

# OPIRUS

## Body shop Manual

### FOREWORD

This Body Shop Manual illustrates body structures and service procedures for the OPIRUS.

This manual illustrates the replacement of major body panels, plastic parts, body dimensions, sealing treatment etc., in a systematic manner which is necessary for effective and lasting body repairs.

You are encouraged to become familiar with this manual and understand each section in order to perform proper repair procedures. Keep this manual in a convenient location so that it is readily available.

All information in this manual including specifications, data and illustrations is made based on the vehicles built at the time the manual was printed.

Information regarding the removal/replacement of components not specifically covered in this manual can be found in the OPIRUS Service Manual. Information regarding electrical harness routing/ connections, etc. can be found in the OPIRUS Electrical Troubleshooting Manual.

The descriptions and specifications contained in this manual were in effect at the time this manual was approved for printing. Kia Motors Corporation reserves the right to discontinue models at any time, or change specifications or design without notice and without incurring obligation.

**Kia Motors Corporation**  
**SEOUL, KOREA**

#### CAUTION :

Severe engine and transaxle damage may result from the use of poor quality fuels and lubricants that do not meet Kia specifications. You must always use high quality fuels and lubricants that meet the specifications described on the specification section in the relevant group of the Workshop Manual.

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Printed in Korea, February 2004  
Pub. No. : A3FB-EG42A (English)

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## IMPORTANT SAFETY NOTICE

Proper service methods and repair procedures are essential for safe, reliable operation of all motor vehicles as well as personal safety of the operator. The service procedures and descriptions in this body shop manual provide general directions for a service and repair.

Procedure, techniques, tools, and parts for service including the skill of the technician vary. It is impossible to provide advice or caution as to each case in this manual.

Accordingly, anyone who intends to use a replacement part, service procedure, or tool, which is not recommended by the vehicle manufacturer, must first assure thoroughly that neither their personal safety nor the safe operation of the vehicle will be first jeopardized by the replacement part, service procedure, or tool they select.

### IN THIS MANUAL

-  **WARNING :** Remind you to be especially careful in those areas where carelessness can cause personal injury.
-  **CAUTION :** To prevent you from making errors that could damage the vehicle as well as personal injury.
-  **NOTE :** Gives you added information that will help you complete a particular procedure.

The following list contains some general WARNINGS that you should follow while working on a vehicle.

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires you to be under the vehicle.
- Make sure that the ignition switch is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on the vehicle. If you have an automatic transaxle, set in park unless instructed otherwise for a specific operation
- Place supporters against the front and rear surfaces of the tires to help prevent the vehicle from moving
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide poisoning.
- Keep yourself and your clothing away from moving parts when the engine is running, especially the drive belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter and muffler.
- Do not smoke while working on a vehicle.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on a vehicle.
- When it is necessary to work under the hood, keep hands and other objects clear of the radiator fan blades! Your vehicle may be equipped with a cooling fan that may turn on, even though the ignition switch is in the OFF position. For this reason care should be taken to ensure that the radiator fan electric motor is completely disconnected when working under the hood and the engine is not running.



## General information

### Fundamental procedures

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00

### For best results

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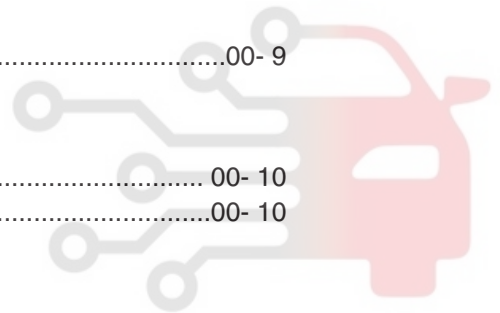
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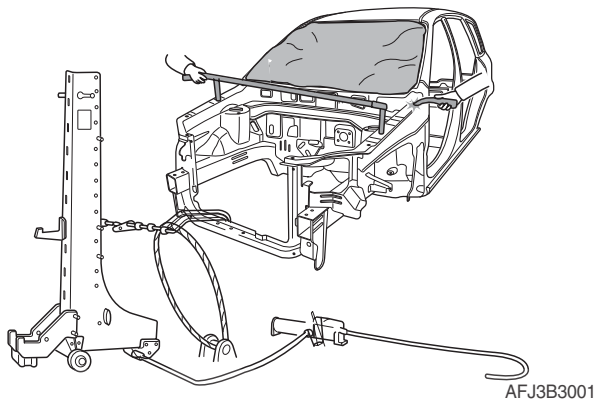


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## Fundamental procedures

### Vehicle protection

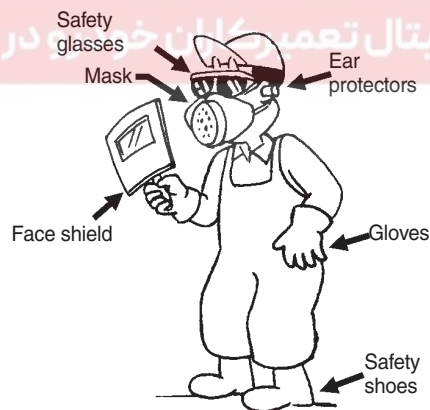
1. Cover the seats before performing any procedure to keep them from getting dirty.
2. Cover all glasses, seats and mats with a heat resistant cover when welding.



3. Protect moldings, garnishes and ornaments.

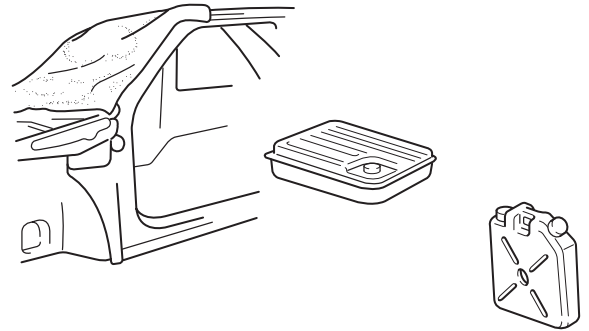
### A word about safety

1. Wear the appropriate safety equipment that is necessary for the procedure being performed.



00003

2. When welding or performing other procedures that require the use of an open flame near the fuel tank, disconnect and remove the tank and fuel pipe, and cap the pipe to prevent fuel leakage.



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### Welding procedures

Observe the following tips when welding.

1. Wear appropriate eye protection.
2. Carefully follow the manufacturers operating instructions for the welding machine you are using.
3. Do not weld, smoke or allow open flames around volatile chemicals, cleaners or solvents or in any area where they have just been used.

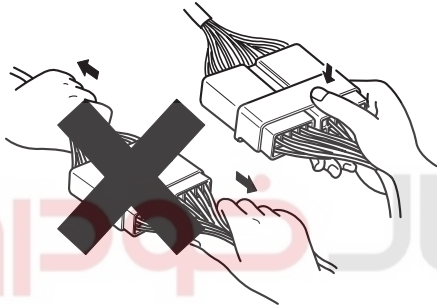
## 00-2 General information

**Body frame straightener**

When using a frame straightener, do not enter the area where the body is being straightened by the chain.

**Electrical procedures**

1. Disconnect the negative battery terminal.
2. Do not pull on wires when disconnecting electrical connectors. Be careful to hold the connector itself when disconnecting it.
3. Insert the connector until it “clicks” when connecting the connector.
4. Handle all electrical components with care.



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## For best results

### Disassembly

#### Measuring dimensions before beginning

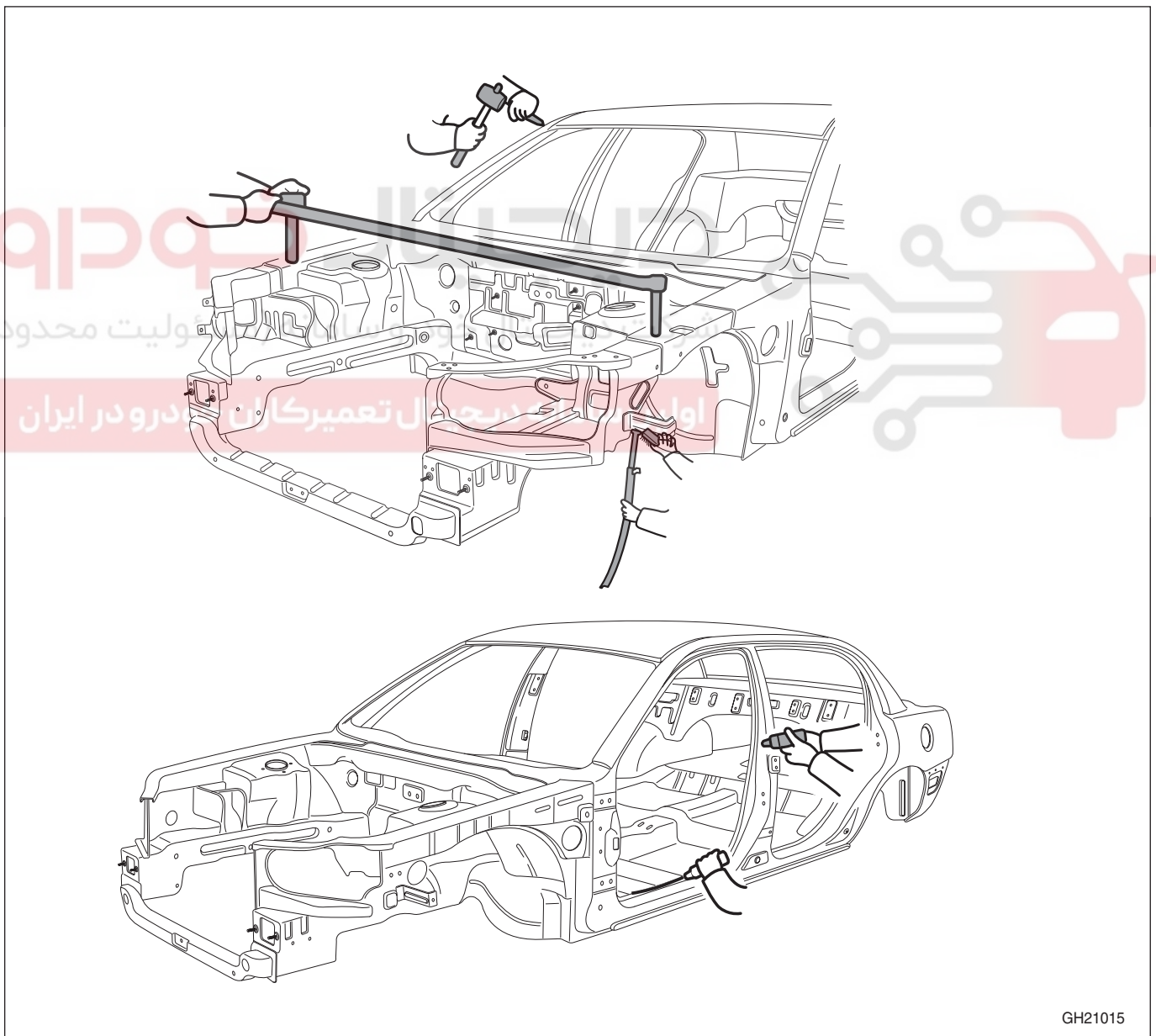
Measure the dimensions of the damaged area according to the body dimension drawings before disassembling and repairing. Adjust dimensions with body frame adjuster if deformed.

#### Selecting cutting area

Select a cutting area that is easily accessible and that is prone to the least amount of distortion when welding. Select an area that would allow the new part to overlap repair area by 1.2~2.0 in (30~50 mm).

#### Protecting body from damage

Secure the body with clamps and jacks to prevent damage to the body when working on it.

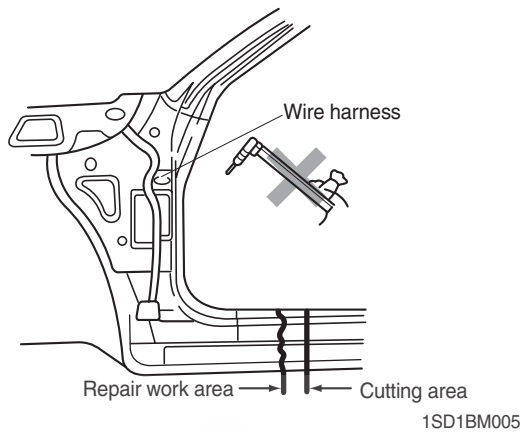


GH21015

## 00-4 General information

### Disassembling related parts

Use caution when removing body molding and trim from the area to be worked. Apply masking tape where needed to prevent damage to the part being removed or to the vehicle body. Before starting repairs, check if pipes, hoses or electrical components are present near damaged area.



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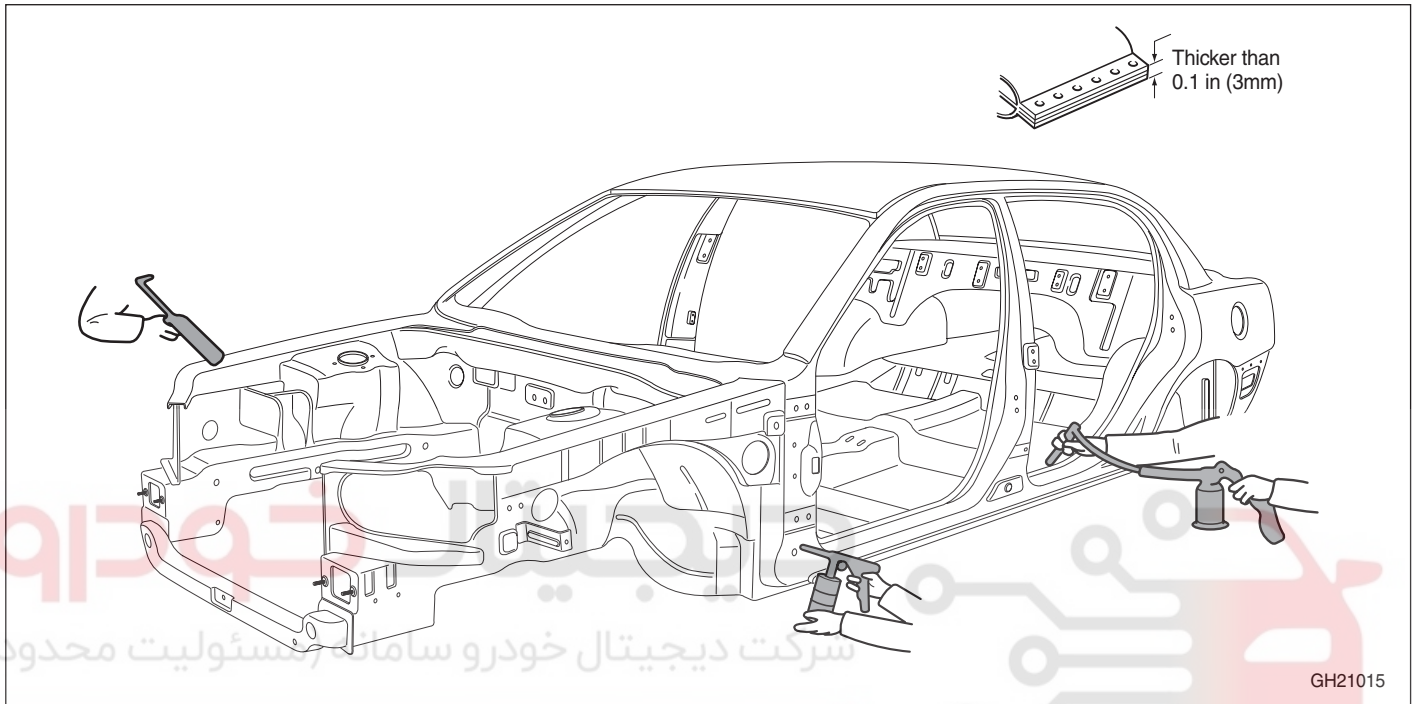
## Preparation of assembly

### Applying spot sealer

Remove paint from the surface of new parts and body to be spot welded, and apply spot sealer for rustproofing.

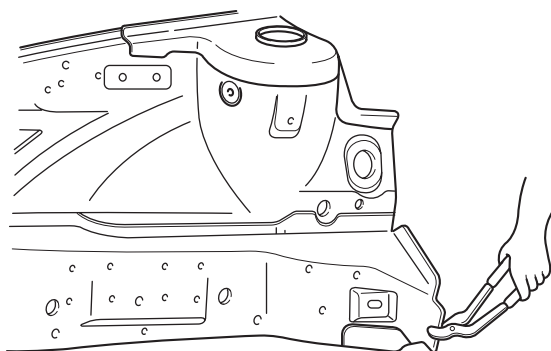
### Selecting a welding method

If the thickness of the area to be welded with the panels overlapped is greater than 0.1 in (3 mm), do plug welding using a carbon arc welding machine.



### Machining holes for plug welding

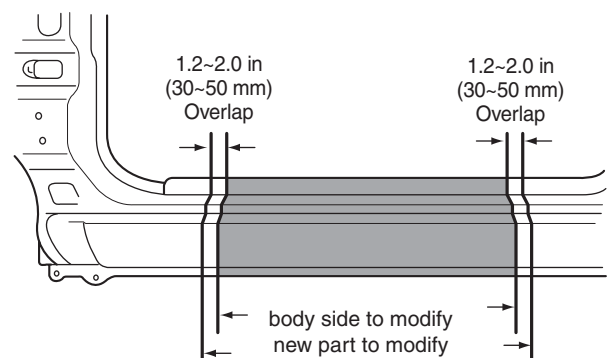
Drill a hole of approximately 0.2~0.24 in (5~6 mm) in diameter in those areas which are not suitable for spot welding.



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### Adjusting a new part

The new part should be cut larger than the repair area, overlapping the repair area by 1.2~2.0 in (30~50 mm).



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## 00-6 General information

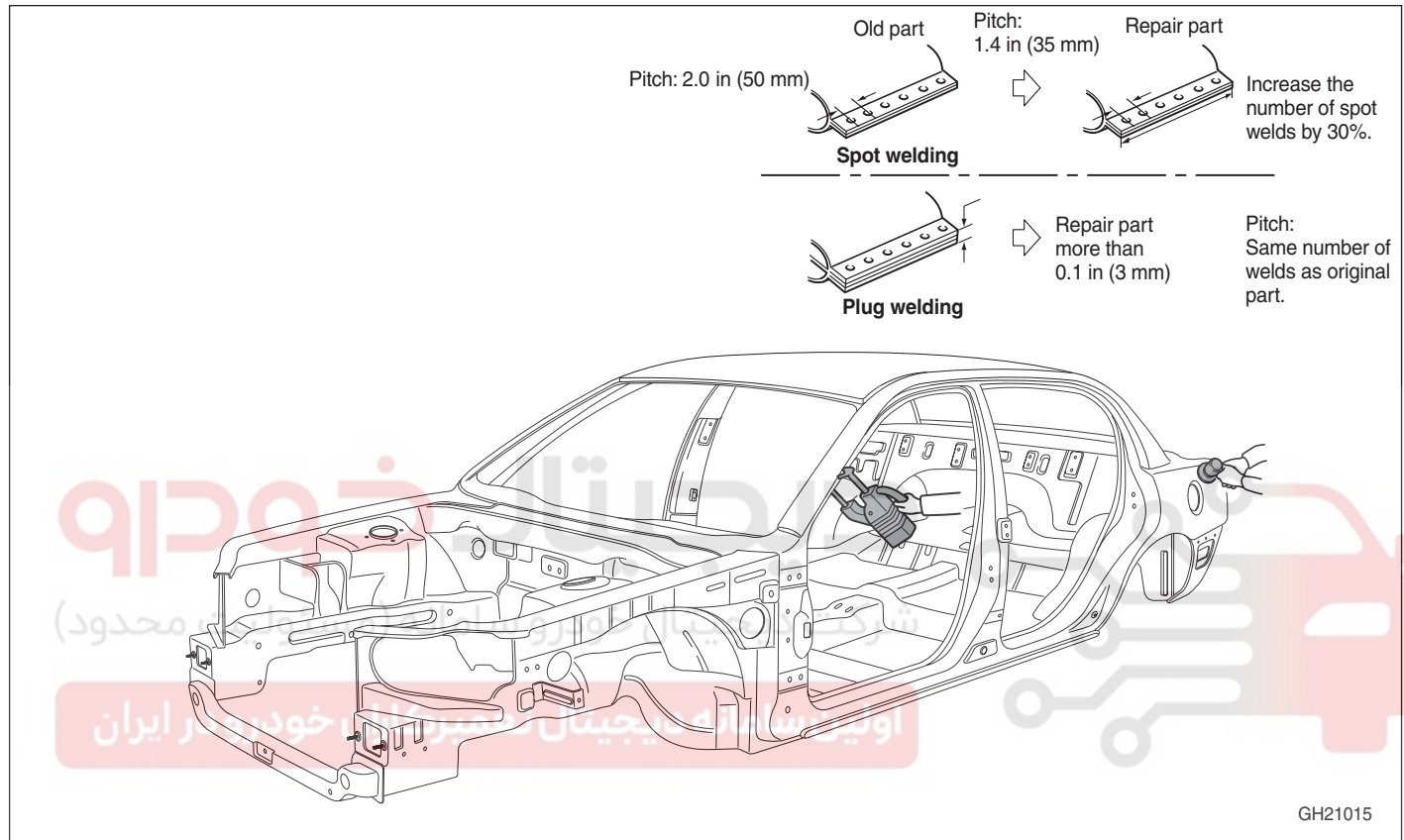
## Assembly

### Measuring dimensions before welding

When assembling a new part, assemble it according to the body dimensions given in Section 31, and start welding after checking the gaps with nearby parts.

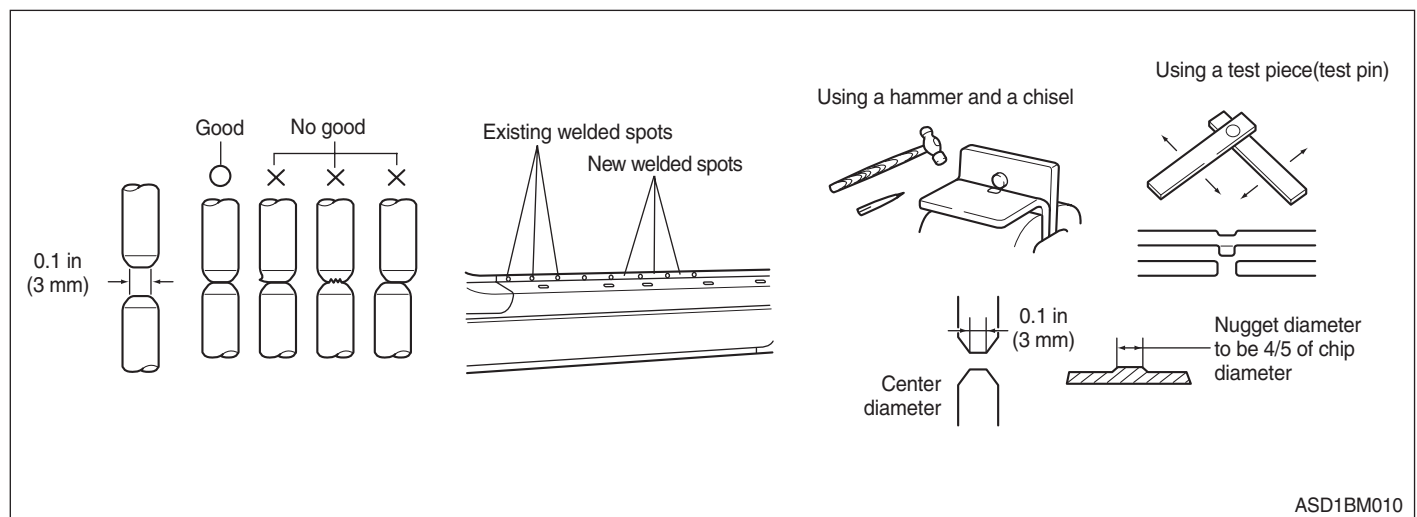
### Caution when welding

The number of welding points should be determined based on the criteria below:



### Caution when spot welding

- The tip of the spot welding machine should be maintained to a minimum of 0.1 in (3 mm) because it greatly affects welding strength. When possible, spot welding should be done between the existing spot welded points.
- Before and after spot welding, weld a test piece(test pin) of the same material as the body panel, and check the welding strength.



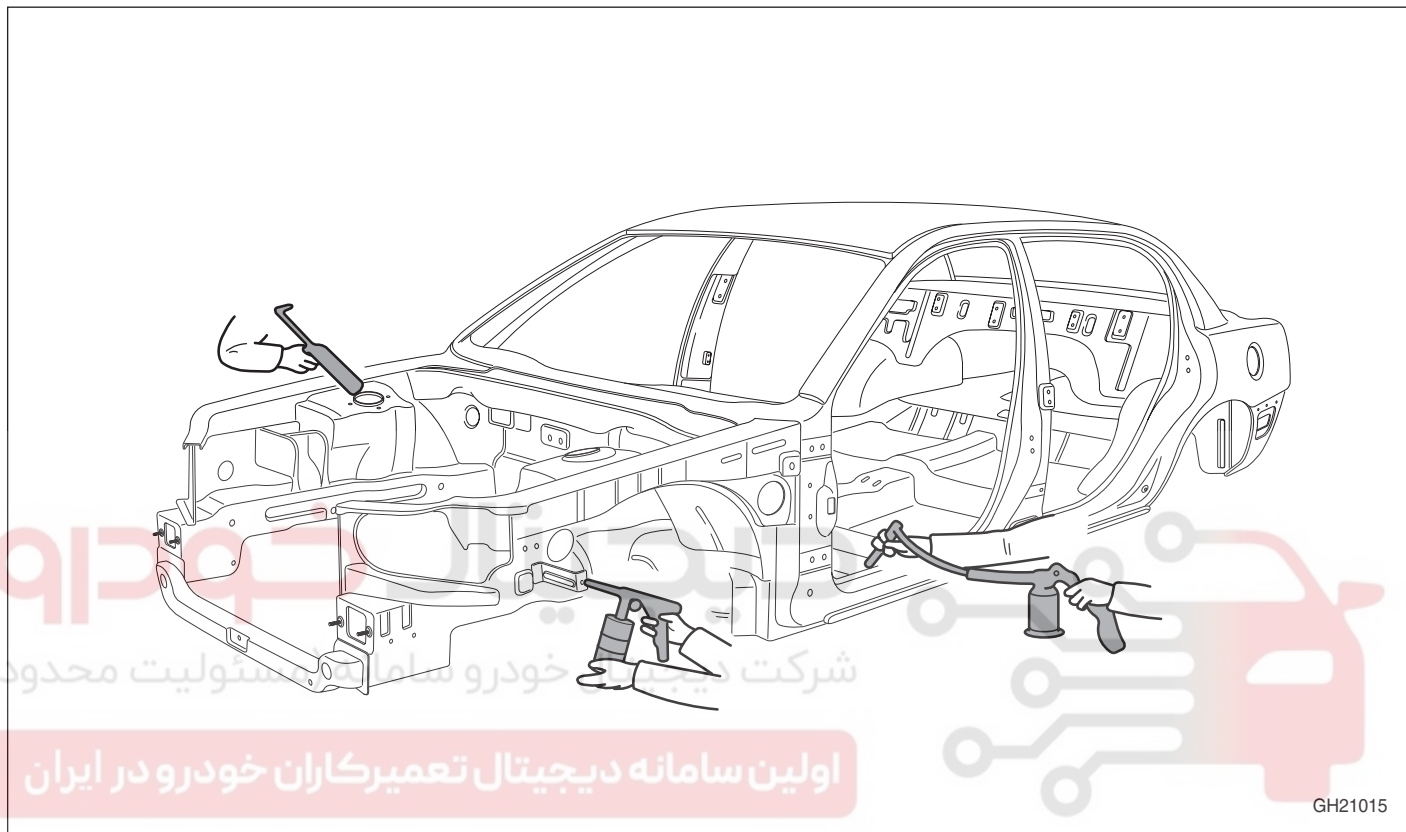
## Rustproof treatment after assembly

### Body sealing

Apply body sealer where necessary.

### Applying rustproof material

Apply rustproofing material(wax, oil, etc.) behind welded area.



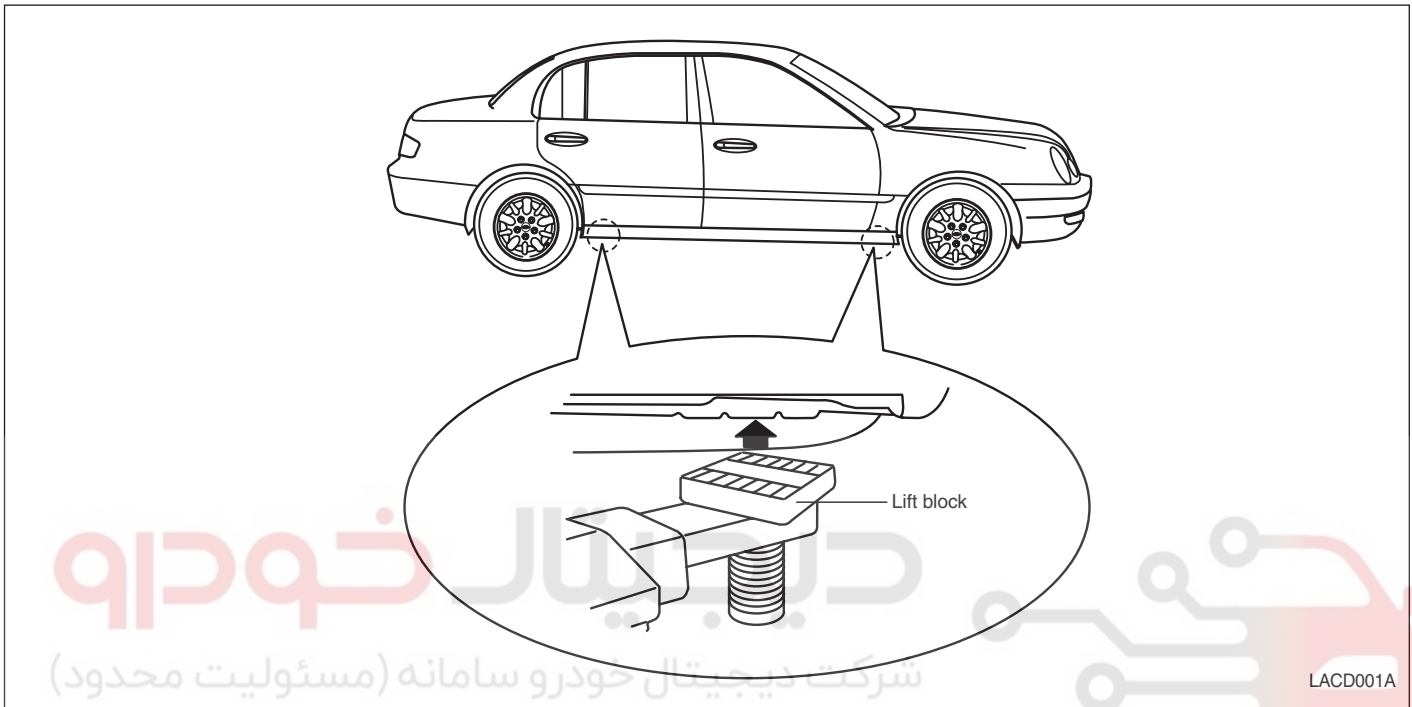
### Applying undercoat

Apply undercoat on the body where necessary.

## 00-8 General information

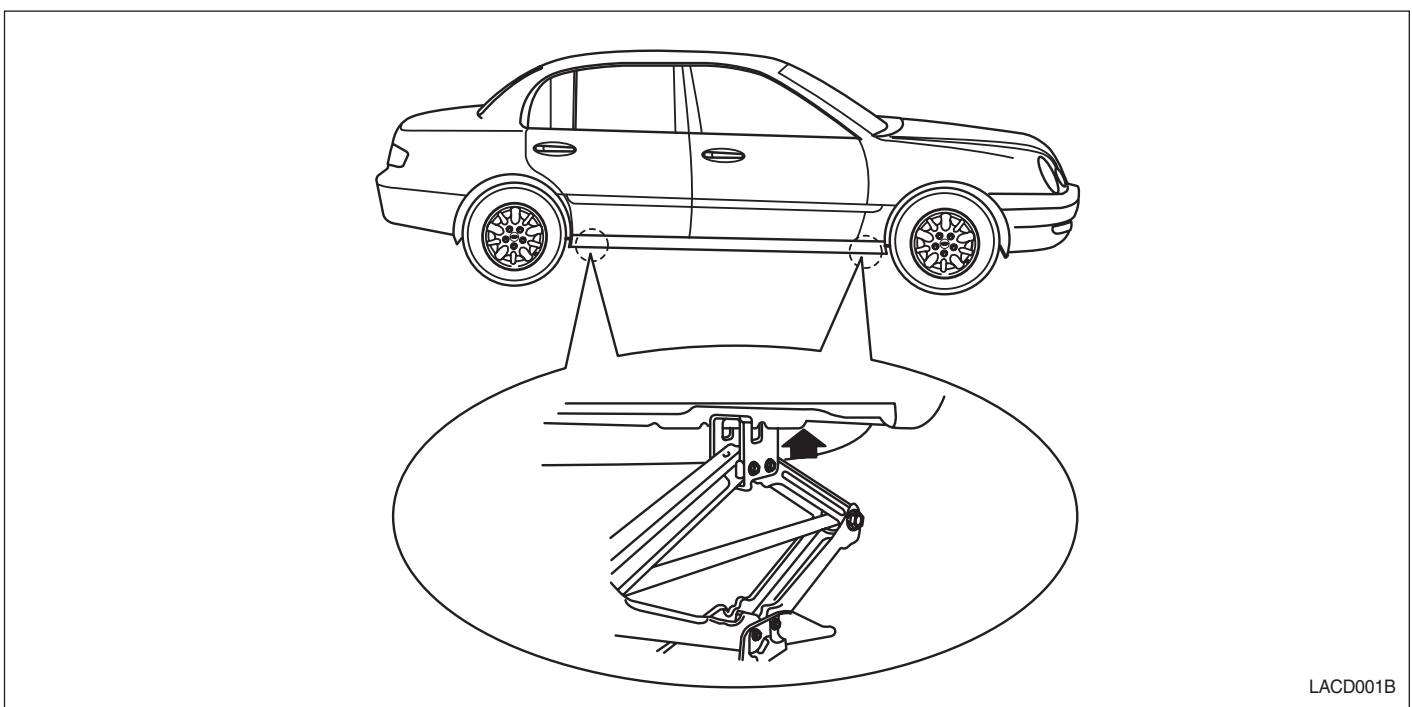
## Vehicle Lift (2-Support Type) And Safety Stand Positions

1. Place the lift blocks under the support points as shown in the illustration
2. Raise the hoist a few inches and rock the vehicle to be sure it is firmly supported.
3. Raise the hoist to full height to inspect the lift points for secure support.

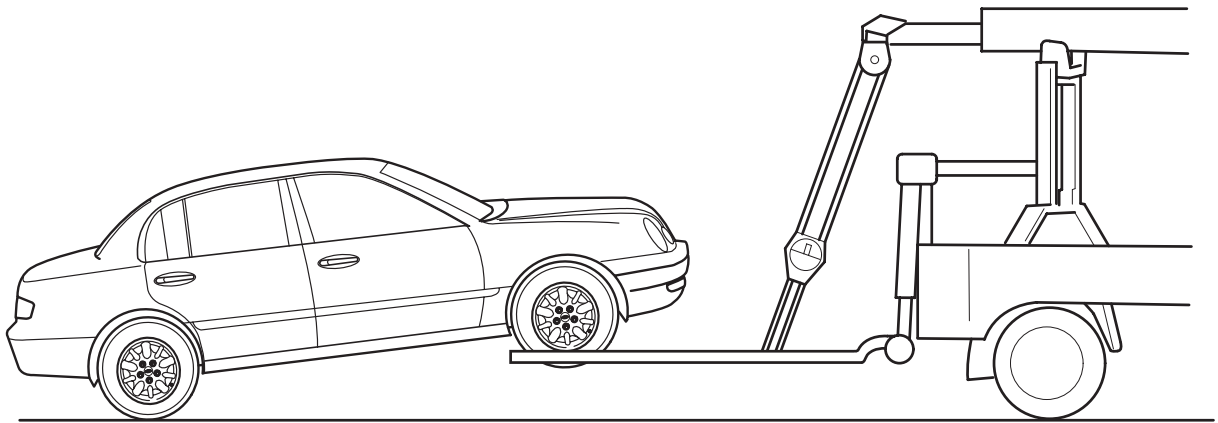


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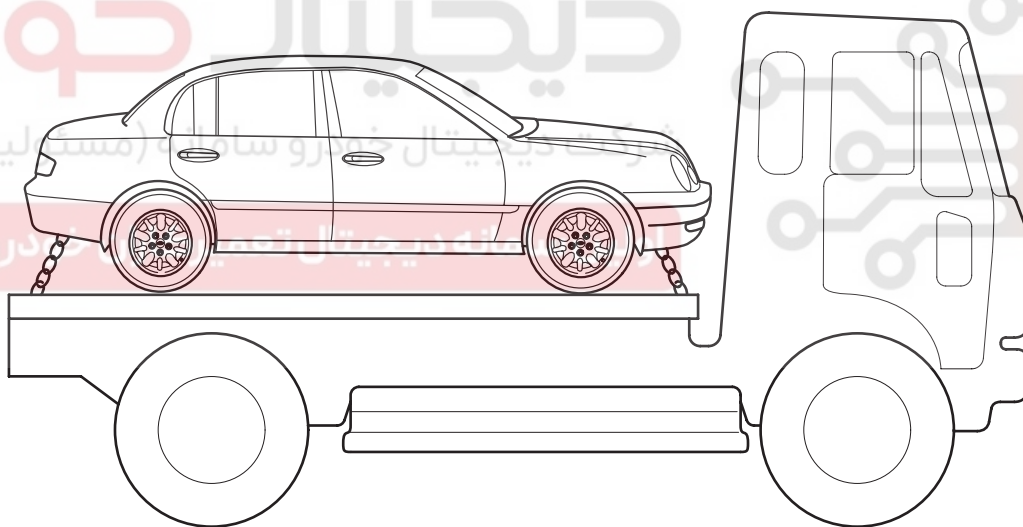
### Jack Support Positions



## Towing



[Wheel lift]



[Flat-bed]

LACD001F

If emergency towing is necessary, we recommend having it done by an authorized KIA dealer or a commercial tow-truck service.

Proper lifting and towing procedures are necessary to prevent damage to the vehicle.

It is recommended that your vehicle be towed with a wheel lift or flatbed equipment.

Donot tow with a slingbelt.

Our company has not approved a slingbelt towing procedure.



## 00-10 General information

## Body colors and major specifications

## Kia color codes

| Kia code | Paint color    |
|----------|----------------|
| Y7       | Gold Silver    |
| 6W       | Warm Grey      |
| R8       | Dark Rose Red  |
| D8       | Cream Gold     |
| Y5       | Light Beige    |
| 4C       | Cobalt Blue    |
| N7       | Carbon Grey    |
| U3       | Pearl White    |
| EB       | Ebony Black    |
| C5       | Diamond Silver |

## Paint manufacture codes

| Kia code | Color name     | Dupont | Spies<br>Hecker | Standex | BASF | Akzo<br>Nobel | PPG |
|----------|----------------|--------|-----------------|---------|------|---------------|-----|
| Y7       | Gold Silver    | X0349  | 741711          | Y7      | Y7   | KIA9732       | Y7  |
| 6W       | Warm Grey      | X0350  | 745278          | 6W      | 6W   | KIA9734       | 6W  |
| R8       | Dark Rose Red  | X0346  | 741121          | R8      | R8   | KIA9317       | R8  |
| D8       | Cream Gold     | X0347  | 748019          | D8      | D8   | KIA9806       | D8  |
| Y5       | Light Beige    | X0348  | 735566          | Y5      | Y5   | KIA9733       | Y5  |
| 4C       | Cobalt Blue    | X0343  | 737518          | 4C      | 4C   | KIA9536       | 4C  |
| N7       | Carbon Grey    | X0344  | 748020          | N7      | N7   | KIA9731       | N7  |
| U3       | Pearl White    | X6781  | 747887          | U3      | U3   | KIA9407       | U3  |
| EB       | Ebony Black    | F0193  | 746187          | EB      | EB   | KIA4002       | EB  |
| C5       | Diamond Silver | M7633  | 739245          | C5      | C5   | KIA9716       | C5  |

## Body structure

### Body composition

|                          |       |
|--------------------------|-------|
| Body shell .....         | 11- 1 |
| Body service holes ..... | 11- 1 |

### High tension steel sheet used area

|                                       |       |
|---------------------------------------|-------|
| Radiator support panel .....          | 11- 2 |
| Wheel apron panel .....               | 11- 3 |
| Cowl & Dash panel .....               | 11- 4 |
| Side body panel .....                 | 11- 5 |
| Roof panel .....                      | 11- 6 |
| Floor panel .....                     | 11- 7 |
| Hood / Front fender / Trunk lid ..... | 11- 8 |
| Front door & Rear door .....          | 11- 9 |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

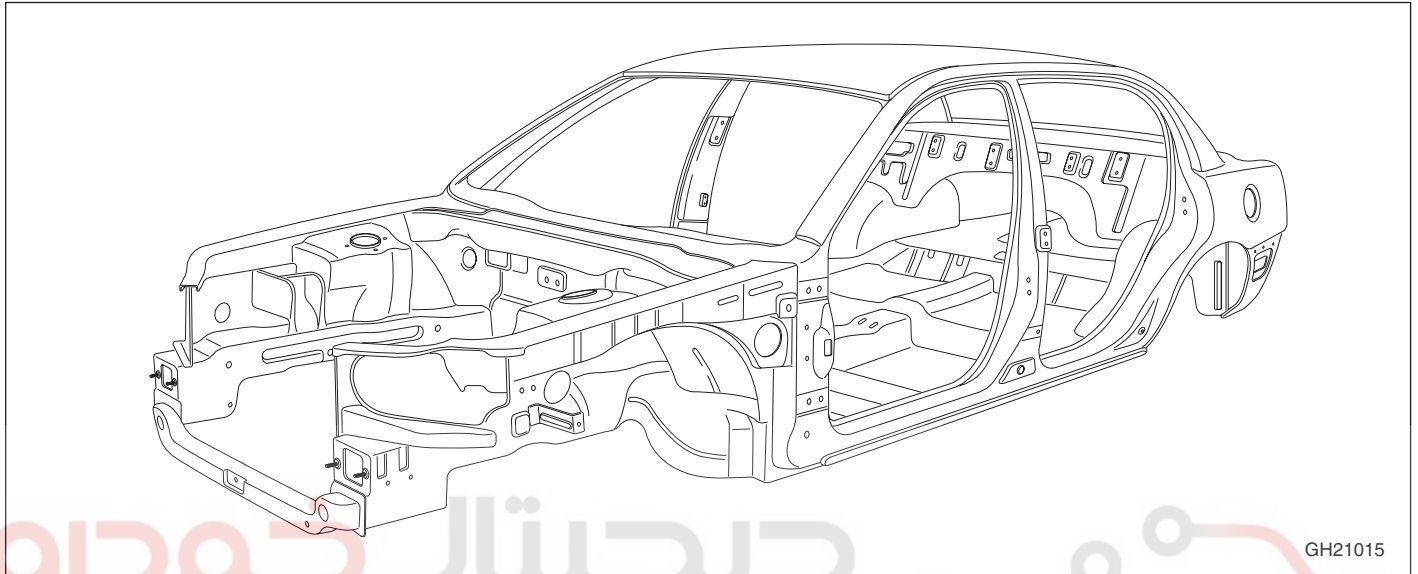
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## Body composition

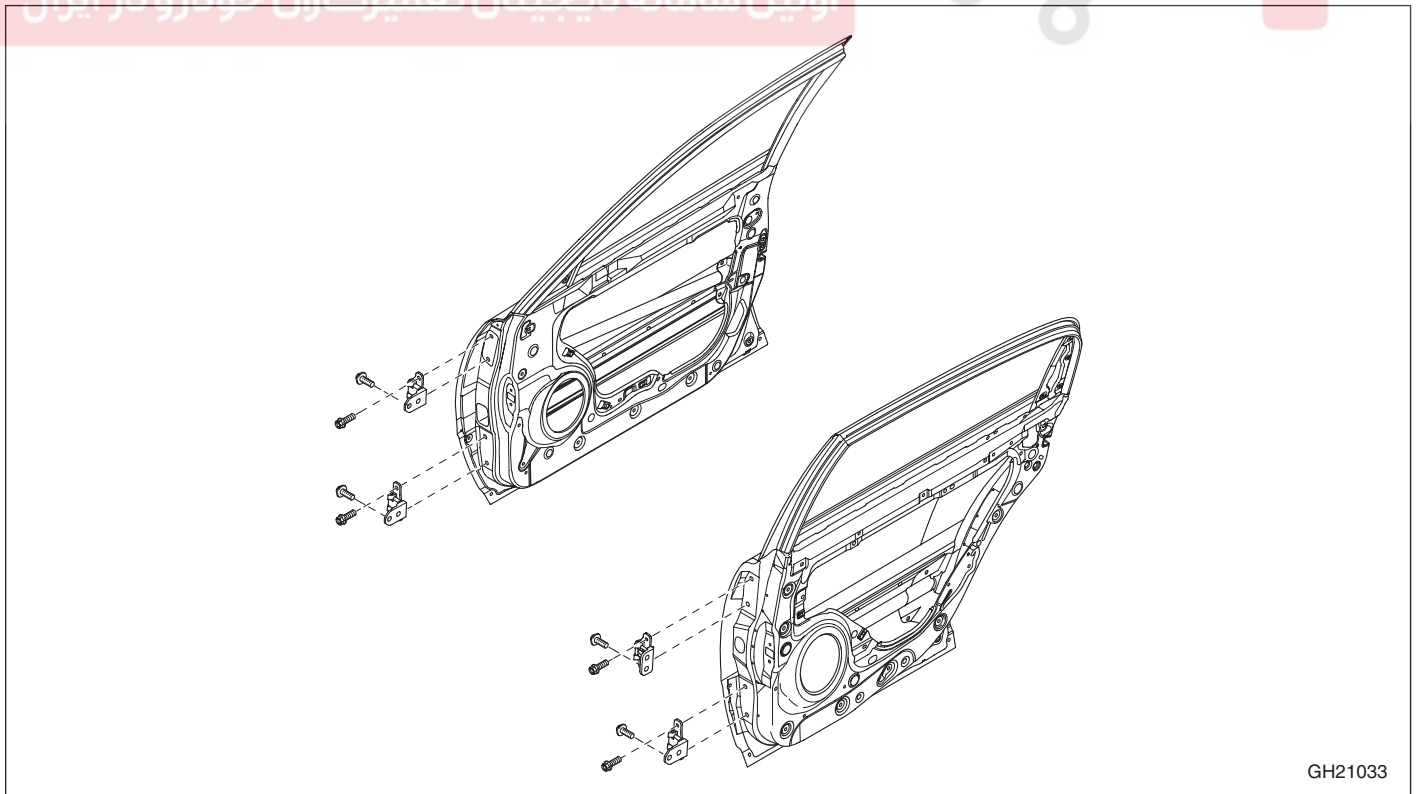
### Body shell

The body consists of the body shell, frame and cross members, etc, welded together. This provides safety, durability, noise protection, rustproofing and vibration proofing of the vehicle.



### Body service holes

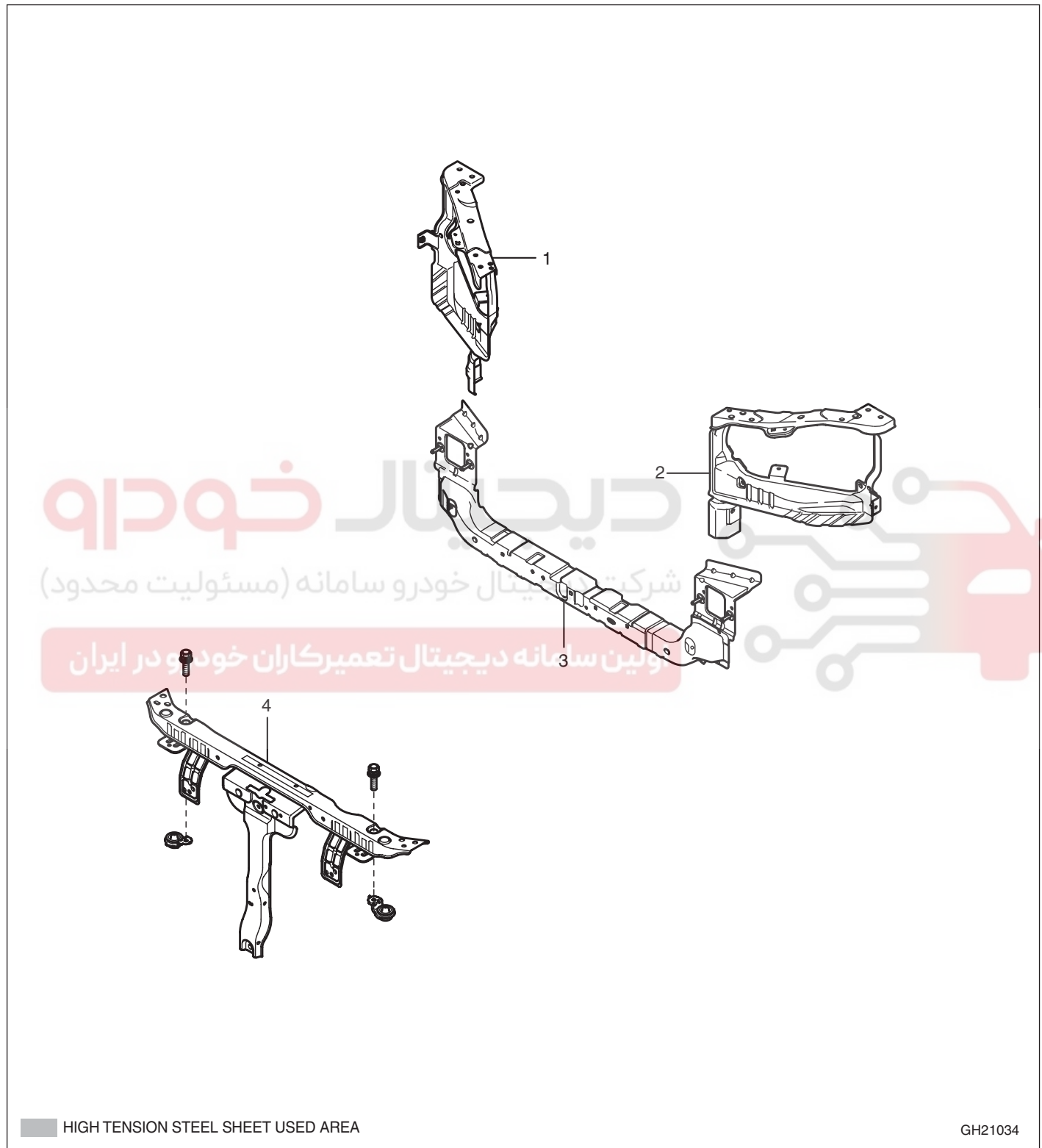
Body service holes are provided in the inner panel to improve serviceability of the body.



## 11-2 Body structure

## High tension steel sheet used area

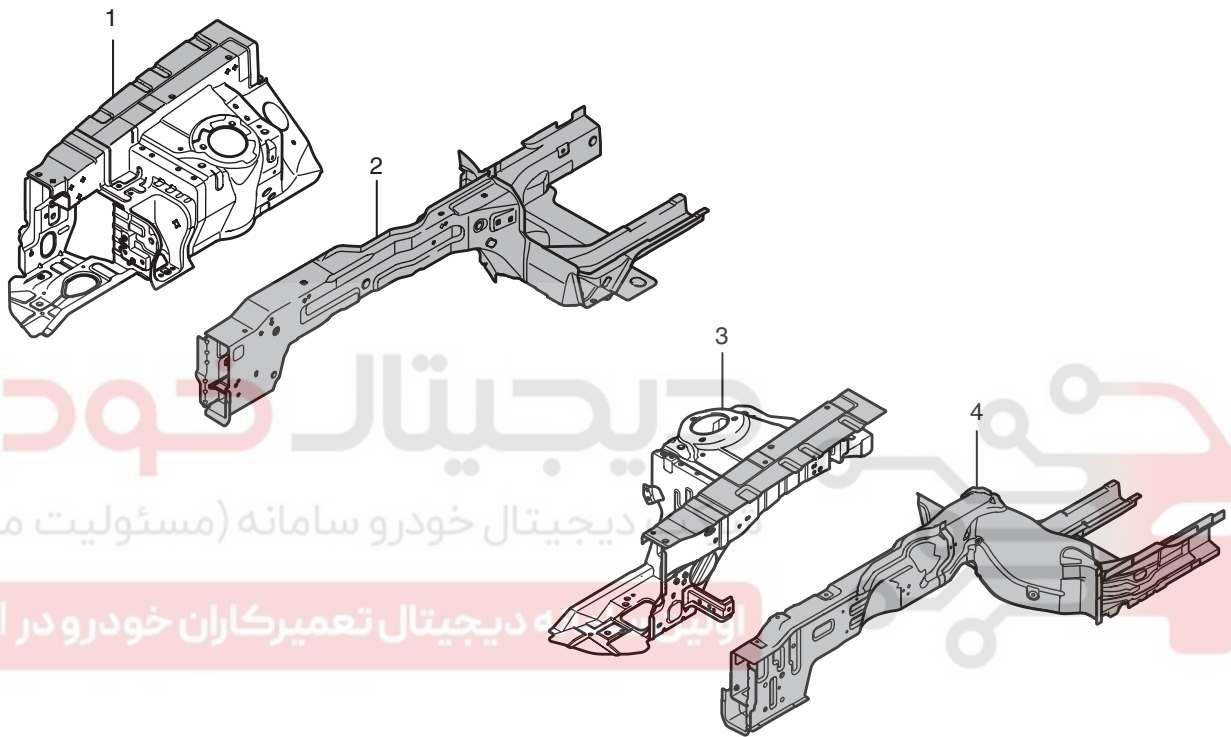
### Radiator support panel



- (1) Radiator support upper RH member assembly  
(2) Radiator support upper LH member assembly

- (3) Radiator support lower member assembly  
(4) Radiator support center member assembly

## Wheel apron panel



■ HIGH TENSION STEEL SHEET USED AREA

GH21035

- (1) Fender apron RH panel assembly
- (2) Front side RH member assembly

- (3) Fender apron LH panel assembly
- (4) Front side LH member assembly



## 11-4 Body structure

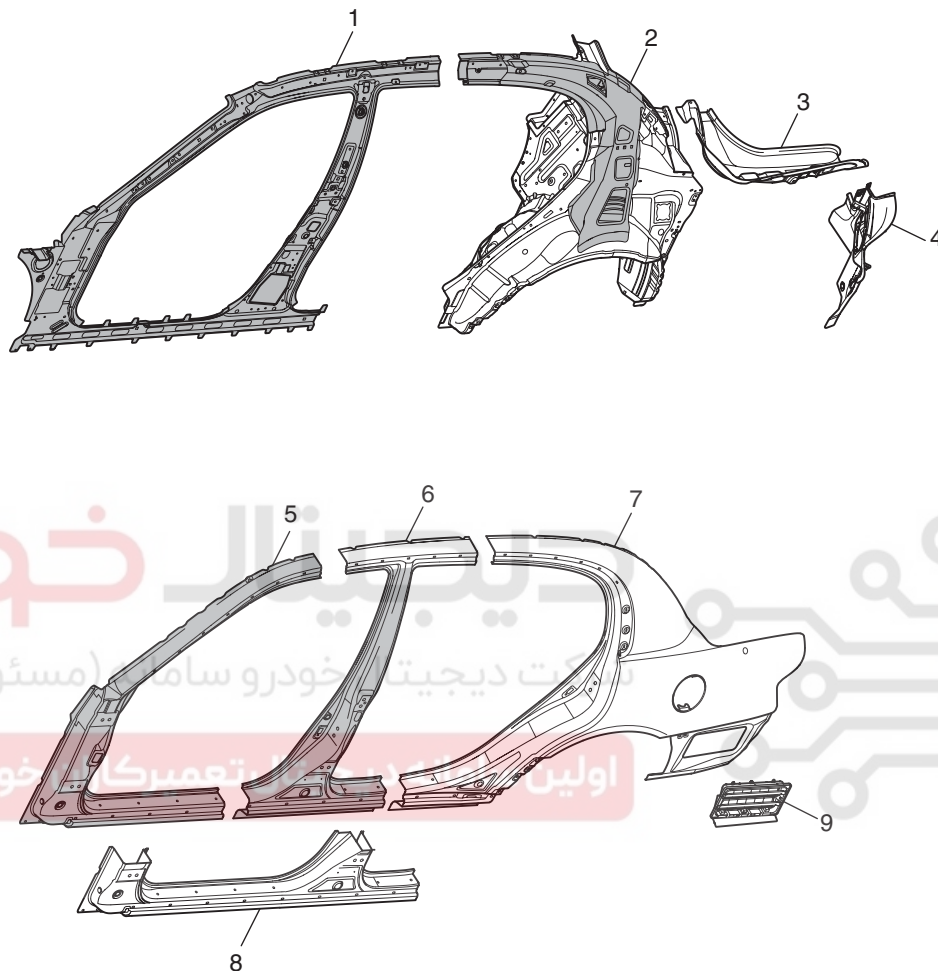
## Cowl &amp; Dash panel



- (1) Cowl complete panel assembly  
(2) Cowl side outer upper panel

- (3) Dash complete panel & member assembly

## Side body panel



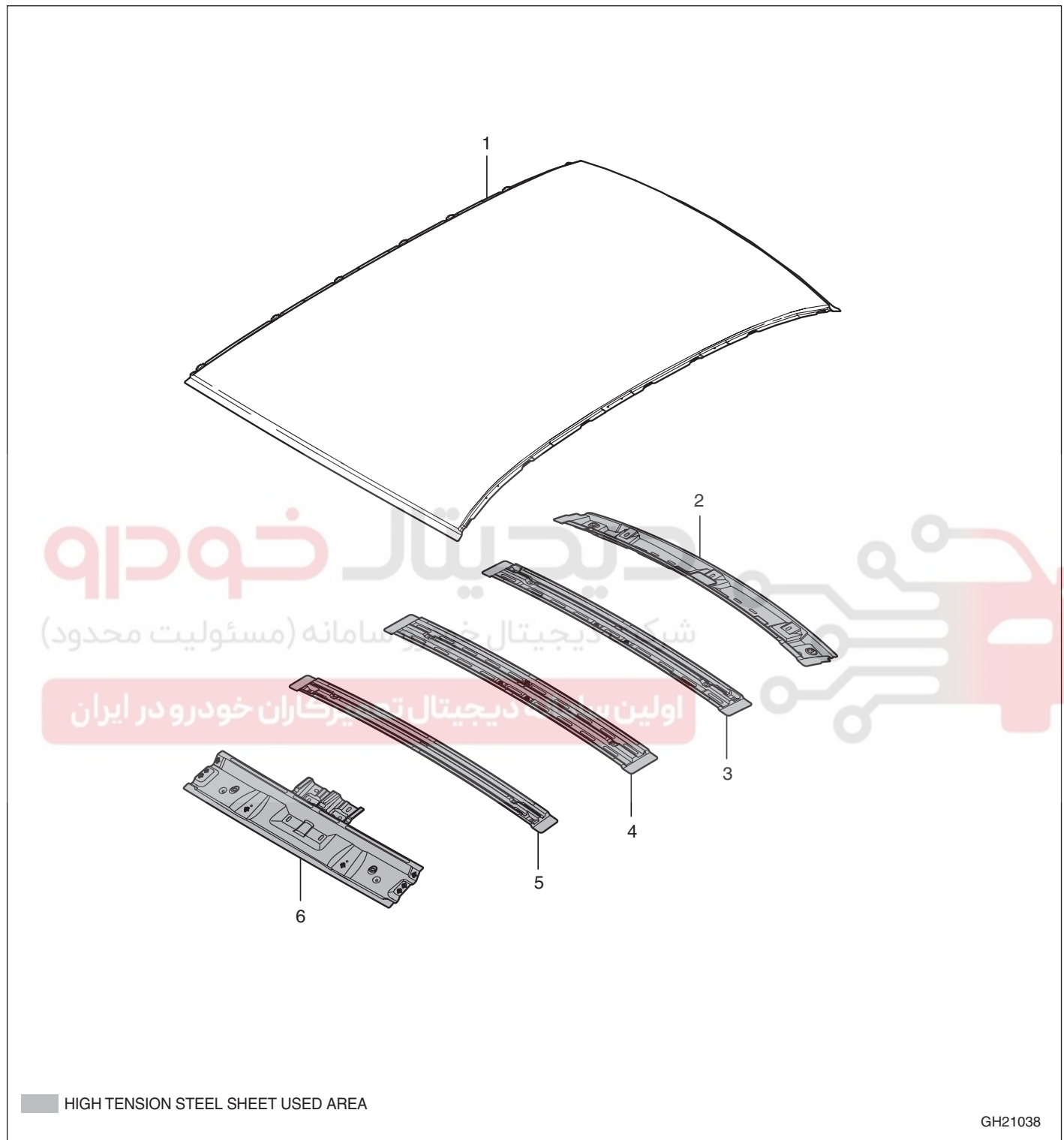
■ HIGH TENSION STEEL SHEET USED AREA

GH21037

- |   |                                   |
|---|-----------------------------------|
| (1) Front inner pillar assembly             | (6) Center outer pillar assembly  |
| (2) Quarter inner panel assembly            | (7) Quarter outer panel assembly  |
| (3) Quarter outer extension assembly        | (8) Side sill outer panel         |
| (4) Combination lamp housing panel complete | (9) Air extractor grille assembly |
| (5) Pillar outer panel assembly             |                                   |

## 11-6 Body Structure

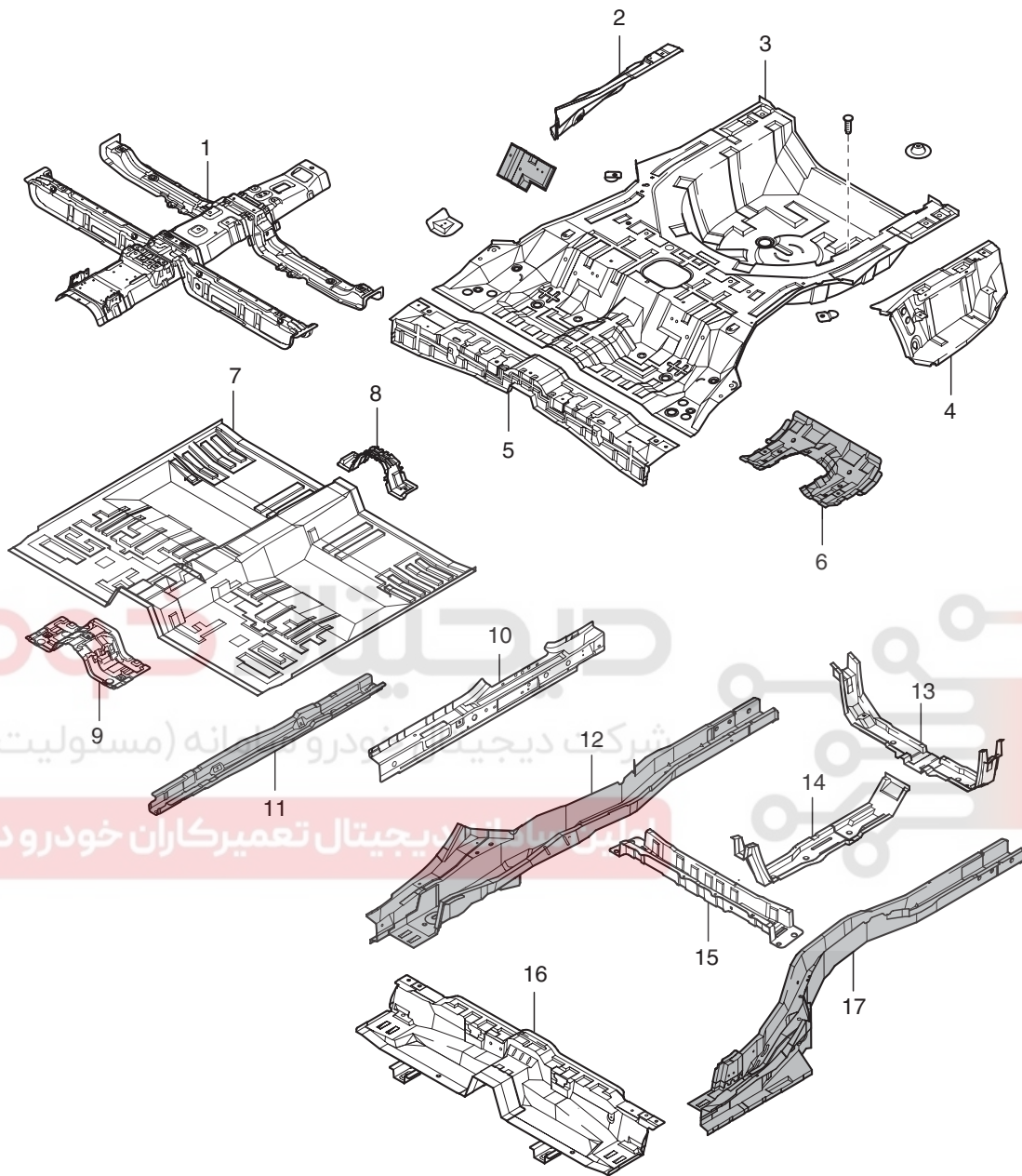
## Roof panel



- (1) Roof panel
- (2) Roof rear rail
- (3) Roof center No.1 rail

- (4) Roof center No.2 rail
- (5) Roof center No.3 rail
- (6) Roof front rail assembly

## Floor panel



■ HIGH TENSION STEEL SHEET USED AREA

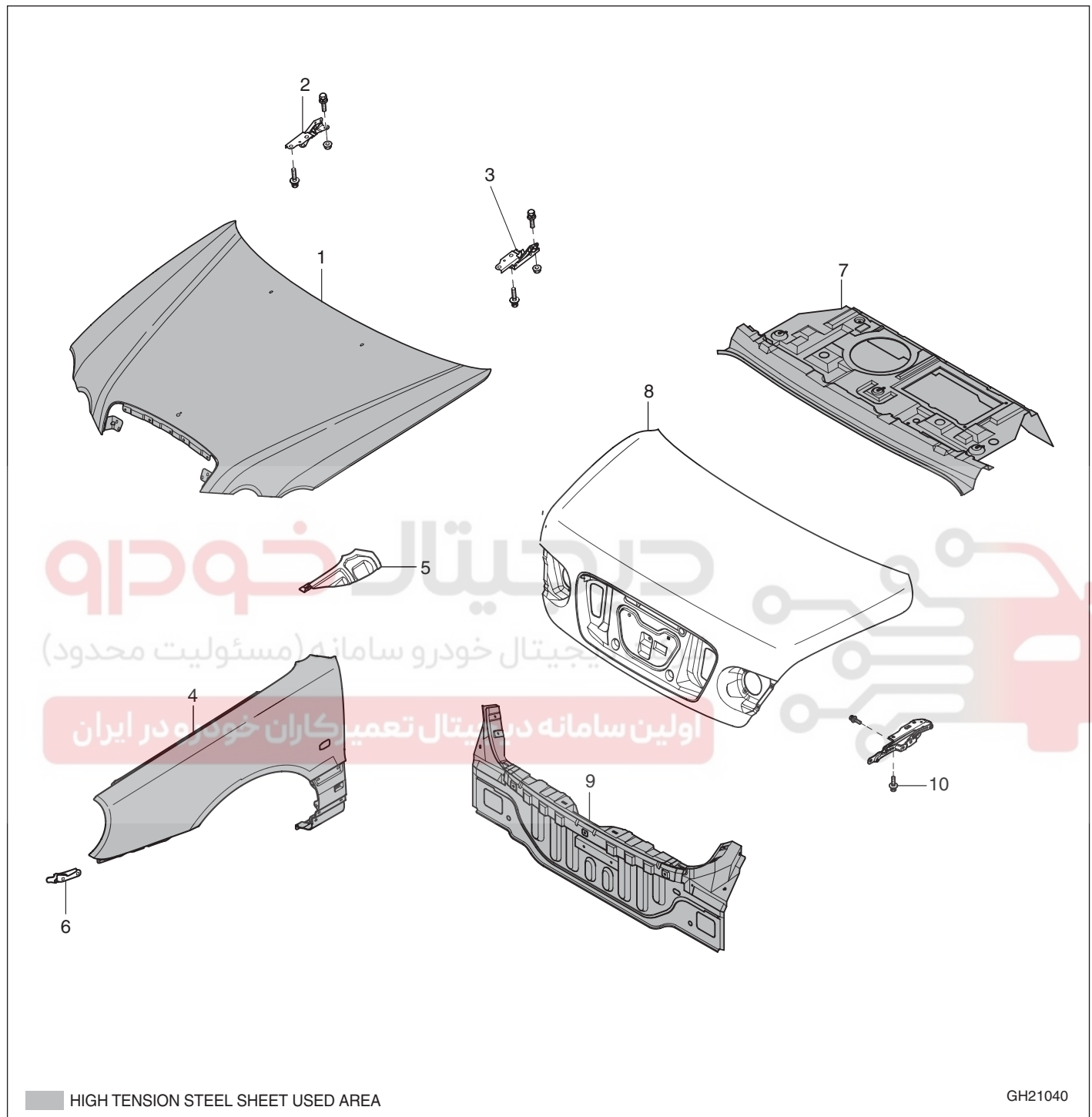
GH21039

- (1) Center floor reinforcement assembly
- (2) Rear floor RH panel assembly
- (3) Rear floor panel
- (4) Rear floor side LH panel assembly
- (5) Rear floor front extension assembly
- (6) Seatbelt anchor bracket assembly
- (7) Front floor panel
- (8) Heat protector mounting front bracket assembly
- (9) Muffler hanger mounting front bracket assembly

- (10) Side sill inner panel assembly
- (11) Center floor side member assembly
- (12) Rear floor side RH member assembly
- (13) Jack up cross member assembly
- (14) Rear towing hook bracket assembly
- (15) Rear floor cross member assembly
- (16) Rear floor front cross member assembly
- (17) Rear floor side LH member assembly

## 11-8 Body Structure

## Hood / Front fender / Trunk lid

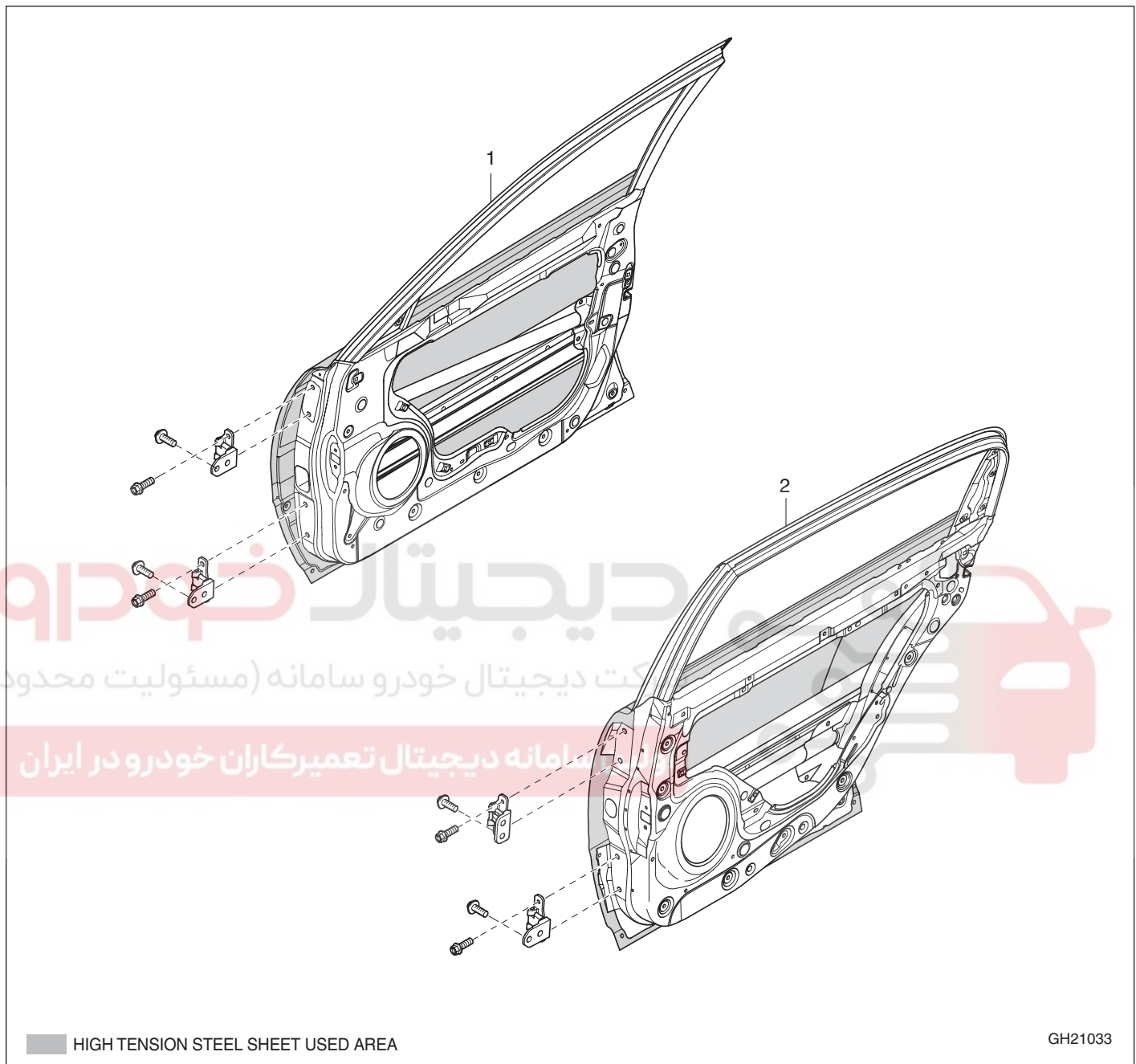


- (1) Hood panel assembly
- (2) Hood RH hinge assembly
- (3) Hood LH hinge assembly
- (4) Fender panel
- (5) Fender rear upper extension

- (6) Front bumper mounting bracket
- (7) Rear package tray panel assembly
- (8) Trunk lid panel assembly
- (9) Back panel assembly
- (10) Trunk lid hinge assembly



## Front door &amp; Rear door



(1) Front door panel assembly

(2) Rear door panel assembly

## Replacing body panels

### Replacing body panels

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Fender apron panel ..... 21-13

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Floor panel (Rear) ..... 21-16

Side panel - 1 ..... 21- 17

Side panel - 2 ..... 21- 18

Roof panel ..... 21-19

Back panel ..... 21-20

## Replacing body panels

### Codes for disassembling and assembling body panels



Three plate welding



Carbon arc welding (plug welding)



Four plate welding



Five plate welding

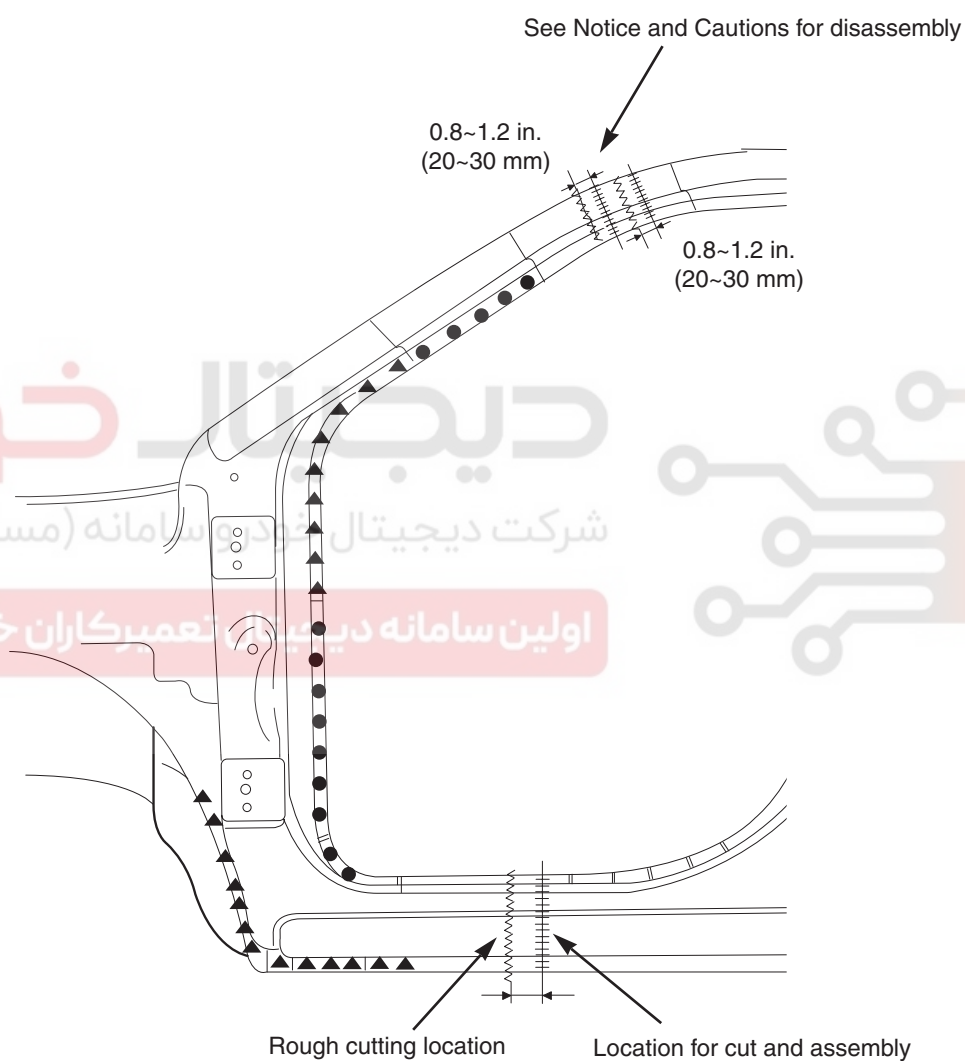
# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

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## 21-2 Replacing body panels


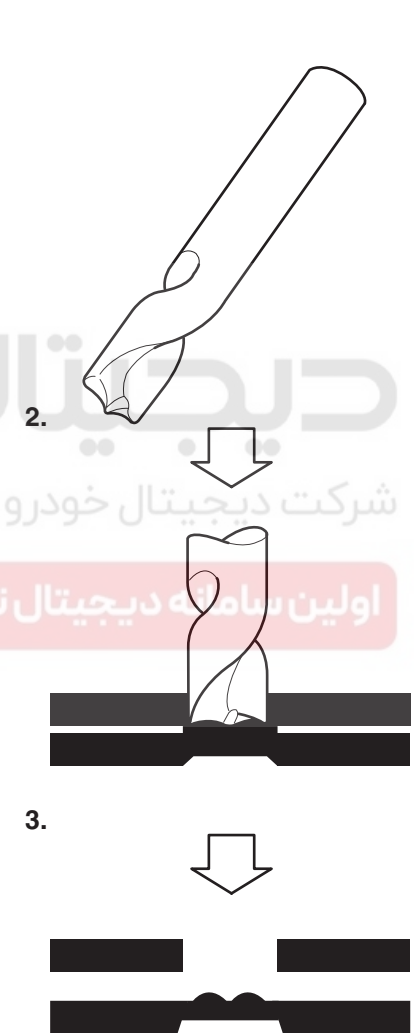
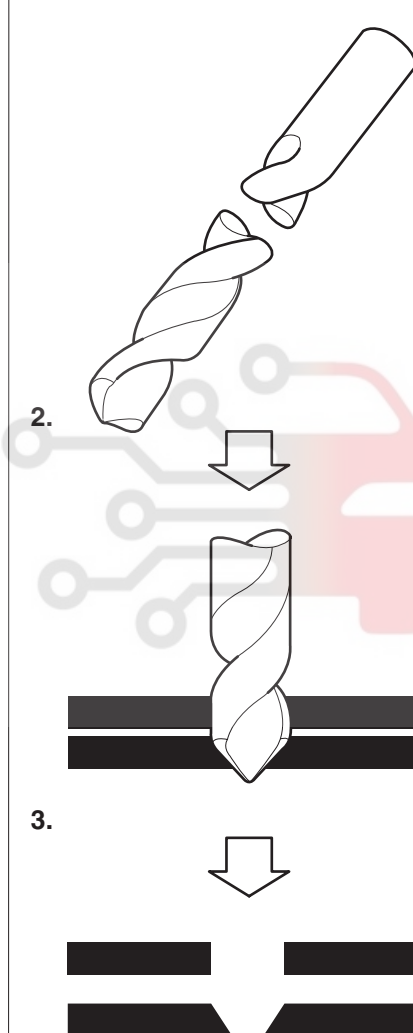


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## Notes when welding body

### Disassembling spot welded area

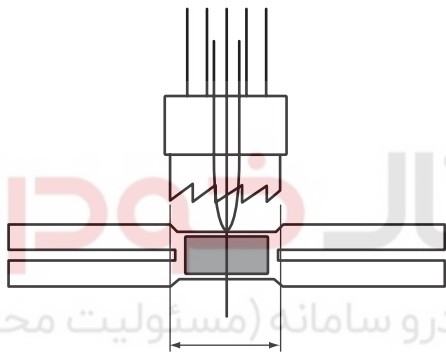
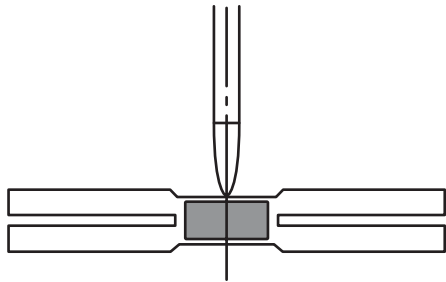
Most body parts are spot welded. In order to disassemble the damaged area, it is best to disassemble the spot welded area from the body frame using a spot cutter or candle type edge drill bit. Do not use a drill bit with a tapered edge. Center punch middle of spot weld to insure the entire spot weld will be removed.

| 1. Spot cutter   | 1. Drill(candle type edge)   | 1. Drill(taper edge)   |
|--|--|--|
|  |  |  |
| Correct  | Correct  | Not correct  |

A3EB3251

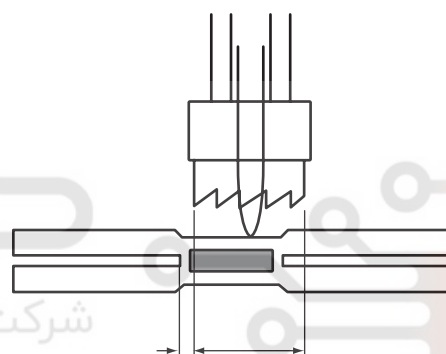
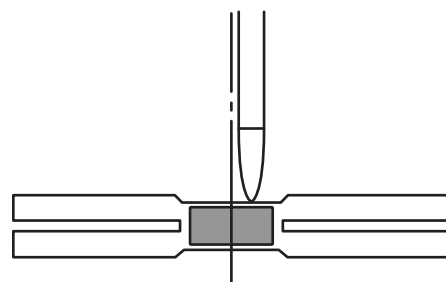
## 21-4 Replacing body panels

Center punch the middle(nugget) of the spot weld.



Spot welded area can be removed from the body frame.

Otherwise,



Spot welded area cannot be removed from the body frame.

A3EB3252

## Assembling a new body frame

The efficiency of the transmission and load distribution are determined by many complicated factors such as thickness of plate, shape and size of a cross section, damage of parts, variance of joints, welding method, and/or welding locations. Therefore, a new part should be fitted to the body frame using the proper procedures to avoid reducing the strength of the body.

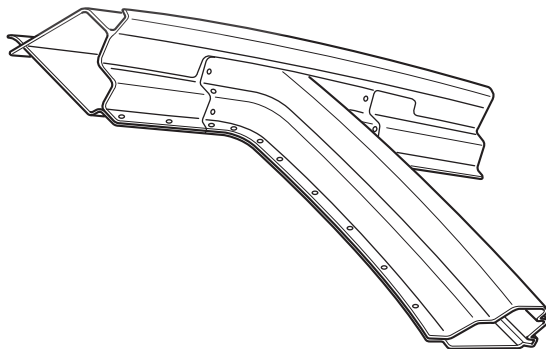
## Determining a welding method

It is extremely important that appropriate welding methods, which don't reduce the original strength and durability of the body be used when making repairs. Try to use either spot welding or carbon arc(plug) welding, Do not braze any body components other than the ones brazed at the factory. Do not use an oxy-acetylene torch for welding.

| Welding                              | Symbol | Details   |
|--------------------------------------|--------|---|
| Spot welding                         | ●      | The most reliable welding method<br>(provides high efficiency and quality of assembled part.) |
| Carbon arc welding<br>(Plug welding) | ■      | Use when spot welding cannot be done or spot welding is not necessary.                        |
| Oxygen-acetylene welding             | ×      | Not used  |

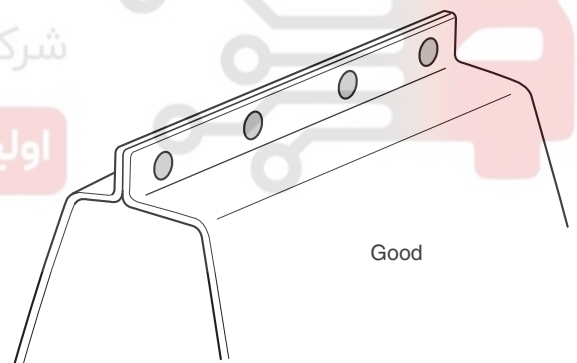
### Spot welding

- Commercial spot welding machines do not perform as well as the machines used in the manufacturing process. When spot welding, increase the number of spot welds by 30%(1.3 times the original number of welds).



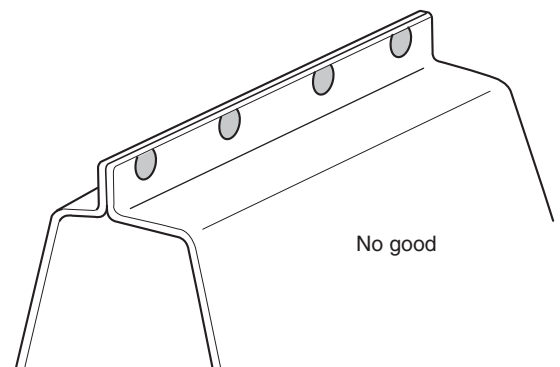
A3EB3253

- When spot welding, weld in the middle of the joint.



A3EB3254

- Spot welding on the edge of the joint will reduce welding strength.



A3EB3255

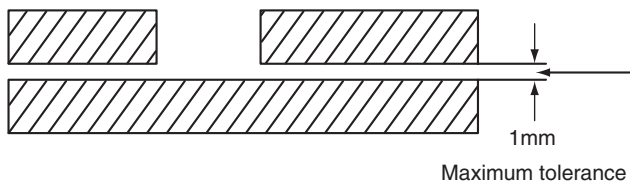


## 21-6 Replacing body panels

### Carbon arc welding

In areas where spot welding is not suitable, do plug welding using a carbon arc welding machine.

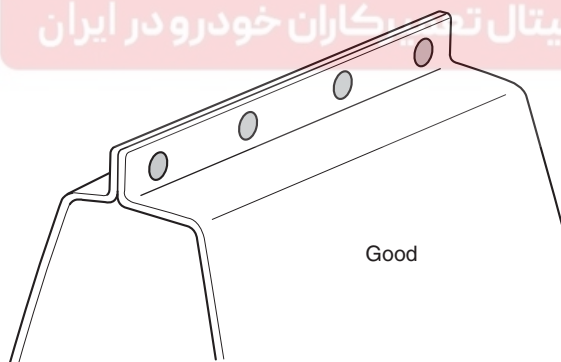
1. Clamp the parts to be welded together tightly. Do not exceed 1 mm of space between parts. A tolerance greater than 1 mm will reduce the strength of the welded area.



A3EB3256

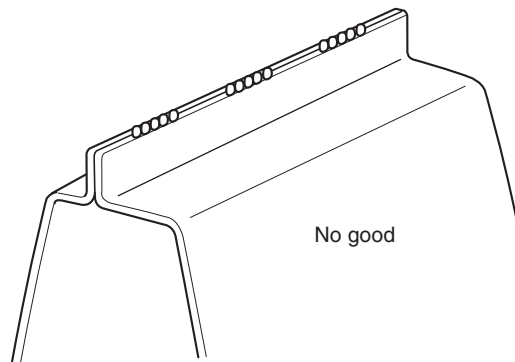
2. Weld in the middle of the flange joint.

- a) Drill a hole 5~6 mm on one side of the flange only, and weld within the hole.



A3EB3254

- b) Do not weld on the edge of the flange joint.



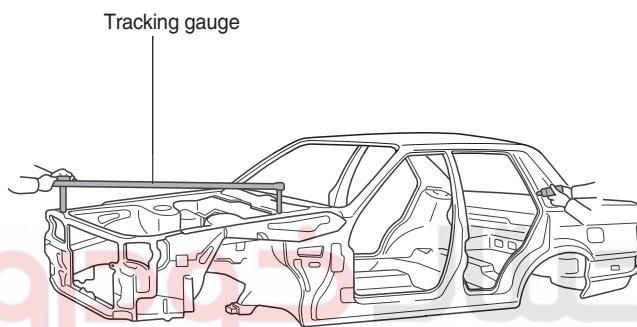
A3EB3257

## Replacing body panel

### Disassembly

#### 1. Body measurement

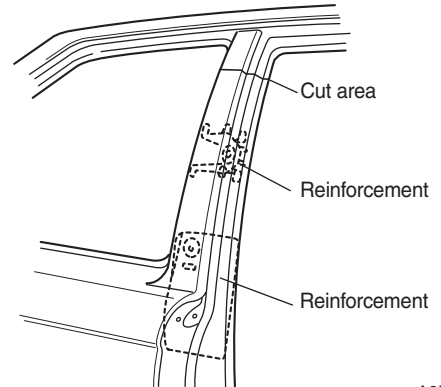
- Before disassembling, measure the damaged area according to the dimensions supplied in Body Dimension, Section 31. If deformation is present, use a frame straightener to adjust.
- When disassembling a panel, apply clamps to prevent damage of each part, and support the lower end of the frame to prevent deformation during the procedure.



A3EB3261

#### 2. Cut and welding point selection

Cutting, if necessary, should not be done in a reinforcement area. Select an area which will result in the least amount of deformation after welding.

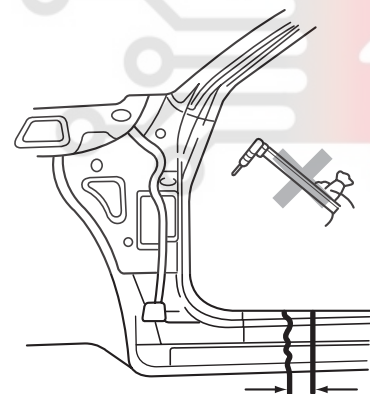


A3EB3258

#### 3. Cutting rough area for replacement part

Cutting should be done according to the following steps to make disassembly easy:

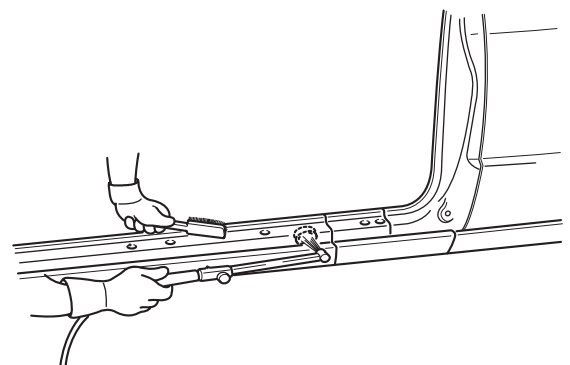
- Use care when cutting an area close to a pipe or wiring harness.
- Cut an area leaving 30~50 mm of tolerance.



ASD1BM005

#### 4. Removing paint from an area to be spot welded

Using a torch and wire brush, remove paint completely before beginning welding.



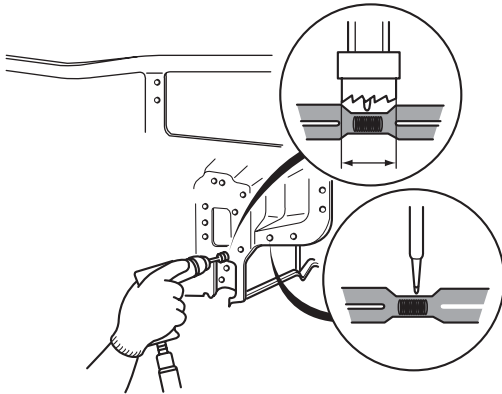
1SD1BM014

## 21-8 Replacing body panels

### 5. Determine a cutting method

#### a) Cutting a spot welded area

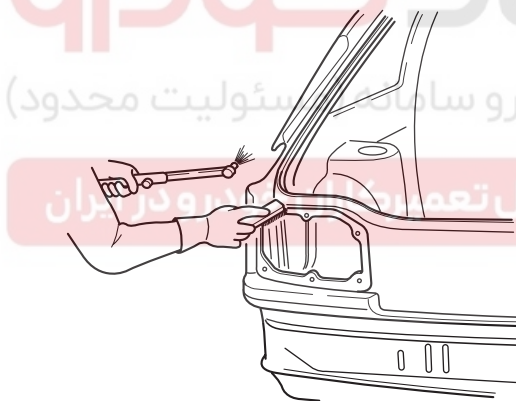
Make a hole in the middle of spot welded area with a punch, disassemble welded area using a spot cutter and remove using a chisel.



1SD1BM015

#### b) Removing brazed area

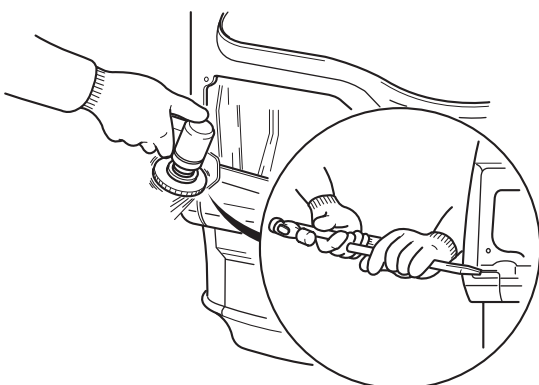
Disassemble using a torch and wire brush, and remove with a chisel.



1SD1BM016

#### c) Removing arc welded area

Remove plug welded area using a disk grinder and disassemble with a chisel.

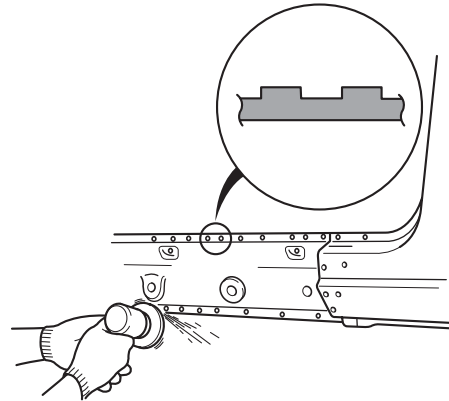


1SD1BM017

### Preparation for assembly

#### 1. Spot weld finish

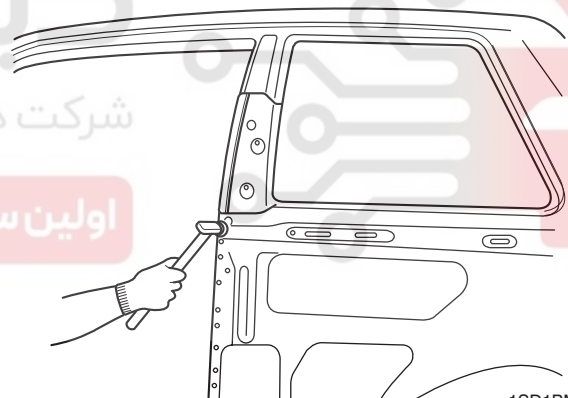
Use a disk grinder or similar tool to finish spot weld mark. Do not grind more than is necessary to smooth surface.



1SD1BM018

#### 2. Panel preparation

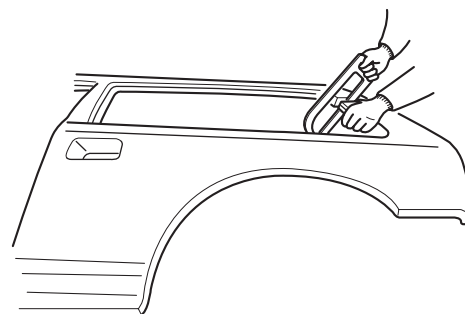
Repair any bent or uneven areas with a hammer to improve the assembly process.



1SD1BM019

#### 3. Cutting a rough area for a new part

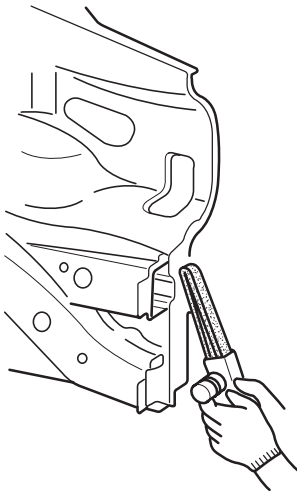
When rough cutting an area for a new part, leave a tolerance of 30~50 mm.



1SD1BM020

#### 4. Preparation for spot welding

Remove paint on spot welded area and on the area overlapped by the new part using a belt sander or similar tool.



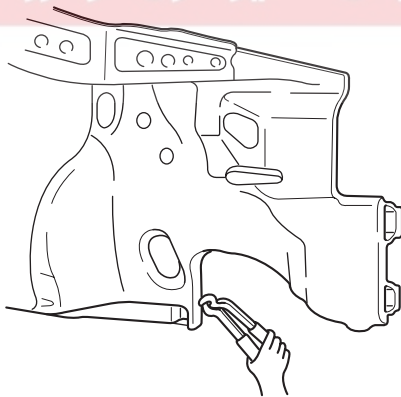
1SD1BM021

#### 5. Drilling a hole for plug welding

If the thickness of the part to be welded is less than 3 mm, drill a 5~6 mm diameter hole. If the thickness of the part to be welded is greater than 3 mm, drill a hole using a 7 mm diameter drill.

**\* Notice**

- Do not spot weld where thickness is greater than 3 mm.



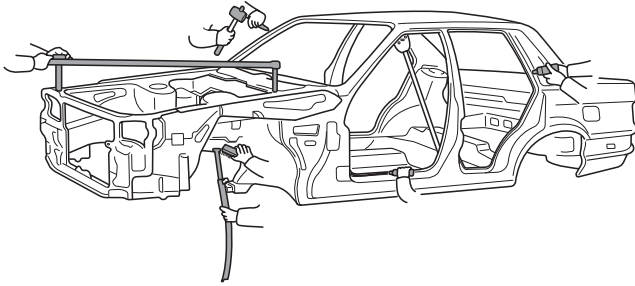
1SD1BM022

## 21-10 Replacing body panels

### Assembly

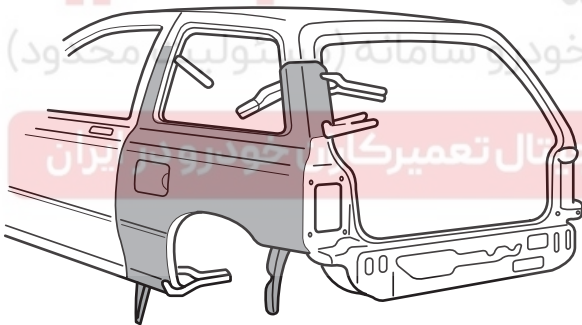
#### 1. Checking welding and fitting in advance

- a) When assembling a new part, measure the dimensions of each part according to the body dimensions given in Section 31, and set part to the reference dimensions.



1SD1BM02004

- b) Prior to final welding, check the fit of all related parts.



1SD1BM023

#### 2. Selecting number of welding points

**Spot welding :** Multiply the original number of factory welds by 1.3 times

**Plug welding :** Same number as original number of factory welds

#### \* Notice

- Plug welding should be done using a carbon arc welding machine.
- Brazing should be done only on areas that were originally brazed at the factory.

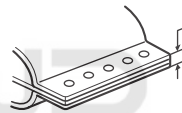
Initial welding  
pitch:50 mm

Welding after repair  
pitch:35 mm



Spot welding: initial number of welds x 1.3

Welding points-same number as original number of factory welds.

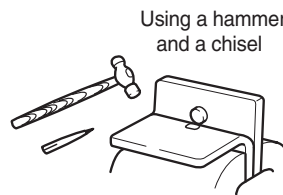


3mm Plug welding-used when  
spot welding is not  
feasible or material is  
thicker than 3 mm

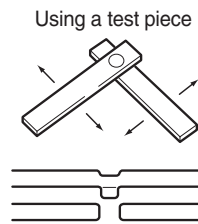
A3EB3259

#### 3. Caution when spot welding

- a) Do a test welding on a piece of material of the same type and thickness as the part to be welded and proceed if test weld is good.
- b) Before spot welding, check if welding debris, oil or paint is present on the area where surfaces meet. Clean or sand as necessary.



Using a hammer  
and a chisel

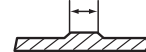


Using a test piece

Center  
diameter



3 mm

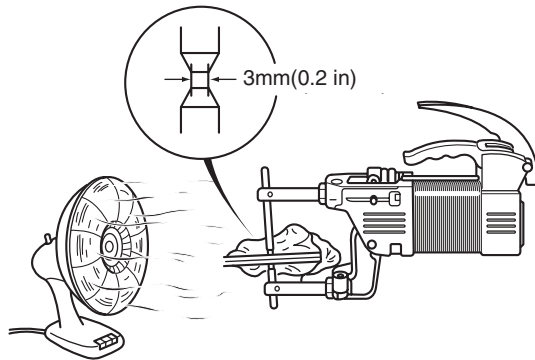


Nugget  
diameter:  
4/5 of tip

A3EB3260

## Replacing body panels 21-11

- c) The tip of the spot welding machine should be maintained to a minimum tolerance of 3 mm. Also let area cool after 5 or 6 welds to minimize problems caused by excessive heat.



1SD1BM026

#### 4. Cutting and welding an assembled area

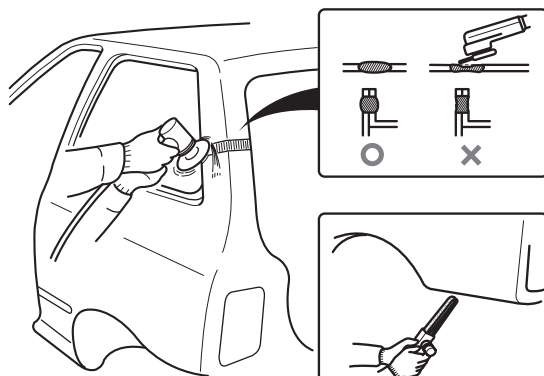
To align a roof panel and a center pillar together for butt welding, temporarily fasten a steel flange to the roof panel and then apply the new center pillar panel. Remove the flange when final welding is done.



1SD1BM027

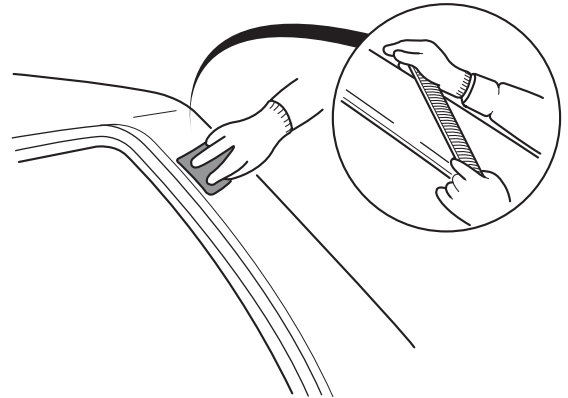
#### 5. Finishing after welding

- a) Grind any areas that were plug welded or butt welded using a disk grinder. Grind carefully to avoid removing too much material. This degrades the strength of the weld.



1SD1BM028

- b) Finish areas that have been brazed by applying body filler then smooth the area with a flexible file and sander.



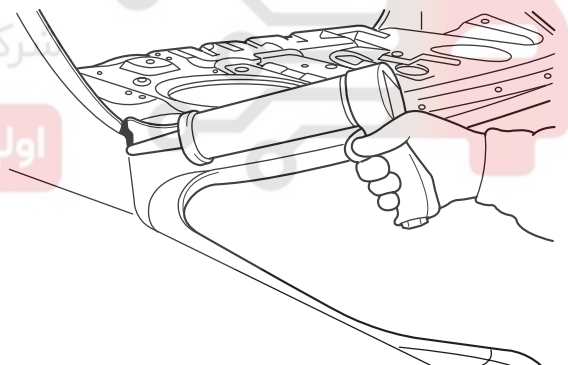
1SD1BM029

#### 6. Applying anti-rust agent and body sealer

After coating the surface with anti-rust agent, apply body sealer where necessary.

##### \* Notice

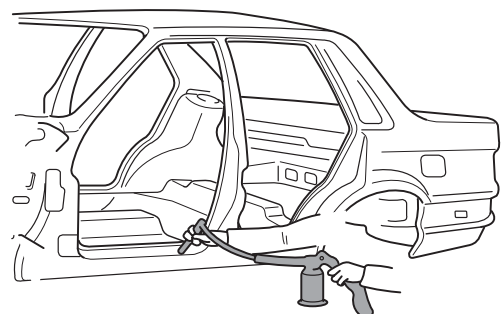
- Apply body sealer before assembly.



1SD1BM030

#### 7. Anti-rust treatment

Apply anti-rust agent to inside of doors and sills by spraying through access holes provided.



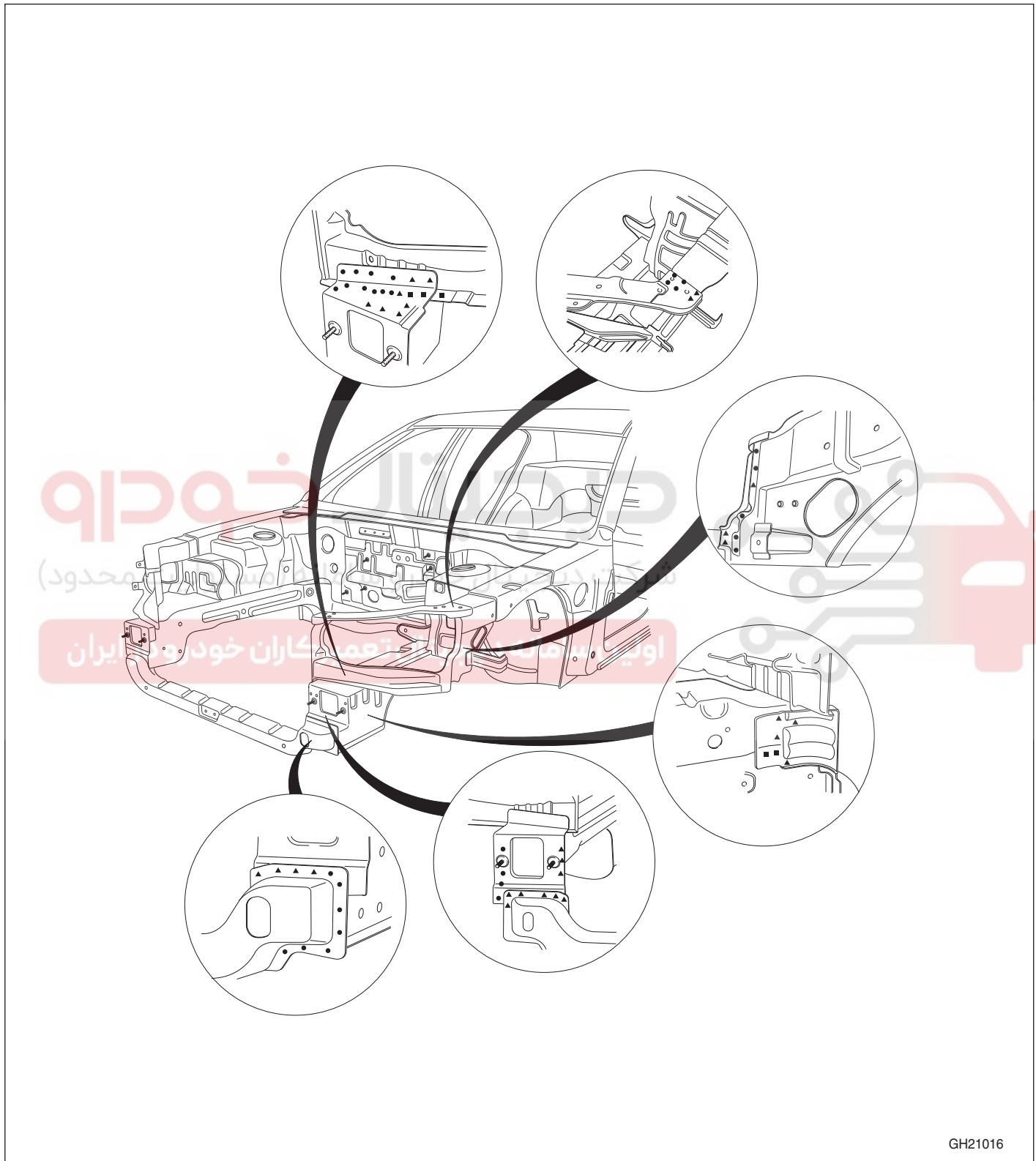
A3EB3261



## 21-12 Replacing body panels

## Radiator support panel

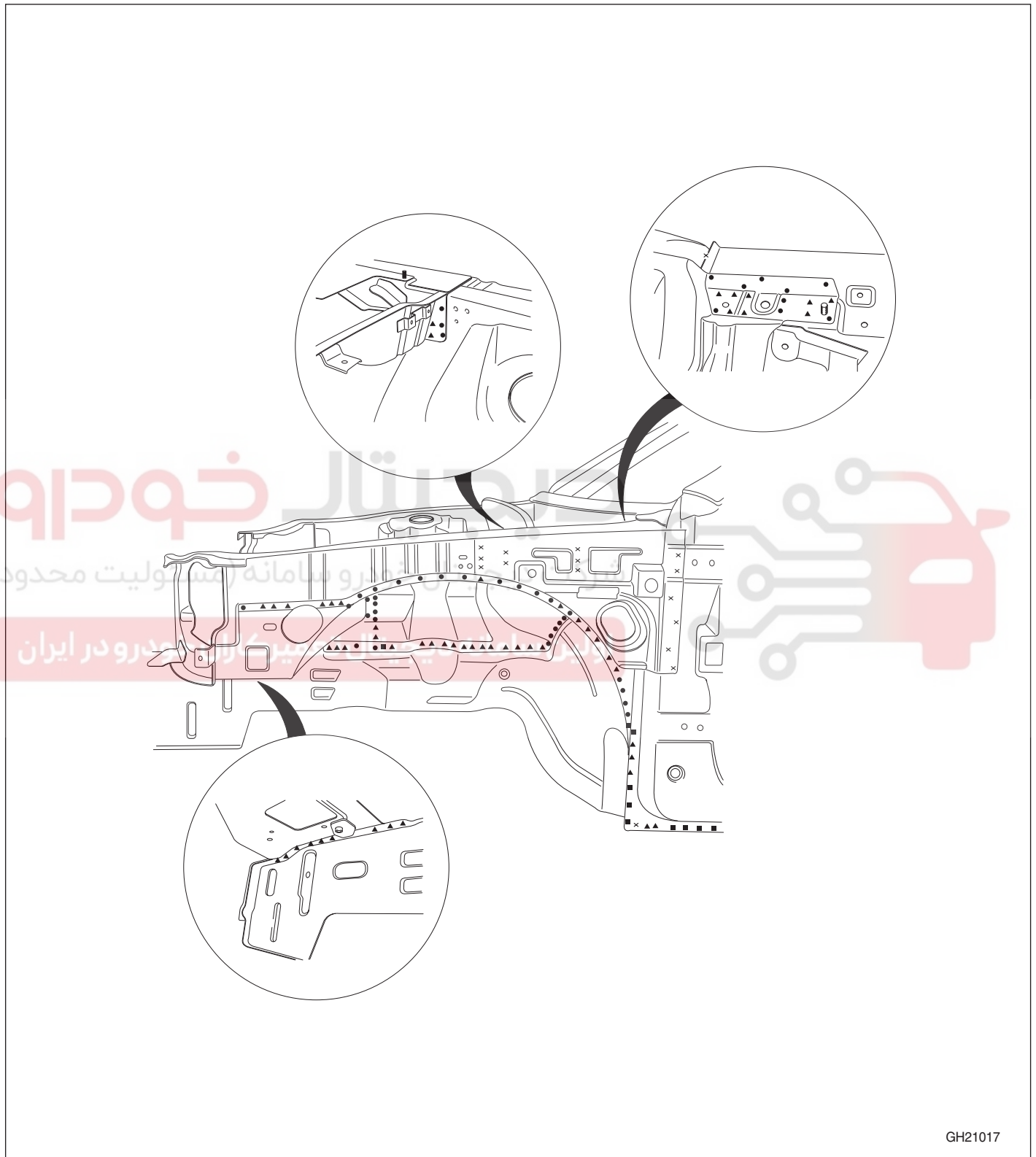
### Welding part





## Fender apron panel

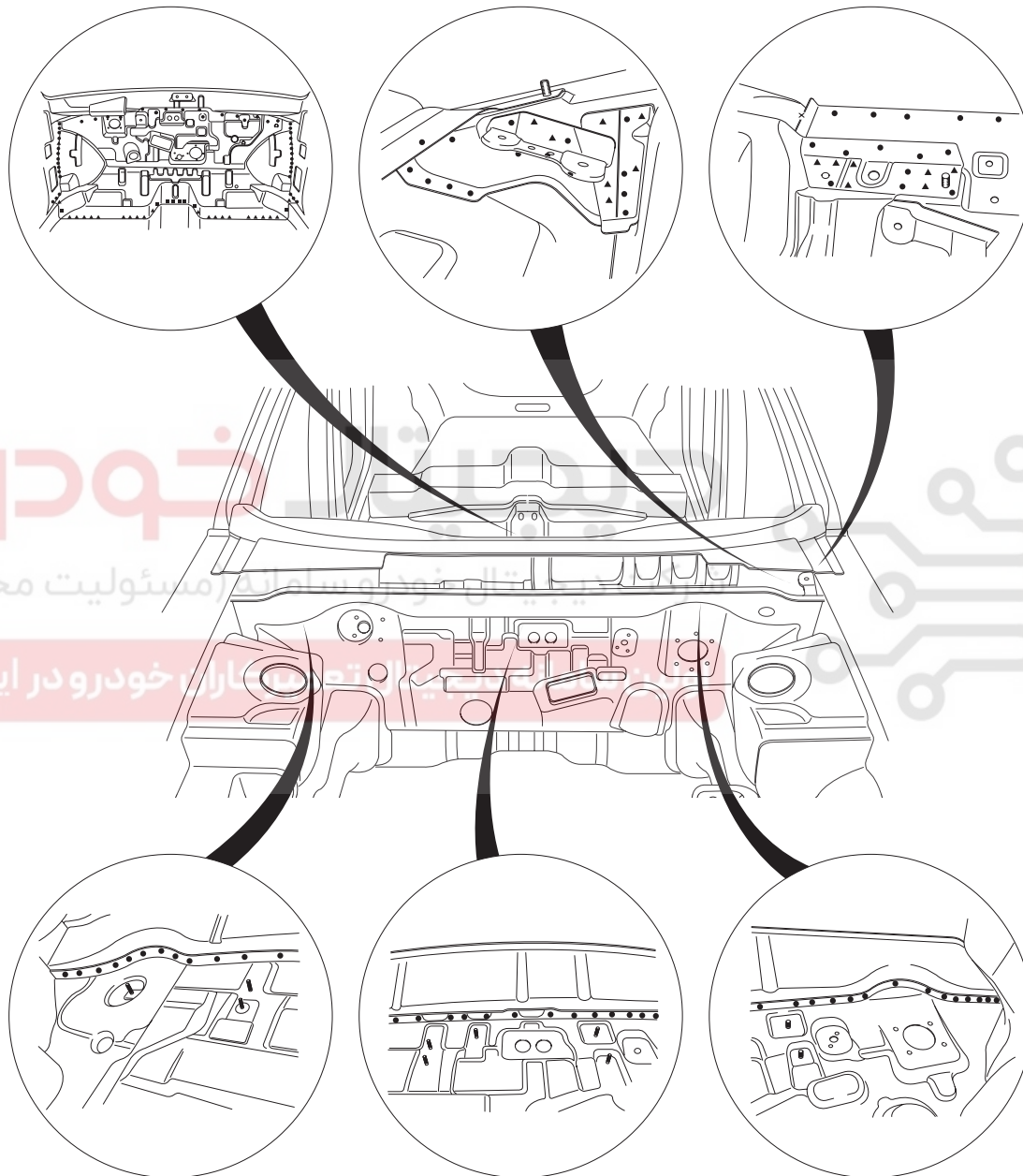
### Welding parts



## 21-14 Replacing body panels

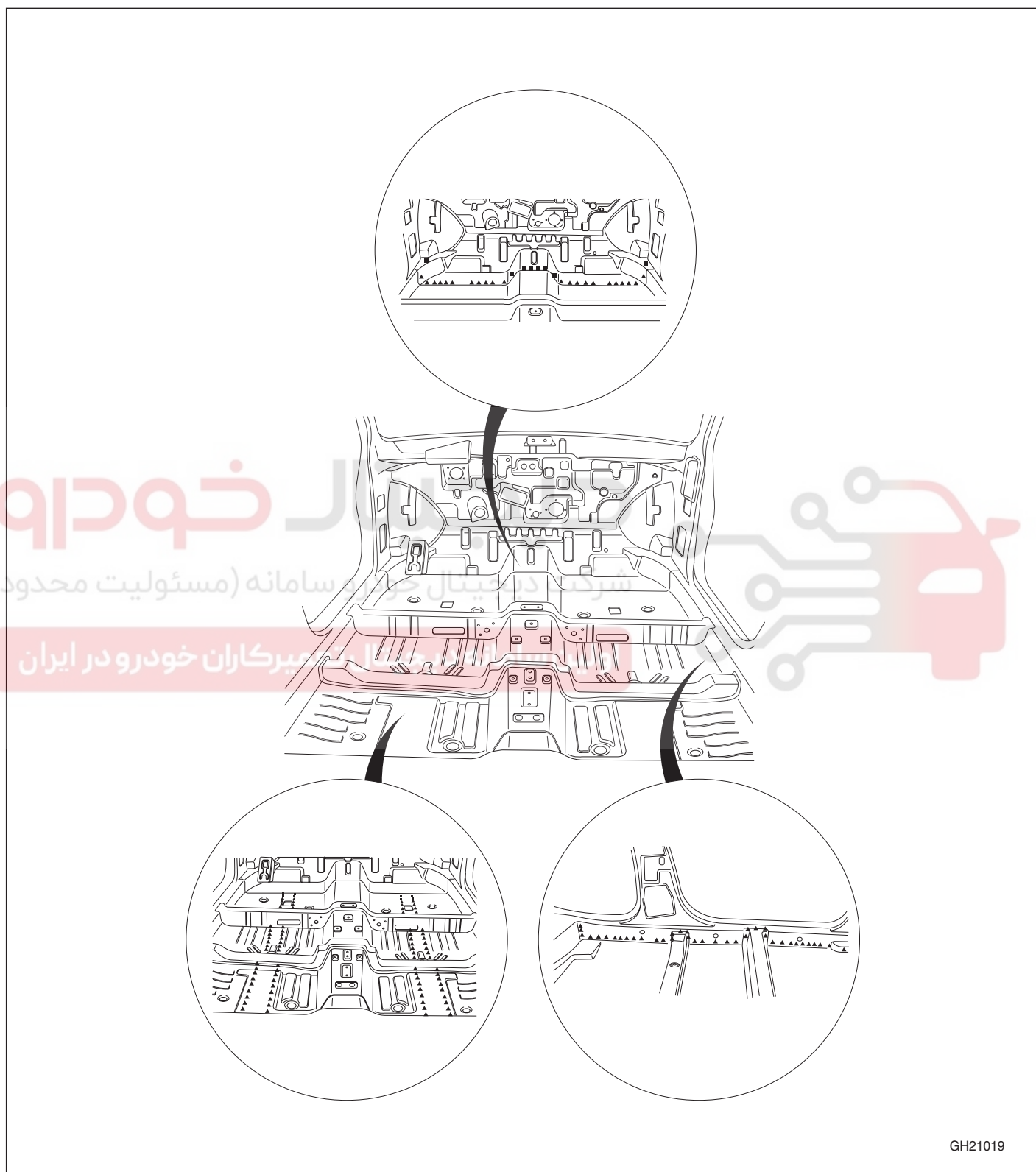
## Cowl & Dash panel

### Welding parts



GH21018

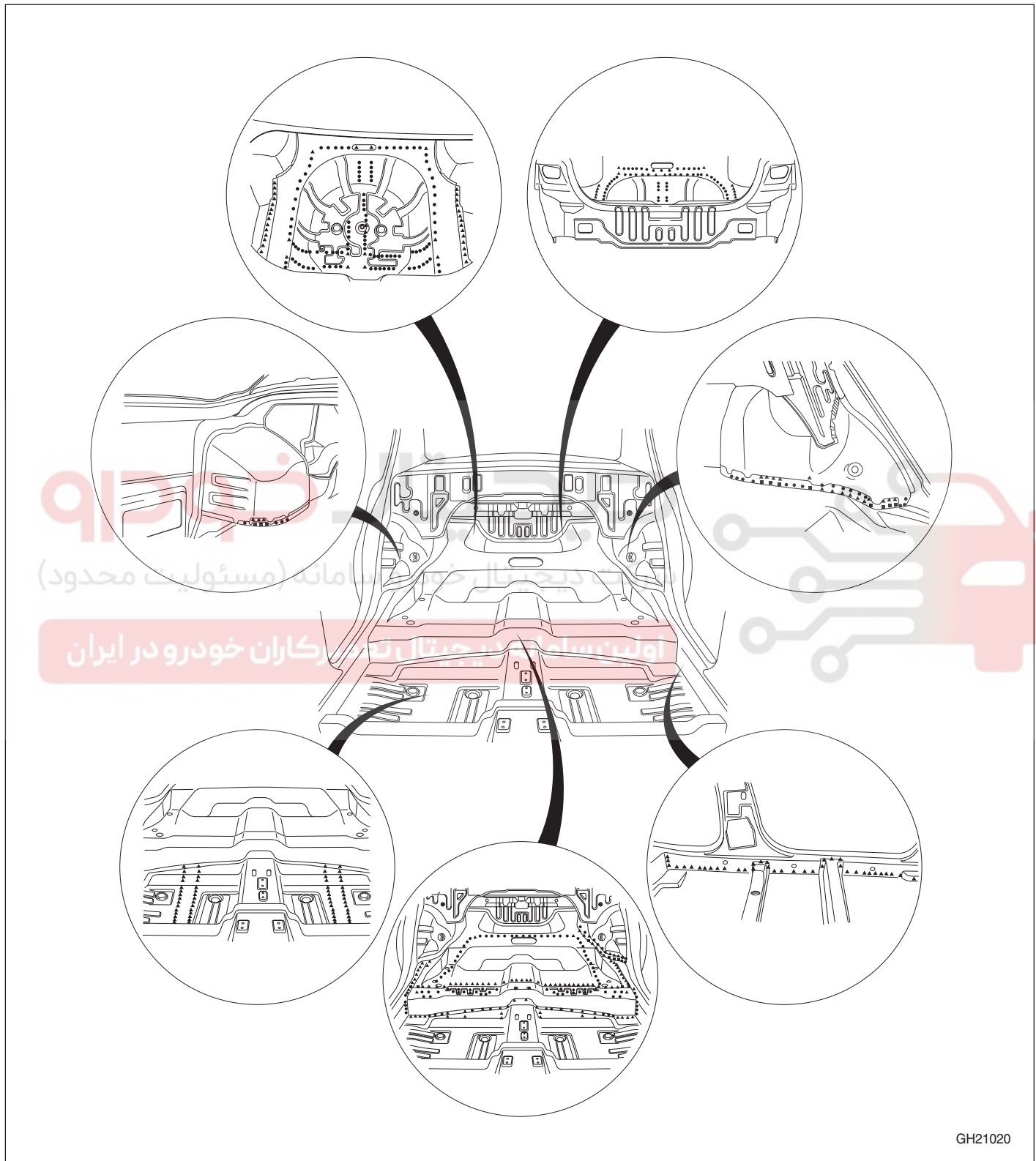
## Floor panel (Front) Welding part



## 21-16 Replacing body panels

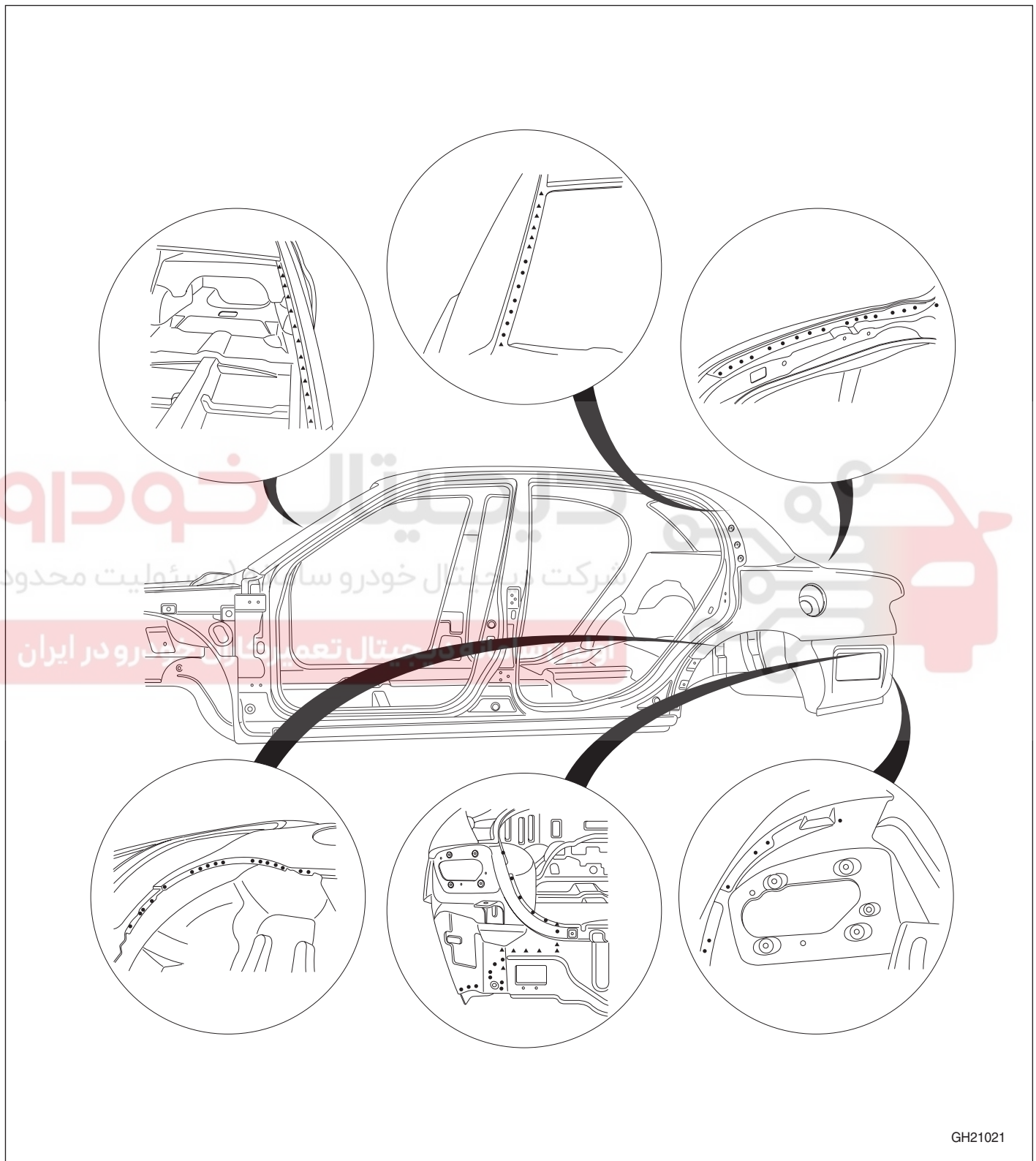
## Floor panel (Rear)

### Welding part



## Side panel - 1

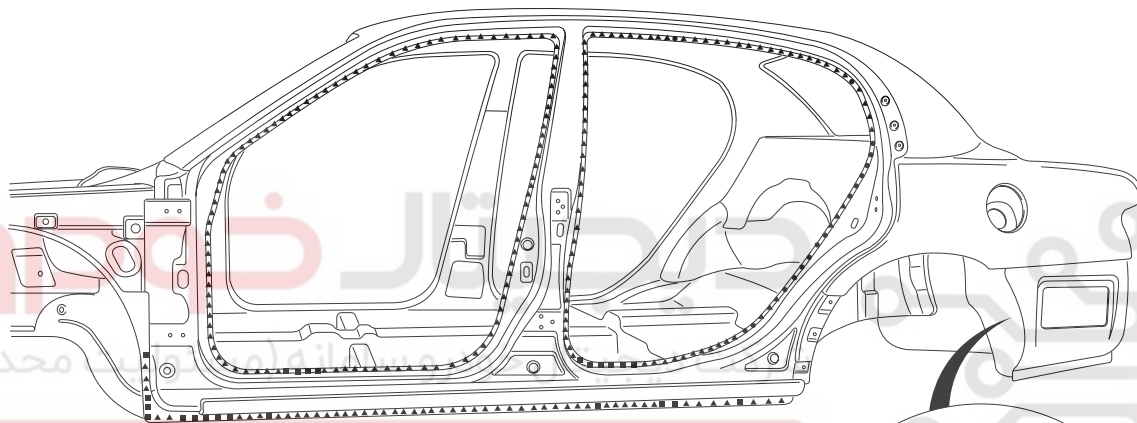
### Welding part



## 21-18 Replacing body panels

## Side panel - 2

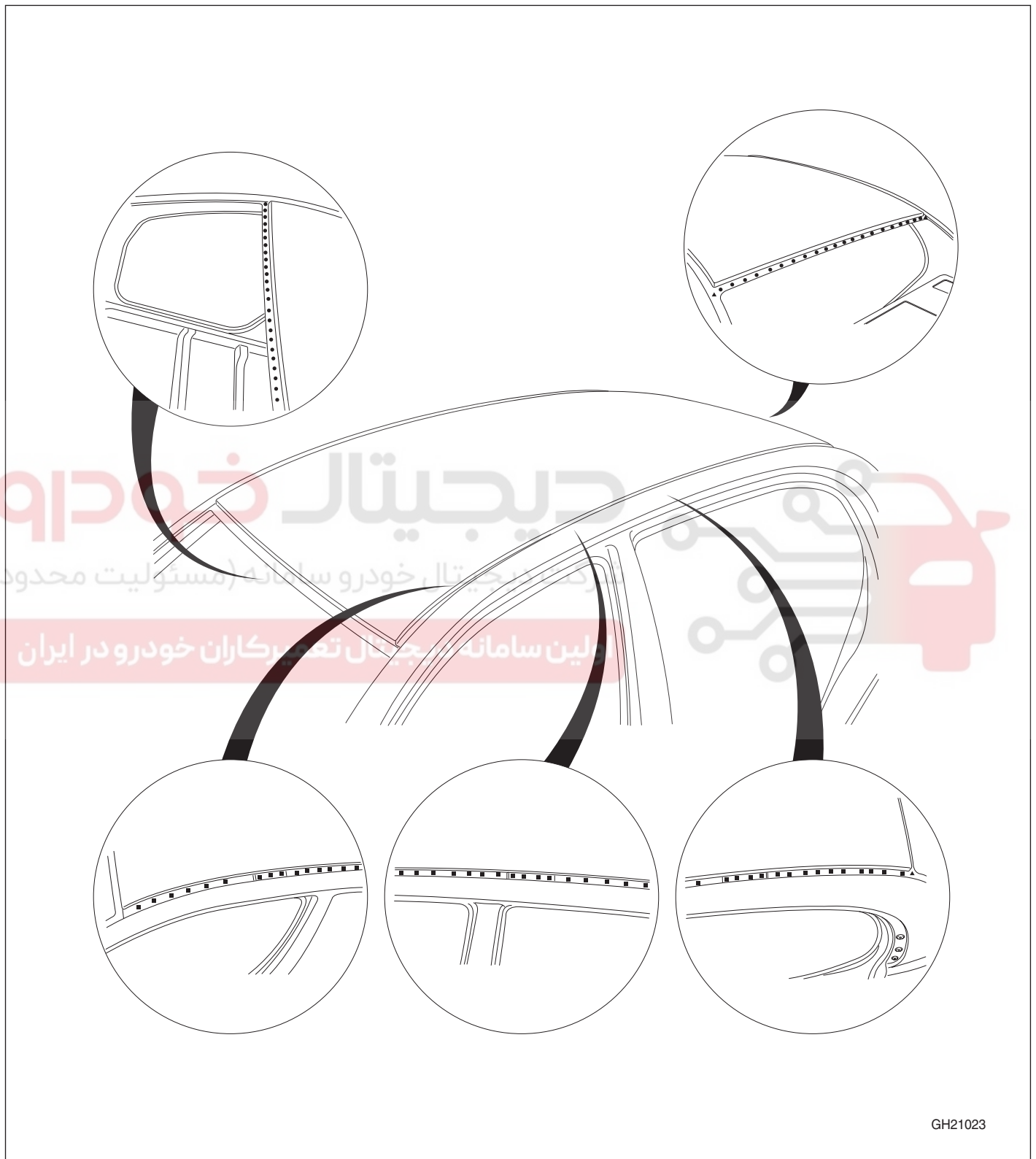
### Welding part



GH21022

## Roof panel

### Welding part

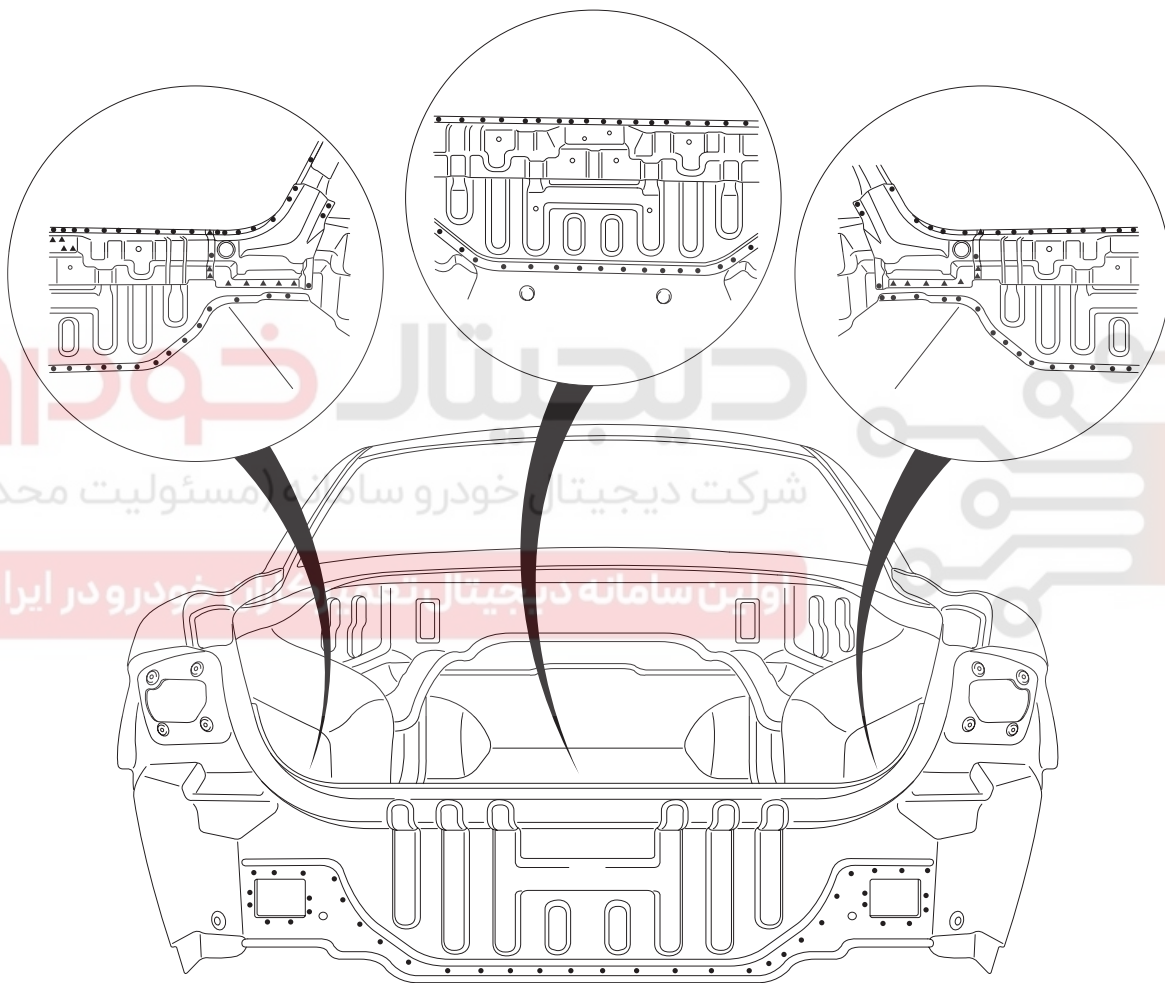




## 21-20 Replacing body panels

## Back panel

### Welding part



GH21024

## Body dimensions

### Body dimensions

|   |        |
|---|--------|
| <b>Body dimension indications</b> ..... | 31- 1  |
| Projected dimensions .....              | 31 - 1 |
| Straight-line dimensions .....          | 31- 1  |
| <b>Front body</b> .....                 | 31- 2  |
| <b>Side frame panel</b> .....           | 31- 4  |
| <b>Interior A</b> .....                 | 31- 6  |
| <b>Interior B</b> .....                 | 31- 8  |
| <b>Interior C</b> .....                 | 31-10  |
| <b>Rear body</b> .....                  | 31-12  |
| <b>Under body</b> .....                 | 31-14  |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



## Body dimensions

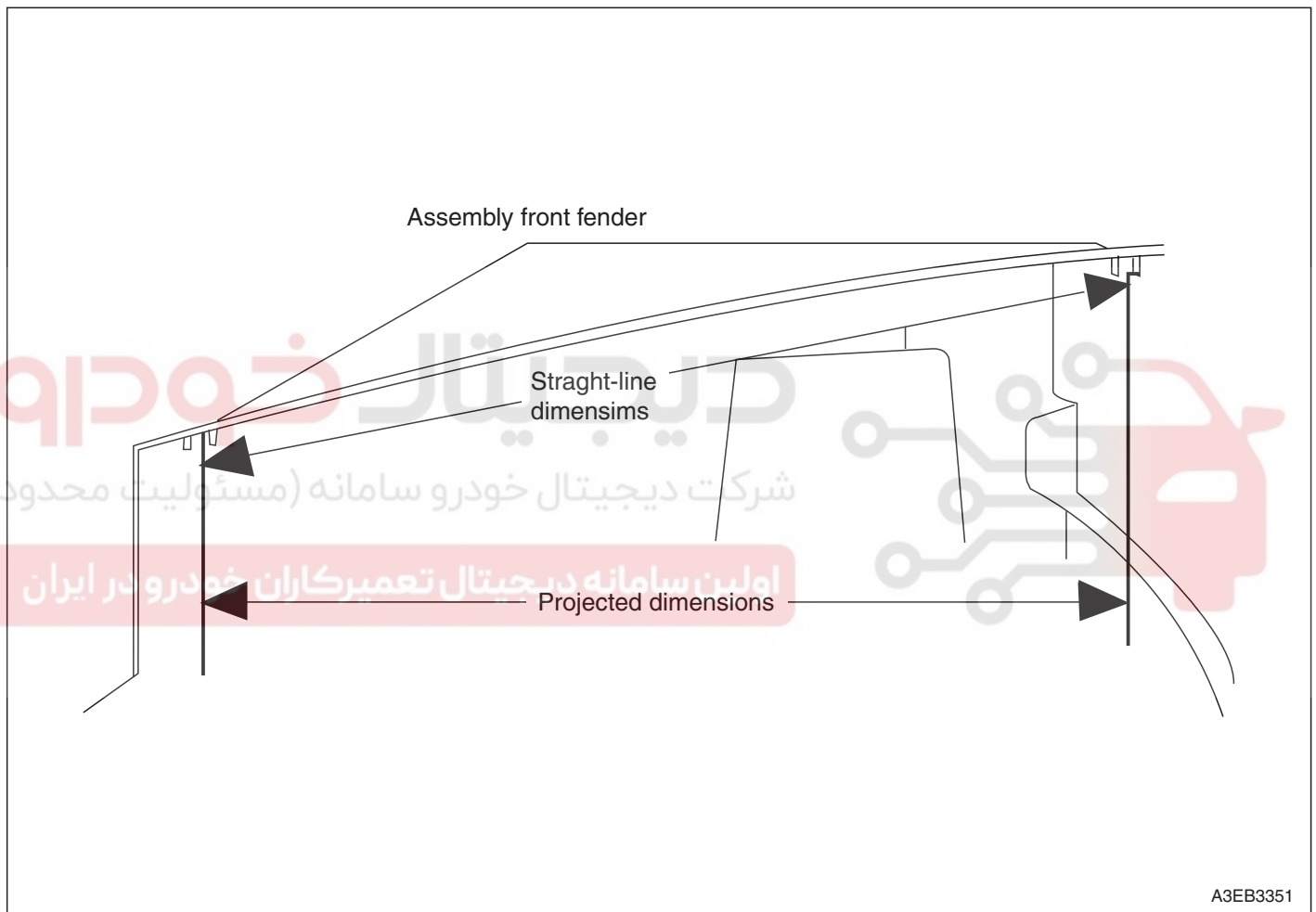
### Body dimension indication

#### Projected dimensions

The projected dimension indicates a dimension from a reference point on the body. (Height may be different in some cases)

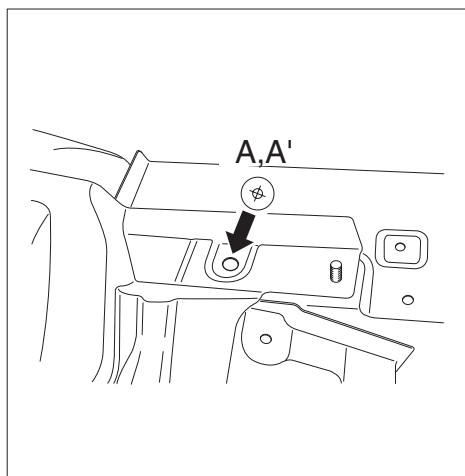
#### Straight-line dimensions (Actual measured dimensions)

The straight-line dimension indicates a actual measured dimension between the measurement reference points.



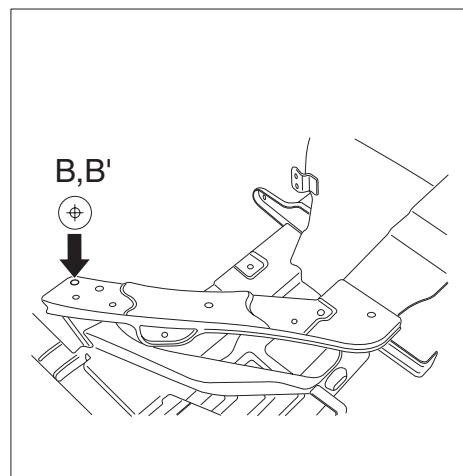
## 31-2 Body dimensions

## Front body straight - line dimensions



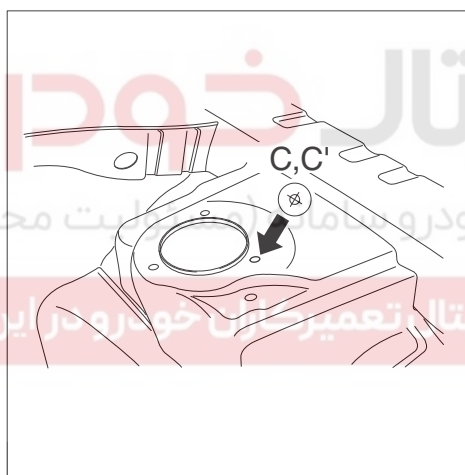
Hood hinge mounting hole

ø13



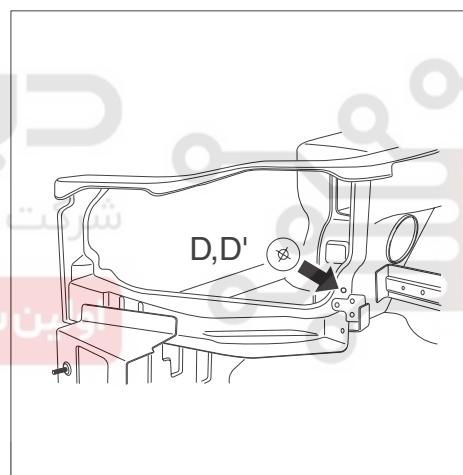
Engine room cover mounting hole

ø8.5



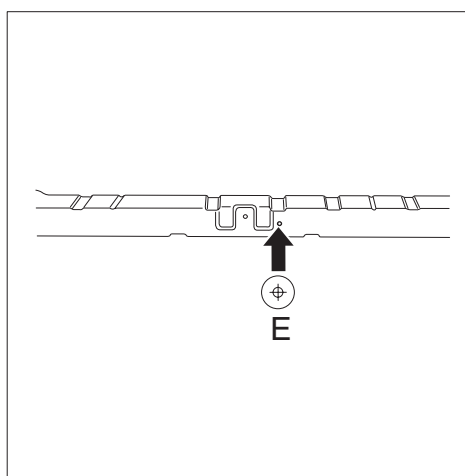
Front suspension housing hole

ø12



Tooling hole

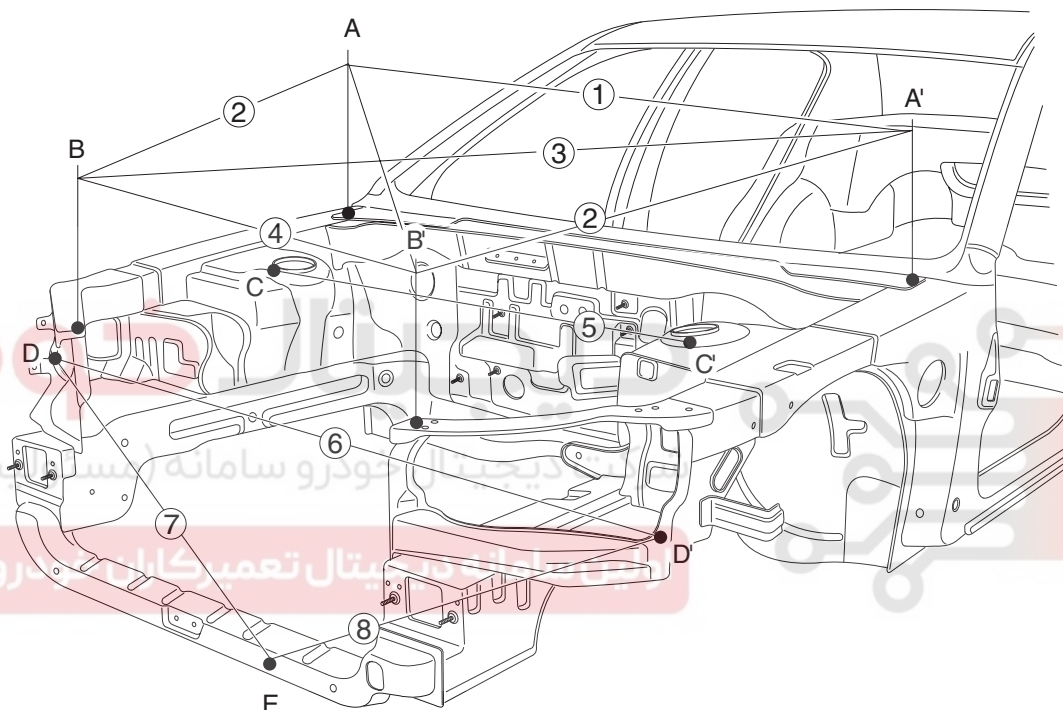
ø10



Ambient sensor mounting hole

ø 7

GH21002

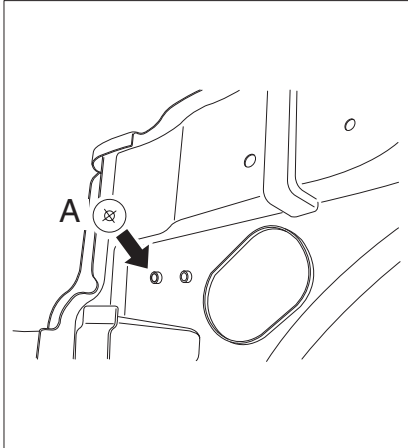


GH21001

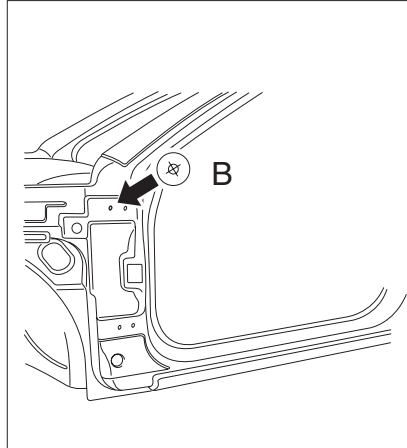
| Measurement point | ①    | ②    | ③   | ④    | ⑤    | ⑥    | ⑦    | ⑧   |  |
|-------------------|------|------|-----|------|------|------|------|-----|--|
| Dimension (mm)    | 1103 | 1380 | 844 | 1684 | 1060 | 1514 | 1053 | 730 |  |

## 31-4 Body dimensions

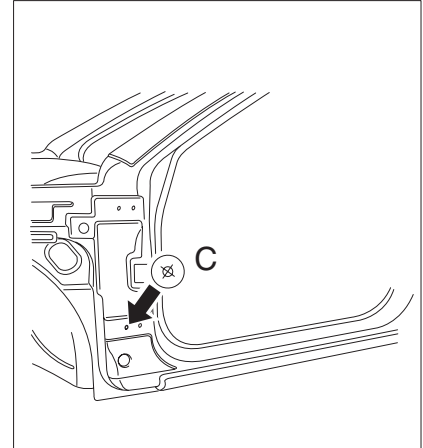
### Side frame straight - line dimensions



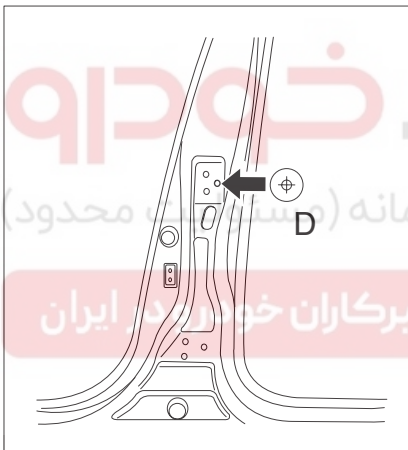
Earth wiring mounting hole  $\varnothing 6.6$



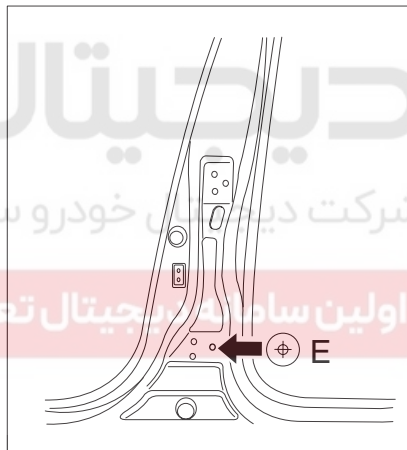
Front door upper hinge mounting hole  $\varnothing 13$



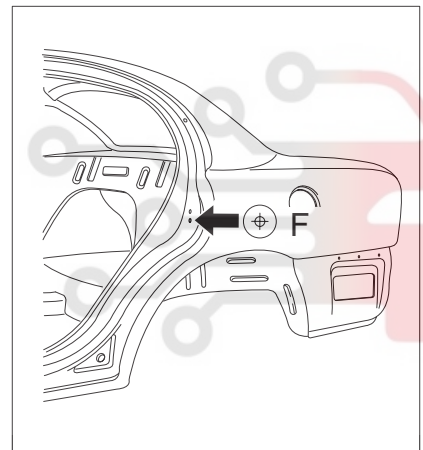
Front door lower hinge mounting hole  $\varnothing 13$



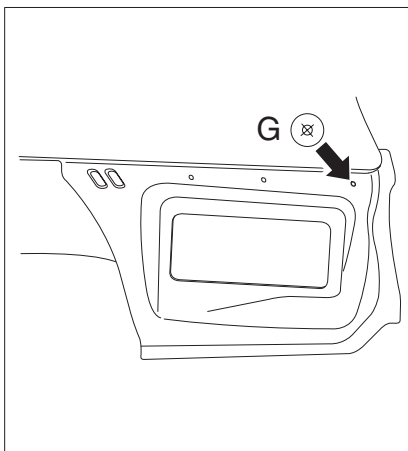
Rear door upper hinge mounting hole  $\varnothing 11$



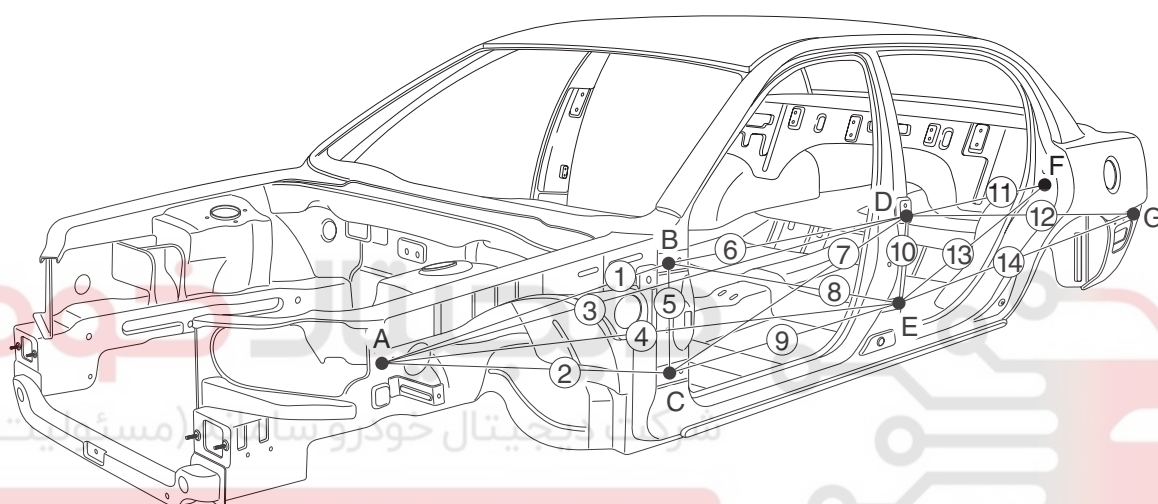
Rear door lower hinge mounting hole  $\varnothing 13$



Door switch mounting hole 17.3 X 27.3



Rear bumper mounting hole  $\varnothing 6.5 \times 7$



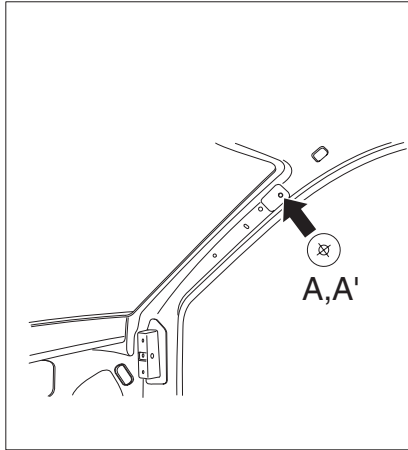
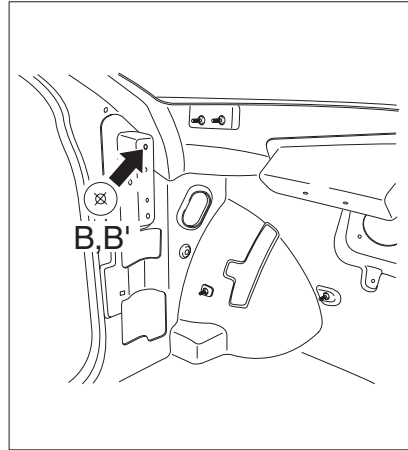
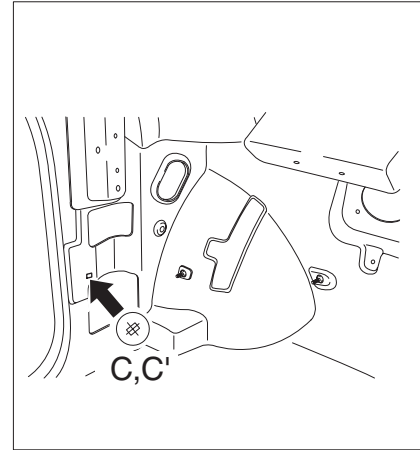
GH21003

|                   |      |      |      |      |      |      |      |      |      |
|-------------------|------|------|------|------|------|------|------|------|------|
| Measurement point | ①    | ②    | ③    | ④    | ⑤    | ⑥    | ⑦    | ⑧    | ⑨    |
| Dimension (mm)    | 1806 | 1826 | 2583 | 2569 | 350  | 1142 | 1197 | 1161 | 1112 |
| Measurement point | ⑩    | ⑪    | ⑫    | ⑬    | ⑭    |      |      |      |      |
| Dimension (mm)    | 340  | 959  | 1947 | 1030 | 1971 |      |      |      |      |

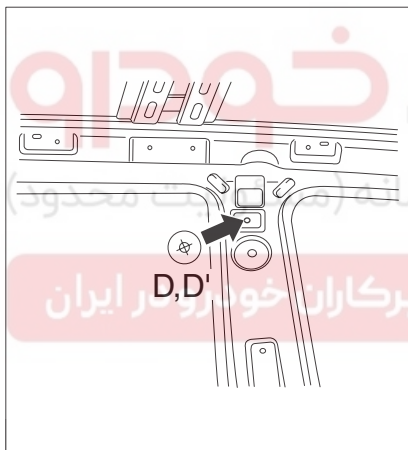
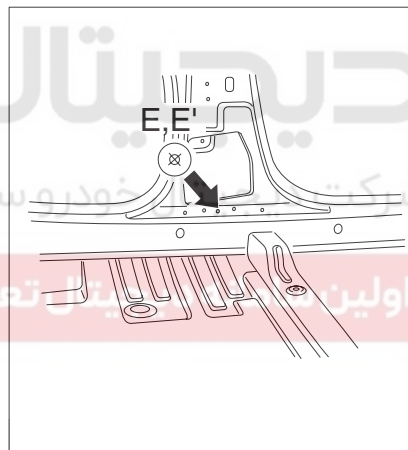
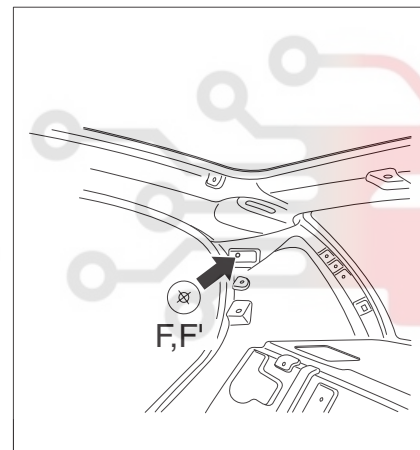
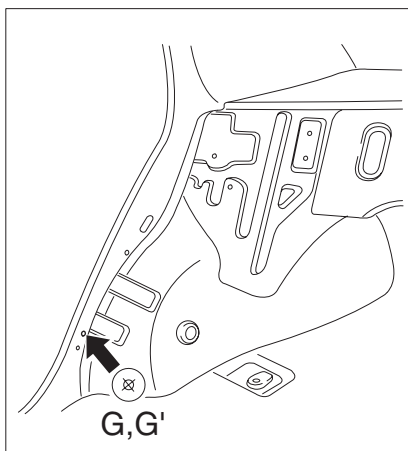


## 31-6 Body dimensions

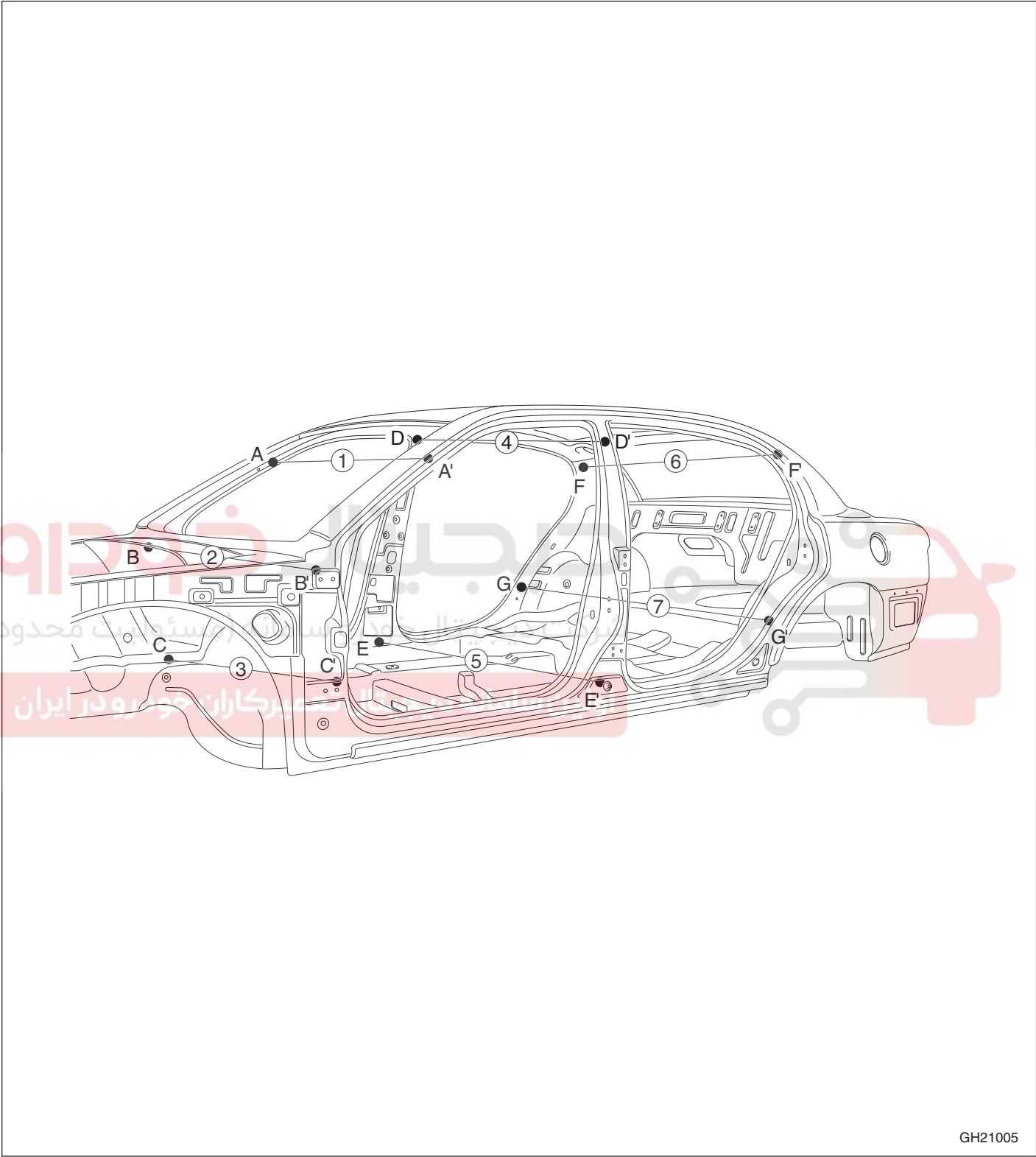
## Interior A straight - line dimensions

Front pillar upper trim mounting hole     $\varnothing 8.5$ Gusset front pillar to cowl mounting hole     $\varnothing 6.6$ 

Hood release handle mounting hole    8.4X8.4

Trim mounting hole     $\varnothing 15$ Fixing side airbag sensor hole     $\varnothing 15$ Quarter upper trim mounting hole     $\varnothing 8.5$ Wiring mounting hole     $\varnothing 7 \times 12$ 

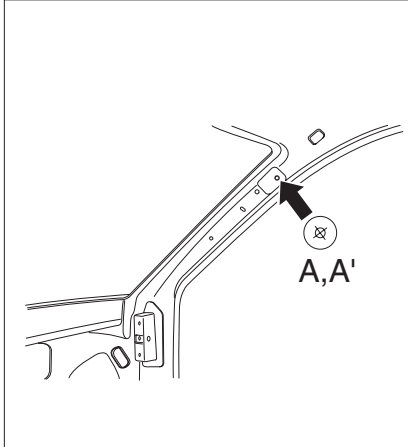
GH21006



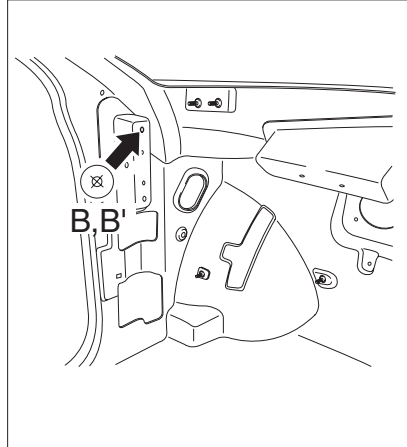
|                   |      |      |      |      |      |      |      |  |  |
|-------------------|------|------|------|------|------|------|------|--|--|
| Measurement point | ①    | ②    | ③    | ④    | ⑤    | ⑥    | ⑦    |  |  |
| Dimension (mm)    | 1231 | 1373 | 1470 | 1228 | 1469 | 1250 | 1500 |  |  |

## 31-8 Body dimensions

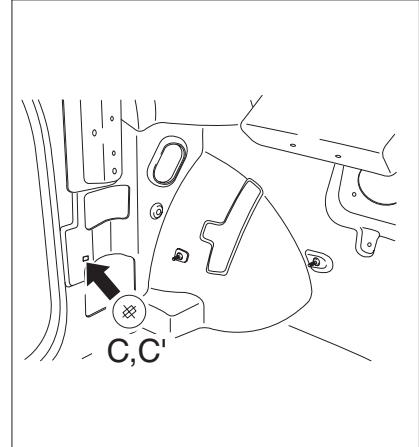
### Interior B straight - line dimensions



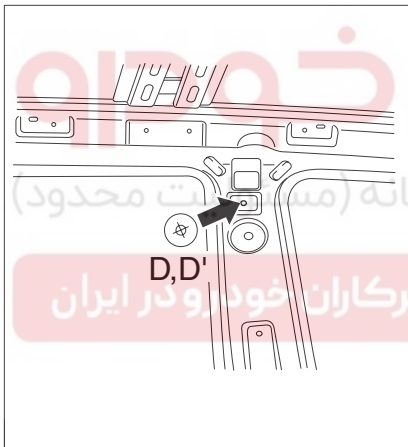
Front pillar upper trim mounting hole  $\varnothing 8.5$



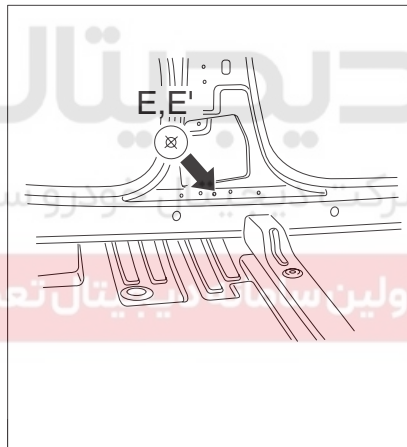
Gusset front pillar to cowl mounting hole  $\varnothing 6.6$



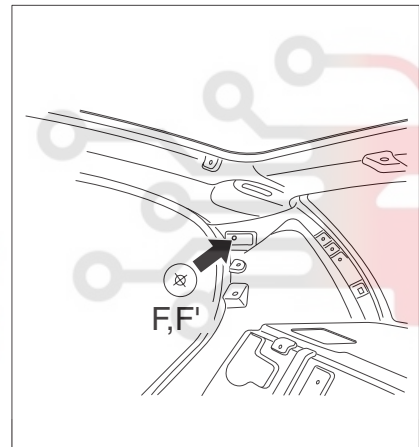
Hood release handle mounting hole 8.4X8.4



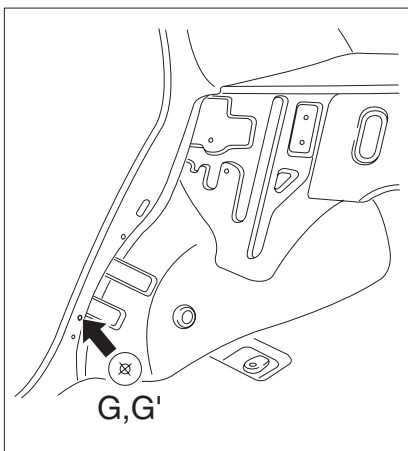
Trim mounting hole  $\varnothing 15$



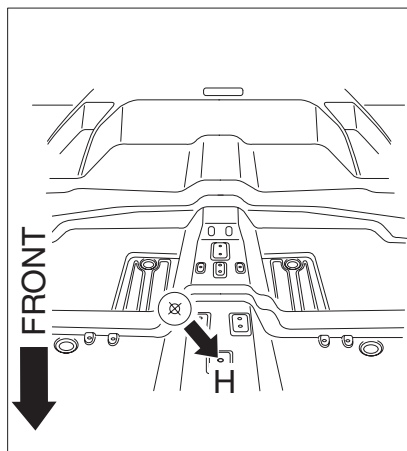
Fixing side airbag sensor hole  $\varnothing 15$



Quarter upper trim mounting hole  $\varnothing 8.5$

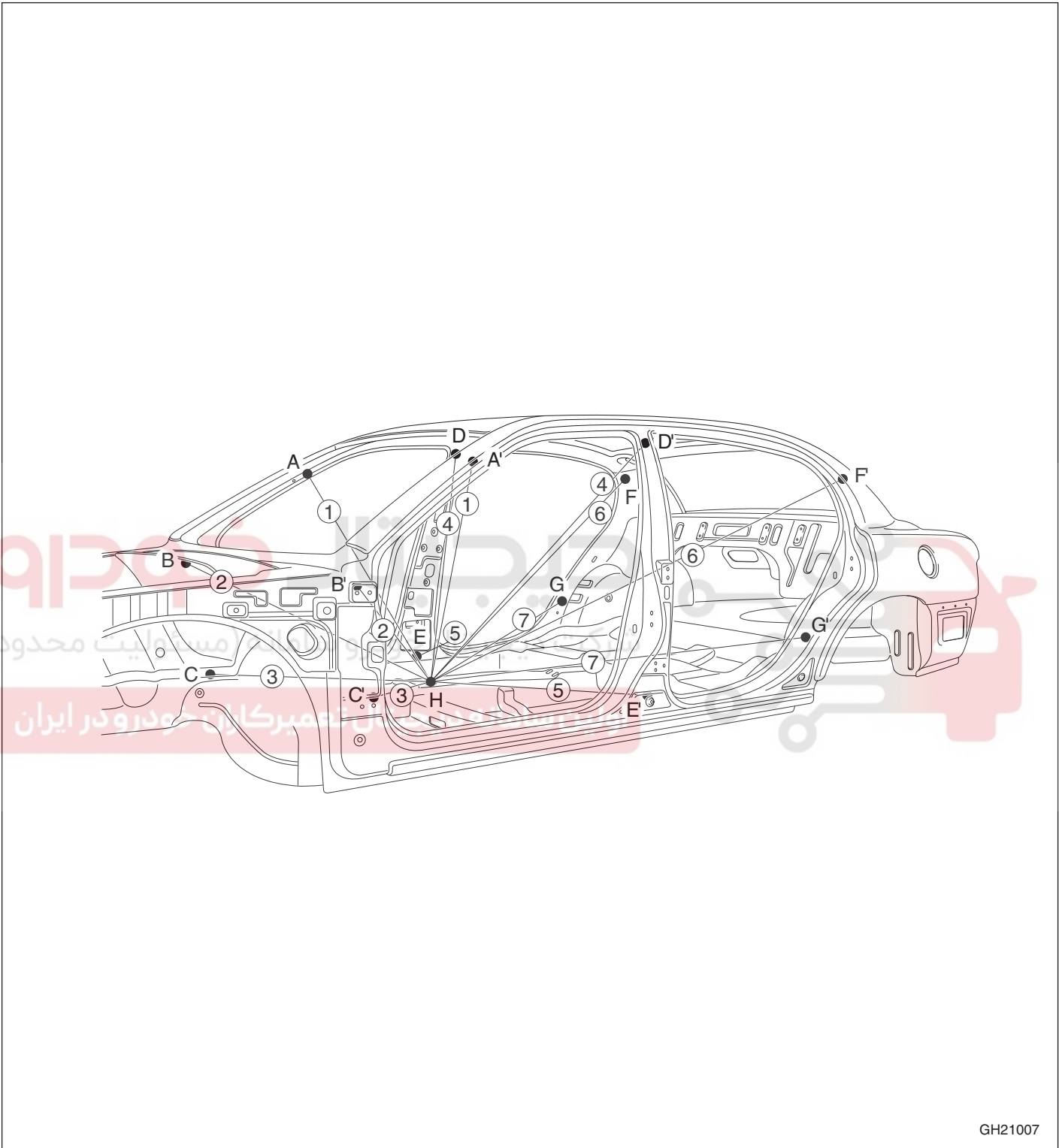


Wiring mounting hole  $\varnothing 7 \times 12$



Parking brake mounting hole  $\varnothing 11$

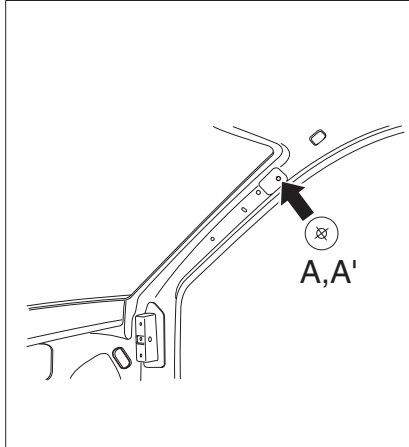
GH21008



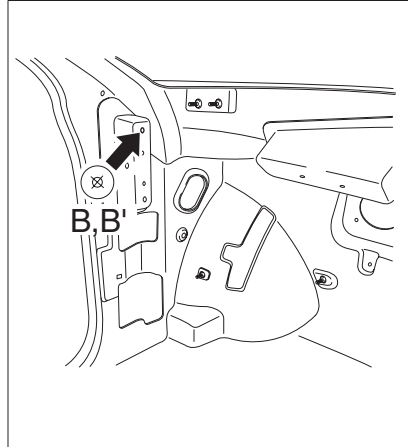
|                   |      |      |      |      |     |      |      |  |  |
|-------------------|------|------|------|------|-----|------|------|--|--|
| Measurement point | ①    | ②    | ③    | ④    | ⑤   | ⑥    | ⑦    |  |  |
| Dimension (mm)    | 1109 | 1098 | 1010 | 1197 | 804 | 1797 | 1414 |  |  |

## 31-10 Body dimensions

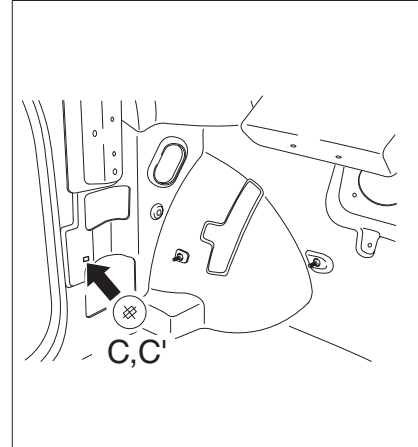
### Interior C straight - line dimensions



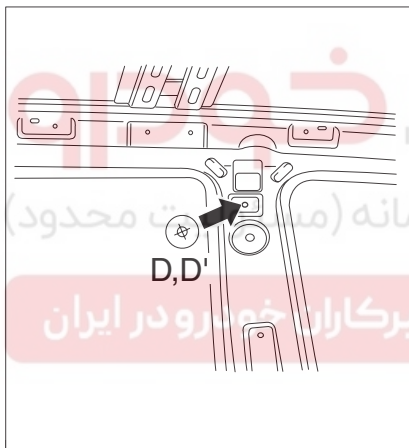
Front pillar upper trim mounting hole     $\varnothing 8.5$



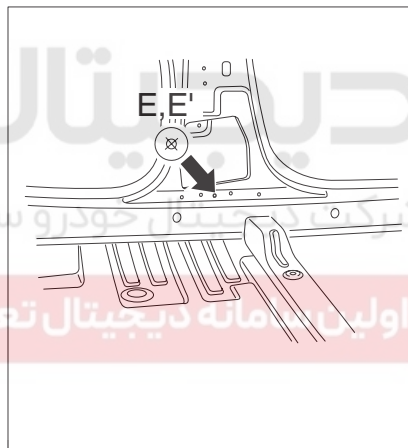
Gusset front pillar to cowl mounting hole     $\varnothing 6.6$



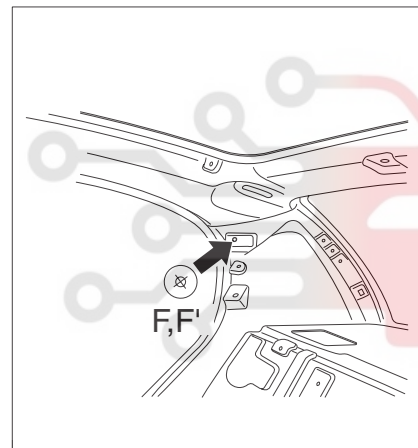
Hood release handle mounting hole    8.4X8.4



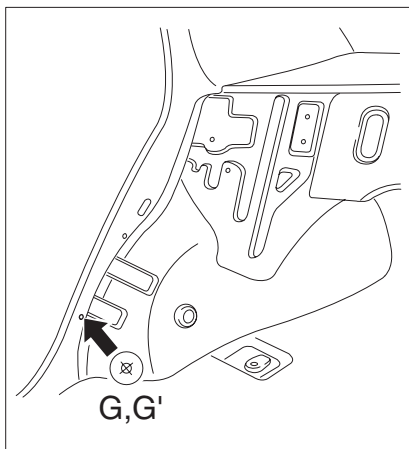
Trim mounting hole     $\varnothing 15$



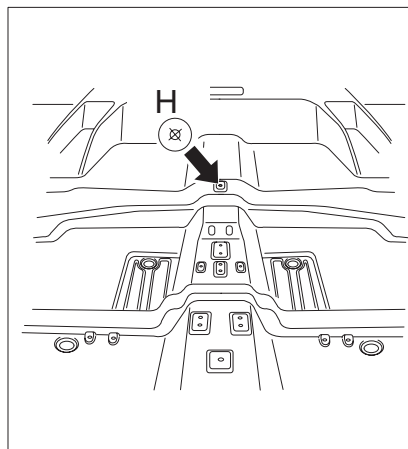
Fixing side airbag sensor hole     $\varnothing 15$



Quarter upper trim mounting hole     $\varnothing 8.5$

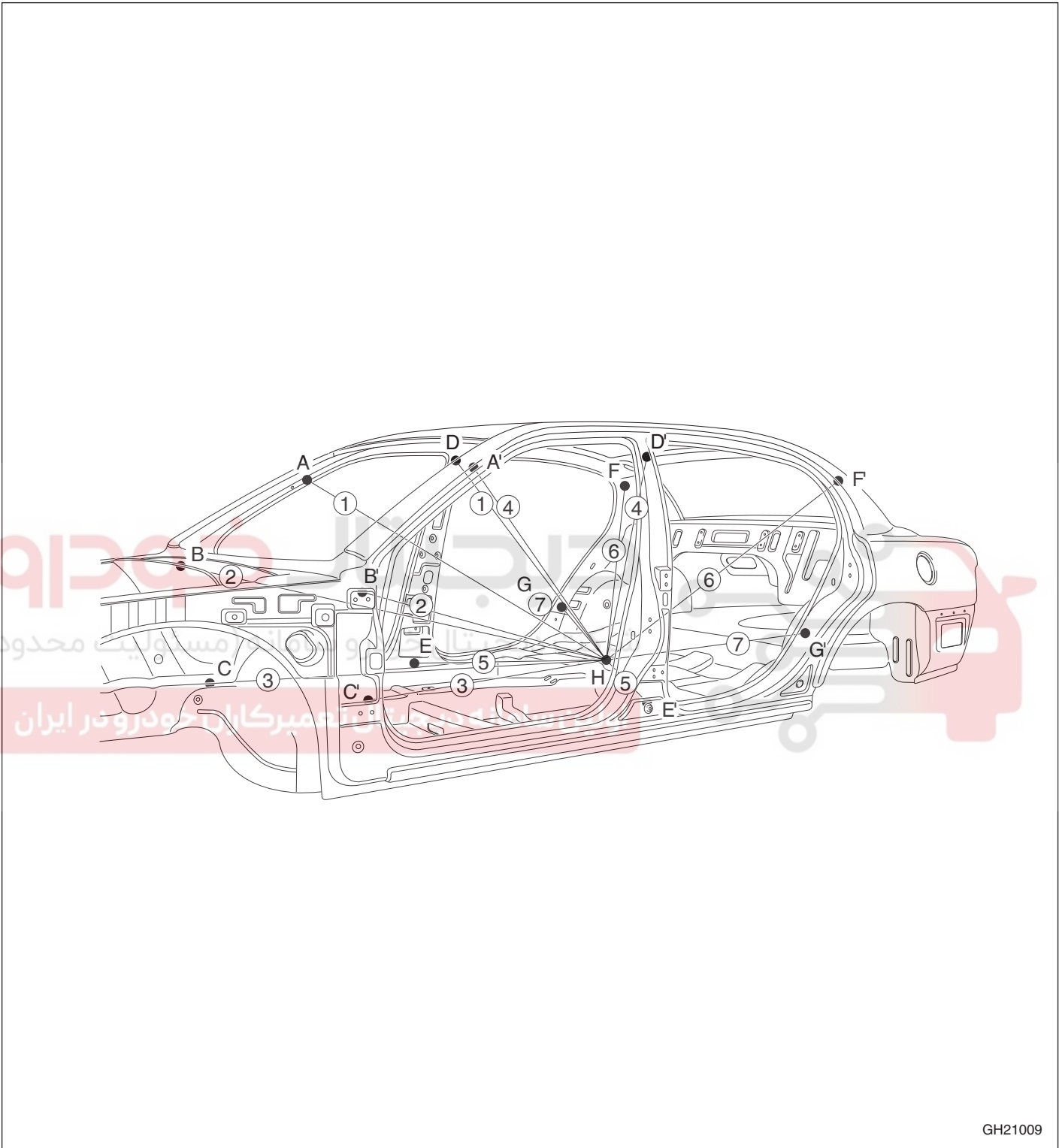


Wiring mounting hole     $\varnothing 7 \times 12$



Carpet mounting hole     $\varnothing 7$

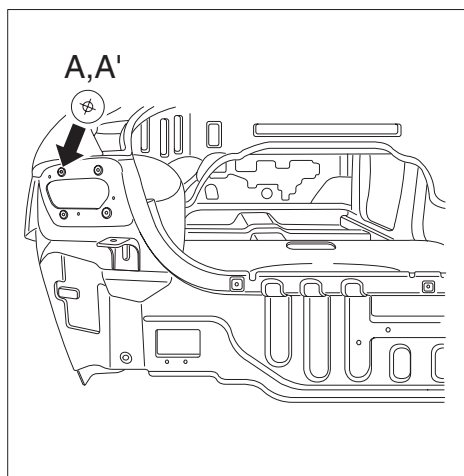
GH21010



|                   |      |      |      |      |     |      |     |  |  |
|-------------------|------|------|------|------|-----|------|-----|--|--|
| Measurement point | ①    | ②    | ③    | ④    | ⑤   | ⑥    | ⑦   |  |  |
| Dimension (mm)    | 1435 | 1703 | 1643 | 1109 | 874 | 1225 | 861 |  |  |

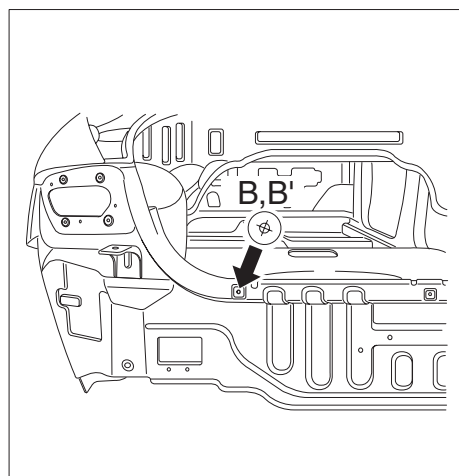
## 31-12 Body dimensions

## Rear body straight - line dimensions



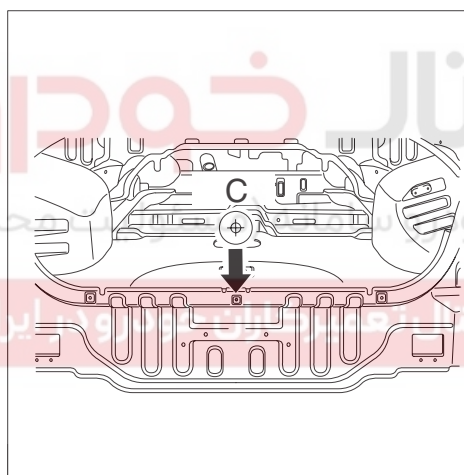
Rear combining lamp guide hole

ø7



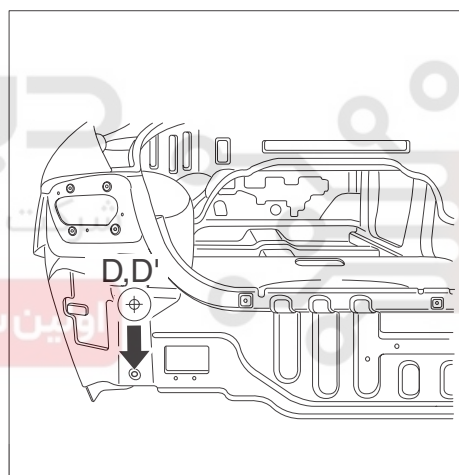
Rear bumper mounting hole

ø6.6



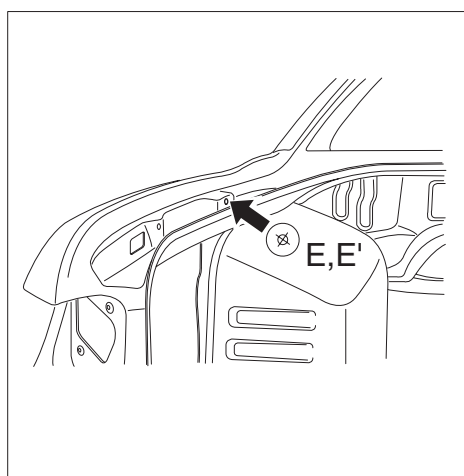
Rear bumper mounting hole

ø6.6



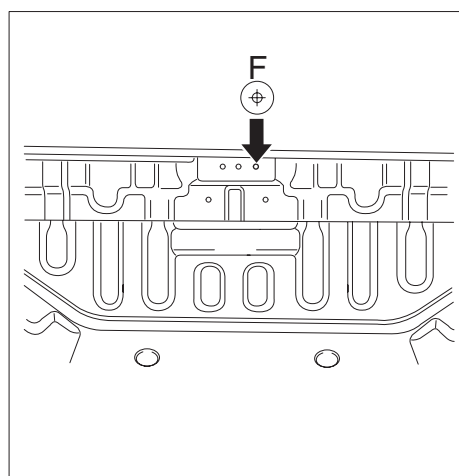
Tooling hole

ø16



Trunk hinge mounting hole

ø9

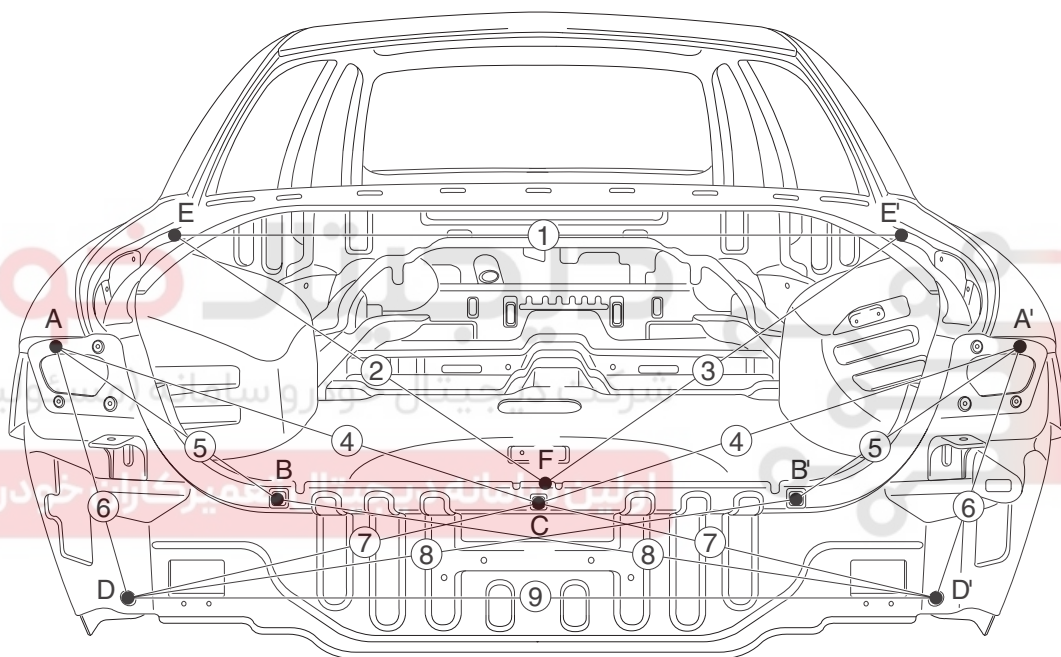


Trunk lid latch mounting hole

ø8

GH21012





GH21011

| Measurement point | ①    | ②   | ③   | ④   | ⑤   | ⑥   | ⑦   | ⑧   | ⑨    |
|-------------------|------|-----|-----|-----|-----|-----|-----|-----|------|
| Dimension (mm)    | 1410 | 955 | 908 | 829 | 512 | 454 | 634 | 970 | 1196 |

## 31-14 Body dimensions

## Under body dimensions

## Projected dimensions

| Measurement point | Description                   | Hole size |
|-------------------|-------------------------------|-----------|
| A                 | Under cover for mouning hole  | ø6.6      |
| B                 | sub frame mounting hole       | ø10.5     |
| C                 | Tooling mounting hole         | ø28.2     |
| D                 | Tooling mounting hole         | ø20       |
| E                 | Tooling mounting hole         | ø25       |
| F                 | Drain hole                    | ø15       |
| G                 | Rear suspension mounting hole | ø16       |
| H                 | Rear bumper mounting hole     | ø16       |

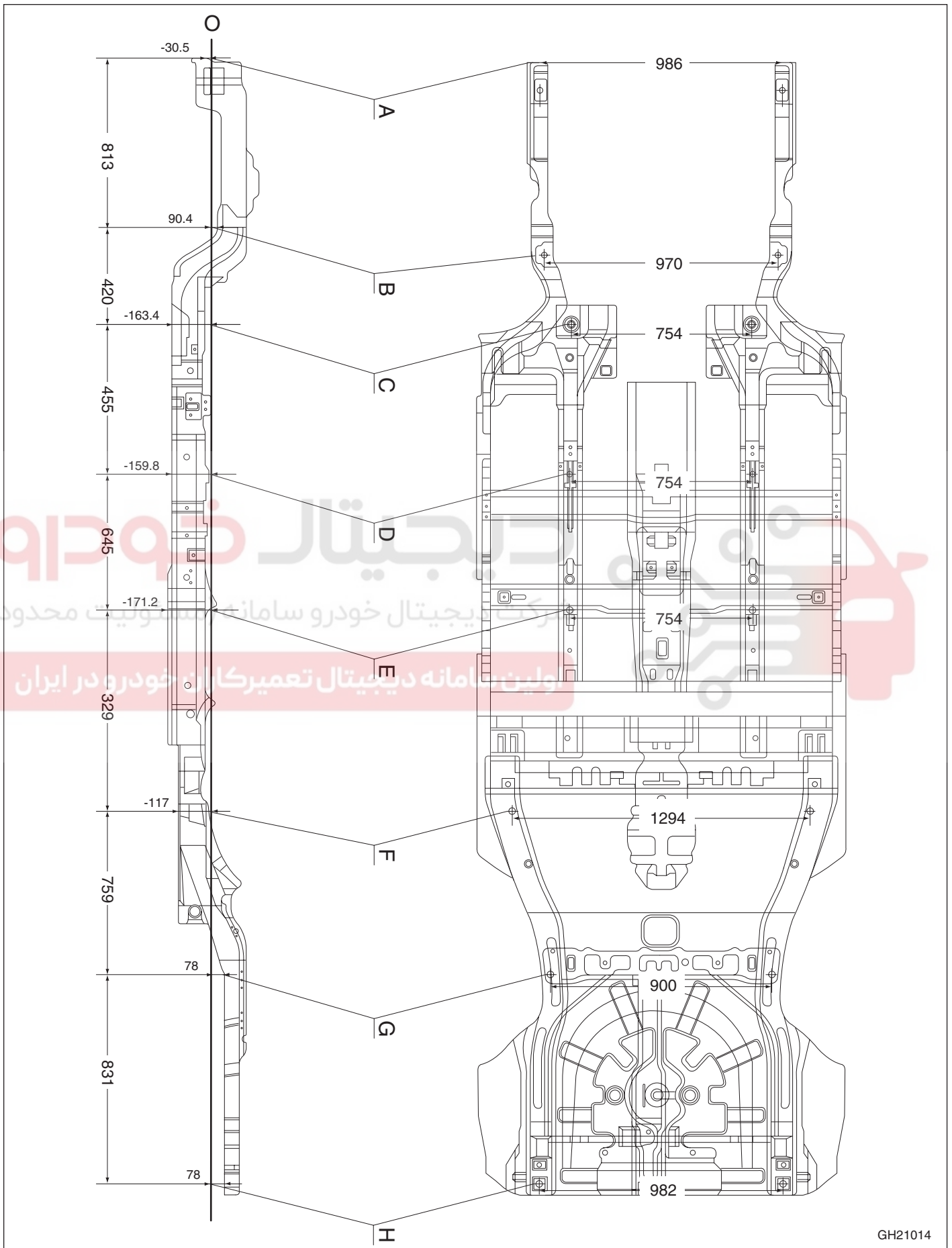
# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



## Body dimensions 31-15



GH21014

## 31-16 Body dimensions

## Straight - line dimensions

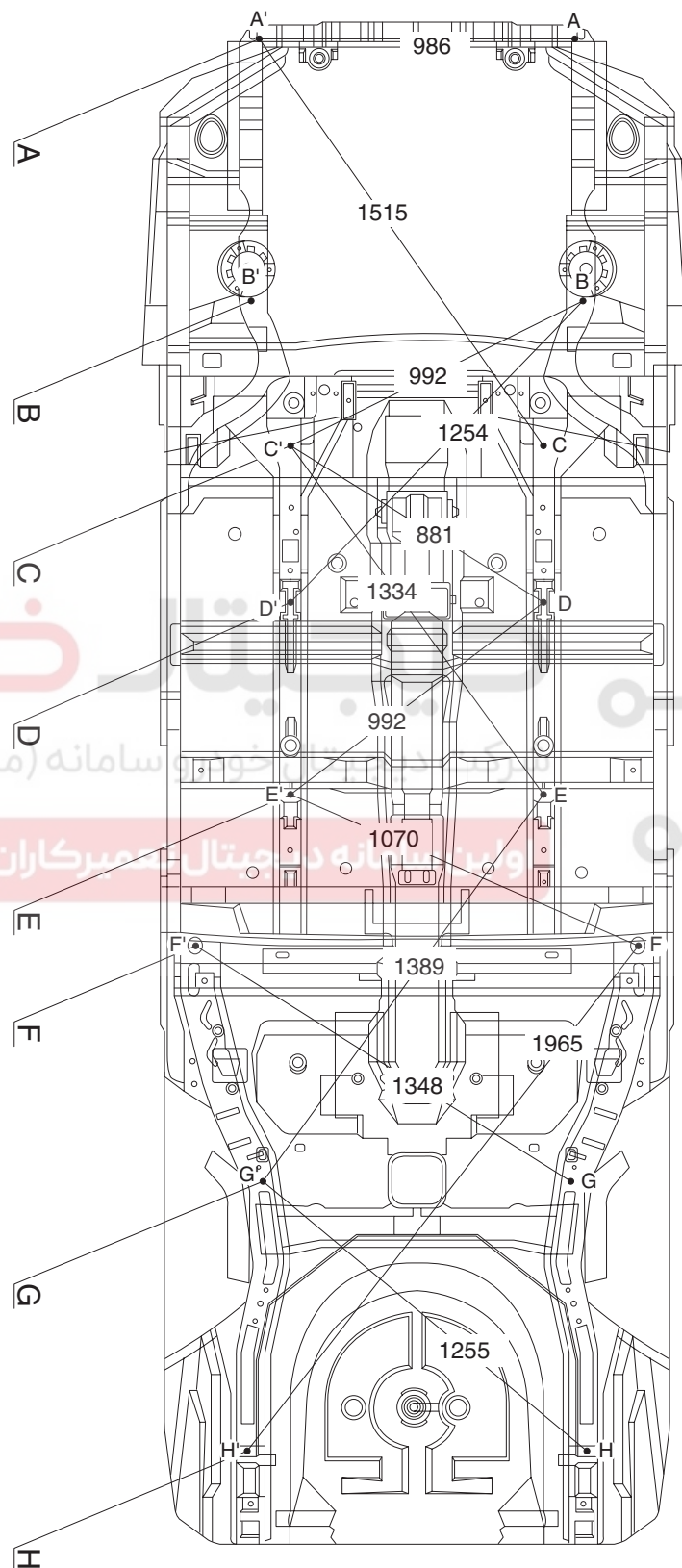
| Measurement point | Description                   | Hole size |
|-------------------|-------------------------------|-----------|
| A                 | Under cover for mounting hole | ø6.6      |
| B                 | Sub frame mounting hole       | ø10.5     |
| C                 | Tooling mounting hole         | ø28.2     |
| D                 | Tooling mounting hole         | ø20       |
| E                 | Tooling mounting hole         | ø25       |
| F                 | Drain hole                    | ø15       |
| G                 | Rear suspension mounting hole | ø16       |
| H                 | Rear bumper mounting hole     | ø16       |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





## Body dimensions

### Body dimensions

|   |        |
|---|--------|
| <b>Body dimension indications</b> ..... | 31- 1  |
| Projected dimensions .....              | 31 - 1 |
| Straight-line dimensions .....          | 31- 1  |
| <b>Front body</b> .....                 | 31- 2  |
| <b>Side frame panel</b> .....           | 31- 4  |
| <b>Interior A</b> .....                 | 31- 6  |
| <b>Interior B</b> .....                 | 31- 8  |
| <b>Interior C</b> .....                 | 31-10  |
| <b>Rear body</b> .....                  | 31-12  |
| <b>Under body</b> .....                 | 31-14  |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



## Body dimensions

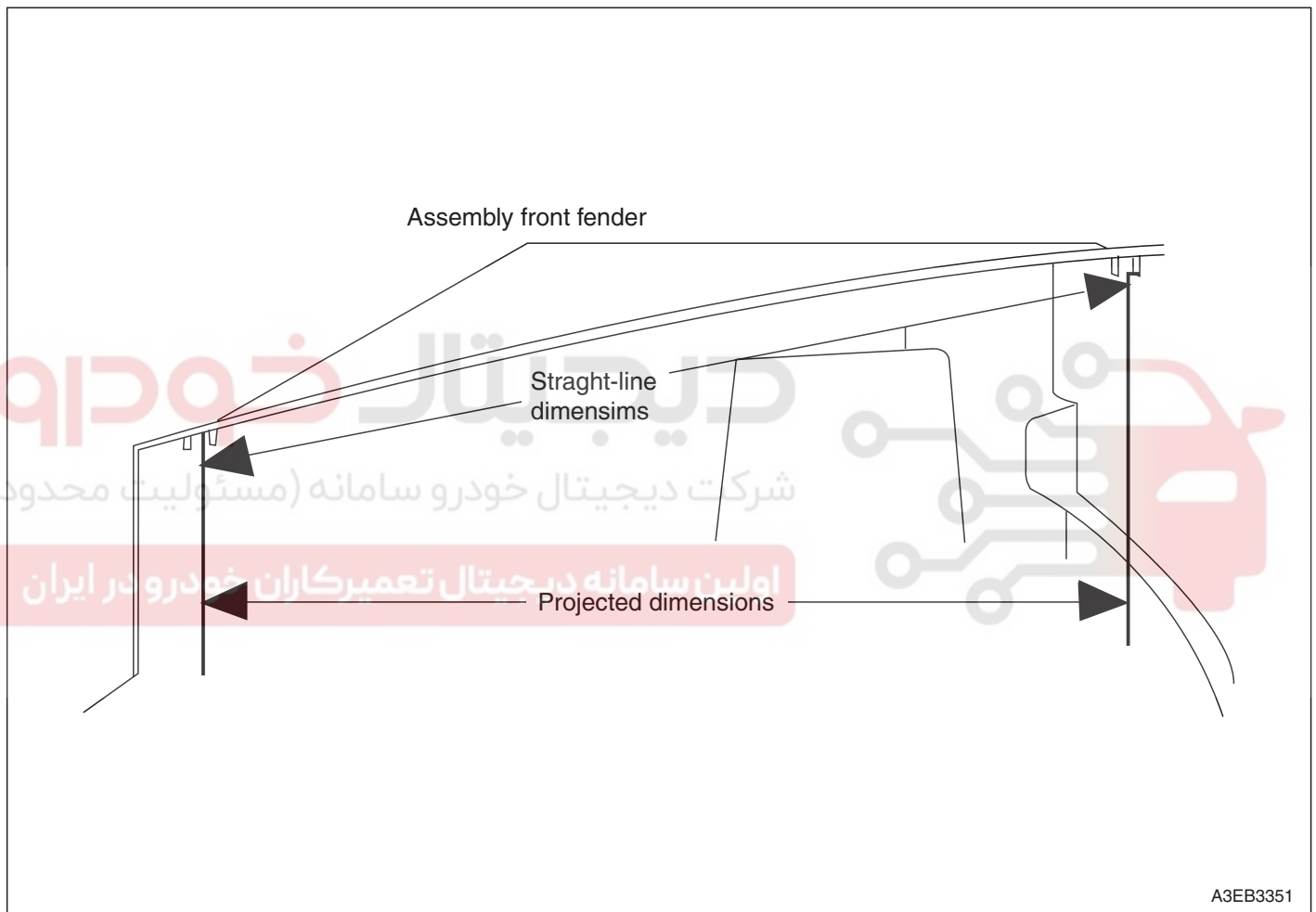
### Body dimension indication

#### Projected dimensions

The projected dimension indicates a dimension from a reference point on the body. (Height may be different in some cases)

#### Straight-line dimensions (Actual measured dimensions)

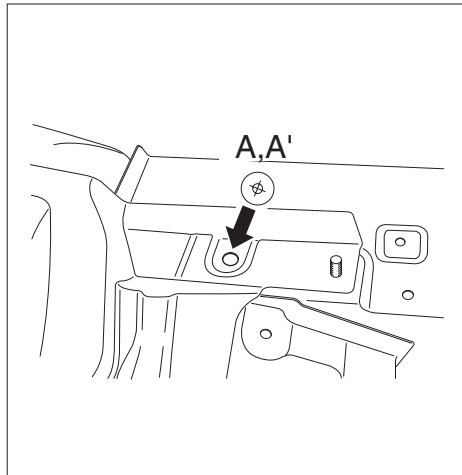
The straight-line dimension indicates a actual measured dimension between the measurement reference points.





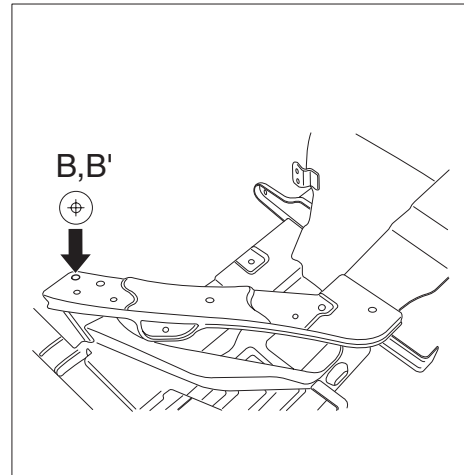
## 31-2 Body dimensions

## Front body straight - line dimensions



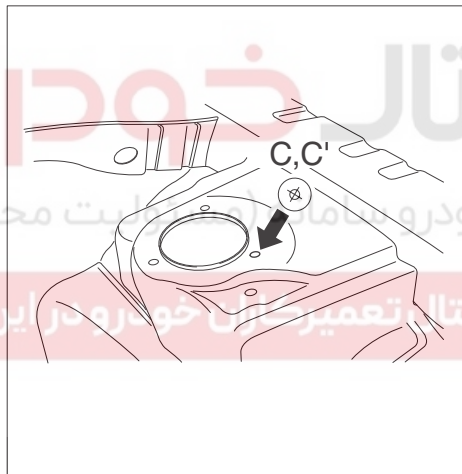
Hood hinge mounting hole

ø13



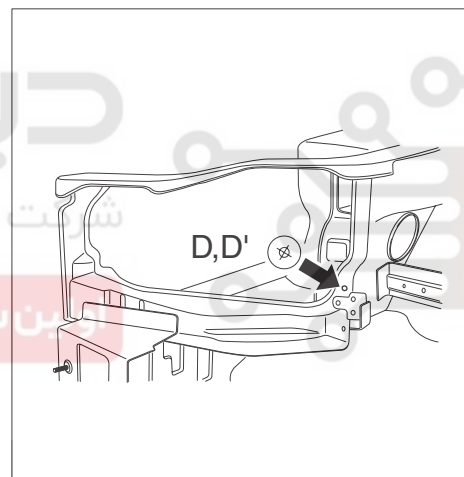
Engine room cover mounting hole

ø8.5



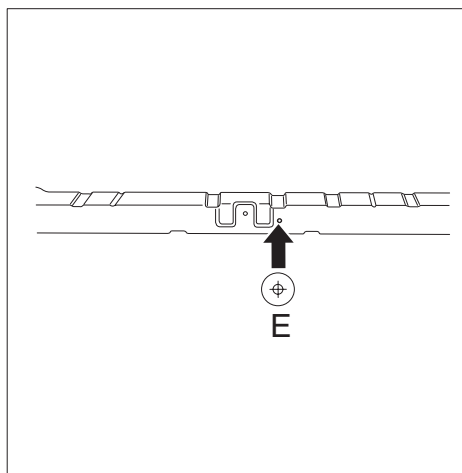
Front suspension housing hole

ø12



Tooling hole

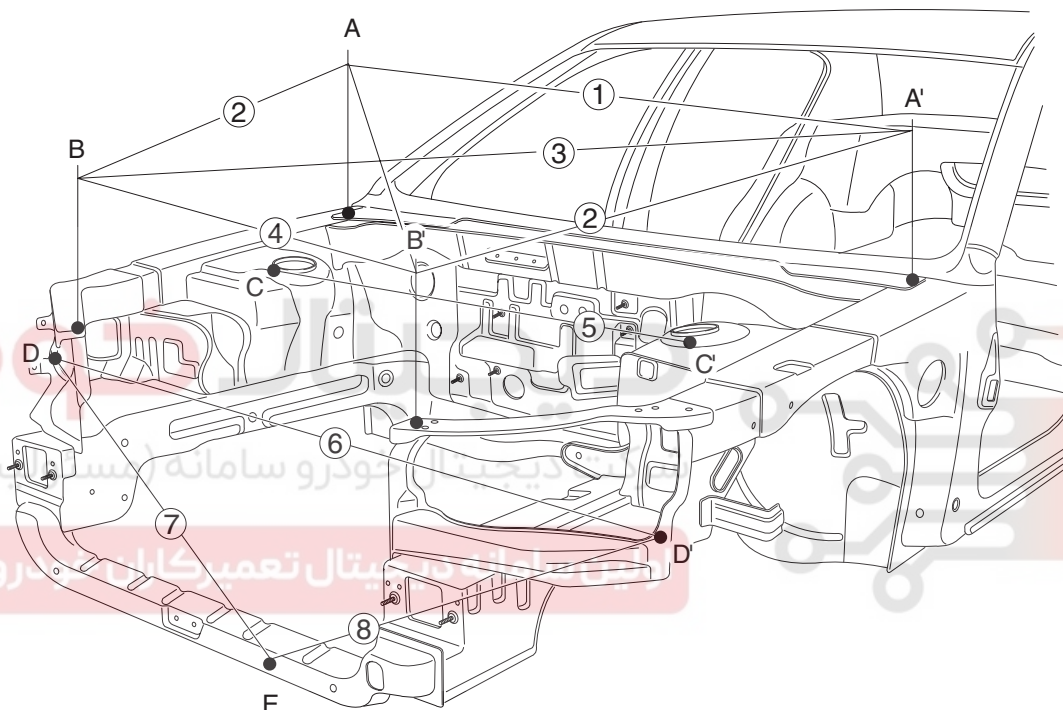
ø10



Ambient sensor mounting hole

ø 7

GH21002

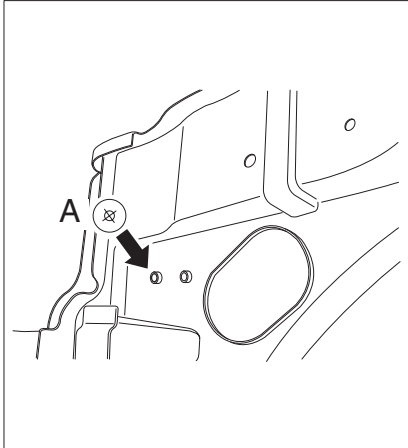


GH21001

| Measurement point | ①    | ②    | ③   | ④    | ⑤    | ⑥    | ⑦    | ⑧   |  |
|-------------------|------|------|-----|------|------|------|------|-----|--|
| Dimension (mm)    | 1103 | 1380 | 844 | 1684 | 1060 | 1514 | 1053 | 730 |  |

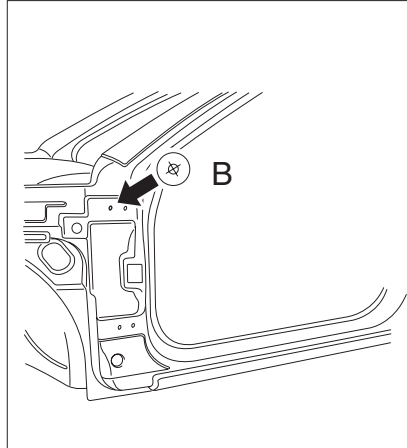
## 31-4 Body dimensions

## Side frame straight - line dimensions



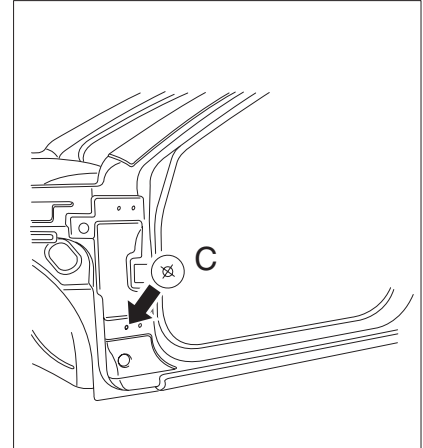
Earth wiring mounting hole

ø6.6



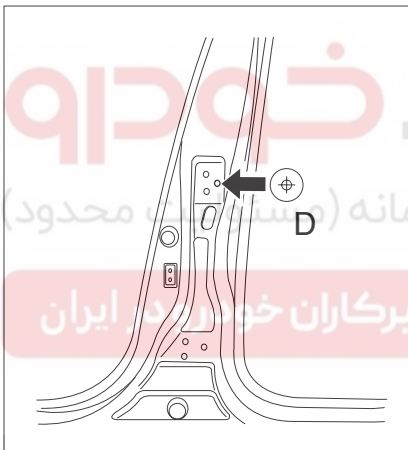
Front door upper hinge mounting hole

ø13



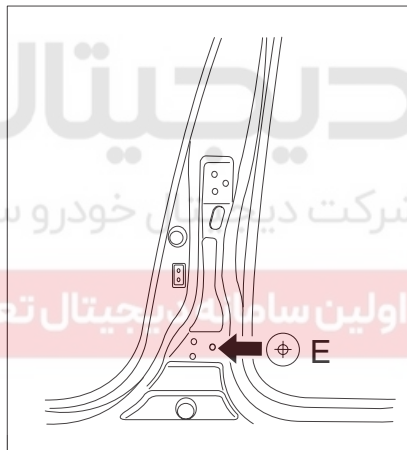
Front door lower hinge mounting hole

ø13



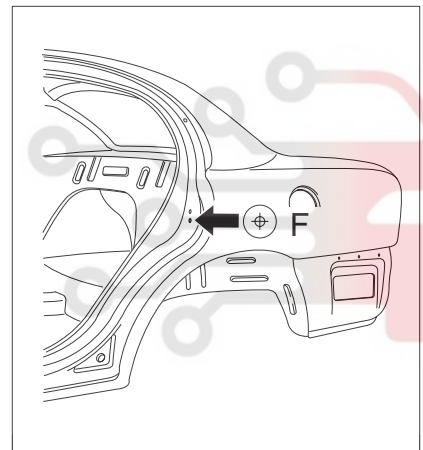
Rear door upper hinge mounting hole

ø11



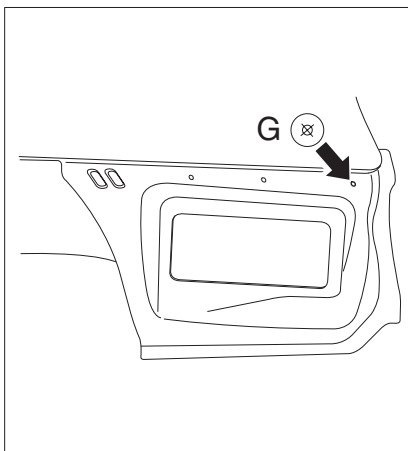
Rear door lower hinge mounting hole

ø13



Door switch mounting hole

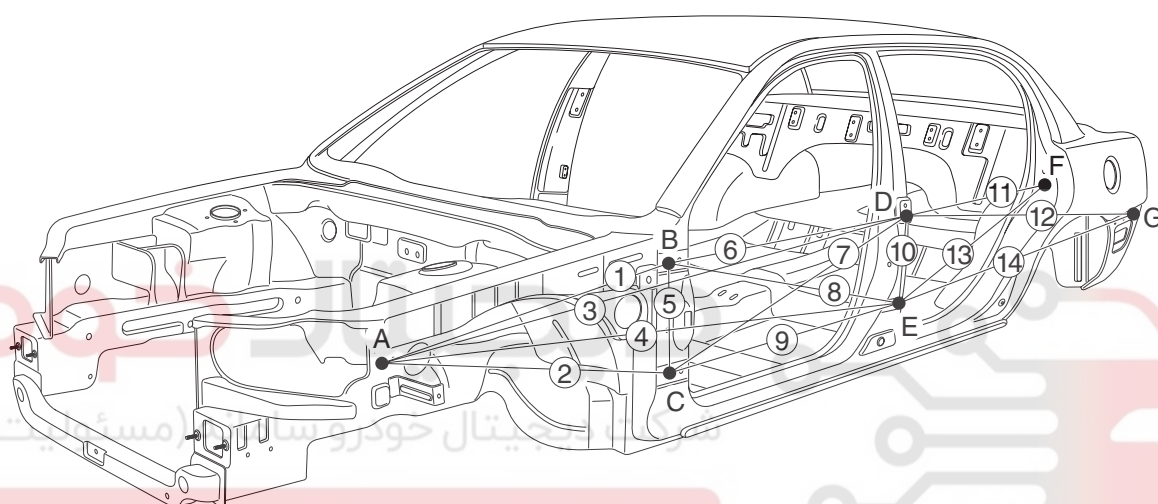
17.3 X 27.3



Rear bumper mounting hole

ø6.5X7

GH21004

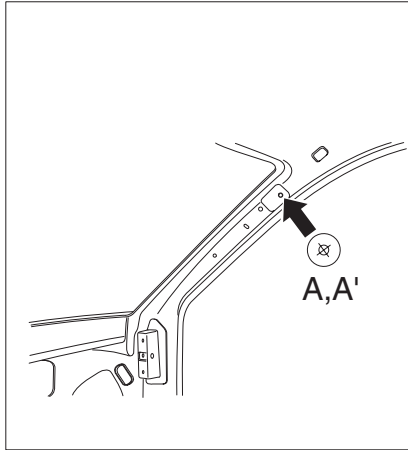
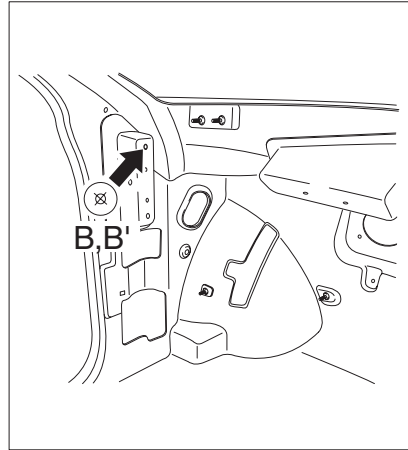
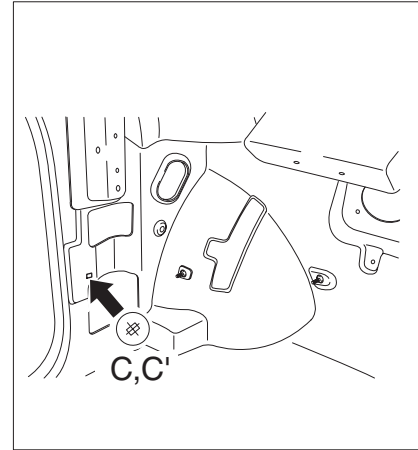


GH21003

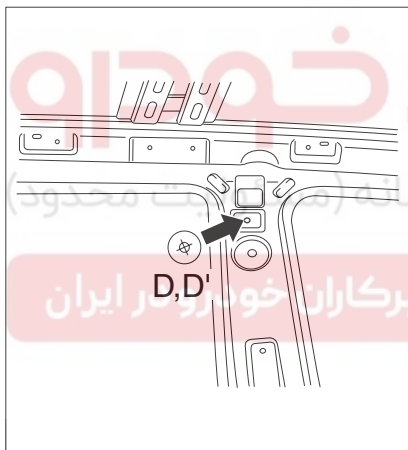
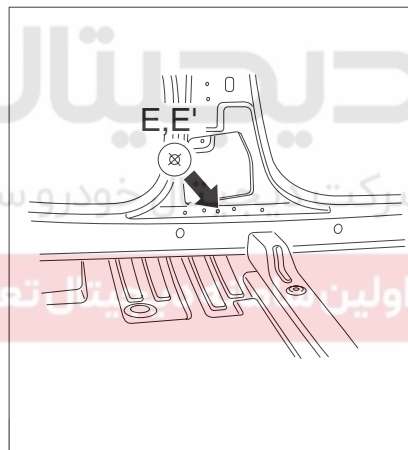
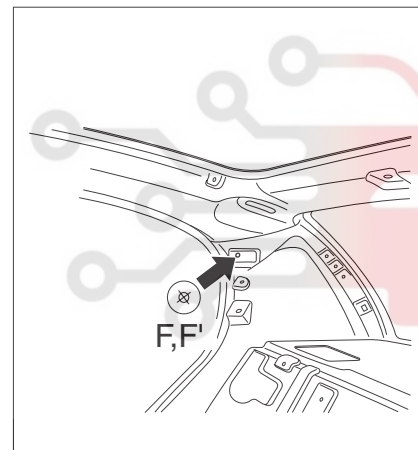
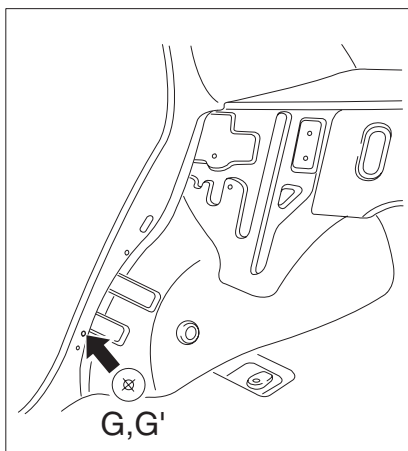
|                   |      |      |      |      |      |      |      |      |      |
|-------------------|------|------|------|------|------|------|------|------|------|
| Measurement point | ①    | ②    | ③    | ④    | ⑤    | ⑥    | ⑦    | ⑧    | ⑨    |
| Dimension (mm)    | 1806 | 1826 | 2583 | 2569 | 350  | 1142 | 1197 | 1161 | 1112 |
| Measurement point | ⑩    | ⑪    | ⑫    | ⑬    | ⑭    |      |      |      |      |
| Dimension (mm)    | 340  | 959  | 1947 | 1030 | 1971 |      |      |      |      |

## 31-6 Body dimensions

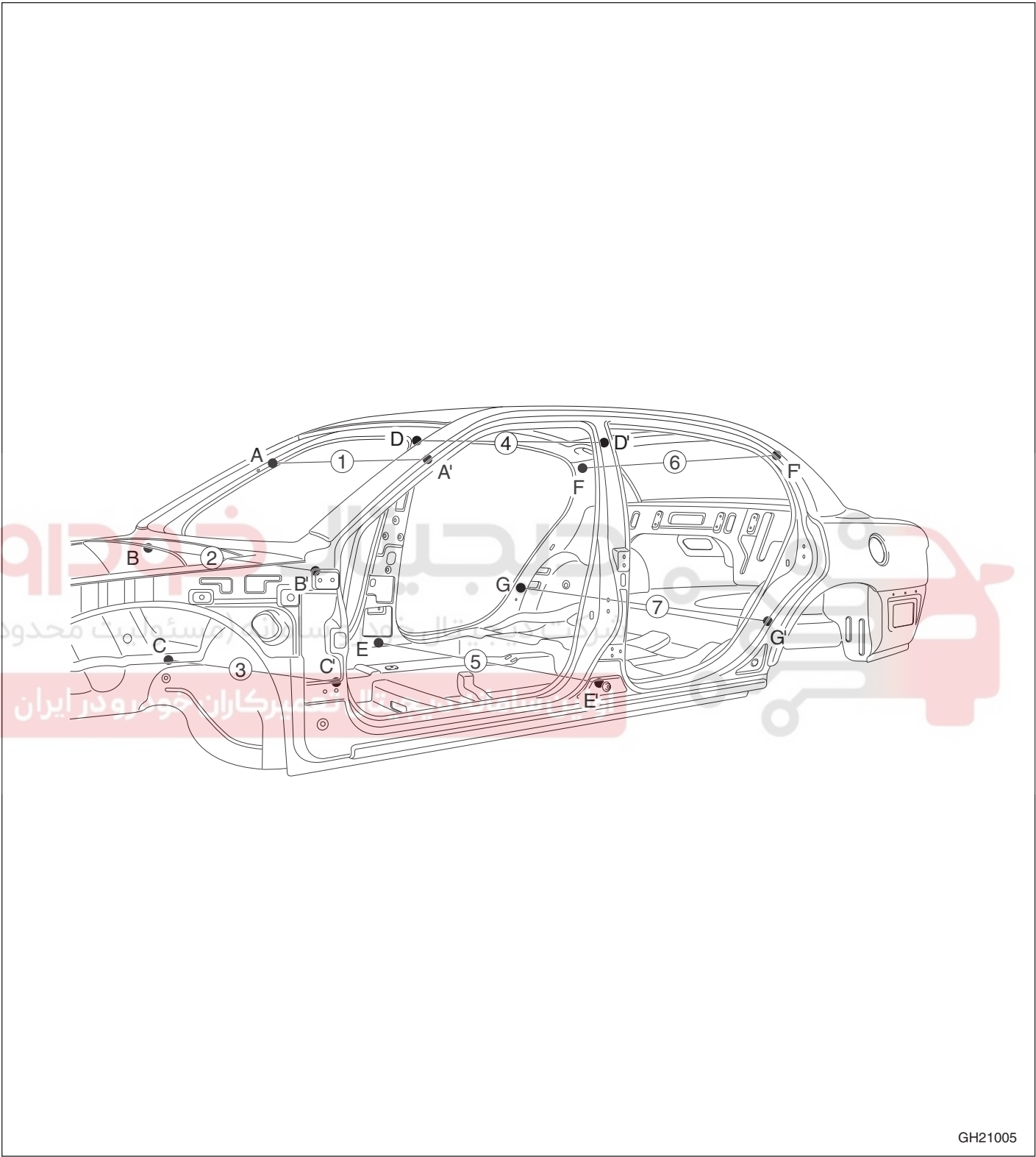
## Interior A straight - line dimensions

Front pillar upper trim mounting hole     $\varnothing 8.5$ Gusset front pillar to cowl mounting hole     $\varnothing 6.6$ 

Hood release handle mounting hole    8.4X8.4

Trim mounting hole     $\varnothing 15$ Fixing side airbag sensor hole     $\varnothing 15$ Quarter upper trim mounting hole     $\varnothing 8.5$ Wiring mounting hole     $\varnothing 7 \times 12$ 

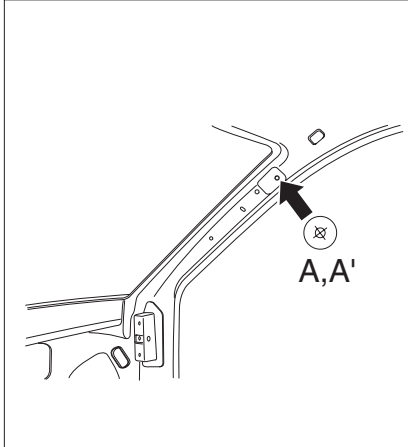
GH21006



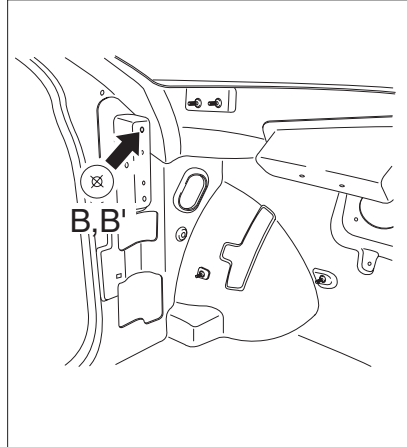
|                   |      |      |      |      |      |      |      |  |  |
|-------------------|------|------|------|------|------|------|------|--|--|
| Measurement point | ①    | ②    | ③    | ④    | ⑤    | ⑥    | ⑦    |  |  |
| Dimension (mm)    | 1231 | 1373 | 1470 | 1228 | 1469 | 1250 | 1500 |  |  |

## 31-8 Body dimensions

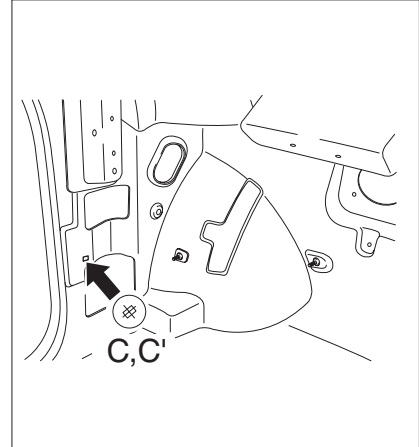
### Interior B straight - line dimensions



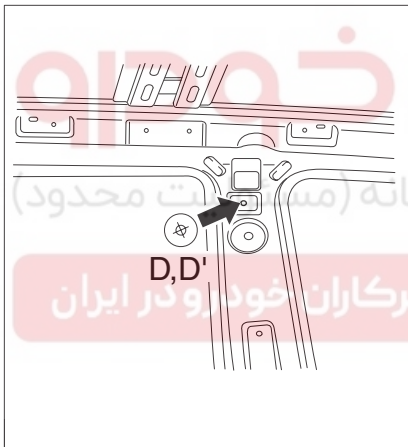
Front pillar upper trim mounting hole     $\varnothing 8.5$



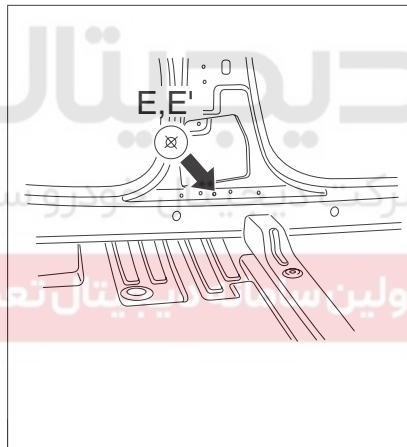
Gusset front pillar to cowl mounting hole     $\varnothing 6.6$



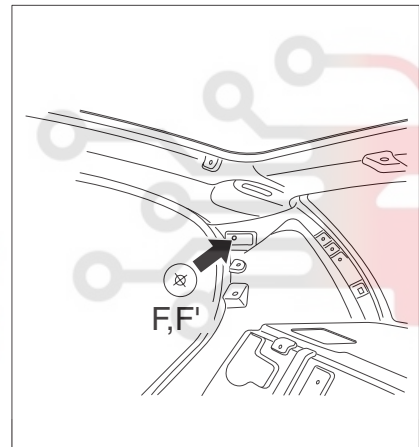
Hood release handle mounting hole    8.4X8.4



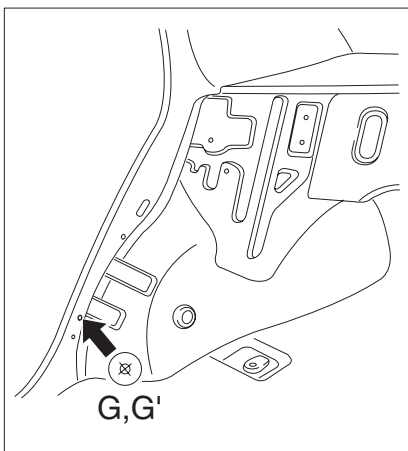
Trim mounting hole     $\varnothing 15$



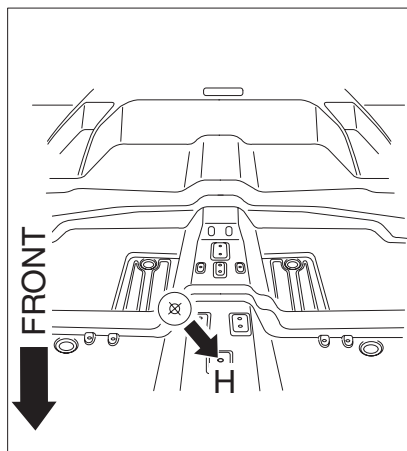
Fixing side airbag sensor hole     $\varnothing 15$



Quarter upper trim mounting hole     $\varnothing 8.5$



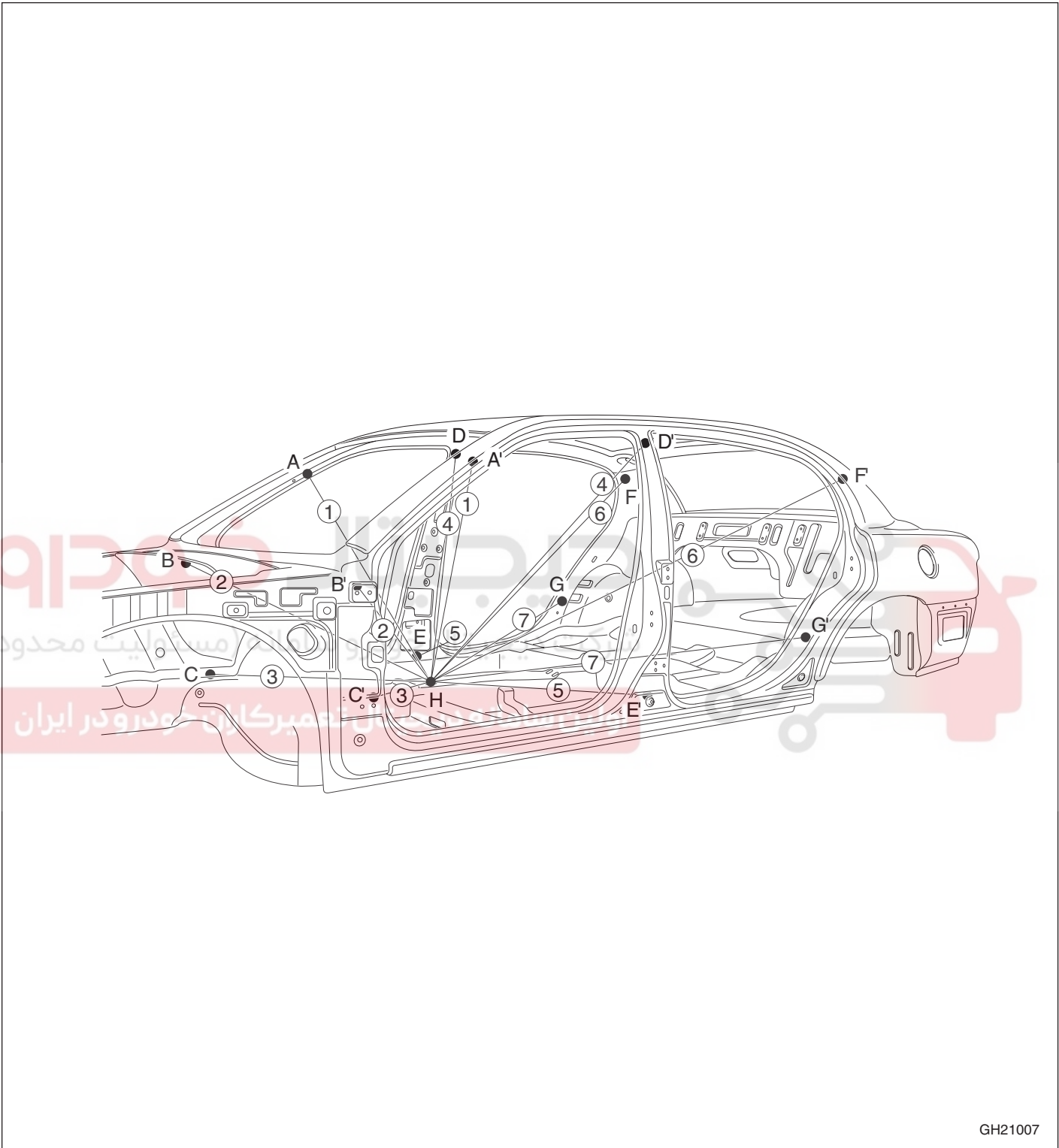
Wiring mounting hole     $\varnothing 7 \times 12$



Parking brake mounting hole     $\varnothing 11$

GH21008

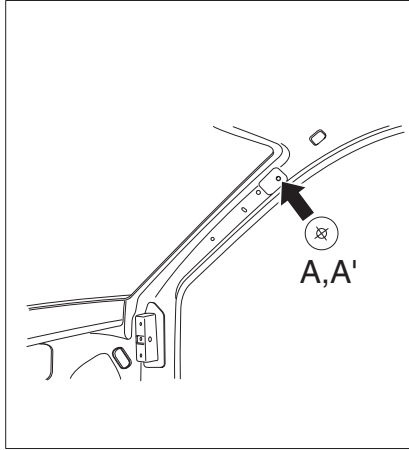




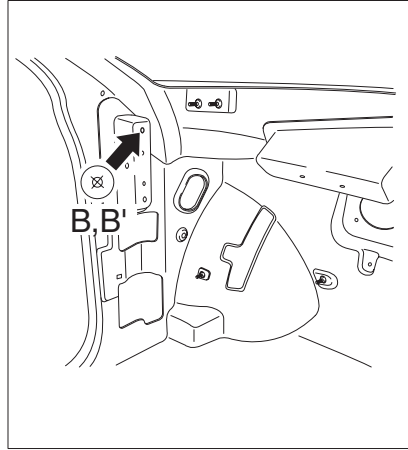
|                   |      |      |      |      |     |      |      |  |  |
|-------------------|------|------|------|------|-----|------|------|--|--|
| Measurement point | ①    | ②    | ③    | ④    | ⑤   | ⑥    | ⑦    |  |  |
| Dimension (mm)    | 1109 | 1098 | 1010 | 1197 | 804 | 1797 | 1414 |  |  |

## 31-10 Body dimensions

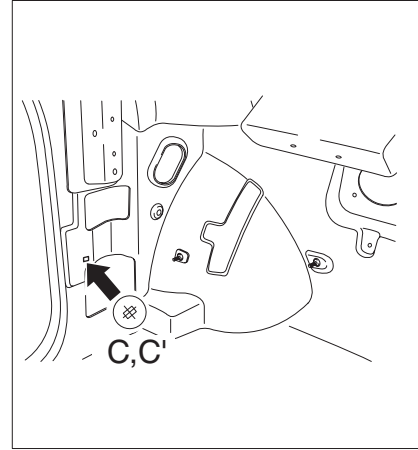
### Interior C straight - line dimensions



Front pillar upper trim mounting hole     $\varnothing 8.5$



Gusset front pillar to cowl mounting hole     $\varnothing 6.6$



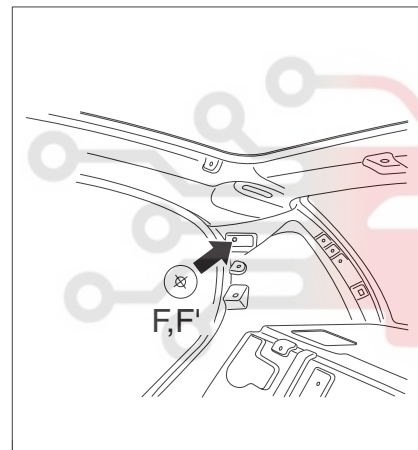
Hood release handle mounting hole    8.4X8.4



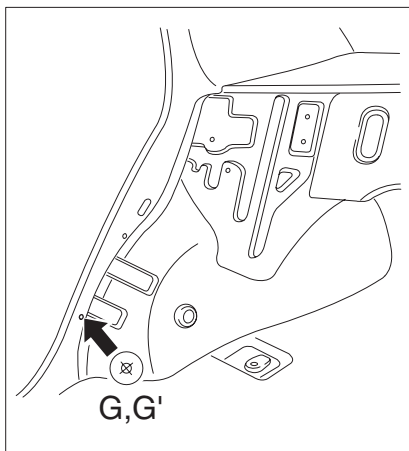
Trim mounting hole     $\varnothing 15$



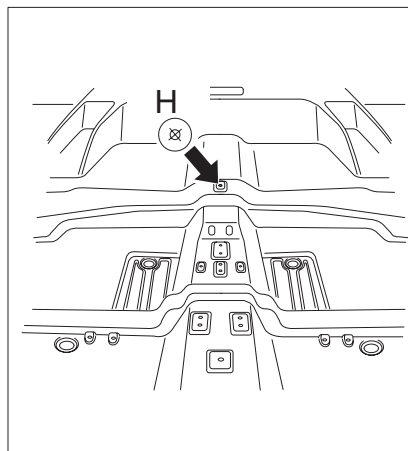
Fixing side airbag sensor hole     $\varnothing 15$



Quarter upper trim mounting hole     $\varnothing 8.5$

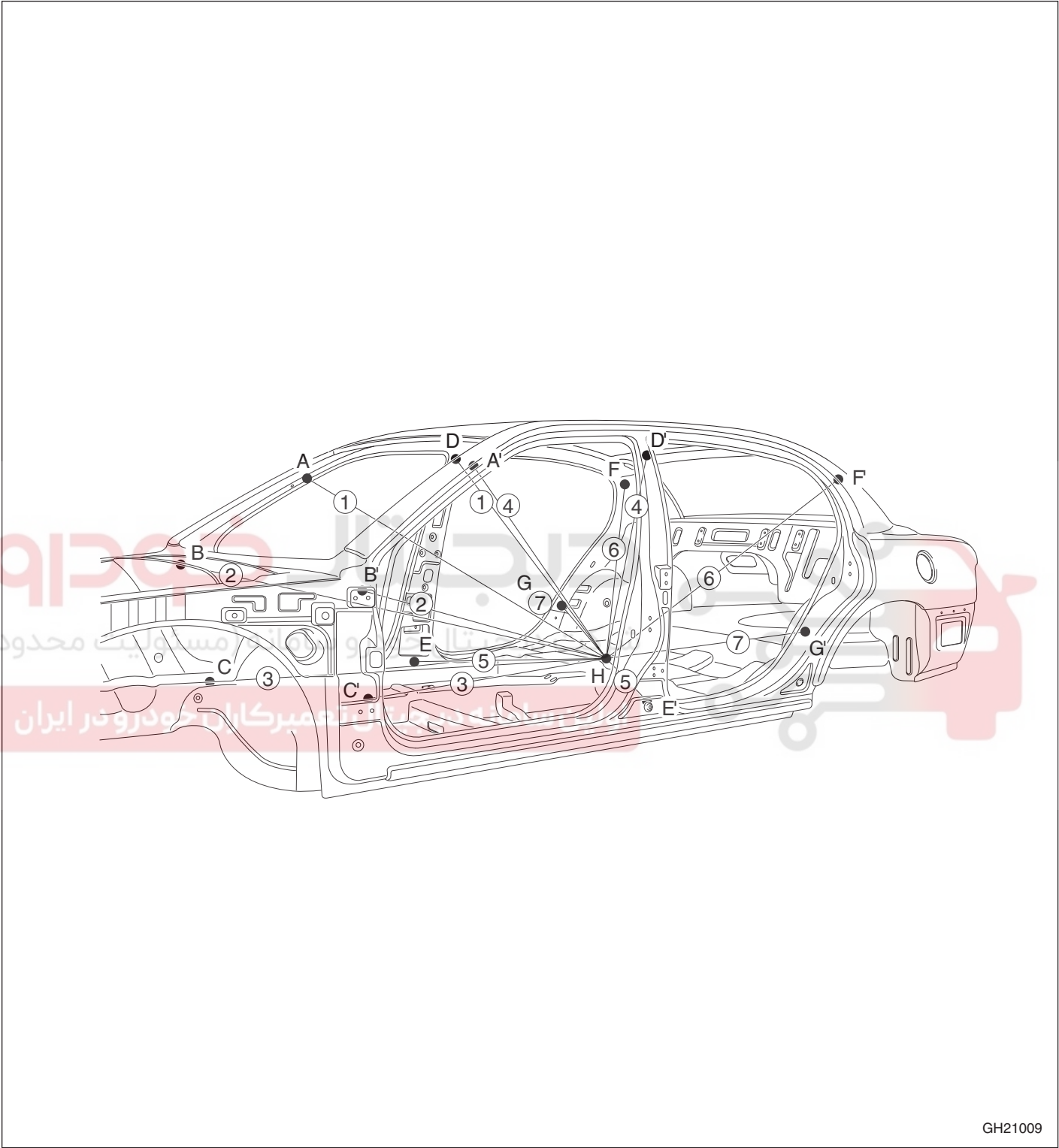


Wiring mounting hole     $\varnothing 7 \times 12$



Carpet mounting hole     $\varnothing 7$

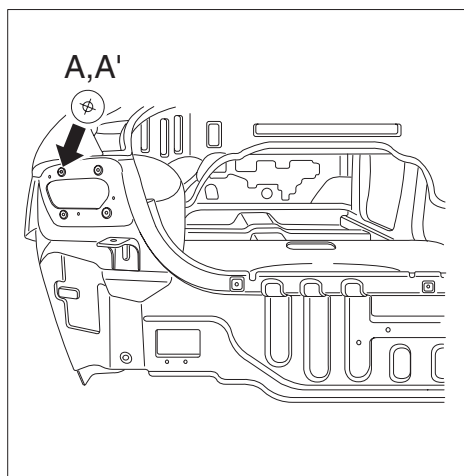
GH21010



| Measurement point | ①    | ②    | ③    | ④    | ⑤   | ⑥    | ⑦   |  |  |
|-------------------|------|------|------|------|-----|------|-----|--|--|
| Dimension (mm)    | 1435 | 1703 | 1643 | 1109 | 874 | 1225 | 861 |  |  |

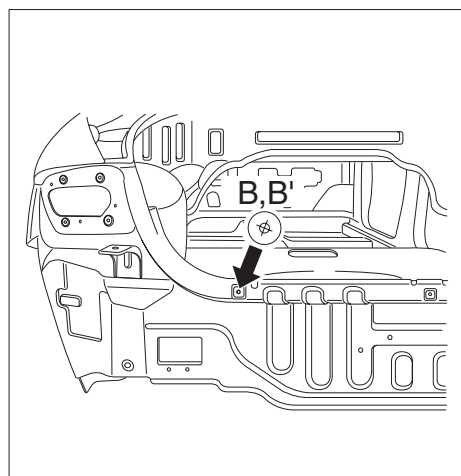
## 31-12 Body dimensions

## Rear body straight - line dimensions



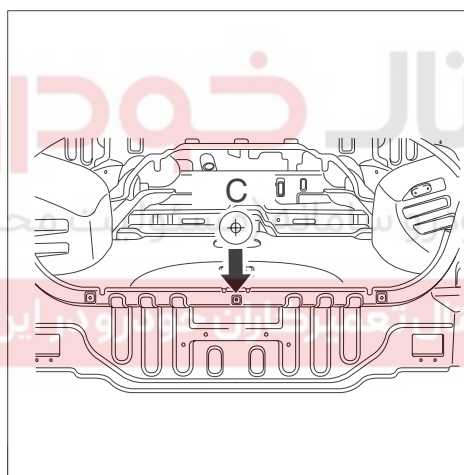
Rear combining lamp guide hole

ø7



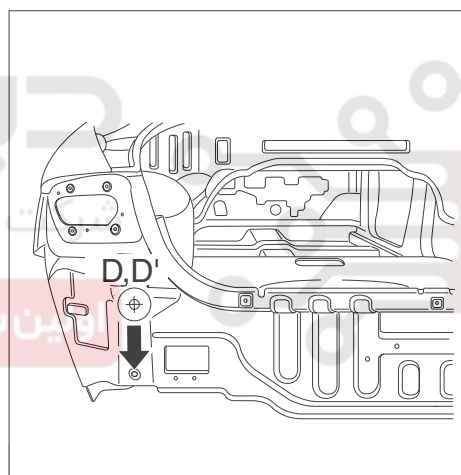
Rear bumper mounting hole

ø6.6



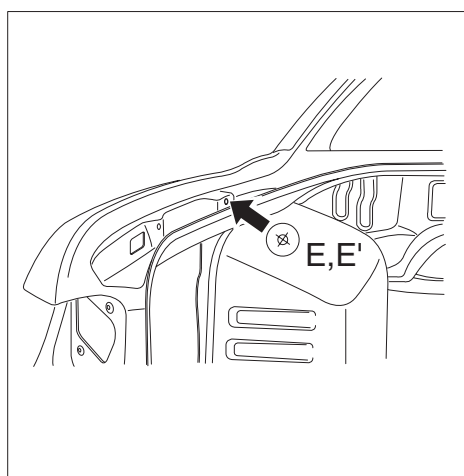
Rear bumper mounting hole

ø6.6



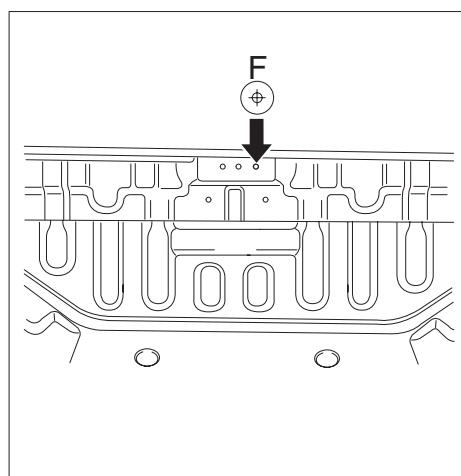
Tooling hole

ø16



Trunk hinge mounting hole

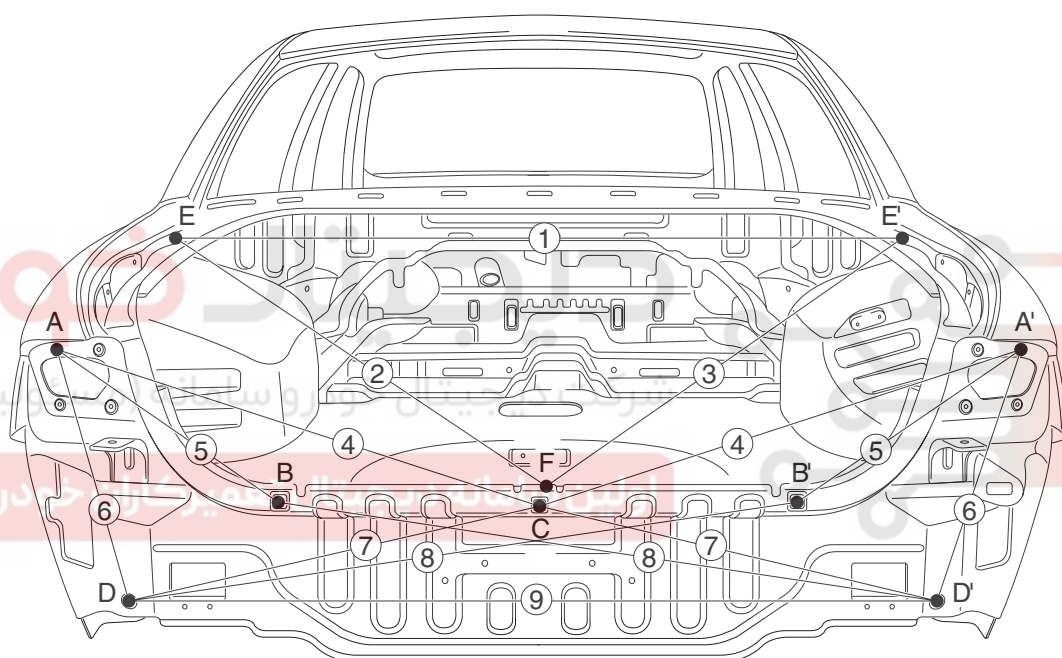
ø9



Trunk lid latch mounting hole

ø8

GH21012



GH21011

| Measurement point | ①    | ②   | ③   | ④   | ⑤   | ⑥   | ⑦   | ⑧   | ⑨    |
|-------------------|------|-----|-----|-----|-----|-----|-----|-----|------|
| Dimension (mm)    | 1410 | 955 | 908 | 829 | 512 | 454 | 634 | 970 | 1196 |

## 31-14 Body dimensions

## Under body dimensions

## Projected dimensions

| Measurement point | Description                   | Hole size |
|-------------------|-------------------------------|-----------|
| A                 | Under cover for mouning hole  | ø6.6      |
| B                 | sub frame mounting hole       | ø10.5     |
| C                 | Tooling mounting hole         | ø28.2     |
| D                 | Tooling mounting hole         | ø20       |
| E                 | Tooling mounting hole         | ø25       |
| F                 | Drain hole                    | ø15       |
| G                 | Rear suspension mounting hole | ø16       |
| H                 | Rear bumper mounting hole     | ø16       |

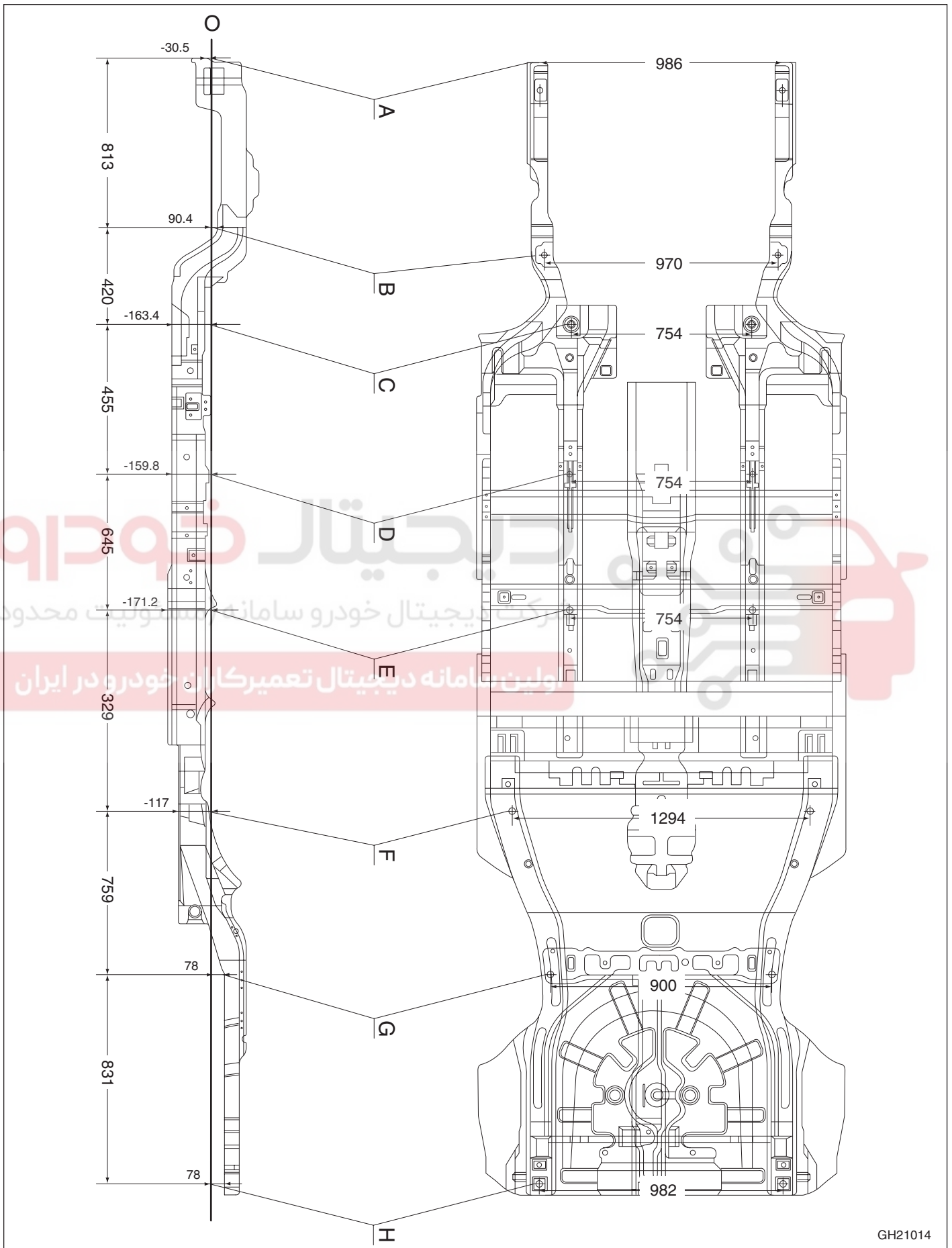
# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



## Body dimensions 31-15



GH21014



## 31-16 Body dimensions

## Straight - line dimensions

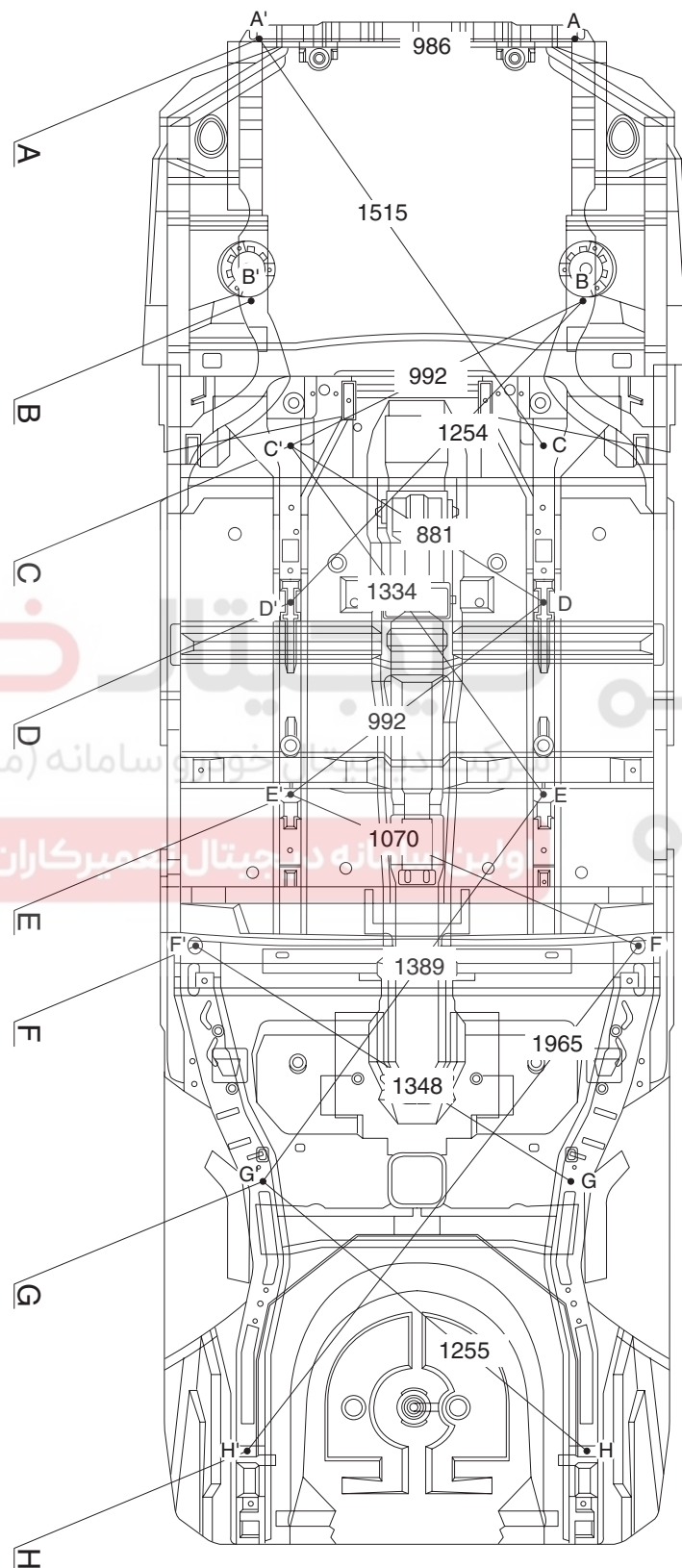
| Measurement point | Description                   | Hole size |
|-------------------|-------------------------------|-----------|
| A                 | Under cover for mounting hole | ø6.6      |
| B                 | Sub frame mounting hole       | ø10.5     |
| C                 | Tooling mounting hole         | ø28.2     |
| D                 | Tooling mounting hole         | ø20       |
| E                 | Tooling mounting hole         | ø25       |
| F                 | Drain hole                    | ø15       |
| G                 | Rear suspension mounting hole | ø16       |
| H                 | Rear bumper mounting hole     | ø16       |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





GH21013

## Waterproof and rustproof

|  |        |
|--|--------|
| Body sealing .....                                       | 41- 1  |
| Body (Floor) .....                                       | 41- 1  |
| Body (Front) .....                                       | 41- 2  |
| Body (Center) .....                                      | 41- 3  |
| Body (Side) .....  | 41- 4  |
| Door .....   | 41- 5  |
| Hood & Trunk lid .....                                   | 41- 6  |
| Under coating .....                                      | 41- 7  |
| Under coating(Under) .....                               | 41- 7  |
| Under coating(Side) .....                                | 41- 8  |
| Applying urstproofing material .....                     | 41- 9  |
| Applying rustproofing material(Body) .....               | 41- 9  |
| Applying urstproofing material(Door) .....               | 41- 10 |
| Applying urstproofing material(Hood and Trunk lid) ..... | 41- 11 |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

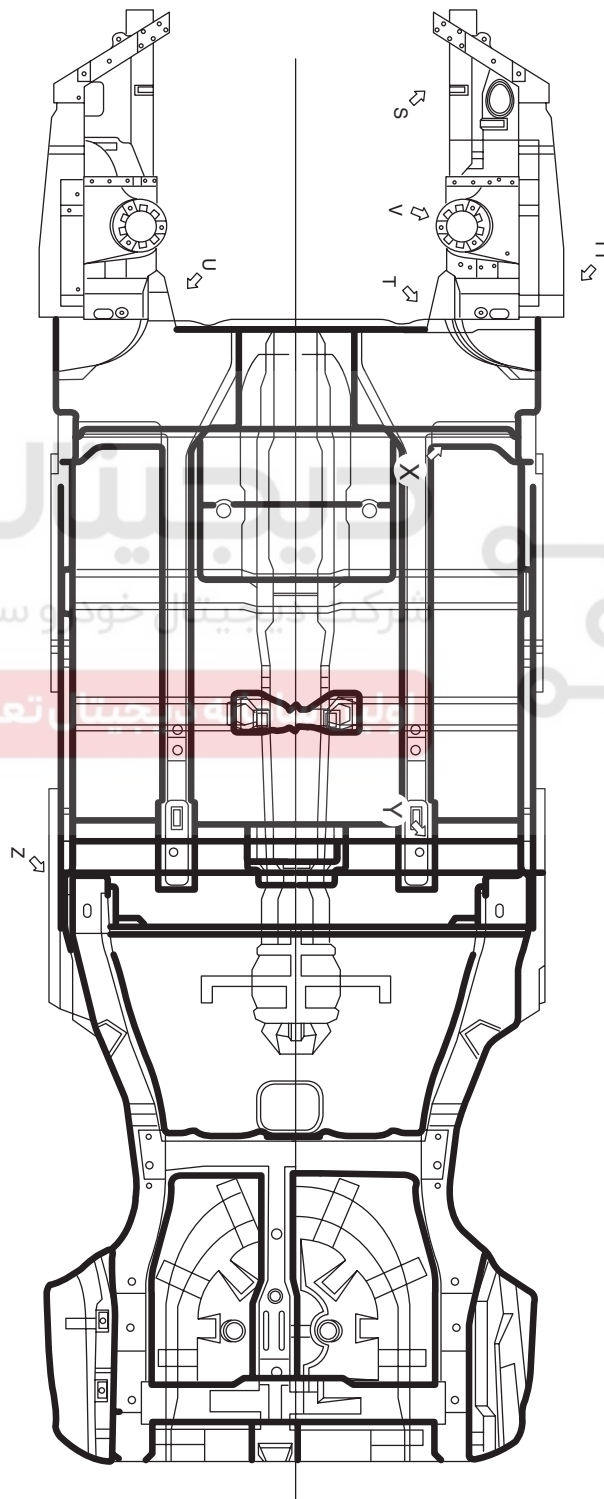
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



## Body sealing

To waterproof and rustproof the vehicle, apply sealer on assembled area of the body panel and on any areas in contact with the body, such as doors(inner/outer), hood(inner/outer), and trunk lid(inner/outer).

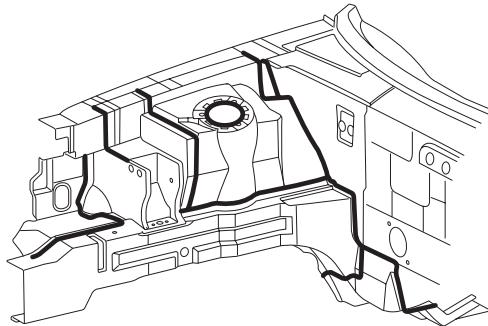
### Body (Floor)



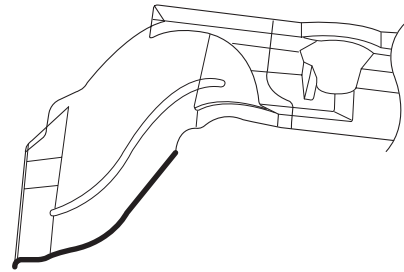
GH21025

## 41-2 Waterproofing and rustproofing

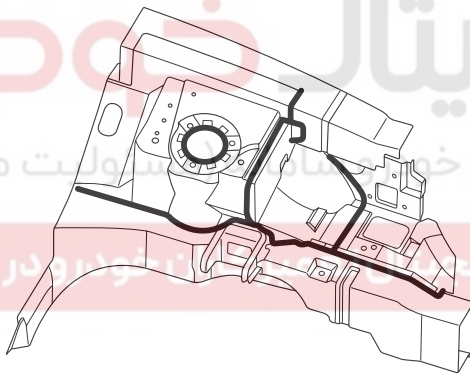
## Body (Front)



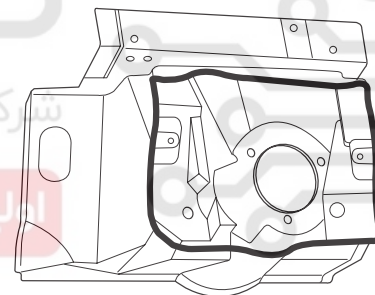
T



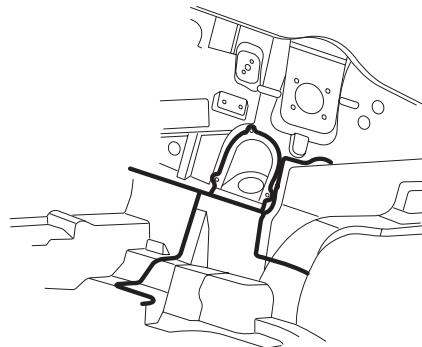
TT



U



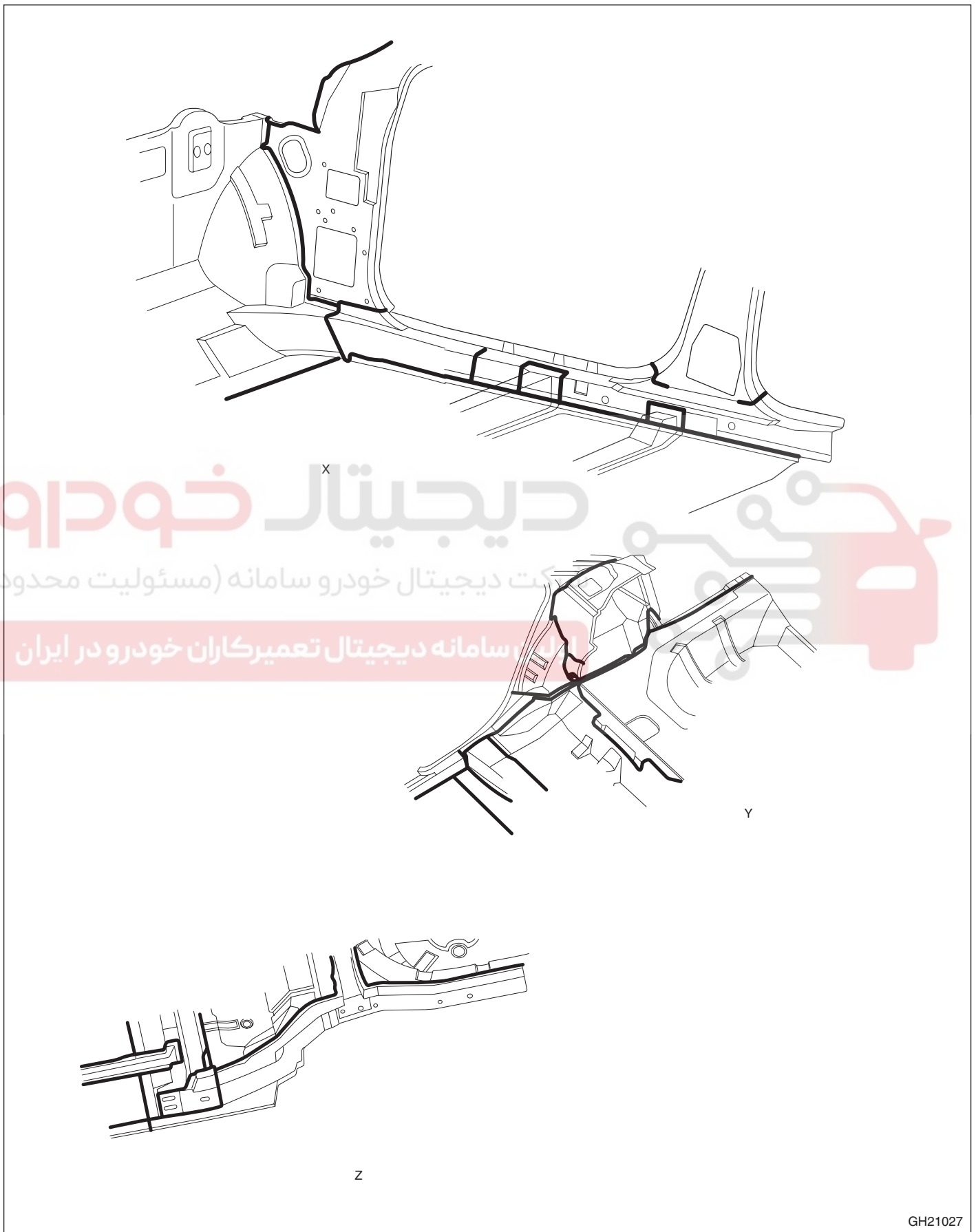
V



S

GH21025

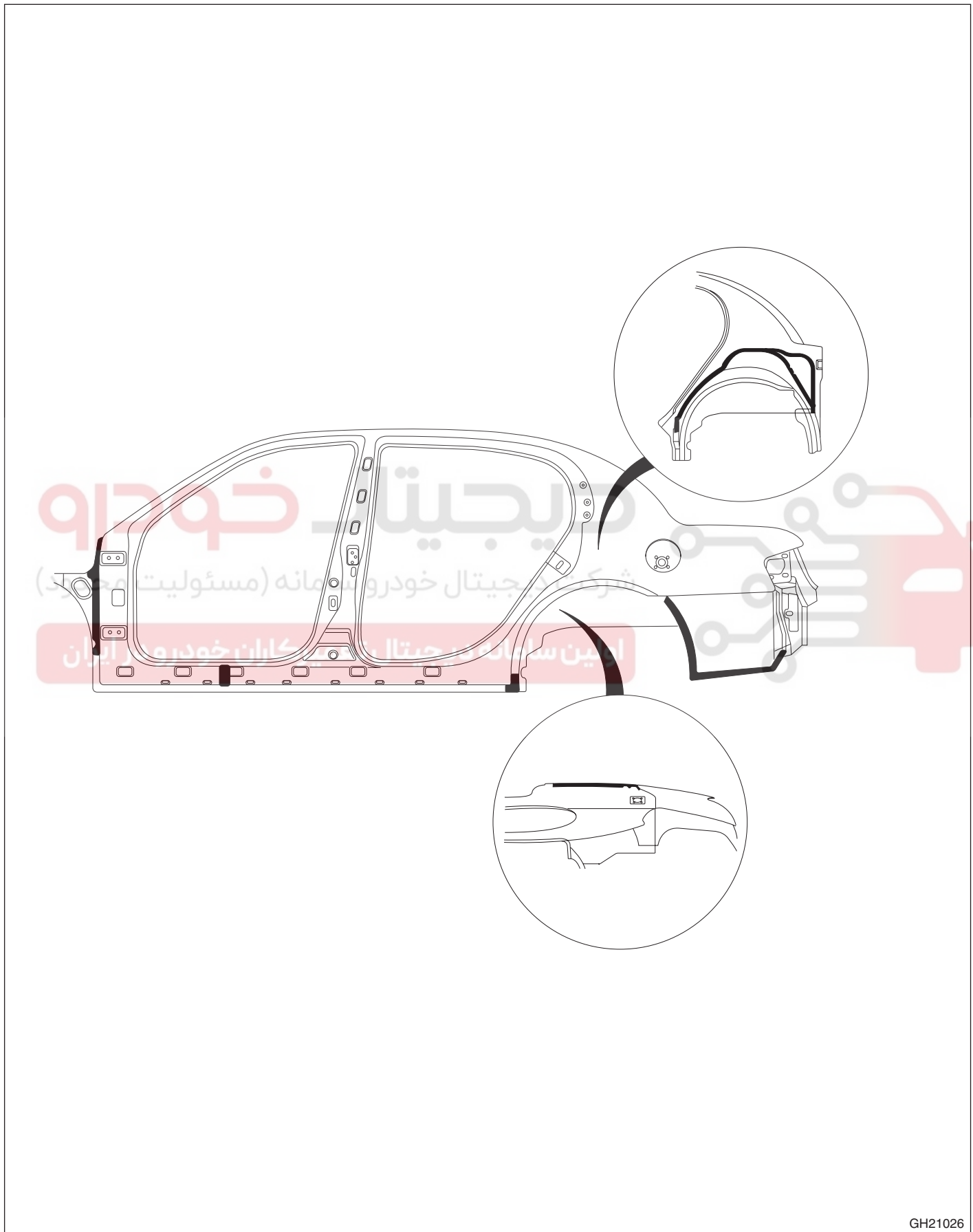
## Body (Center)



GH21027

## 41-4 Waterproofing and rustproofing

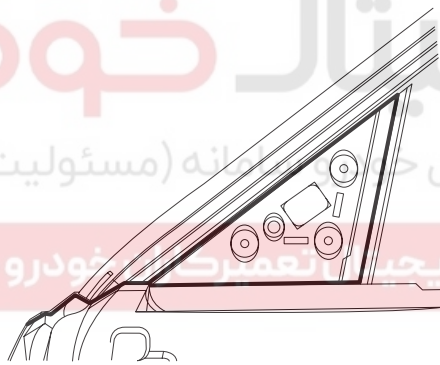
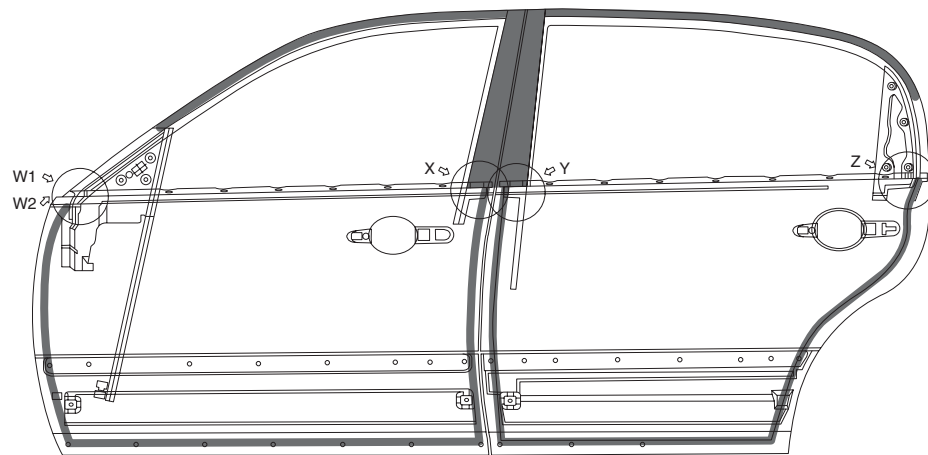
## Body (Side)



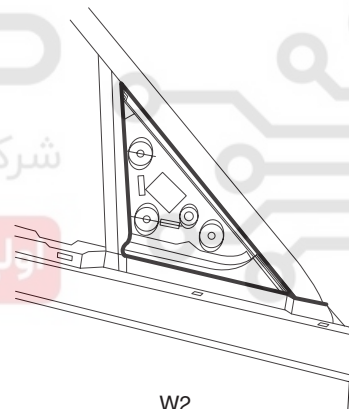
GH21026



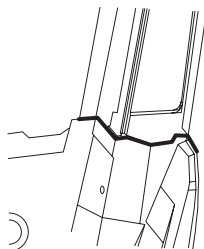
## Door



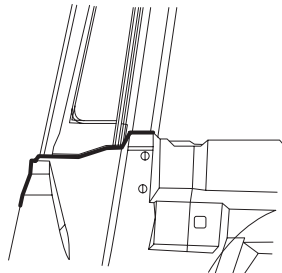
W1



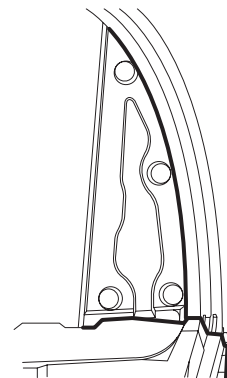
W2



X



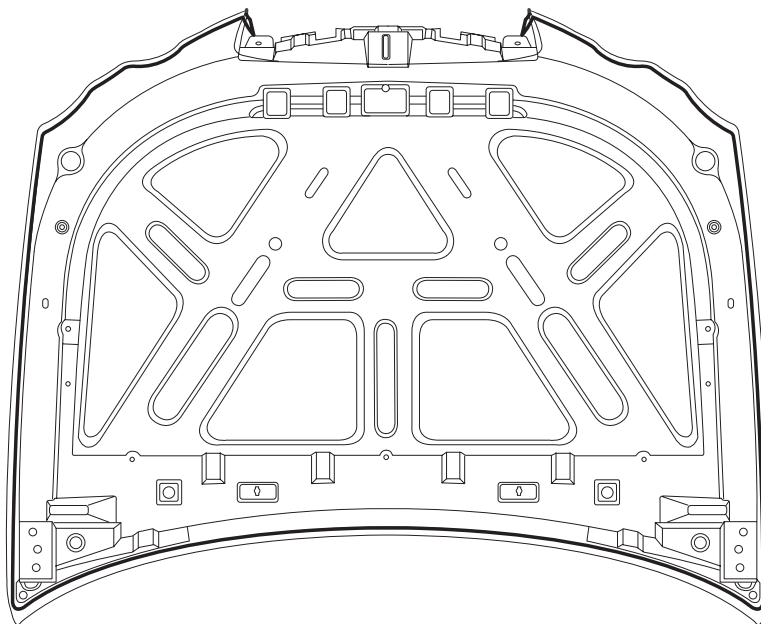
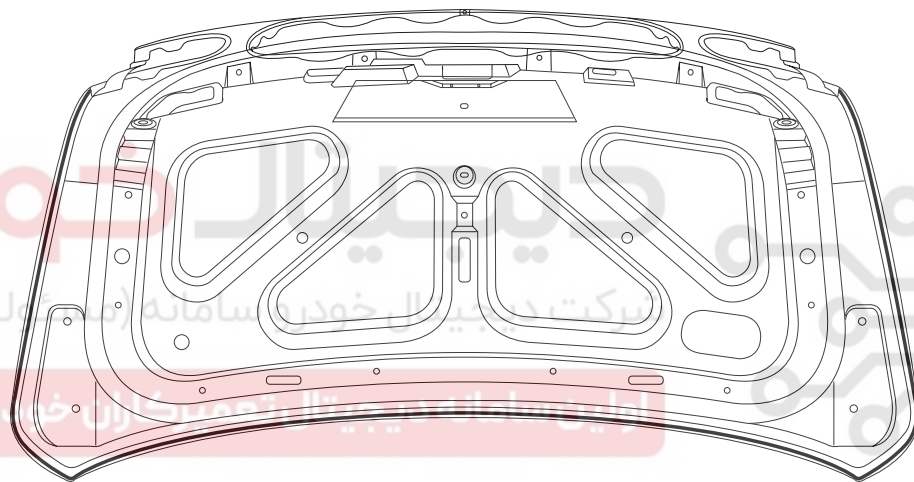
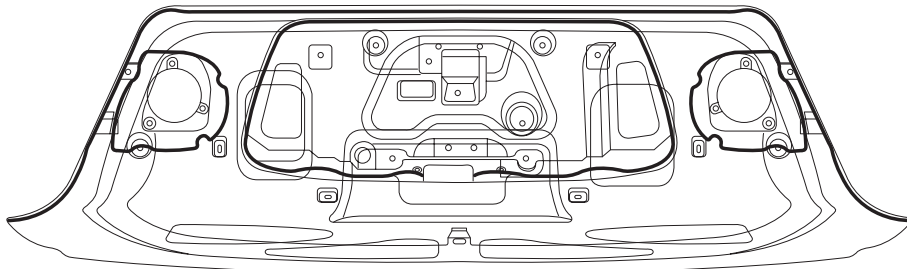
Y



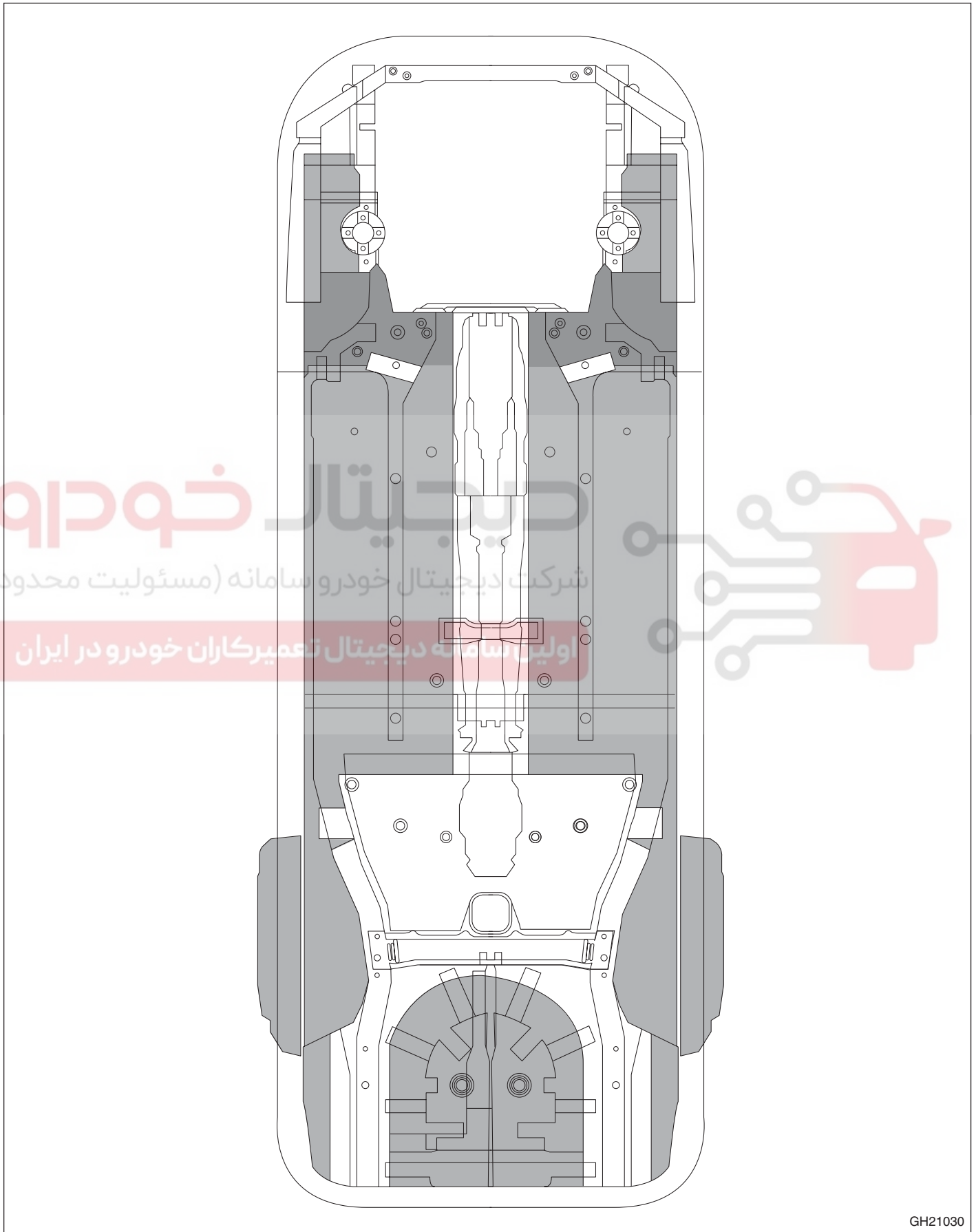
Z

## 41-6 Waterproofing and rustproofing

## Hood &amp; Trunk lid

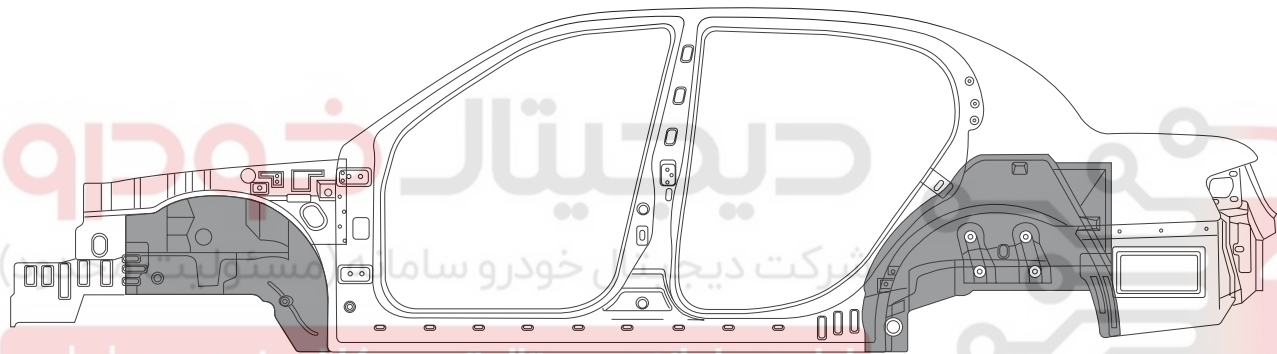


GH21028

**Under coating (Under)**

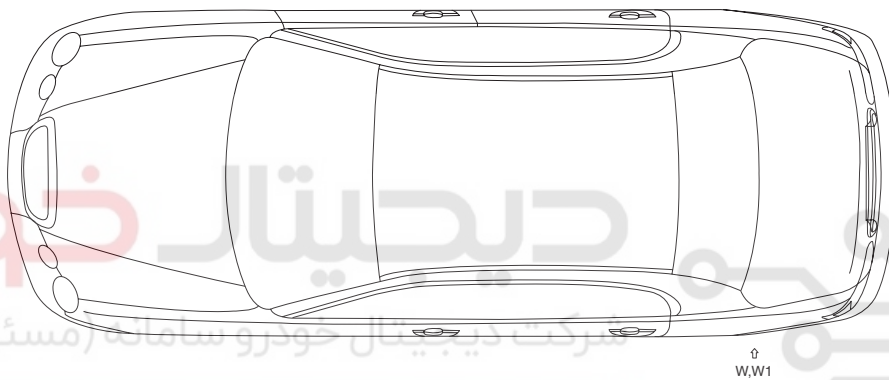
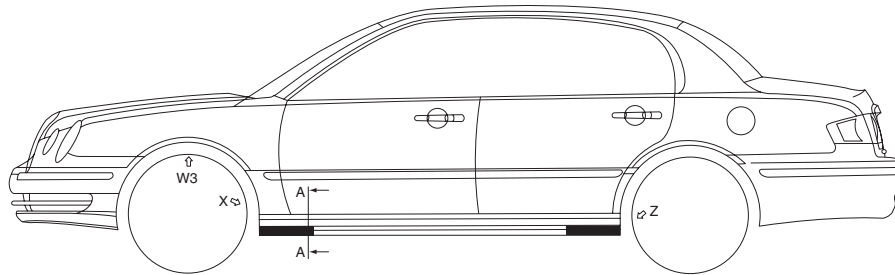
41-8 Waterproofing and rustproofing

Under coating(Side)

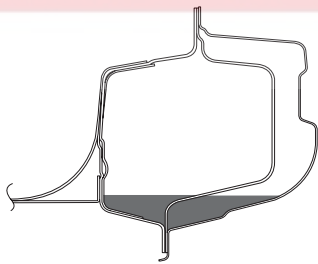


GH21030

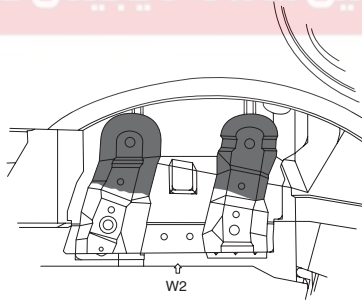
## Applying rustproofing material



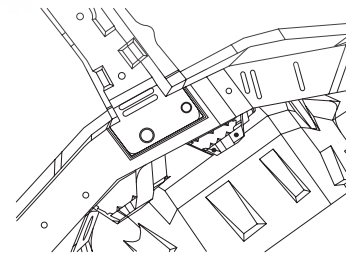
دیتال خودرو  
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)  
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



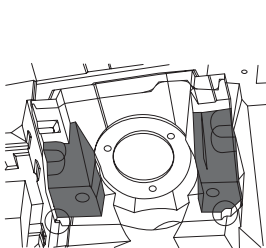
A-A



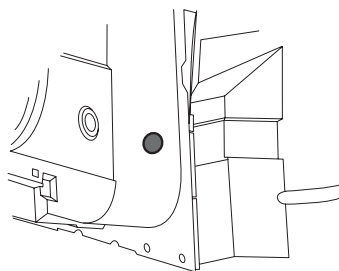
W1



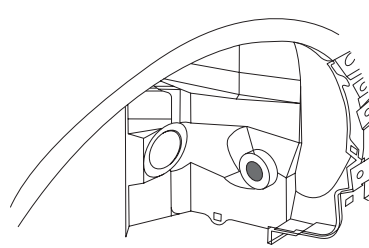
W2



W3



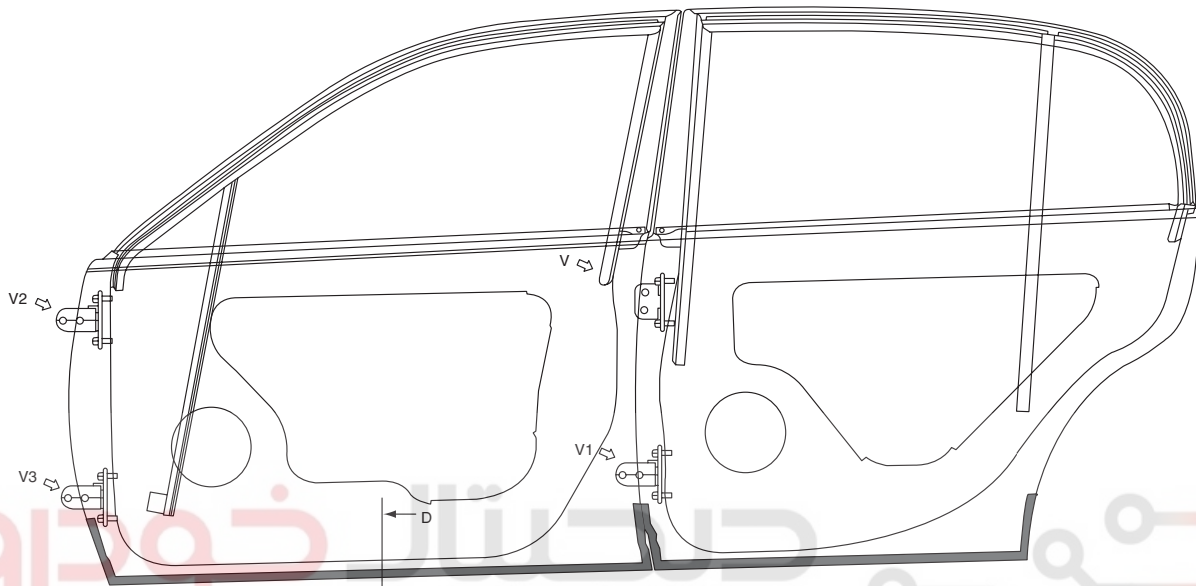
X



Z

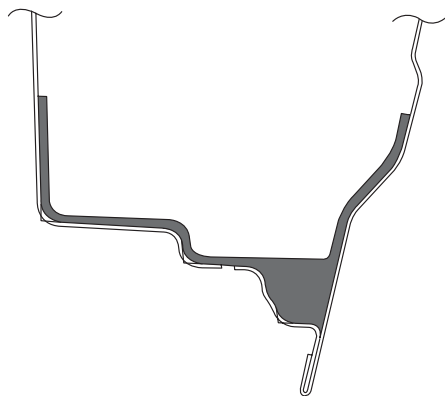
## 41-10 Waterproofing and rustproofing

## Applying rustproofing material(Door)

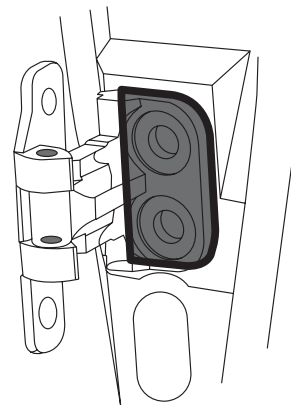


شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



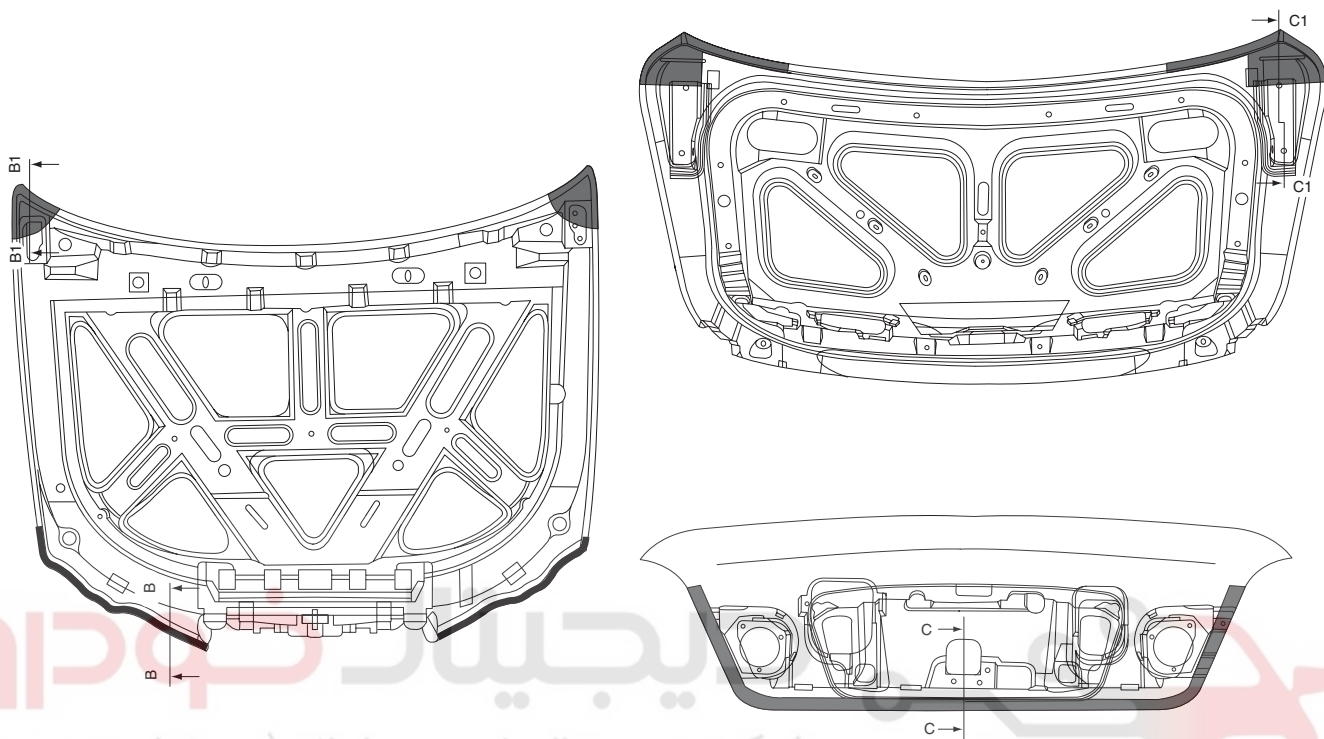
D-D



V

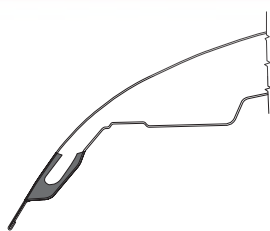
GH21032

## Applying rustproofing material (Hood &amp; Trunk lid)

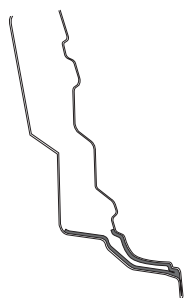


شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

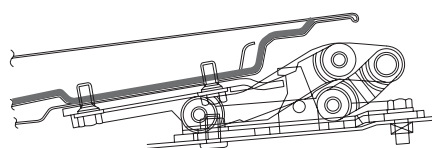
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



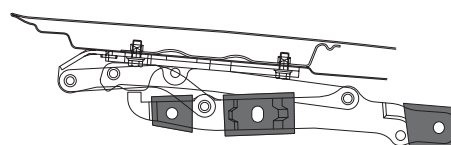
B-B



C-C



B1-B1



C1-C1



## Body modification tools

### Body modification tools

|                                  |       |
|----------------------------------|-------|
| Modification tools .....         | 51- 1 |
| Cut and disassembly tools .....  | 51- 2 |
| Assembly tools .....             | 51- 3 |
| Measurement tools .....          | 51- 3 |
| Welding machine .....            | 51- 4 |
| Buffing and grinding tools ..... | 51- 5 |
| Handheld tools .....             | 51- 7 |
| Repair tools set .....           | 51- 8 |

دیجیتال خودرو

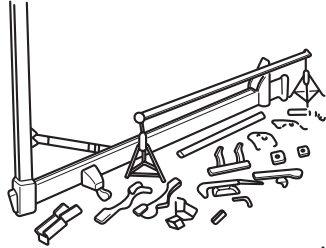

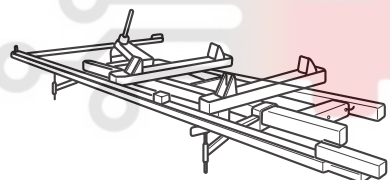
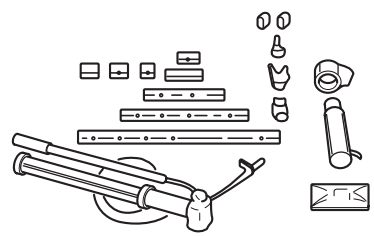
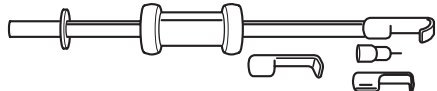
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران




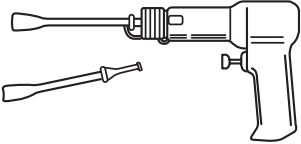
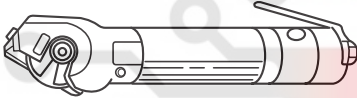
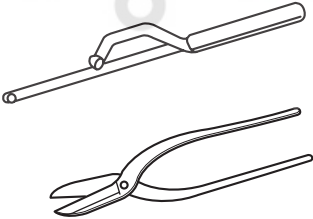
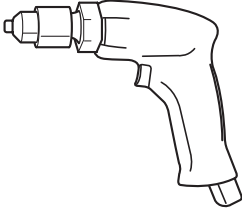
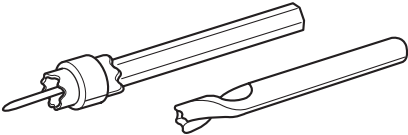
## Body modification tools

### Modification tools

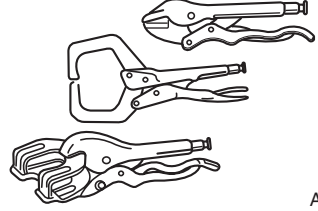
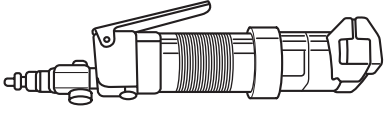
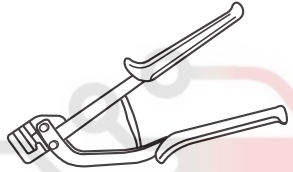
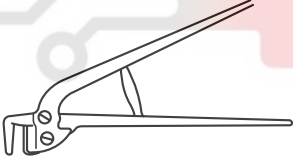
| Name               | Used for                                | Figure  |
|--------------------|---|---|
|                    |   |  <p>A3EB3501</p>   |
| Frame straightener | Modify twisted or bent body             |  <p>A3EB3502</p>   |
|                    |   |  <p>A3EB3503</p> |
| Port power         | Push out, stretch, pull in damaged area |  <p>A3EB3504</p> |
| Body puller        | Stretch damaged area                    |  <p>A3EB3505</p> |

## 51-2 Body modification tools

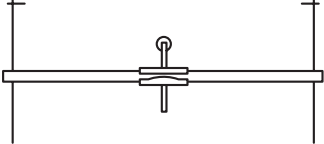
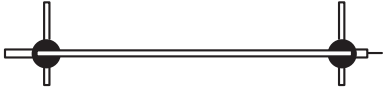
## Cut and disassembly tools

| Name                        | Used for  | Figure  |
|-----------------------------|---|---|
| Air saw                     | Cut a panel   | <br>A3EB3506    |
| Air diesel                  | Cut or bend a panel, cut and disassemble spot welded area                             | <br>A3EB3507   |
| Rotary cutter               | Cut a panel   | <br>A3EB3508 |
| Hand saw and metal scissors | Cut a panel   | <br>A3EB3509 |
| Air drill                   | Fix a spot cutter or drill to cut or disassemble spot welding area, to finish a hole. | <br>A3EB3510 |
| Spot cutter                 | Cut and disassemble spot welded area  | <br>A3EB3511 |

## Assembly tools

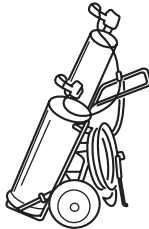
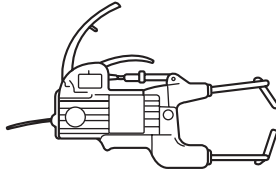

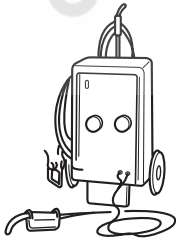
| Name          | Used for   | Figure  |
|---------------|--|---|
| Vice pliers   | Fix a panel or area to weld                                      | <br>A3EB3512   |
| Air bench     | Finish contact area of flange and finish a hole for plug welding | <br>A3EB3513   |
| Quick bench   | Finish a hole for plug welding                                   | <br>A3EB3514  |
| Flanging tool | Finish contact area of flange                                    | <br>A3EB3515 |

## Measurement tools

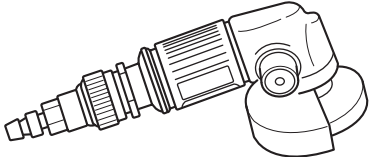
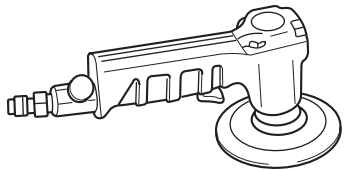
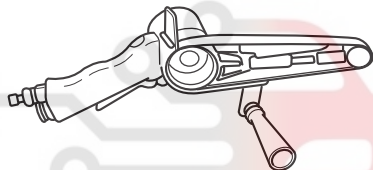
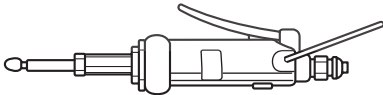
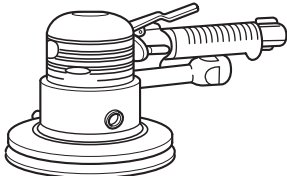
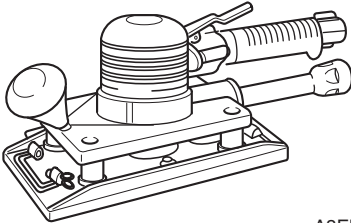
| Name            | Used for                             | Figure  |
|-----------------|--------------------------------------|---|
| Centering gauge | Measure distortion of body and frame | <br>A3EB3516 |
| Tracking gauge  | Measure body and frame               | <br>A3EB3517 |

## 51-4 Body modification tools

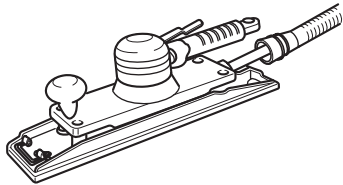
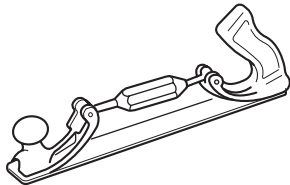
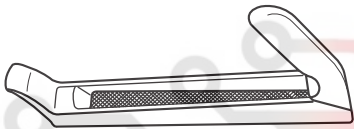
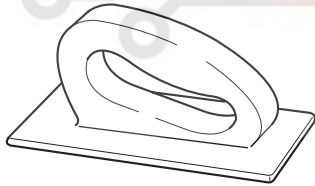
## Welding machine

| Name                       | Used for  | Figure  |
|----------------------------|---|---|
| Gas welding machine        | Cut a panel   | <br>A3EB3518   |
| Spot welding machine       | Weld a panel  | <br>A3EB3519   |
| Carbon arc welding machine | Weld a panel  | <br>A3EB3520  |
| Stud welding machine       | Stretch a panel, weld a stud bolt to fix front window mold clip | <br>A3EB3521 |

## Buffing and grinding tools

| Name                  | Used for                                  | Figure  |
|-----------------------|---|---|
| Disk grinder          | Buff                                      | <br>A3EB3522   |
| Disk sander           | Buff                                      | <br>A3EB3523   |
| Belt sander           | Buff paints                               | <br>A3EB3524  |
| Small sized grinder   | Buff paints or smooth finishing           | <br>A3EB3525 |
| Double action sander  | Grind rough area of puttee assembled area | <br>A3EB3526 |
| Orbital sander(short) | Grind rough area of puttee assembled area | <br>A3EB3527 |

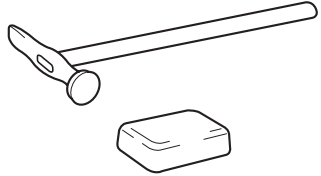
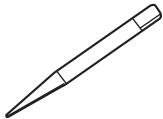
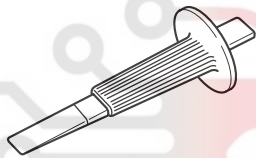
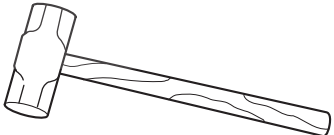
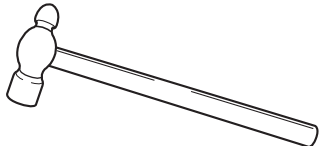
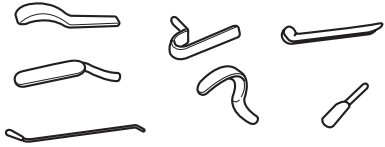
## 51-6 Body modification tools

| Name                 | Used for                                    | Figure  |
|----------------------|---|---|
| Orbital sander(long) | Used for puttee grinding of wide area       | <br>A3EB3528   |
| Flexible file        | Grind touch up area, uneven area of a panel | <br>A3EB3529   |
| Surform tool         | Buff rough area of puttee area              | <br>A3EB3530  |
| Hand file            | Grind body puttee, pulley, finish puttee    | <br>A3EB3531 |

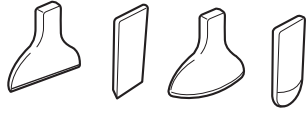
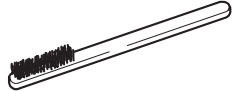


## Body modification tools 51-7

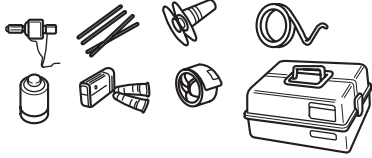
## Handheld tools

| Name                  | Used for  | Figure  |
|-----------------------|---|---|
| Body hammer and dolly | —   | <br>A3EB3532   |
| Center punch          | Punch a hole in the middle of a spot welding area | <br>A3EB3533   |
| Plane chisel          | Cut and disassemble a panel                       | <br>A3EB3534  |
| Weight hammer         | Used when greater force is required               | <br>A3EB3535 |
| Bowl pin hammer       | Used when smaller force is required               | <br>A3EB3536 |
| Spoon                 | Used for an area where not reached by hand        | <br>A3EB3537 |

## 51-8 Body modification tools

| Name        | Used for   | Figure  |
|-------------|--|---|
| Body chisel | Bend rough body line damaged or sheet metal etc.                     | <br>A3EB3538 |
| Wire brush  | Remove paints, rust, slag on welded area which are hard to recognize | <br>A3EB3539 |

## Repair tools set

| Name                         | Used for             | Figure  |
|------------------------------|----------------------|---|
| Window tool set              | Repair window collar | <br>A3EB3540 |
| Repair tool set for plastics | Repair plastic parts | <br>A3EB3541 |

## Plastic parts

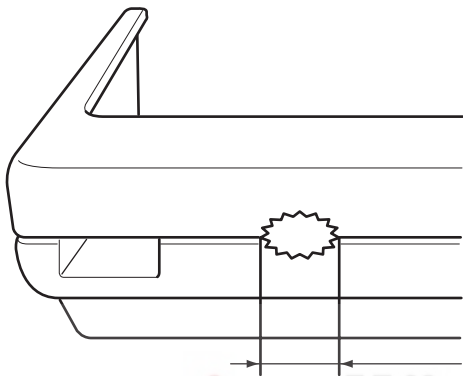
|   |       |
|---|-------|
| Polypropylene (PP) bumper repairability ..... | 61- 1 |
| Bumper repair procedure .....                 | 61- 2 |
| Repair method for PP bumper .....             | 61- 3 |



## Polypropylene(PP) bumper repairability

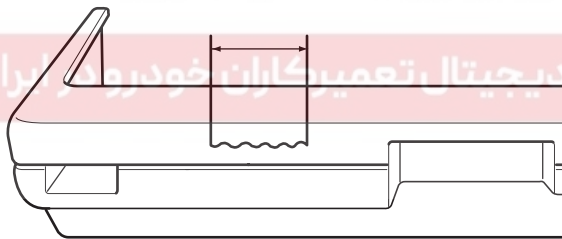
The three types of damaged bumpers shown below can be repaired. Because of cost and quality considerations, bumpers with more damage may be repaired, but replacing the bumper is encouraged.

1. If a hole on a bumper is less than 2 in.(50 mm).



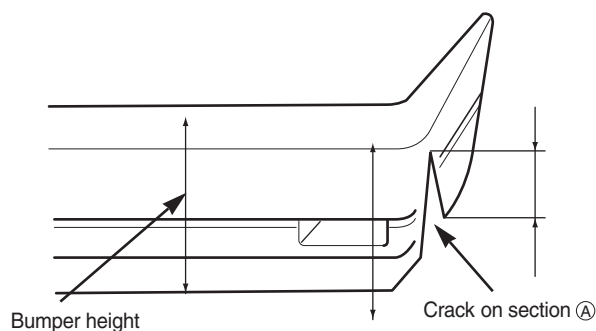
A3EB3601

2. If a crack on a bumper is less than 4 in.(100 mm).



A3EB3602

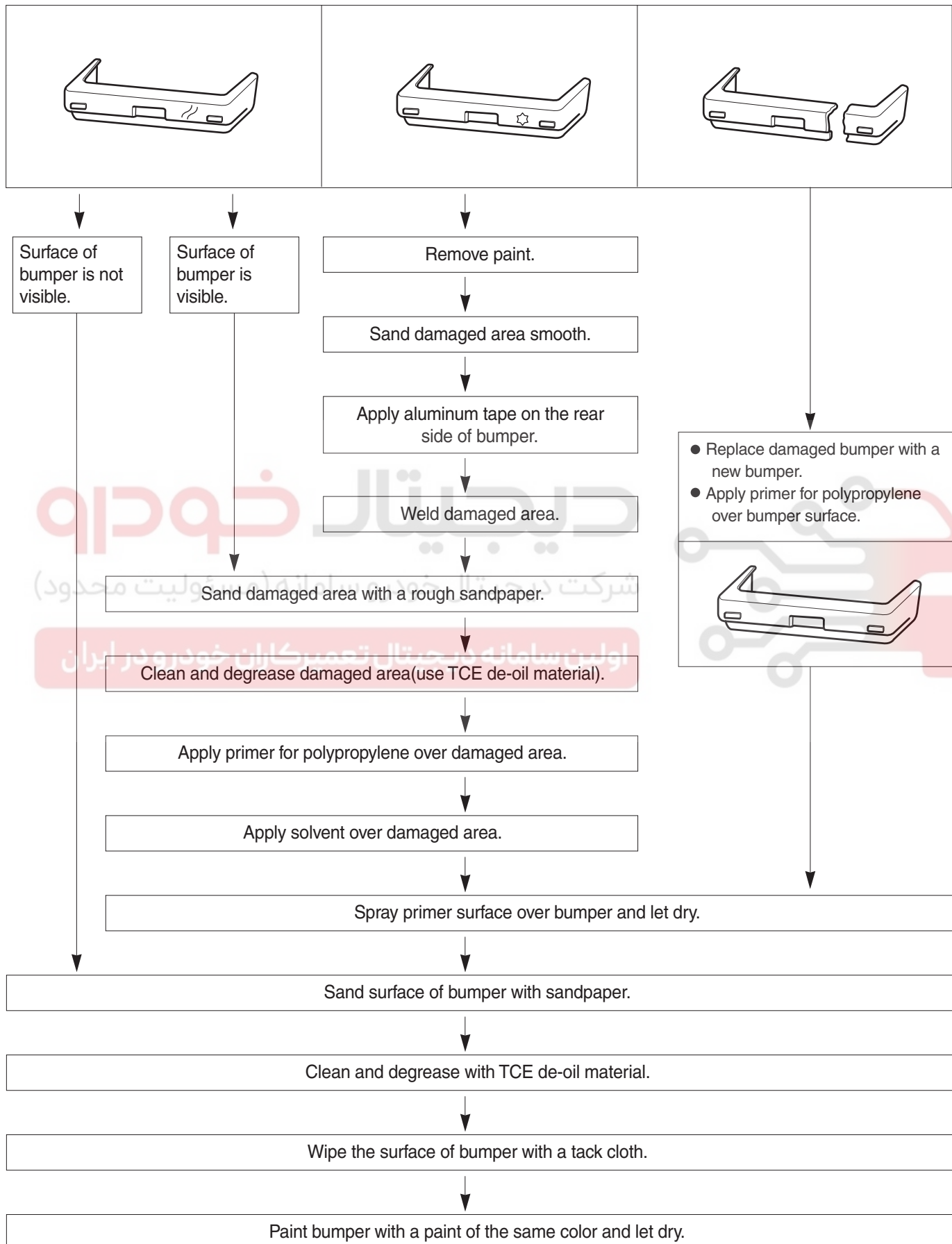
3. If a crack on bumper section (A) is less than 4 in.(100 mm) (less than half of the bumper height).



A3EB3603

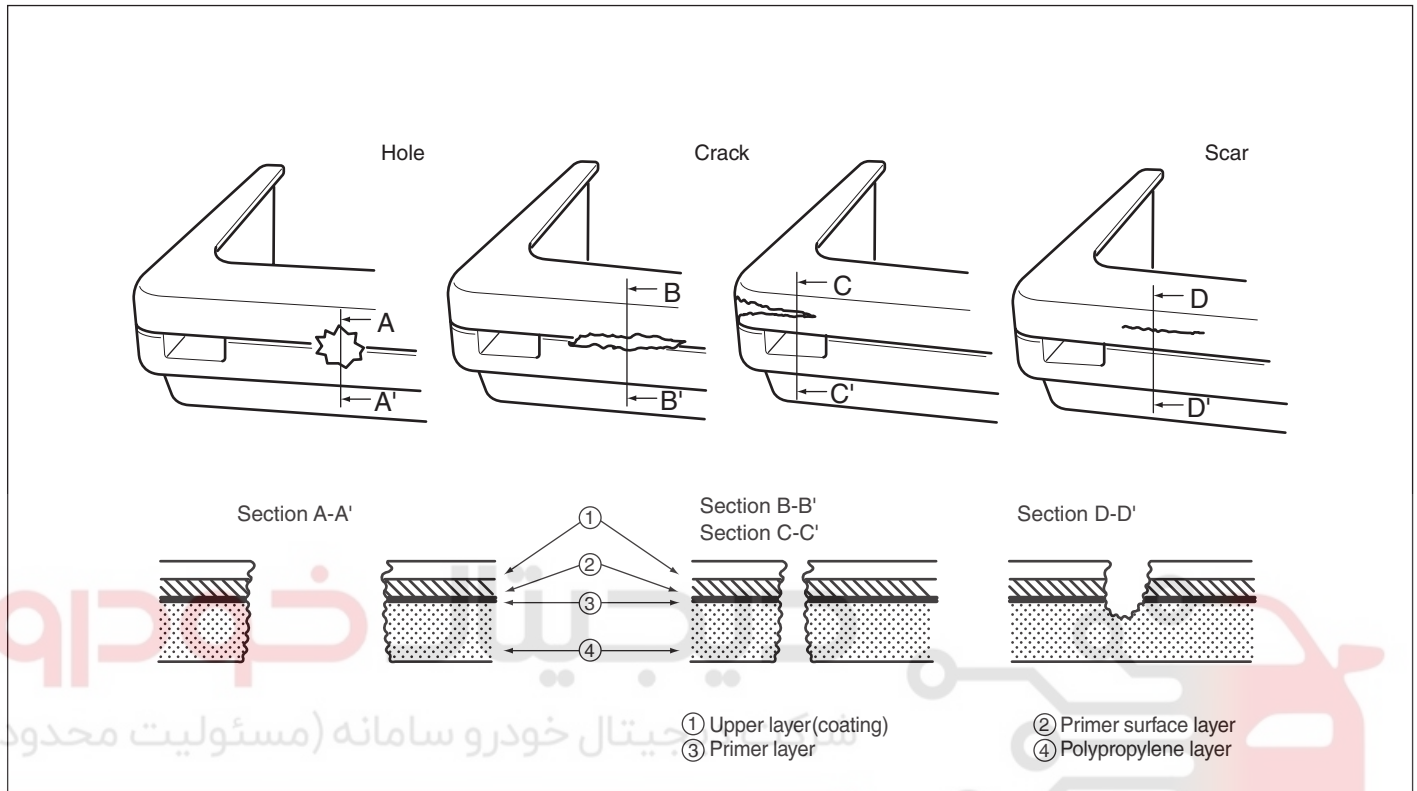
## 61-2 Plastic parts

## Bumper repair procedure

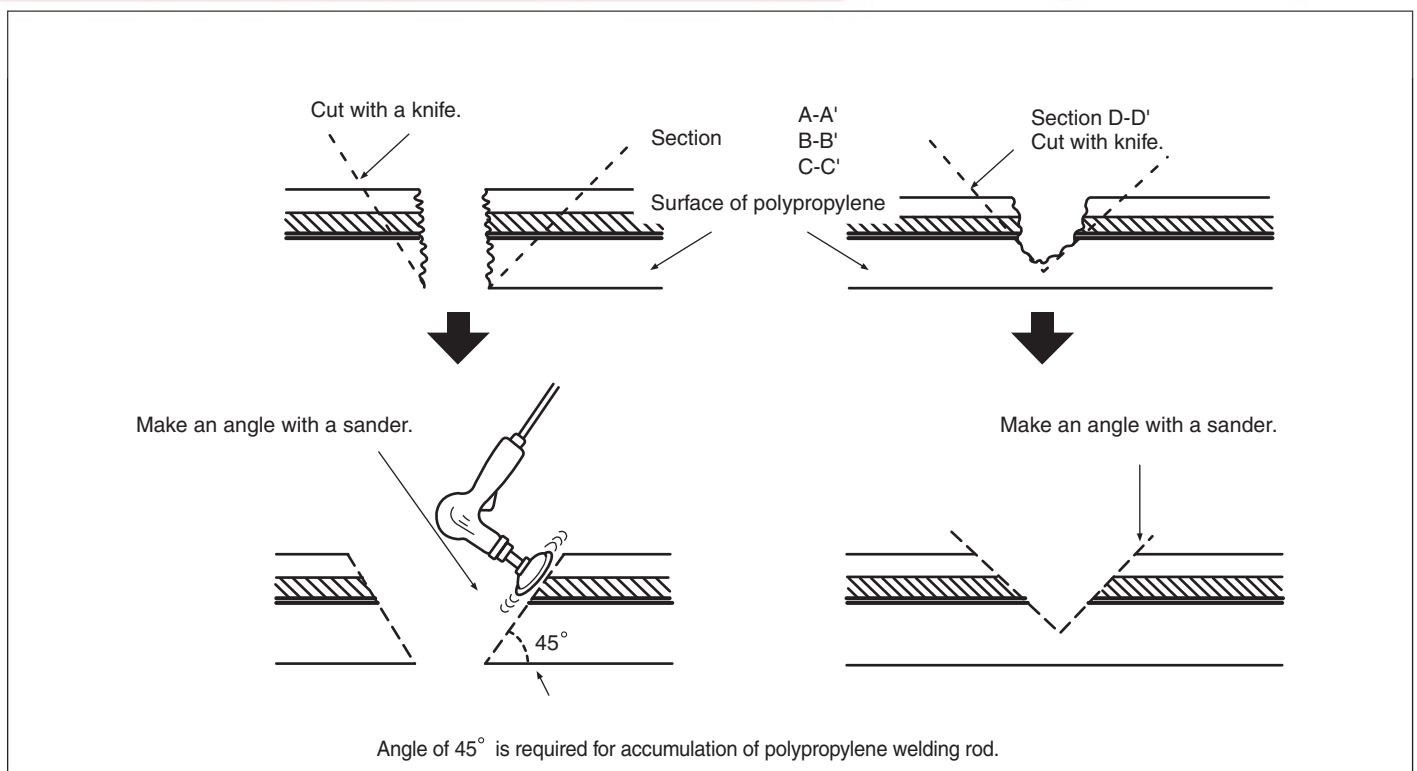


## Repair method for PP bumper

Damage to the bumper that reaches the surface of the polypropylene cannot be fixed just by painting. Use the repair methods shown below to repair damage that reaches the surface of the polypropylene.



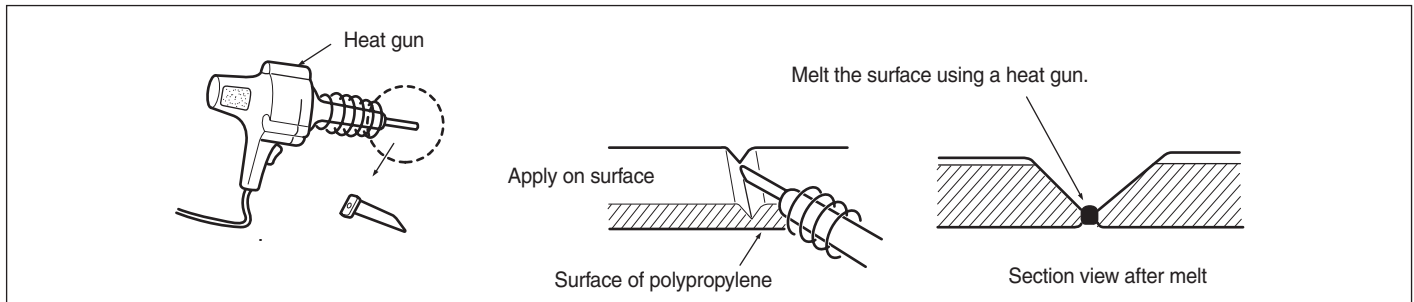
1. Rough cut the damaged area 45° using a knife and then sand the angle smooth.



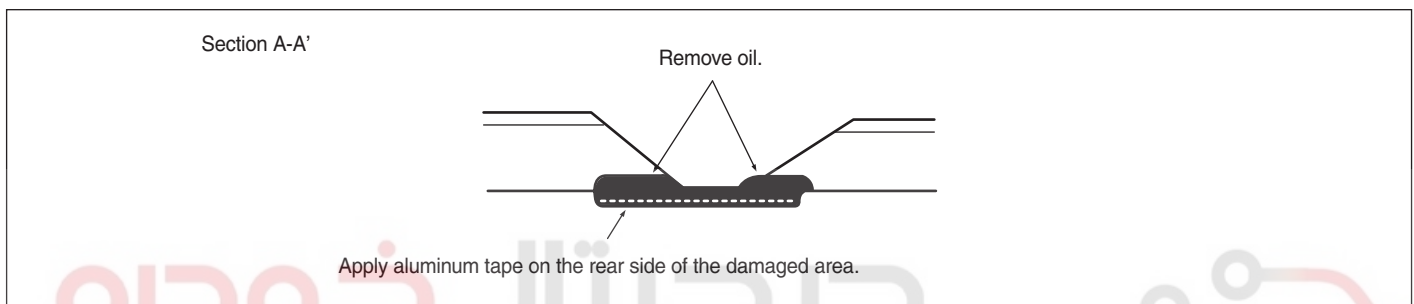
## 61-4 Plastic parts

### 2. Welding damaged area

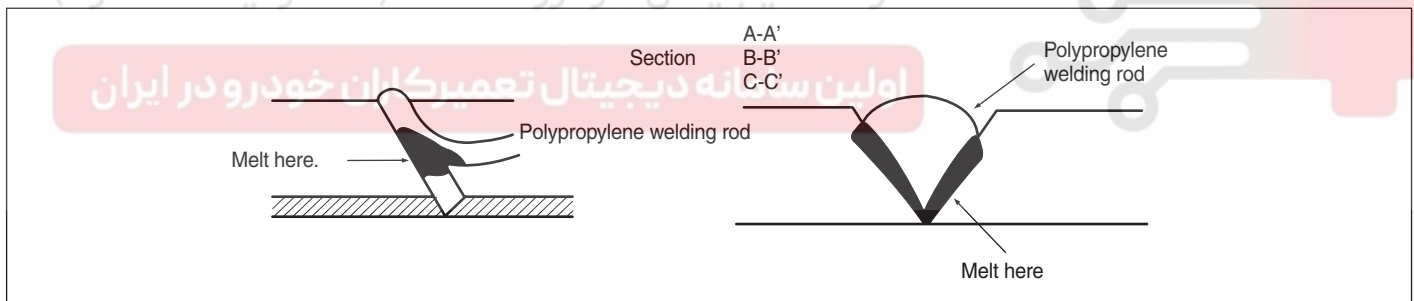
a) To repair cracked area, melt the area using a heat gun and attachment.



b) To repair a hole, remove oil from the damaged area and apply aluminum tape to the rear side of the damaged area.

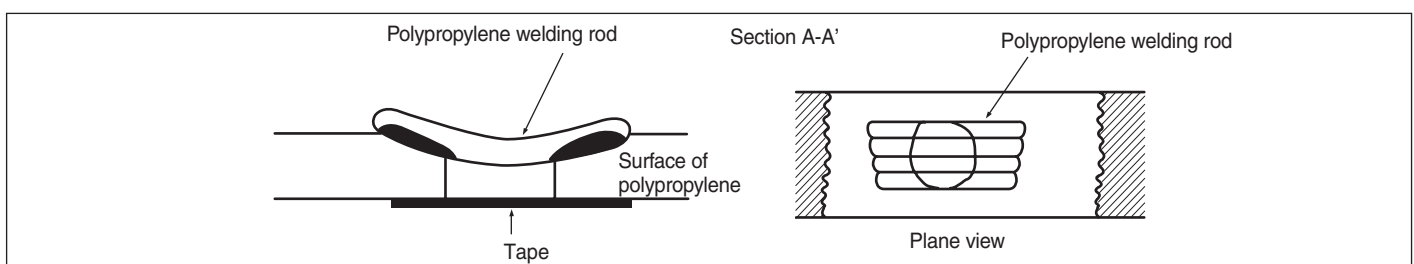


### 3. Melt polypropylene welding rod using a heat gun and fill in the cracked area.



#### \* Notice

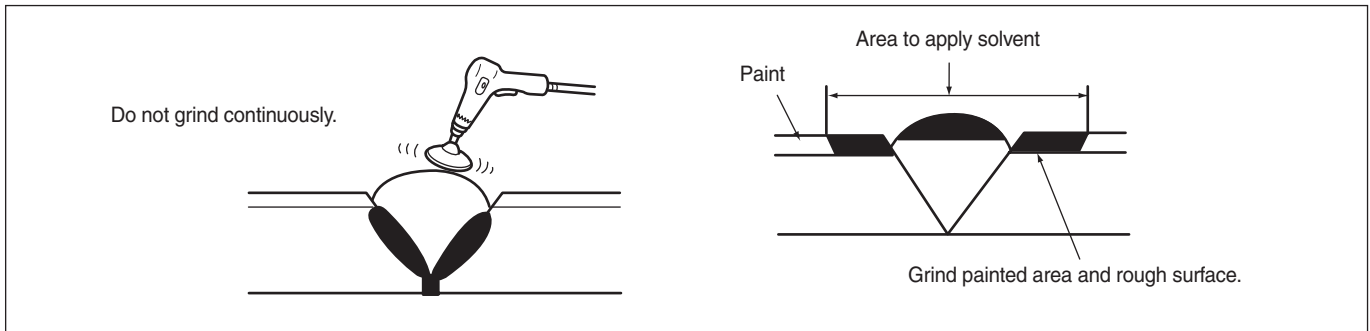
- Heat and melt the area indicated.
- Melt the welding rod carefully so that it does not over-melt. If the welding rod over-melts like jelly, the welding strength will deteriorate.
- Use the heat gun 0.4~0.8 in. (10~20 mm) away from the repair area to be welded.
- Welding rod should not move until the welded area is cooled.



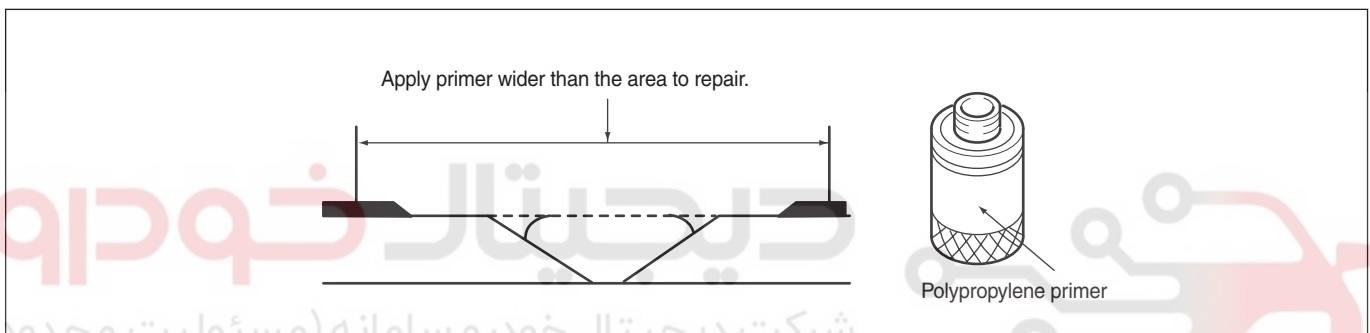


## Plastic parts 61-5

4. Grind polypropylene surface carefully. It melts easily due to the heat generated by friction. If melted, remove that area. Also, grind the area where solvent is to be applied.



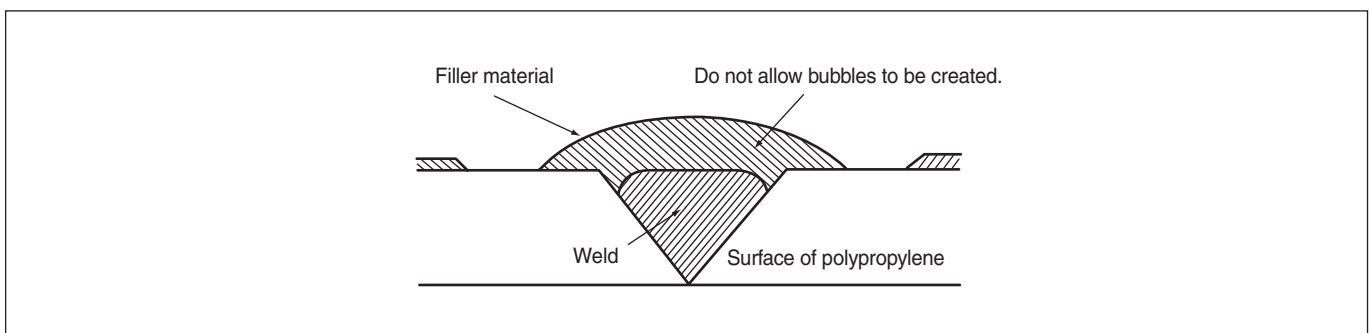
5. Apply polypropylene primer evenly with a brush over an area wider than the area to be repaired. Dry it at 20°C(68°F) for more than 10 minutes.



6. Mix main filler material and hardener at a ratio depending on paint specifications. Mix filler material and apply over the damaged area.

**\* Notice**

- Mix main filler material and hardener so that no bubbles are made.
- Work immediately after mixing filler material because the filler material hardens quickly (in about 5 minutes).
- Dry it at 20°C(68°F) for about 30 minutes before sanding.



- Filler material consists of two types of epoxy.  
When the filler material hardens, you will have a desirable finish with flexibility like polypropylene.
- Use only filler material designed for use on polypropylene bumpers.

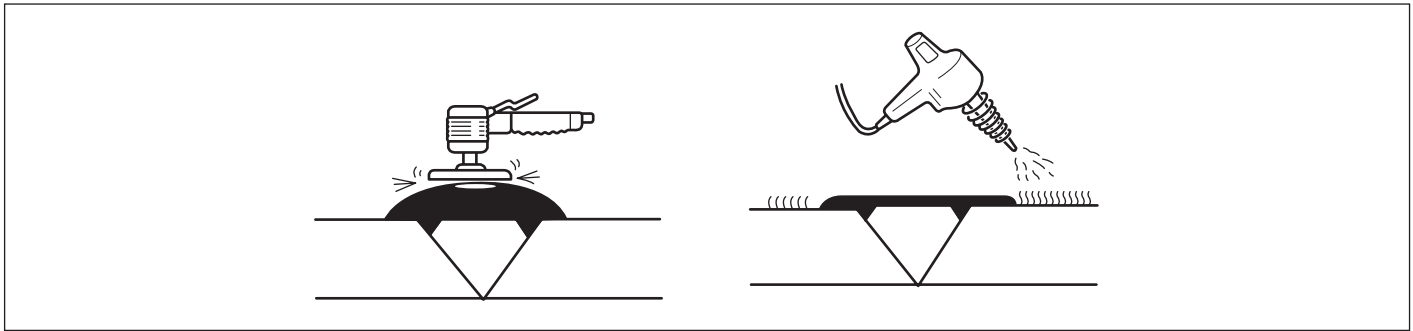
## 61-6 Plastic parts

7. Sand the damaged area with sandpaper using #180~#240 grit paper.

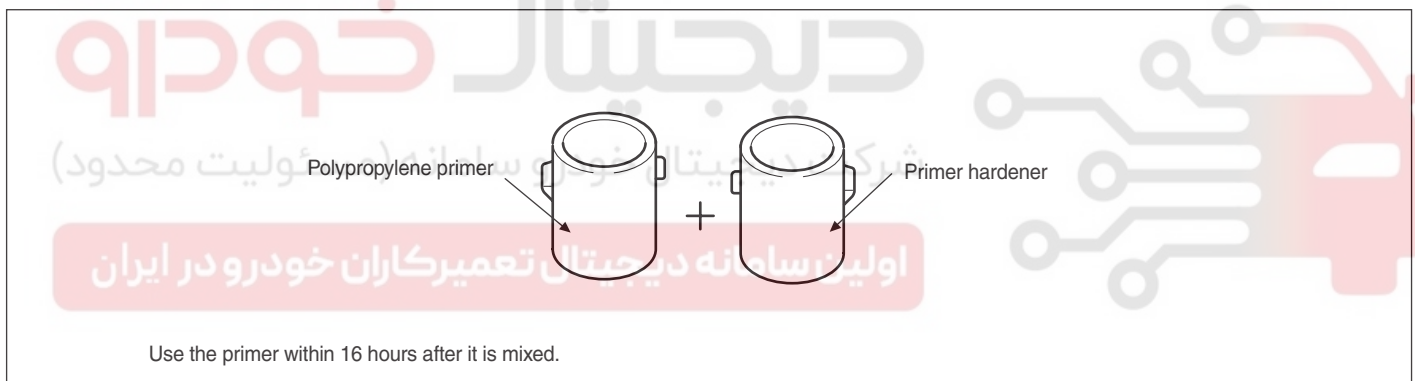
**\* Notice**

- The surface will not be even if excessive force is applied during sanding.
- If there is fuzz in the damaged area, heat it a little bit with a heater gun and melt it.

8. Degrease the painted surface.



9. Mix polypropylene primer and hardener at a ratio depending on paint specifications. Spray polypropylene primer on the surface of the damaged area and the bumper.



10. Apply polypropylene primer.

**\* Notice**

- Use only water to clean after applying polypropylene primer. Solvent, if used, will melt the primer.

11. Lightly sand the sprayed area using a primer surfacer, and finish the surface of the bumper with a sandpaper(#400~#600).

The polypropylene surface should not be exposed.(Either wet sanding or dry sanding is all right.)

12. Use agent(TCE(Tir Chloro Ethane) degreasing material) to remove any grease or oil, and wipe the finished surface of the bumper quickly with a clean cloth.

**\* Notice**

- The painting method for the polypropylene bumper is the same used to paint the urethane bumper.
- Therefore, use urethane primer only on urethane bumpers and polypropylene primer on polypropylene bumpers.

14. Air dry at 20°C(68°F) for about 8 hours, or dry in 60°C(140°F) for about 2 hours.

(Since drying time varies according to the type of paint used, follow paint manufacturers directions for drying times.)

**\* Notice**

- Air dry if possible. Forced drying may create air bubbles on the top layer.

