rear floor lower cross member assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

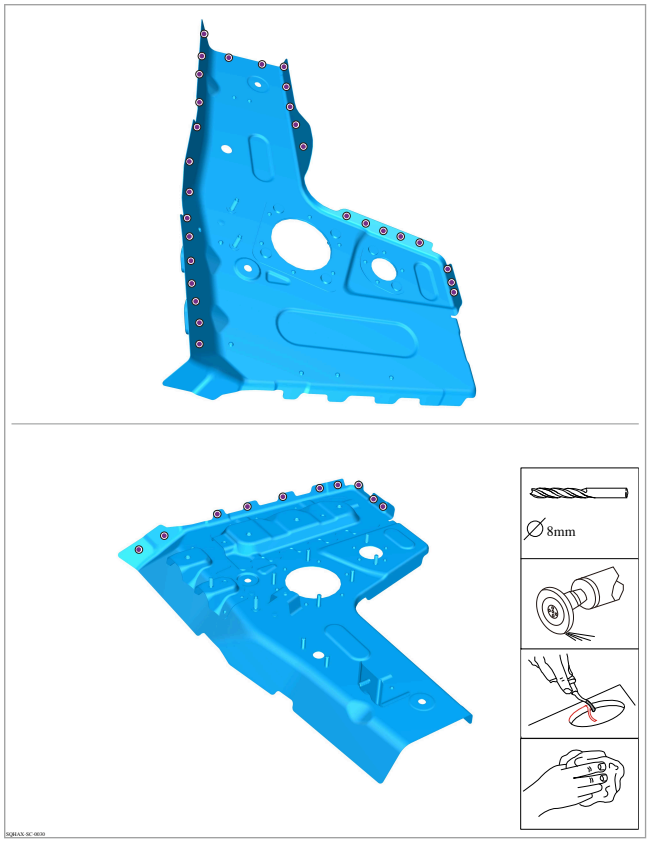
Caution

- During installation of components, the number of welding spots shall be increased by about 30% on the basis of the original number.
- When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

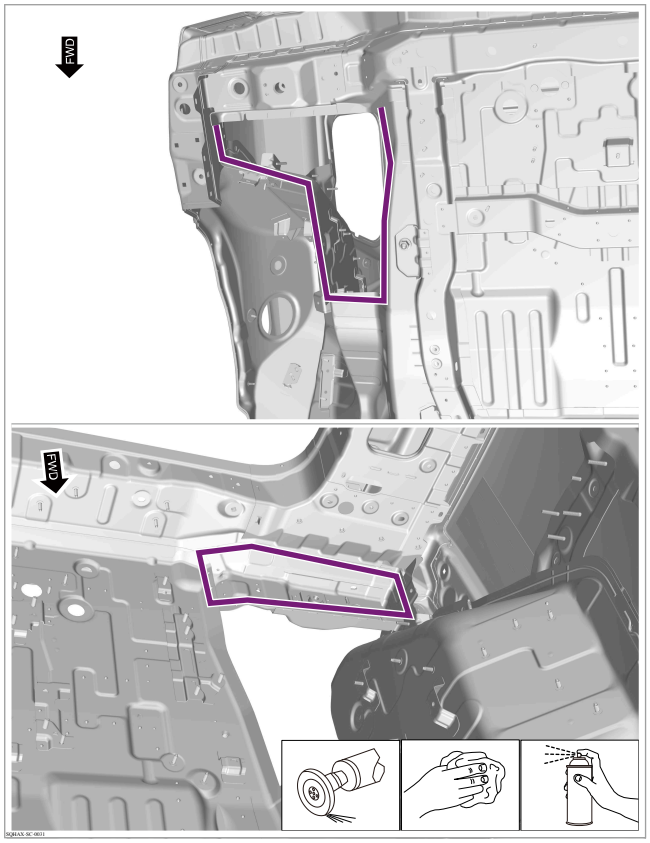


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Spray zinc powder conductive primer on the re-joint surface.

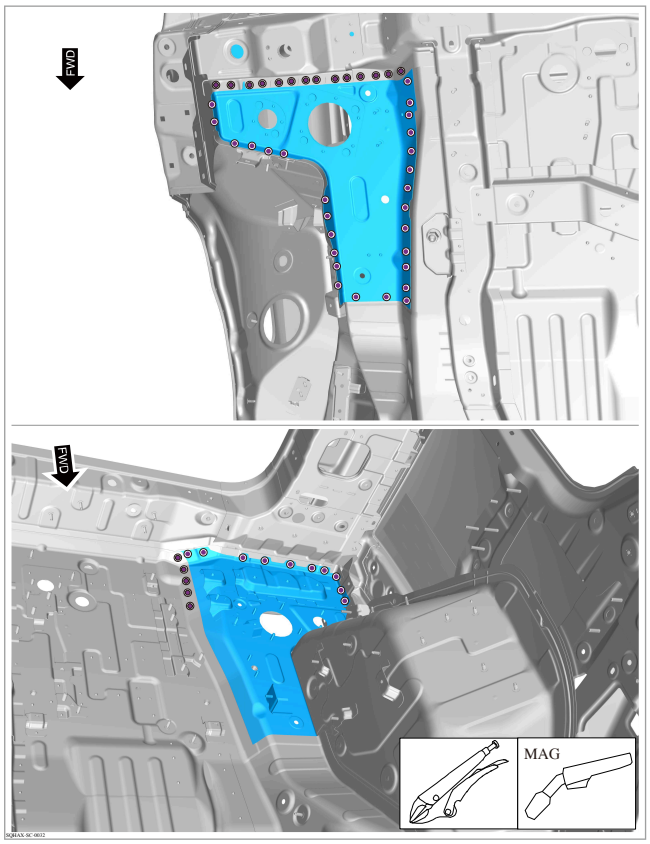
> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



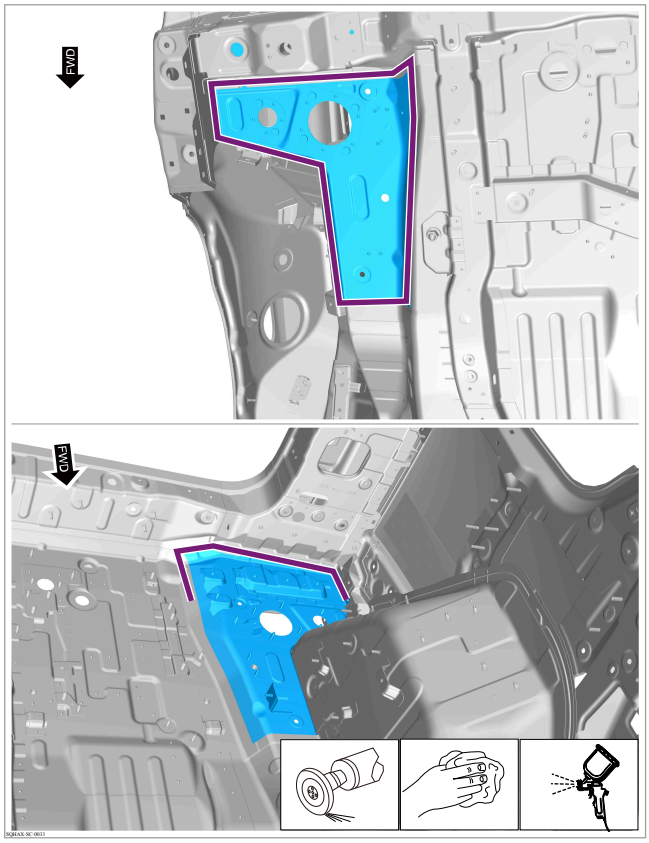
3. Use locking pliers to fix the rear floor panel assembly to the original position, and weld using metal active gas welding.

Caution

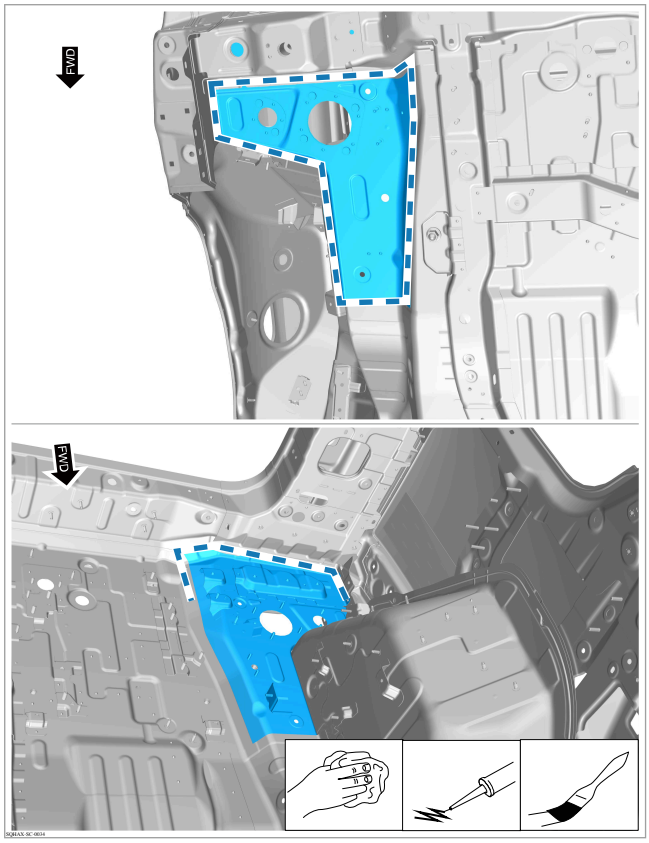
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



6. Install seat belt installation reinforcement plate assembly). Refer to Seat Belt Installation Reinforcement Plate Assemb ly

Rear Floor Rear Crossmember Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

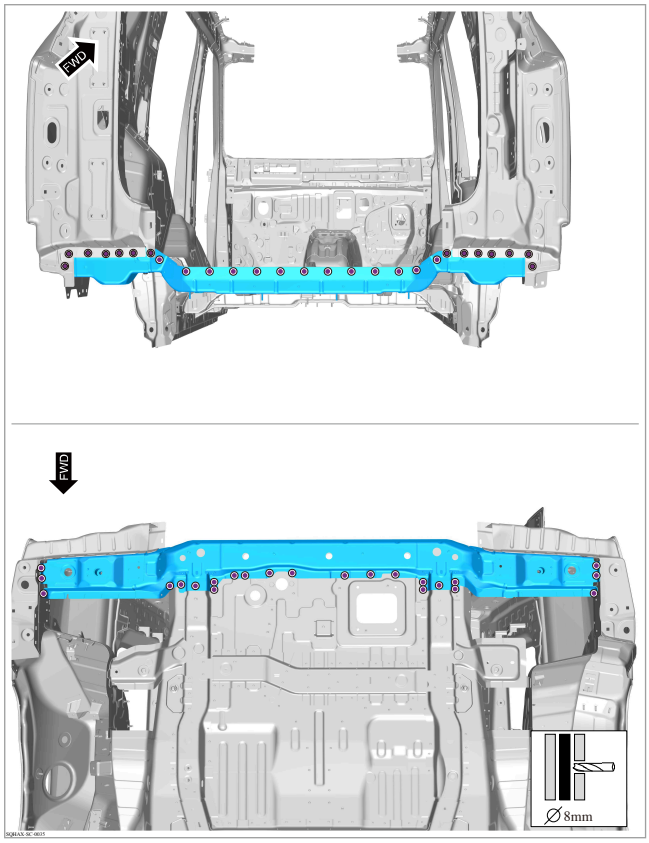
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the floor sealing panel assembly. Refer to Rear Floor Sealing Plate Assembly
2. Remove the rear wall panel assembly. Refer to Rear wall panel assembly
3. Disassemble the assembly of the rear cross member of the floor.
   a. Use an 8mm specialized drill bit to remove one layer of weld spots and detach the rear floor rear crossmember a ssembly



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

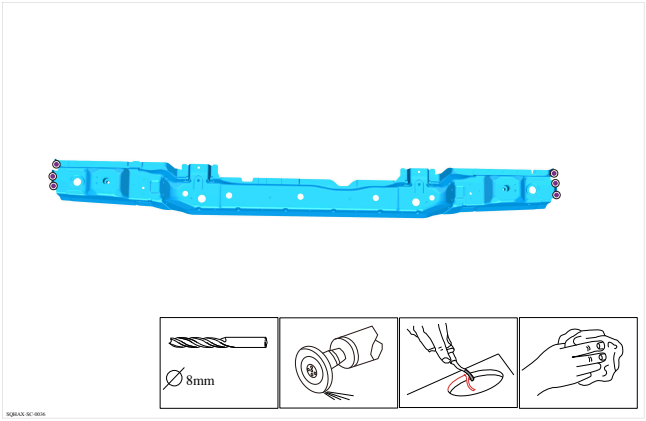
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

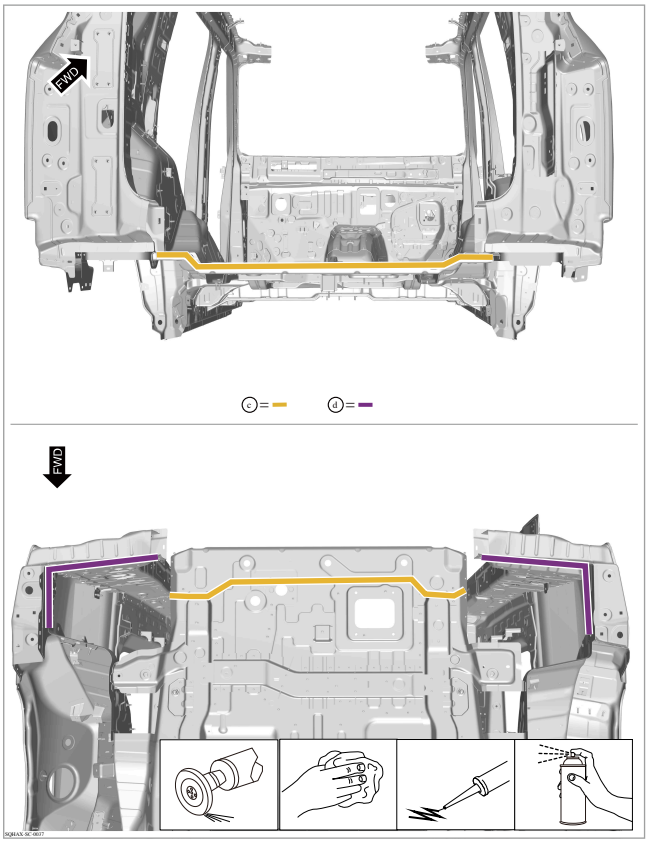


2. Secure the prepared parts to the vehicle body and measure Underbody for correctness, see
3. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



4. Use locking pliers to secure the rear floor rear cross member assembly to its original position and weld it.

Caution

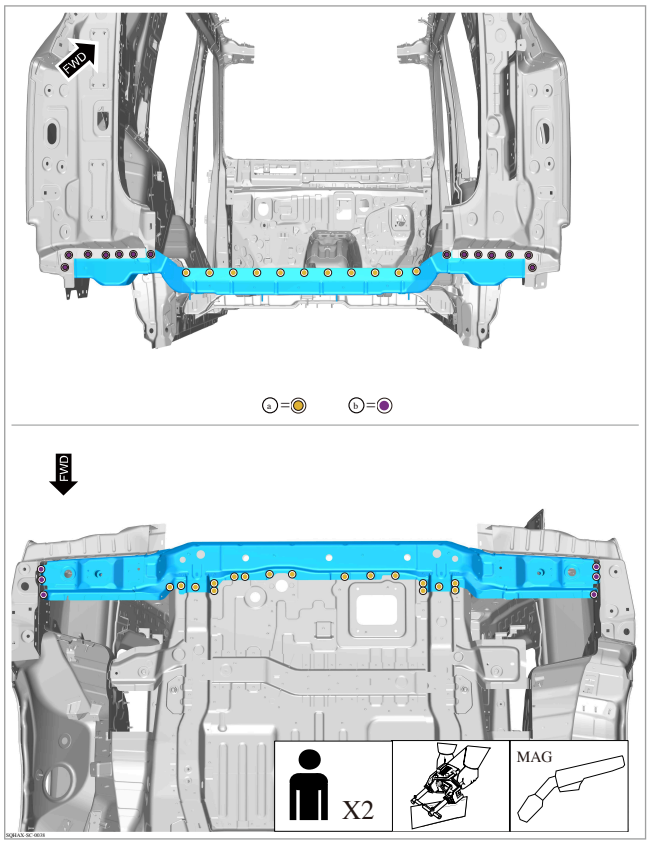
This step is difficult to be performed and requires the cooperation of many people.

a. Use resistance spot welding.

b. Use metal active gas welding.

Caution

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



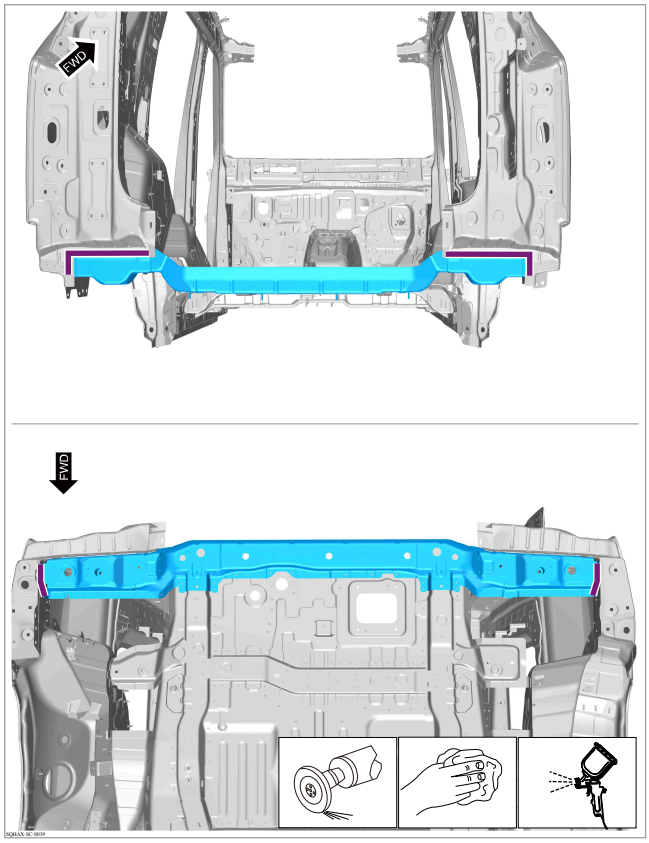
5. Please confirm again whether the data underneath the vehicle body is correct, see Underbody

Reminder

– If there is an abnormality in the data, please refer to body repair.

– If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.

8. Install the rear wall panel assembly. Refer to Rear wall panel assembly
9. Install the floor end board assembly. Refer to Rear Floor Sealing Plate Assembly

Rear floor panel assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

Reminder

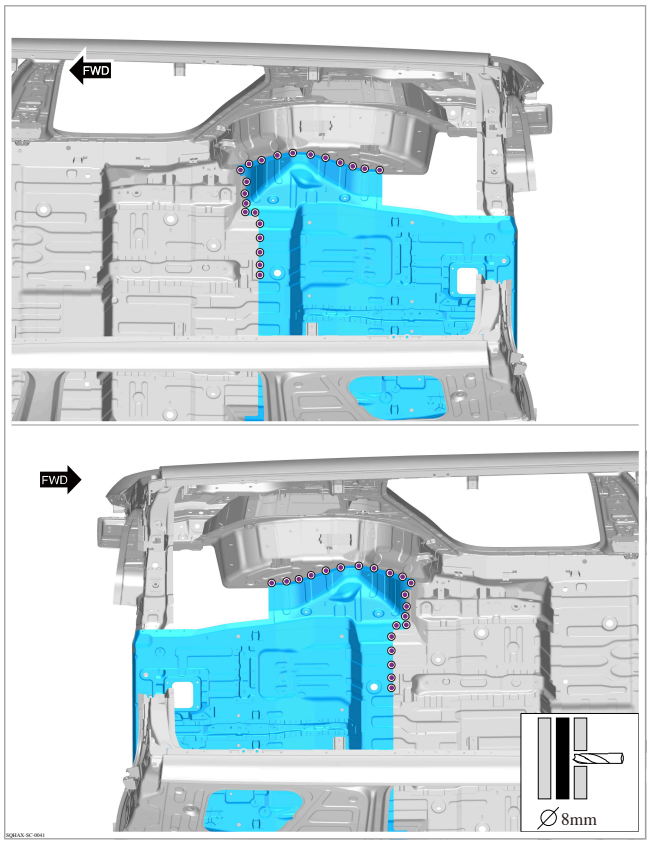
The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble the seat belt installation reinforcement plate assembly (both sides). Refer to Seat Belt Installation Reinfo rcement Plate Assembly
2. Disassemble the floor beam I assembly. Refer to Floor Beam Assembly I
3. Disassemble the rear middle panel assembly. Refer to Rear wall panel assembly
4. Disassemble the floor closure panel assembly (both sides). Refer to Rear Floor Sealing Plate Assembly

5. Disassemble the floor rear cross member assembly I. Refer to Rear Floor Rear Crossmember Assembly
6. Disassembly of the underfloor beam assembly. Refer to Rear cross beam assembly of middle floor
7. Remove the longitudinal beam assembly (both sides) after disassembly. Refer to Rear longitudinal beam assembly
8. Remove the welding spots.
   a. Use a special 8mm drill bit to remove one layer of weld spots and dismantle the rear floor panel assembly.



Installation

⚠ Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

⚠ Caution

- During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
- When welding, the original welding spots should be avoided.
- During welding, a test weld should be conducted to confirm that the machine is adjusted properly, **weld point di stance = plate thickness * 10 + 10mm**, see Gas shielded welding for welding methods.
- To reduce welding slag splashing, the zinc powder conductive primer at the hole position can be removed with steel wire before metal active gas welding.
- It is recommended to use the tack cloth and degreasing cleaner to clean the joint surface.

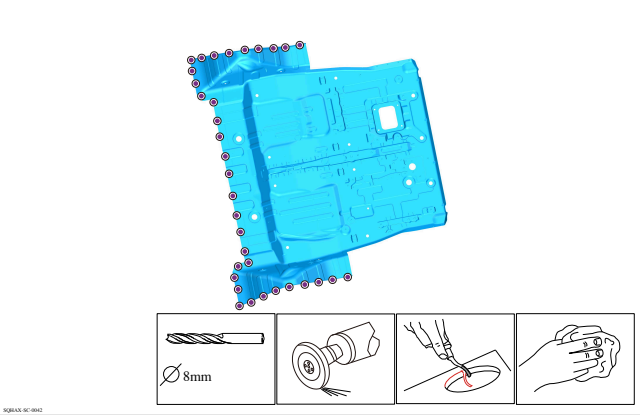
1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

c. Remove burrs in the circular hole.

d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Secure the prepared parts to the vehicle body and measure Underbody for correctness, see

3. Handle the joint surface.

a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

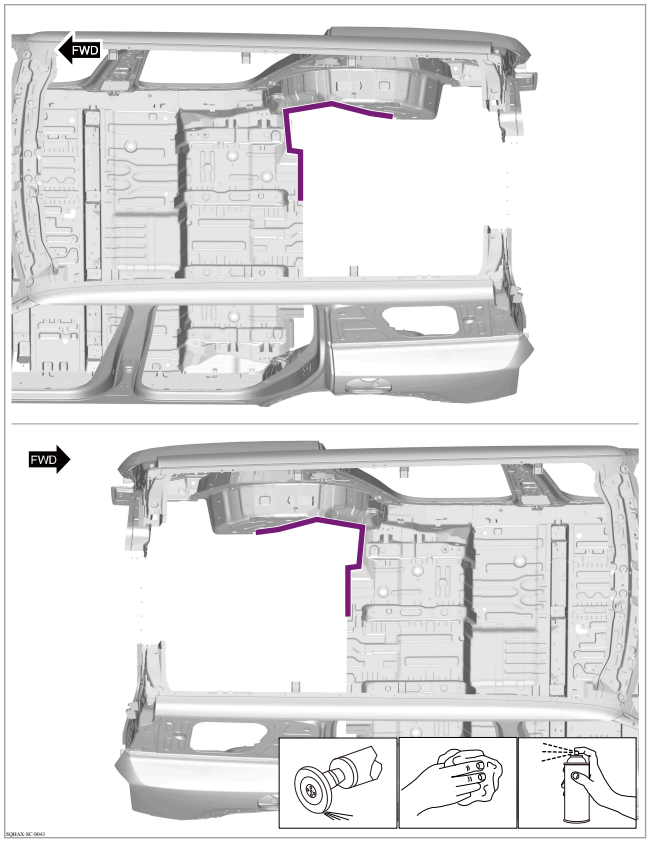
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

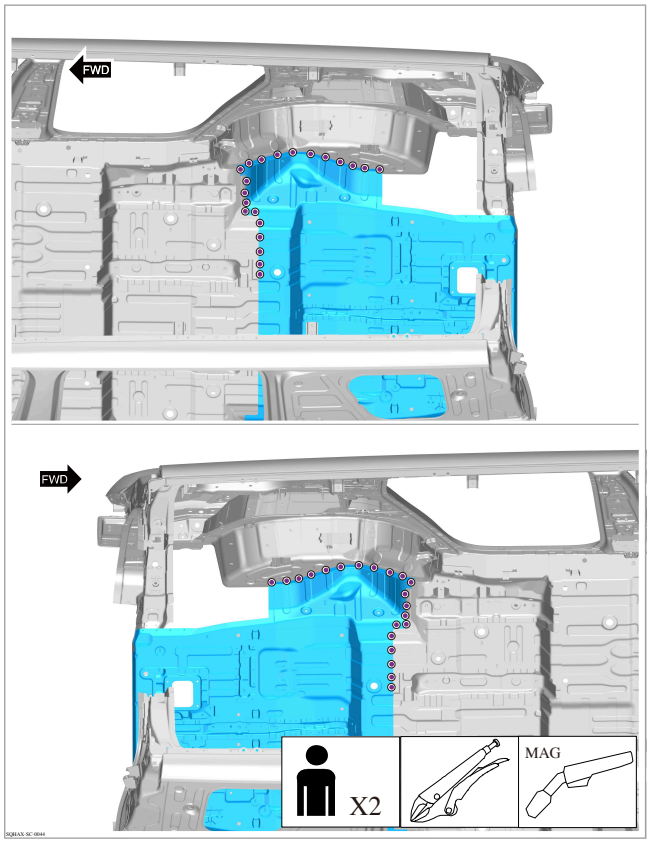
Do not spray it too thick to avoid affecting the welding quality.



4. Use locking pliers to secure the rear floor panel assembly to the original position and weld it.

> **Caution**
>
> This step is difficult to be performed and requires the cooperation of many people.

a. Use metal active gas welding.

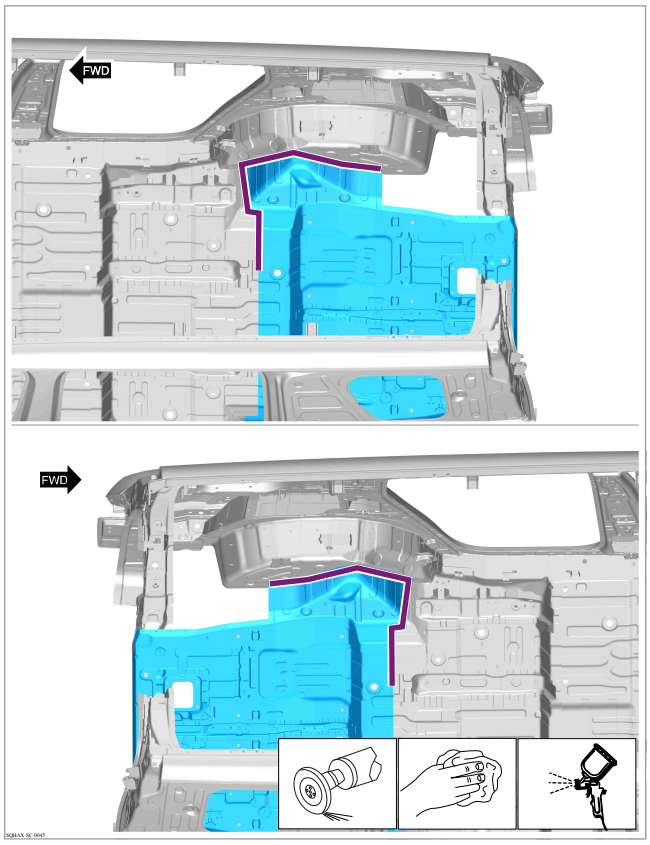


5. Please confirm again whether the data underneath the vehicle body is correct, see Underbody

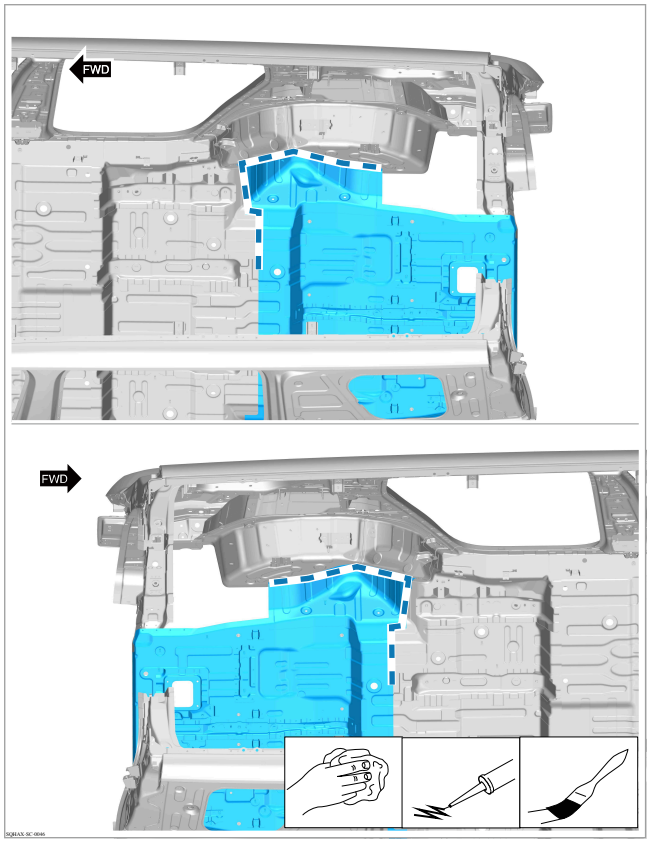
Reminder

- If there is an abnormality in the data, please refer to body repair.
- If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



8. Install the rear longitudinal member assembly (both sides). Refer to Rear longitudinal beam assembly
9. Installing the subfloor crossbeam assembly. Refer to Rear cross beam assembly of middle floor
10. Install floor beam assembly I. Refer to Floor Beam Assembly I
11. Installation of floor end panel assembly (both sides) after installation. Refer to Rear Floor Sealing Plate Assembly
12. Install the rear floor crossmember assembly after the floor. Refer to Rear Floor Rear Crossmember Assembly
13. Install the rear wall panel assembly. Refer to Rear wall panel assembly
14. Install the safety belt installation reinforcement plate assembly (both sides) after installation. Refer to Seat Belt Installa tion Reinforcement Plate Assembly

Rear floor lower cross beam assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

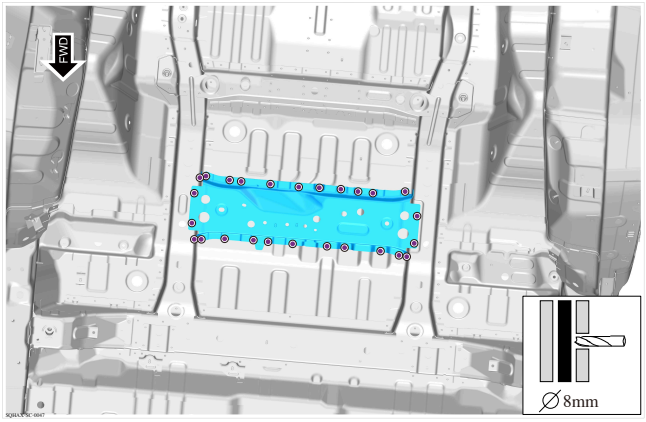
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Use an 8mm special drill bit to remove one layer of weld spots and remove the rear floor lower beam assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

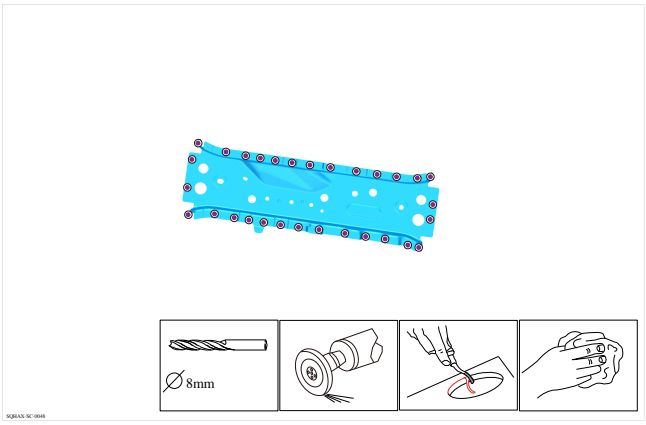
Caution

- During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
- When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

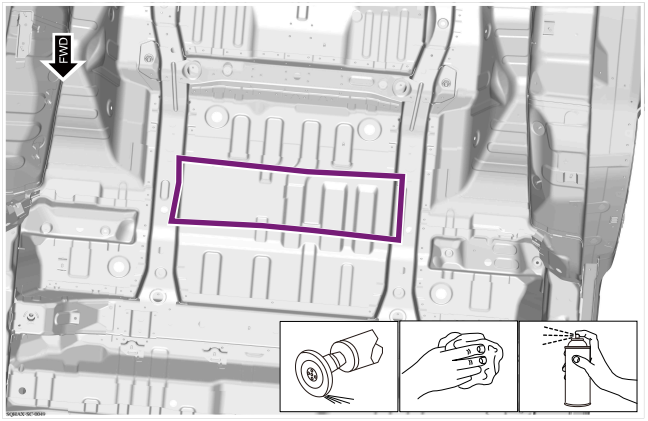
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

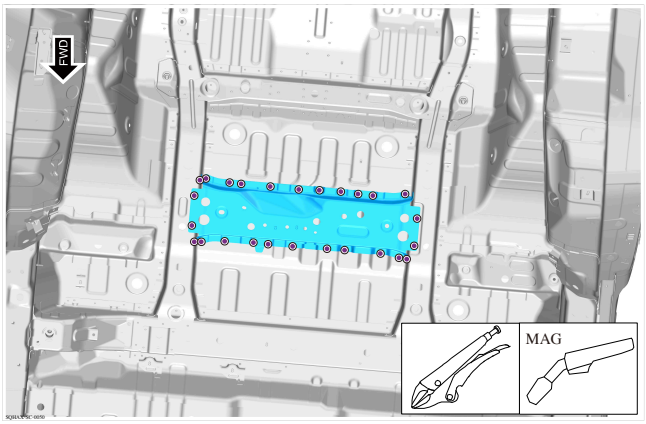
Do not spray it too thick to avoid affecting the welding quality.



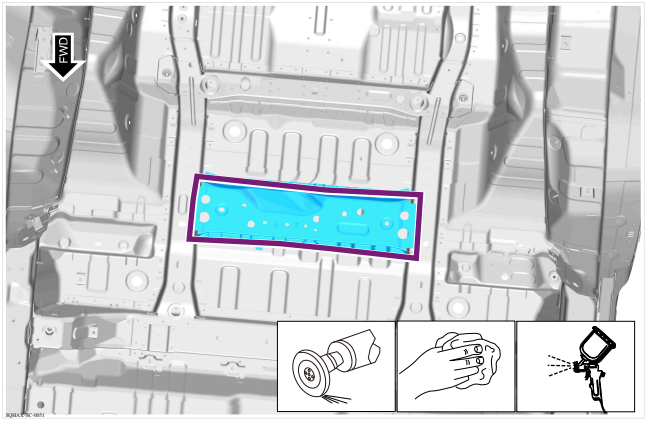
3. Use locking pliers to secure the rear floor under the crossbeam to the original position, and weld it using metal active gas welding.

Caution

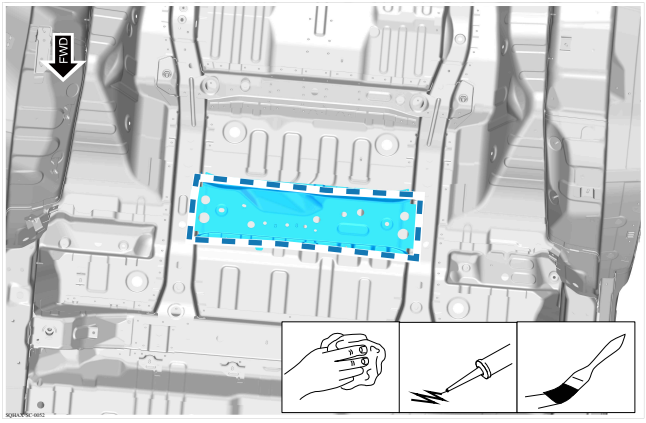
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



Rear longitudinal beam assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

The disassembly and assembly methods on the left and right sides are the same. Below is an example of the left si de.

Operation tools and auxiliary materials

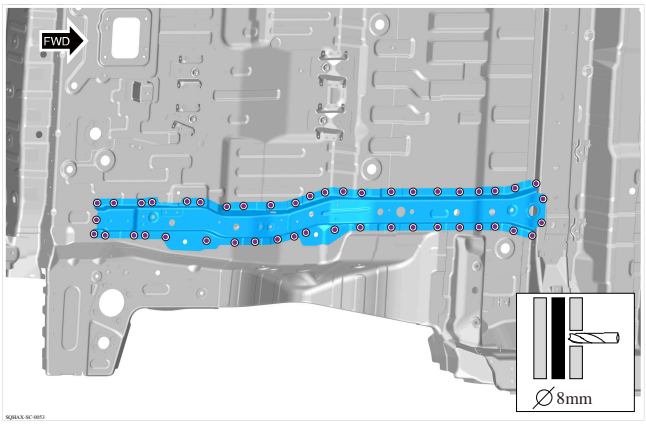
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Disassemble seat belt installation reinforcement plate assembly. Refer to Seat Belt Installation Reinforcement Plate A ssembly
2. Disassemble the floor cross beam I cross beam assembly. Refer to Floor Beam Assembly I
3. Disassemble the Floor Rear Crossmember Assembly 1. Refer to Rear Floor Rear Crossmember Assembly
4. Disassemble the assembly of the crossbeam under the floor. Refer to Rear floor lower cross beam assembly
5. Disassembly of the underfloor beam assembly. Refer to Rear cross beam assembly of middle floor
6. Remove the after longitudinal beam assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

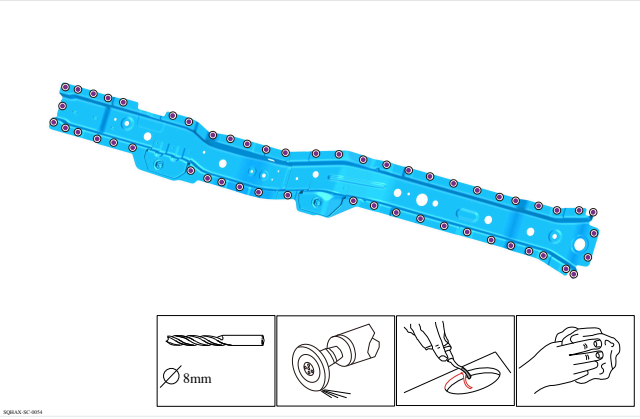
Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

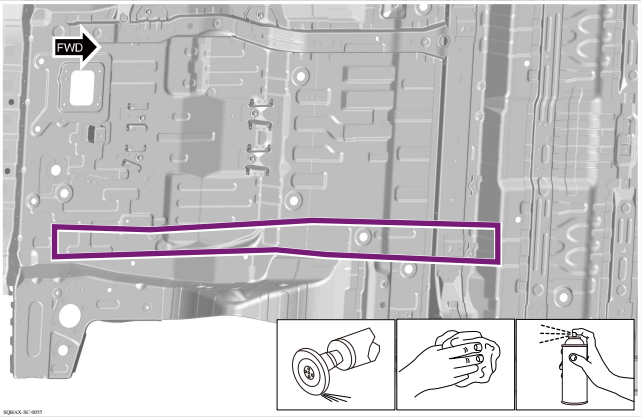


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

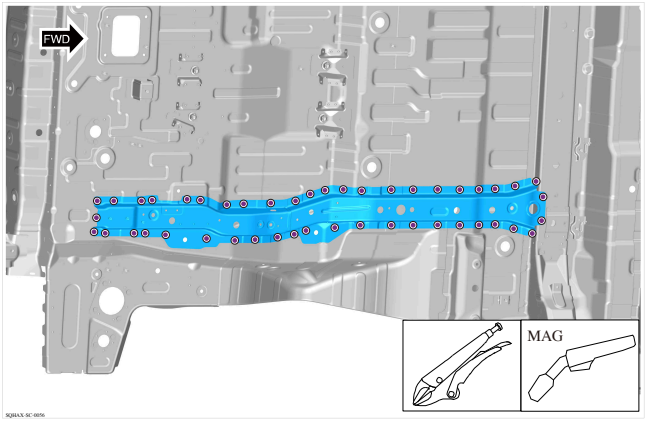
   c. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.

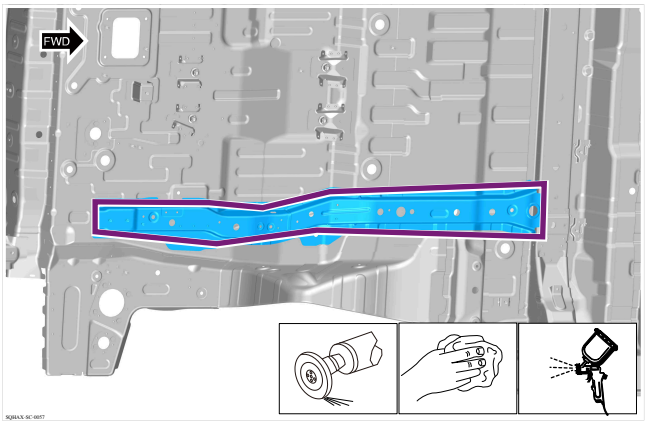


3. Use locking pliers to fix the rear longitudinal beam assembly in the original position, and weld with metal active gas w elding.

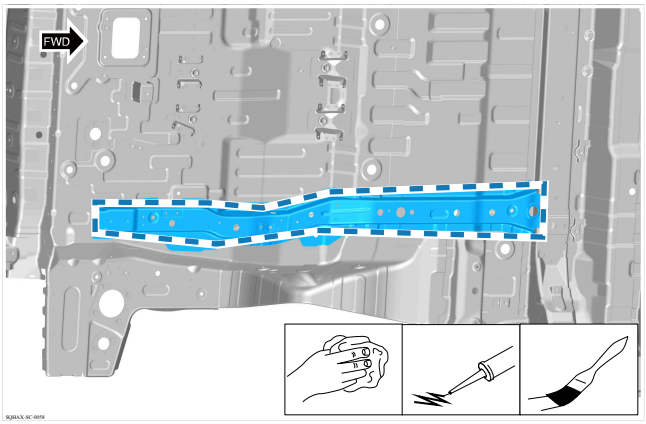
> **Caution**
>
> – During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debrid, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



6. Installing the subfloor crossbeam assembly. Refer to Rear cross beam assembly of middle floor
7. Disassemble the assembly of the crossbeam under the floor. Refer to Rear floor lower cross beam assembly
8. Disassemble the assembly of the rear cross member of the floor. Refer to Rear Floor Rear Crossmember Assembly
9. Disassemble the floor beam I assembly. Refer to Floor Beam Assembly I
10. Install the seat belt installation reinforcement plate assembly. Refer to Seat Belt Installation Reinforcement Plate Asse mbly

Rear cross beam assembly of middle floor

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

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Operation tools and auxiliary materials

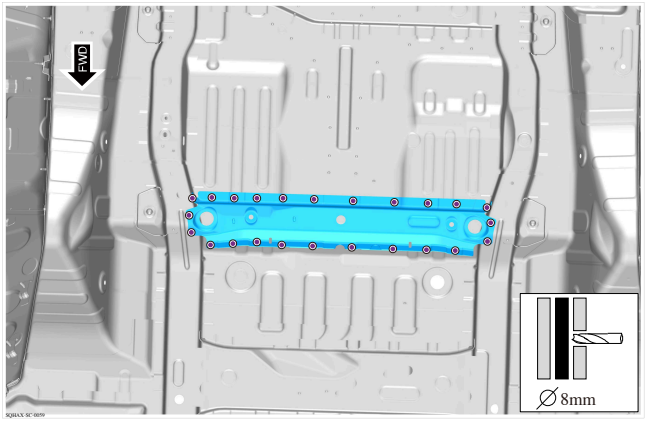
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
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– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Using a 8mm dedicated drill bit, remove one layer of the weld spot and remove the rear crossmember assembly of the middle floor.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

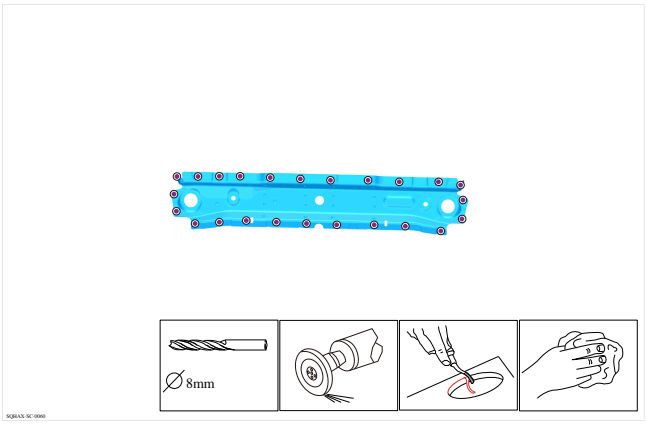
Caution

- During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.
- When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

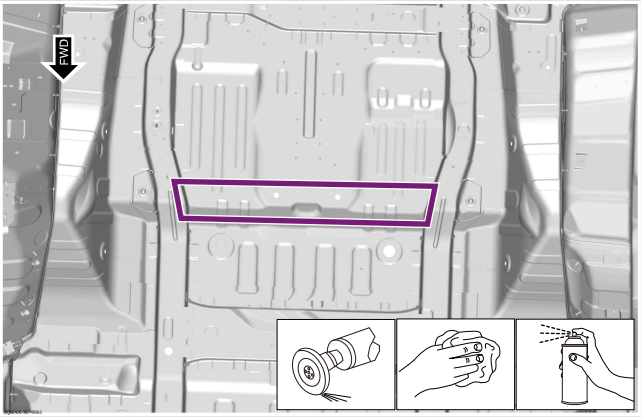
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

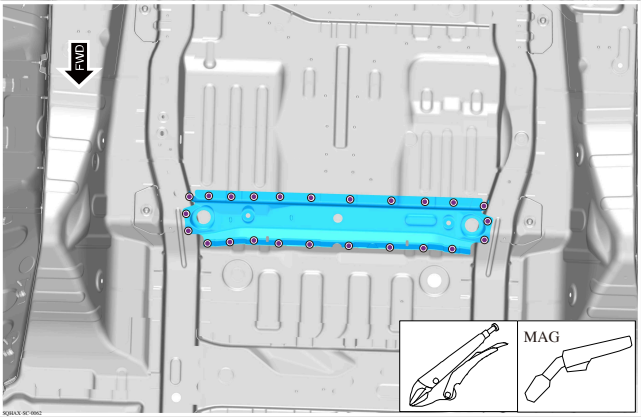
Do not spray it too thick to avoid affecting the welding quality.



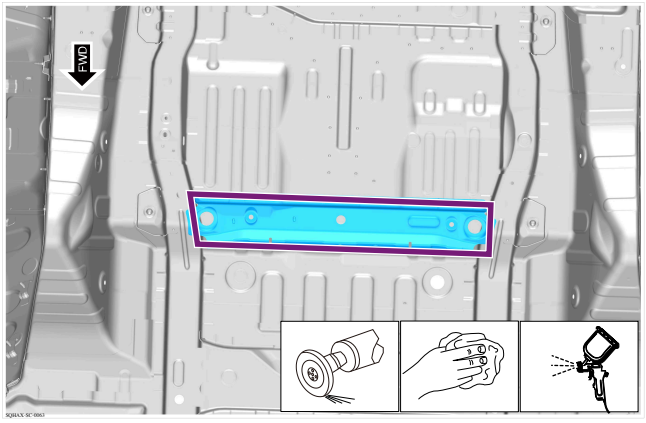
3. Use locking pliers to secure the rear crossbeam of the mid-floor back to its original position, and weld using Metal Acti ve Gas welding.

Caution

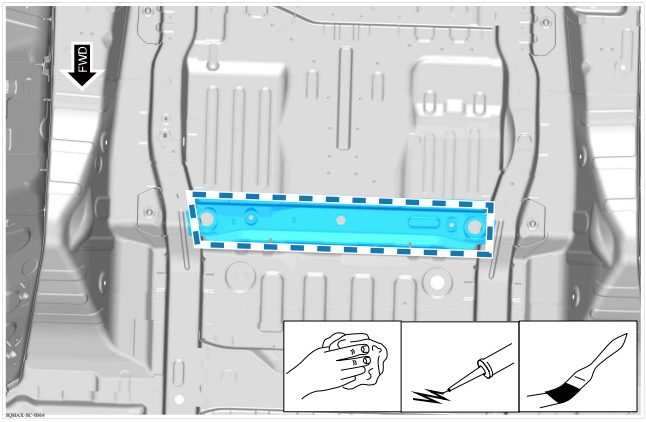
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



Middle floor panel assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

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– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Reminder

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Operation tools and auxiliary materials

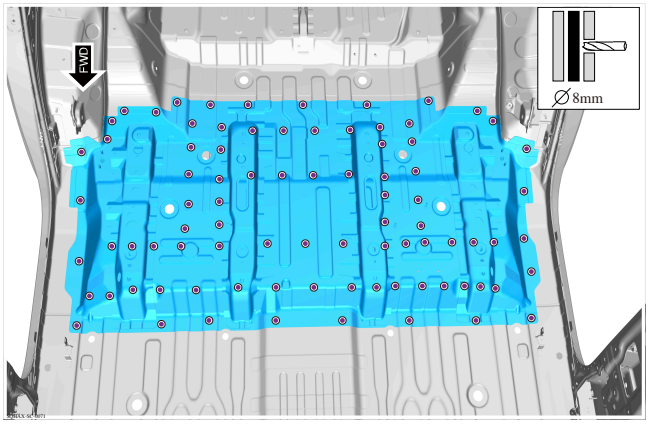
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– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the middle floor panel assembly.
   a. Using an 8mm special drill bit, remove the first layer of weld, and then remove the middle floor panel assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

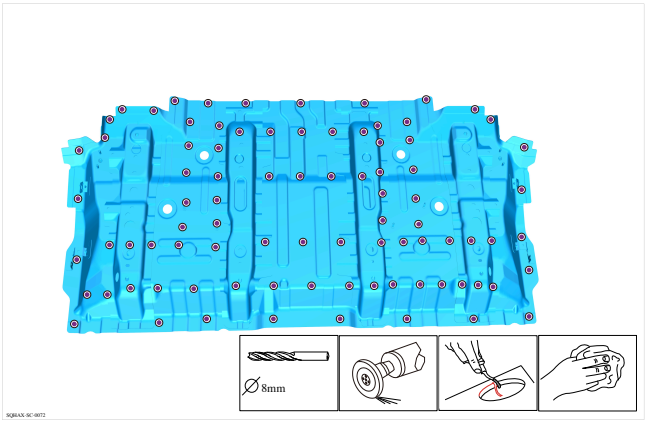
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   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.

a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

b. Wipe off the fine dust and other debris on the joint surface.

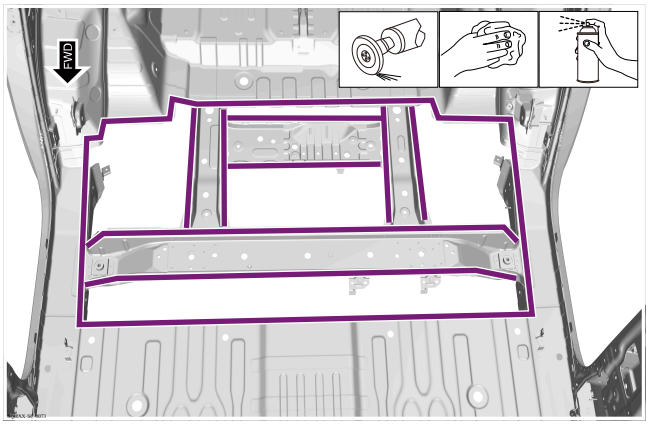
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

Do not spray it too thick to avoid affecting the welding quality.



3. Use locking pliers to secure the mid-floor panel assembly to its original position and perform welding.

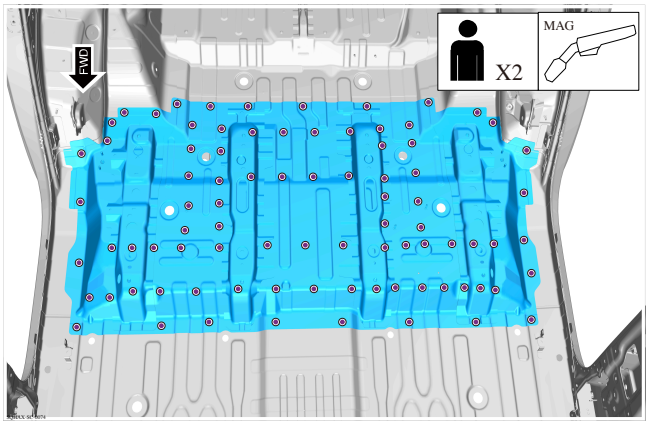
Caution

This step is difficult to be performed and requires the cooperation of many people.

a. Use metal active gas welding.

Caution

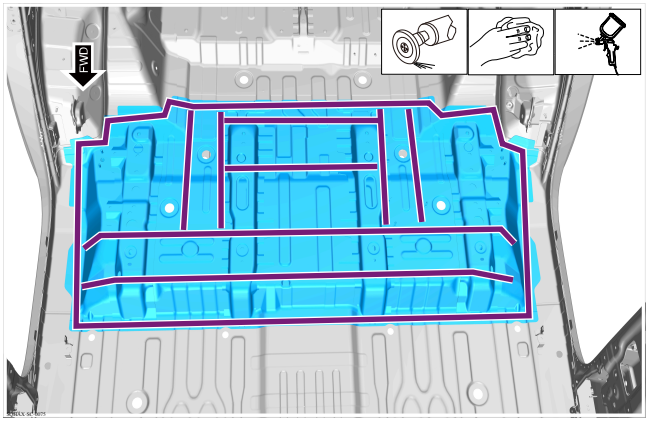
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.

b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.

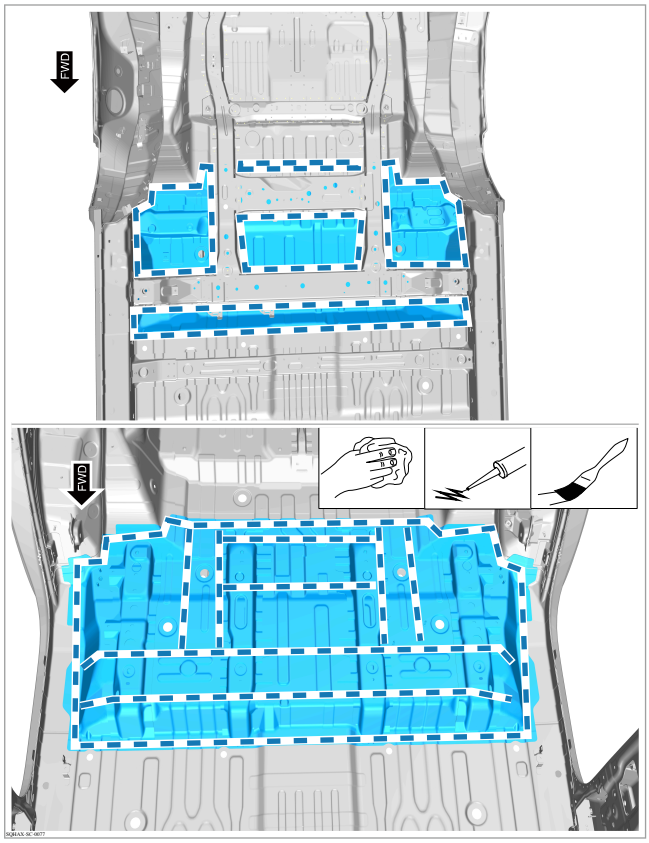
c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.

   b. Apply sealant to the connection area.

   c. Use a brush to apply the sealant evenly.



Middle Floor Front Cross Beam Assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

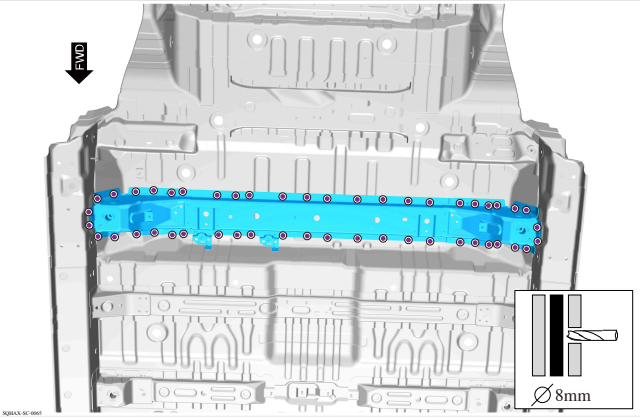
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the after longitudinal beam assembly. Refer to Rear longitudinal beam assembly
2. Use a special 8mm drill bit to remove one layer of weld spot and remove the front crossbeam of the center floor.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

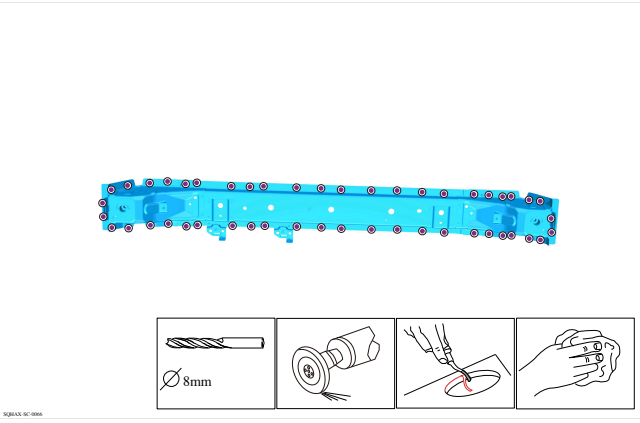
– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Use a special drill bit to create holes at the welding positions of the new component.
   b. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   c. Remove burrs in the circular hole.
   d. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.



2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

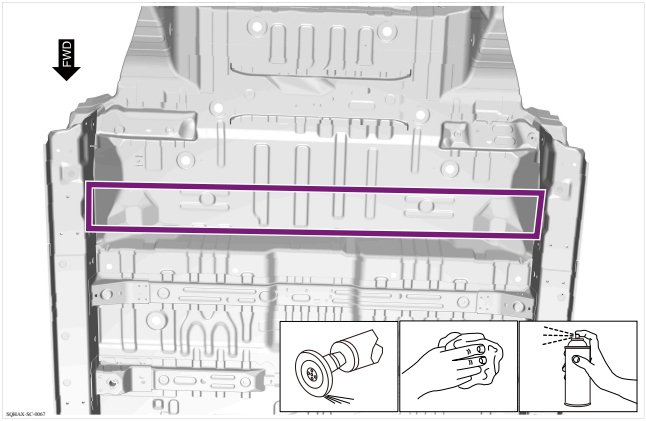
Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

c. Spray zinc powder conductive primer on the re-joint surface.

Caution

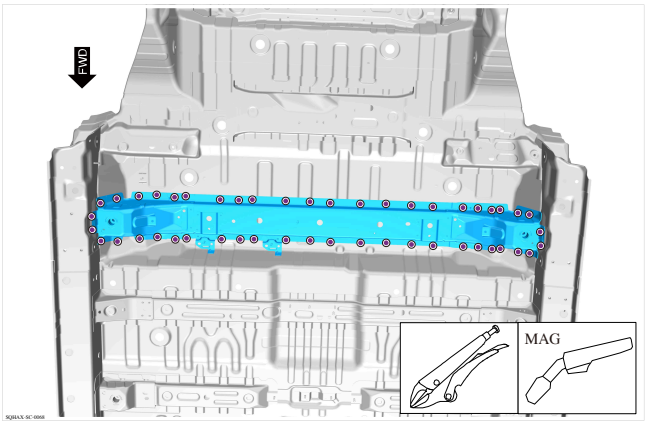
Do not spray it too thick to avoid affecting the welding quality.



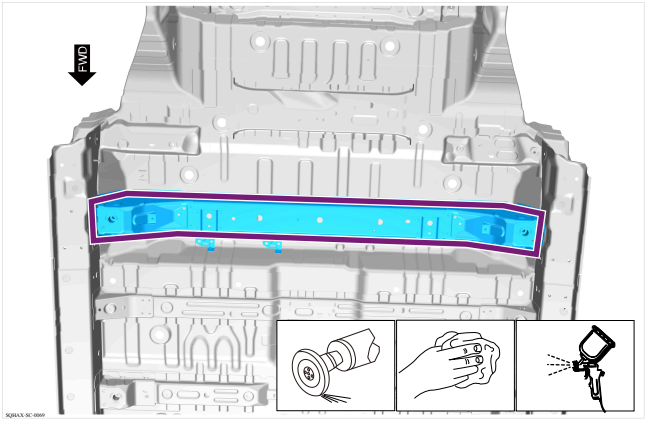
3. Use locking pliers to secure the middle floor front crossbeam assembly to its original position, and weld using metal a ctive gas welding.

Caution

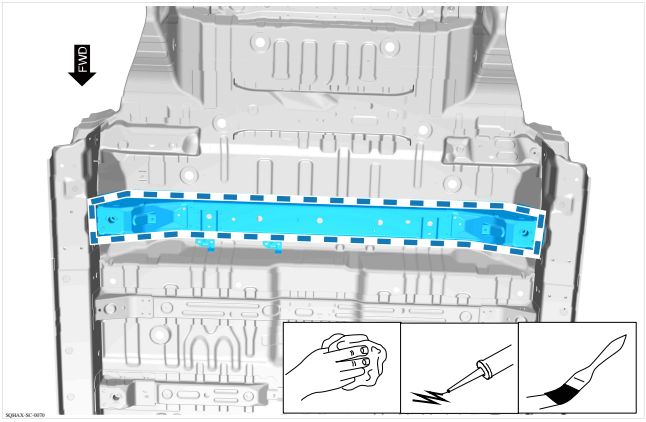
– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Gas shielded w elding .



4. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



5. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



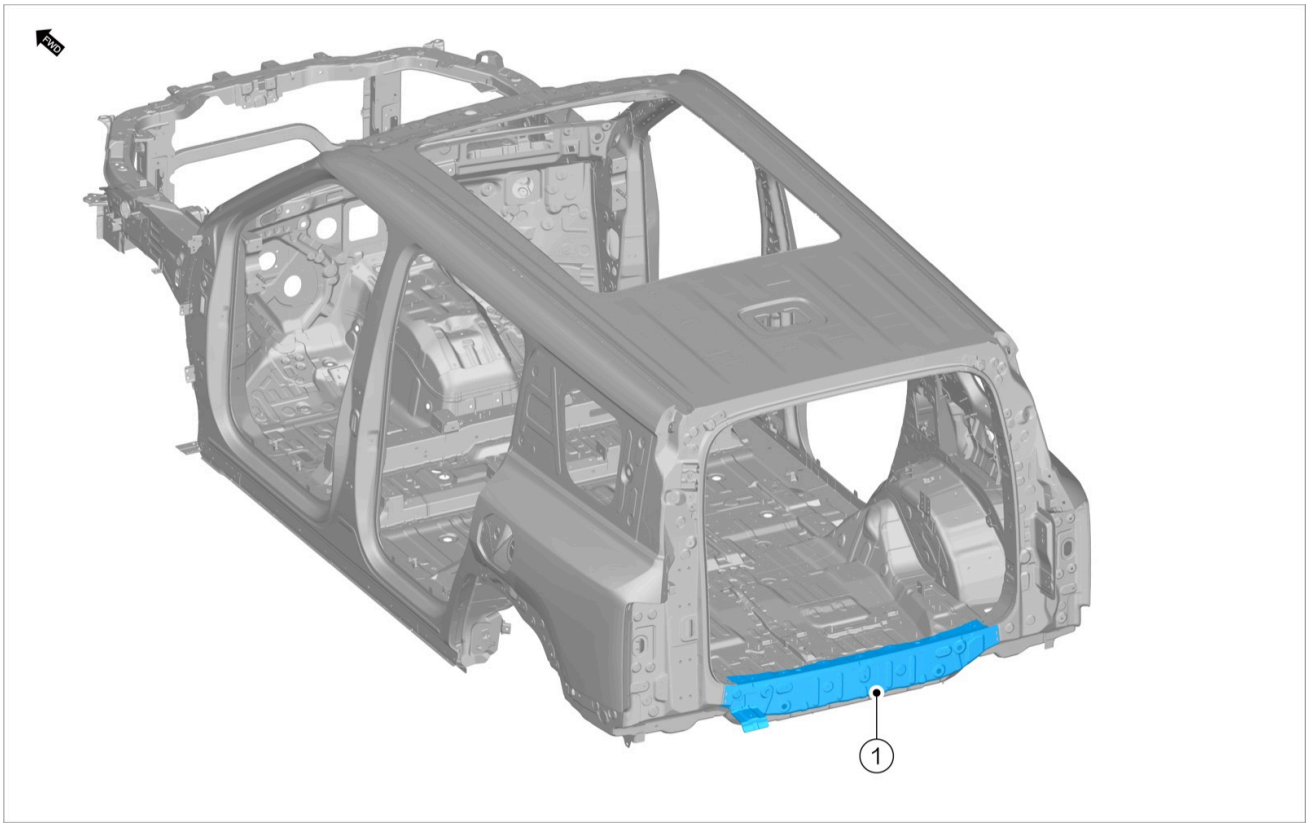
6. Install the rear rail assembly. Refer to Rear longitudinal beam assembly

Component overview

The main purpose of this topic is to help you identify the location and corresponding details of front compartment compone nts that need to be replaced.

Location overview

You can find and confirm the references of components to be repaired through the following figure and table.



S/N	Component name	Refer to document
1	Rear wall panel assembly	Rear wall panel assembly

Rear wall panel assembly

Warning

To avoid repair accidents, the Operation specifications and requirements shall be observed during operation.

Caution

– Before operation, please carefully read and observe site safety and vehicle protection regulations. For details, p lease refer to Site safety and vehicle protection .

– During operation, please take safety protection measures as required. For details of safety protection, please re fer to Sheet metal protection .

Reminder

– The circular icon in the illustration in this topic does not indicate the specific quantity of welding spots, but only i ndicates the approximate positions of welding spots. The specific quantity shall be subject to the actual vehicl e.

– There are various process symbols in the technical illustrations in this document. To understand their meanings, please refer toDescription of diagram .

Operation tools and auxiliary materials

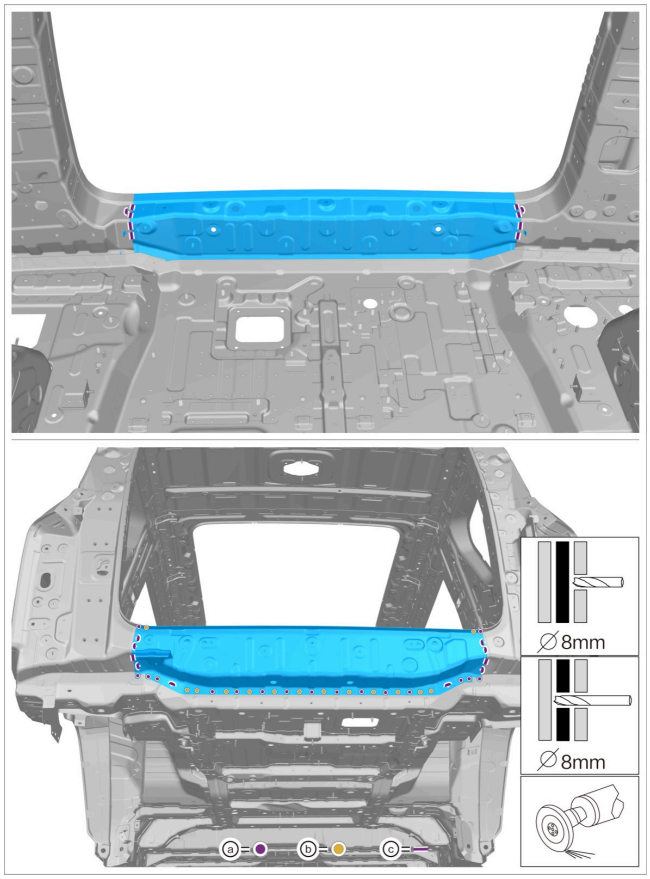
Reminder

The tools and auxiliary materials described in this topic are recommended, which shall be subject to the actual situa tion.

– **Removing welding spots**: Spot welding removal drill, special drill bit, see Removal of welding spots .
– **Cleaning/trimming flats**: Abrasive wheel grinder. Refer to Grinding tools .
– **Punching**： Puncher, refer toAuxiliary tools .
– **Cleaning**: Degreaser, tack cloth. Refer to Cleaning auxiliary materials .
– **Welding**: Resistance spot welder, gas shielded welder, refer to Welding tools .
– **Anti-corrosion**:
  - **Tools**: Spray gun, refer toSpraying tools 。
  - **Auxiliary materials**: Refer to Anti-corrosion materials .
    - **Joint surface anti-corrosion**: Zinc powder conductive primer
    - **Anti-corrosion of welding surface** Anti-rust primer

Removal

1. Remove the rear wall panel assembly.
   a. Remove 1 layer of welding spots with an 8 mm special drill bit.
   b. Use an 8mm special drill bit to remove 2 layers of weld spots.
   c. Use a grinding machine to remove continuous welds and remove the rear panel assembly.



Installation

Caution

Before final assembly, ensure you fully understand all related work steps and perform a trial assembly.

Caution

– During installation of components, the number of welding spots shall be increased by about 30% on the basis o f the original number.

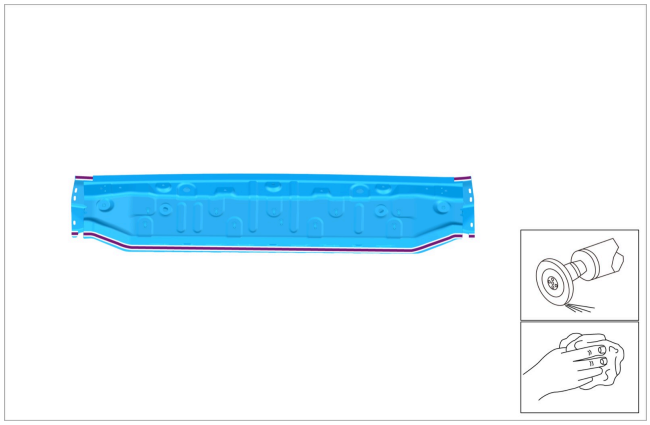
– When welding, the original welding spots should be avoided.

1. Prepare a new component.
   a. Grind the surface of the new component with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.

   b. Wipe off the fine dust and other debris on the joint surface.

Reminder

Recommended auxiliary materials: Tack cloth and degreasing cleaner.

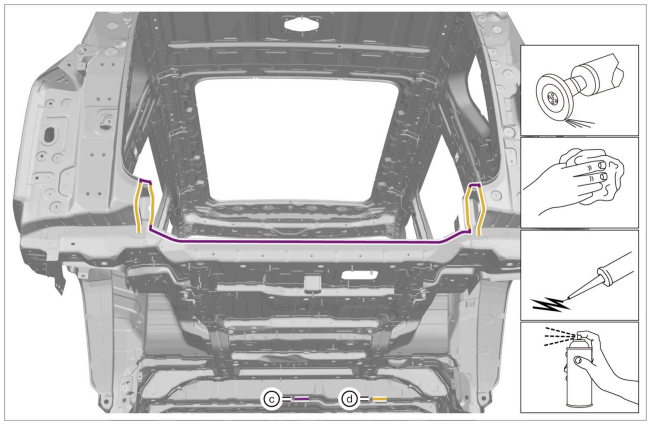


2. Handle the joint surface.
   a. Remove the residue on the joint surface with an abrasive wheel grinder until metal is exposed, and the surface is smooth and flat.
   b. Wipe off the fine dust and other debris on the joint surface.

> **Reminder**
>
> Recommended auxiliary materials: Tack cloth and degreasing cleaner.

   c. Apply structural adhesive on the joint surface.
   d. Spray zinc powder conductive primer on the re-joint surface.

> **Caution**
>
> Do not spray it too thick to avoid affecting the welding quality.



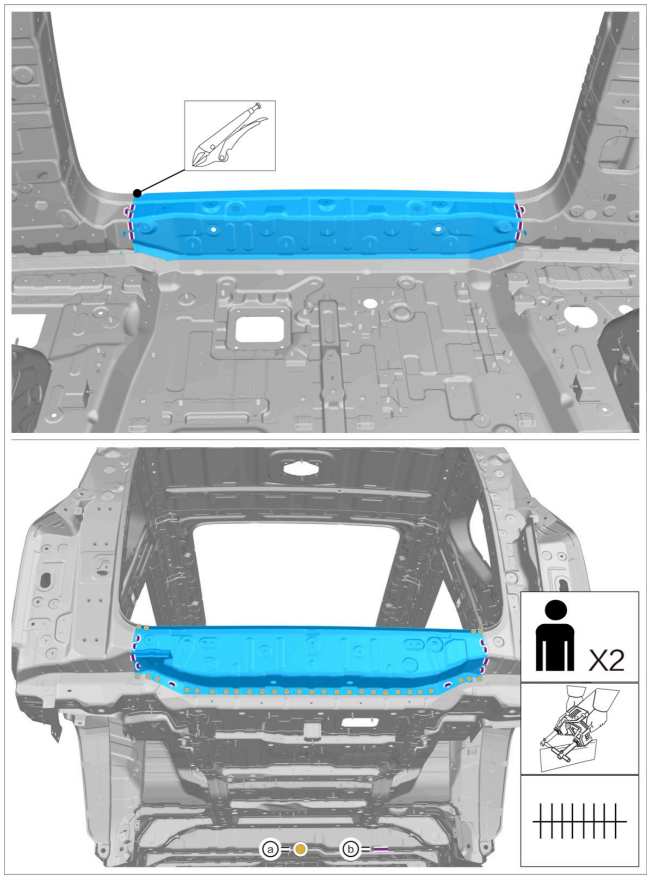
3. Secure the prepared parts to the vehicle body and measure 背门 for correctness, see How to measure and align vehi cle body
4. Use locking pliers to fix the rear panel assembly to its original position and perform welding.

> **Caution**
>
> This step is difficult to be performed and requires the cooperation of many people.

   a. Use resistance spot welding.
   b. Use continuous seam welding.

> **Caution**

– During welding, trial welding shall be carried out to confirm that the machine is properly adjusted. **Distance between welding spots = panel thickness * 10 + 10 mm**. For welding methods, refer to Resistance spo t welding and Gas shielded welding .



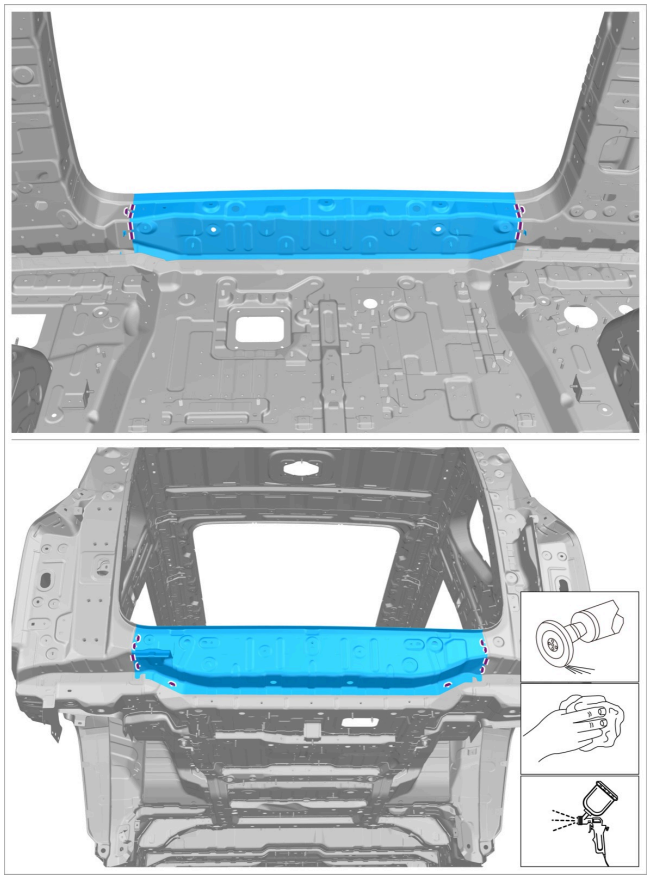
5. Double-check whether the perioperative data is correct, see 背门

Reminder

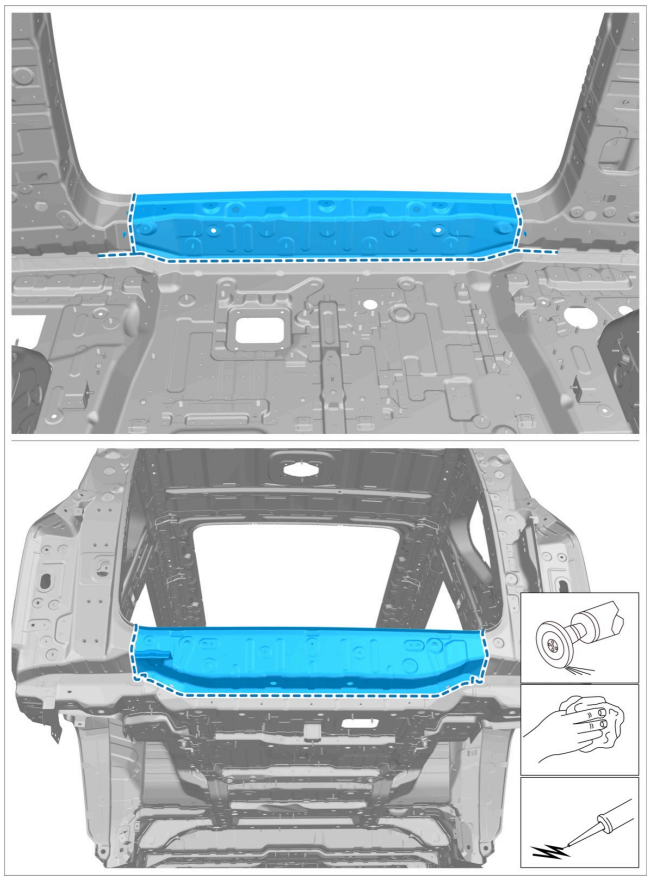
– If there is an abnormality in the data, please refer to How to measure and align vehicle body body repair.

– If the data cannot be repaired through calibration, the component may need to be reinstalled.

6. Carry out anti-corrosion treatment on the welded parts. Refer to Anti-corrosion treatment .
   a. Grind the parts that have been welded by metal active gas welding to make them smooth and flat.
   b. Use the tack cloth and degreasing cleaner to remove stains from the surface of the component.
   c. Apply anti-rust primer to prevent corrosion on the surface of components.



7. Apply sealant to the joint with reference to the position shown in the figure below.
   a. Use tack cloth and degreasing cleaner to clean the area where the adhesive will be applied, ensuring it is free of debris, oil stains, and water marks.
   b. Apply sealant to the connection area.
   c. Use a brush to apply the sealant evenly.



8. After the vehicle body components are installed, conduct a waterproof test.

⚠ Caution

– Cure the sealant before the waterproof test.

– After the waterproof test, dry and check the tested parts, and carry out anti-corrosion treatment in case of a risk of rust.

– No interior trims need to be installed before the end of waterproof test.

– If there is a problem, find the leaking part and deal with it according to the actual situation.

