

Module 1

Kia Body Repair Manuals

All Kia "Body Repair Manuals" (BRM) include a good overview of the vehicle body structure along with generic general information and cautions for repairing Kia vehicles. Much of the same information is included in all manuals and applies to all current models in the Kia fleet.

Modules 1 of this manual will cover the Kia generic body repair information covering all models included in those course. Module 2 will look at model specific information for each of the following vehicles:-

- Picanto (TA)
- Rio (UB)
- Soul I (PS) 2015
- Cerato (YD) 2,4 & 5 door 2014
- Pro-Ceed (JD) 2013
- Optima (TF) 2014
- Carens (RP) 2014
- Sportage (SL)
- Sorento (UM12)
- Carnival (YD)
- Light truck K2900 (PU)

General Information

General Guide Lines and Precautions

This vehicle is a completely new design. During its development, close attention has been given to safety, stability, weight and corrosion protection. Typical of unibody design, the vehicle is designed so that the front and rear compartments will absorb much of the collision energy so that the passengers are better protected. During collisions, these front and rear energy absorbing systems may be severely damaged. During repair, these damaged areas must be returned to their original strength and geometry. If this is not properly done, the vehicle will not provide the intended level of protection to its occupants in the event of another collision. The repairs described in this manual were performed on the vehicle's body shells. In some instances special fixtures were welded in place to support the structure. During the repair of an actual vehicle, the interior would be fully disassembled and standard jack screws or portable braces may be used for temporary support. During the repair of an accident involved vehicle, the vehicle must first

be returned to pre-impact dimensions prior to beginning the sectioning repair procedures. The extent of damage that must be repaired should then be evaluated to determine the appropriate repair procedures. This manual provides locations and procedures where structural sectioning may be employed. It is the responsibility of the repair technician, based upon the extent of damage, to determine which location and procedure is suitable for the particular damaged vehicle. During the repair of a collision damaged automobile, it is impossible to fully duplicate the methods used in the factory during the vehicle manufacture. Therefore, auto body repair techniques have been developed to provide a repair that has strength properties equivalent to those of the original design and manufacture.

Safety Factors

When repairing Kia vehicles it is important to follow the following recommendations.

1. Disconnect the negative (-) battery cable before performing any work on the vehicle.
2. Protect yourself by wearing goggles, earplugs, respirators, gloves, safety shoes, caps, etc. when working on a vehicle.
3. Safely support the vehicle before any work is done. Block the front or rear wheels if the vehicle is not lifted off of the ground
4. 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
5. Ensure proper ventilation of your working area. Some paint and sealant can generate toxic gases when heated. Use an air chisel or saw to remove damaged panels instead of a gas torch.
6. Observe all local and national safety regulations when performing any work.
7. Cover interior with heat-resistant cover to ensure safety when welding.
8. Take care when using gas or cutting torches so as not to burn body sealer or interior. Extinguish immediately if they should catch fire.

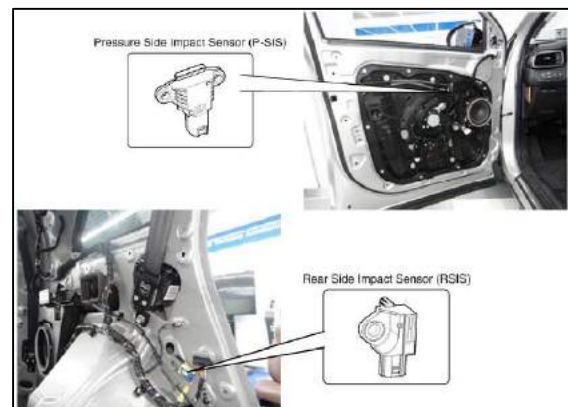
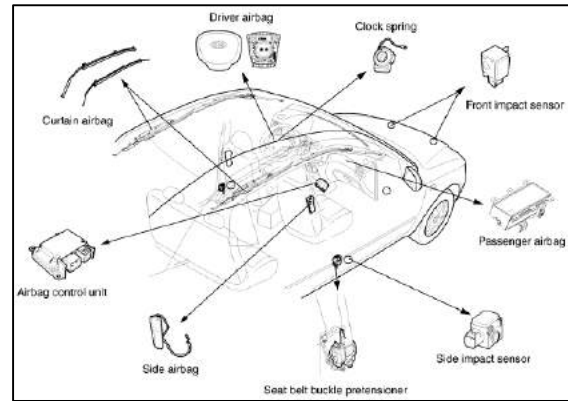
SRS Air-Bag

This vehicle is equipped with a Supplemental Restraint System AIR-BAG to provide the vehicle's driver and/or the front passenger with additional protection than that offered by the seat-belt system alone, in case of a frontal impact of sufficient severity. When handling airbag components (removal, installation or inspection, etc.), always follow the directions given in the repair manual for the relevant model to prevent the occurrence of accidents and airbag malfunction.

1. Work must be started after approximately 30 seconds or longer from the time the ignition switch is turned to the LOCK position and the negative (-) terminal cable is disconnected from the battery. (The airbag system is equipped with a back-up power source so that if work is started within 30 seconds of disconnecting the negative (-) terminal cable of the battery, the airbag may be deployed.) When the negative (-) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized by the audio memory system. Then when work is finished, reset the audio system as before and adjust the clock.
2. When using electric welding, first disconnect the air-bag connectors under the steering column near the MULTI-FUNCTION SWITCH and the passenger's side crash pad before starting work.
3. Store the air-bag modules where the ambient temperature remains below 93°C (200F°), without high humidity and away from electrical noise.
4. WARNING/CAUTION labels are attached to the periphery of the air-bag components. Refer to the SHOP MANUAL.

Note; detailed illustrations showing where airbag, sensors and components are shown for each model. This should be checked before removal of any interior trim panels.

The following examples show illustrations for the Optima (TF) 2014 and the pressure sensor of the UM12 2015 model.



Welding

All repairs in this manual require the use of a Metal-Inert Gas (MIG) welder, Gas (oxyacetylene) welding must not be used. Both high strength steel and mild steel can be welded using the MIG welder.

The I-CAR recommendations for welding should be followed. The shielding gas should be 75% Argon and 25% CO₂. The recommended welding wire size is 0.23" and the wire should satisfy the American Welding Society standard code AWSER70S-6. During the repair process, plug welds are used to duplicate original factory spot welds. All plug welds should be done with the MIG welder. An 8mm (5/16") hole is placed in the top (welding side) sheet metal. Then begin welding along the edges and the spiral towards the centre (see illustration). This is important so that weld penetration between the two metal pieces takes place along the circumference of the circle.

Observe the following tips when welding.

1. Wear appropriate eye protection.
2. Carefully follow the manufacturer's operating instructions for the welding machine you are using.

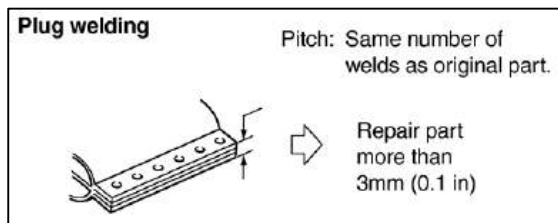
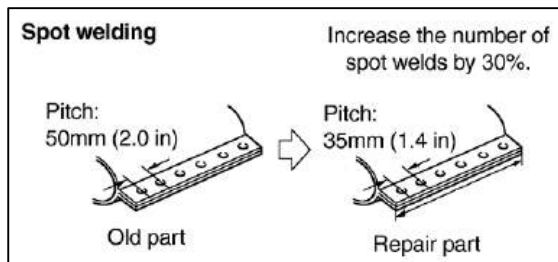
- Do not weld, smoke or allow open flames around volatile chemicals, cleaners or solvents or in any area where they have just been used.

Measuring Dimensions before Welding

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

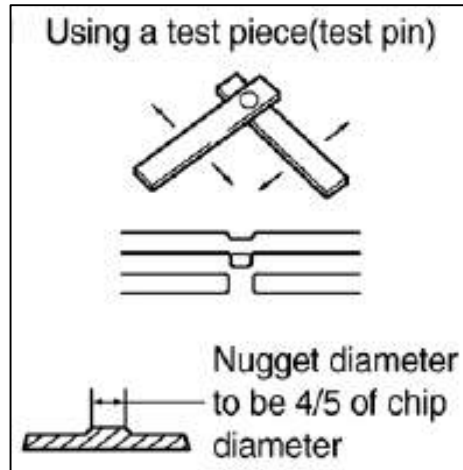
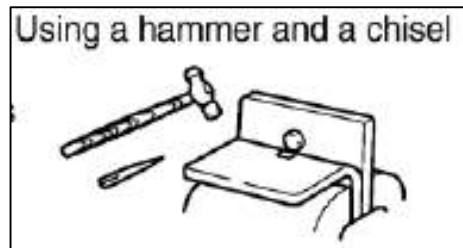
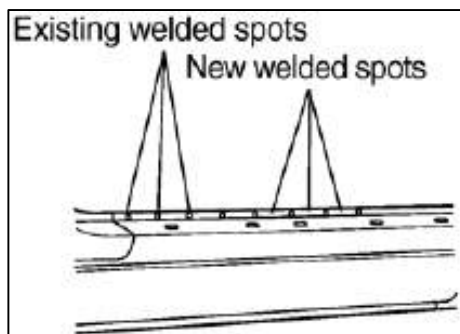
Caution when Welding

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 3mm (0.1 in) 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.



Electronic Parts

Vehicles today include many electronic parts and components, and these are in general very susceptible to adverse effects caused by overcurrent, reverse current, electromagnetic waves, high temperature, high humidity impacts, etc. In particular such electronic components can be damaged if there is a large current flow during welding from the body side.

Take the following precautions during body repair to prevent damage to the CONTROL MODULES (ECM, TCM, ABS CM, SRS CM, etc.).

- Before removing and inspecting the electrical parts or before starting electric welding operations, disconnect the negative (-) terminal cable from the battery.
- Do not expose the CONTROL MODULES to ambient temperatures above 80°C (176°F). If it is possible the ambient temperatures may reach 80°C (176°F) or more, remove the CONTROL MODULES from the vehicle before starting work.
- Be careful not to drop the CONTROL MODULES and not to apply physical shocks to them.

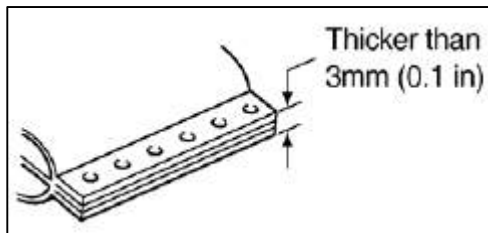
Preparation of Panel Installation

Applying Spot Sealer

Remove paint from the surface of new parts and body to spot weld, 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 3mm (0.1 in), do plug welding using a carbon arc welding machine.



Protecting Body from Damage

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

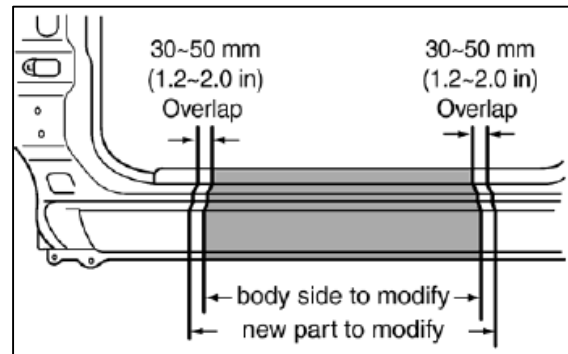
Machining Holes for Plug Welding

For areas where a spot welder cannot be used use a puncher or drill to make hole for plug welding.

Thickness of welded portion	Diameter of Plug hole
Under 10mm(0.04in)	Over 5mm(0.20in)
1.0~1.6mm (0.04~0.06in)	Over 6.5mm(0.26in)
1.7~2.3mm (0.07~0.09in)	Over 8mm(0.31in)
Over 2.4mm(0.09in)	Over 10mm(0.39in)

Adjusting a New Part

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



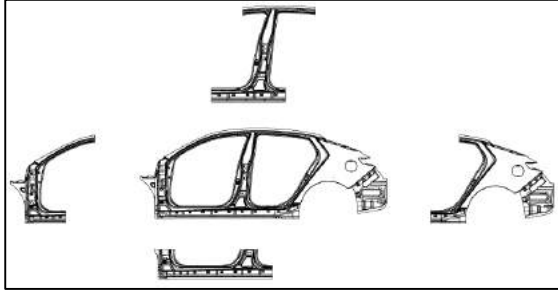
Corrosion Protection and Sealing

Proper corrosion protection and sealing is an important part of repair. When reviewing these repair procedures, it is important to recognize the need for corrosion restoration to provide long term strength of the repaired member. A two part epoxy primer was applied to the metal surfaces during the latter part of the repair. For closed sections, such as front and rear rails, rocker panels and pillars, the primer is applied without applying the metal conditioner and the conversion coating. These steps are omitted to ensure that no rinse water is trapped in the closed sections. The primer application followed by an application of an oil or wax based rust proofing material. After the corrosion restoration process for the closed sections are completed, then the process can be applied to all exterior sections. For exterior surfaces, both metal conditioner and conversion coating treatments are applied to the exterior surface prior to application of the epoxy primer. The procedure in applying the corrosion restoration process is an important order to ensure that moisture, due to the water rinsing of the metal conditioner and conversion coating is not inadvertently trapped inside any closed section before the epoxy primer and rust proofing materials have been applied. Appropriate seam sealers are then applied to all joints. Follow manufacturer's recommendations for the appropriate type of seam sealer to be used at each seam or joint.

Side Body Panels

The side body panel for this vehicle is designed and stamped from a single piece of sheet metal from the factory as shown in the figure. While the entire side panel **is not available in New Zealand**, the partial panels shown are available.

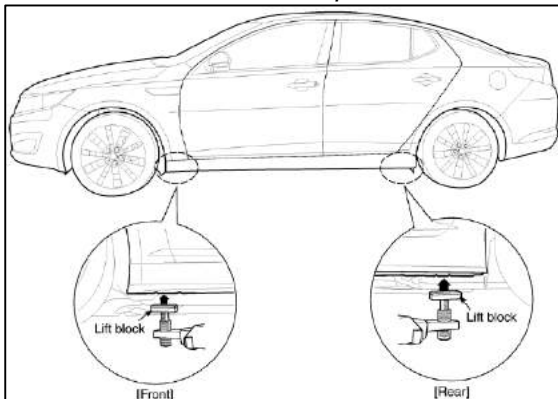
The illustration below shows the panels available for the Optima (TF)



Vehicle Lift and Safety Stand Positions

Kia repair manuals have illustrations that show the correct support points for raising all of their models.

This illustration shows the Optima.





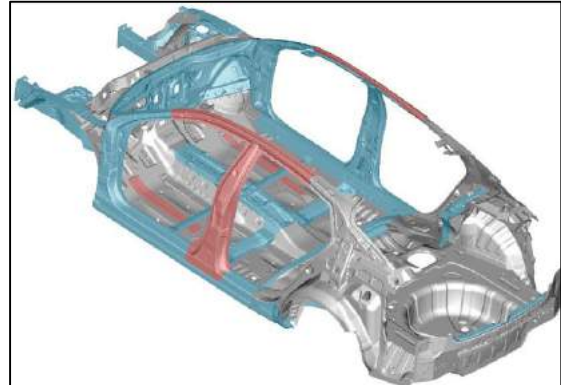
Body Construction

Body Assembly

Kia now provides detailed information on the different steels used for manufacturing almost all the different models of the current fleet.

The following example shows the different steels used for the Optima.

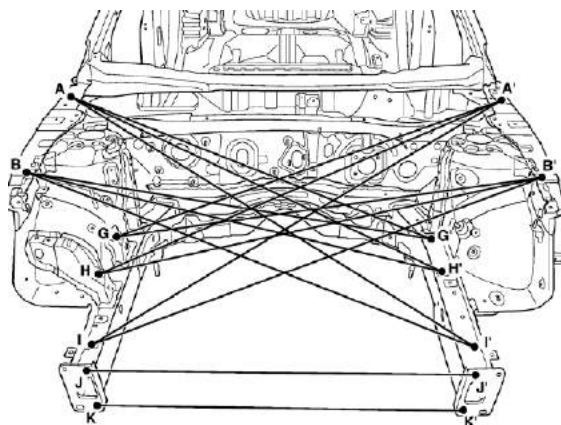
-  Mild steel
-  High strength steel
-  Ultra High strength steel



Body Dimensions

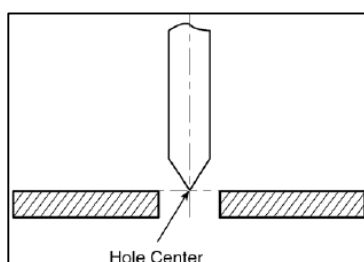
Actual-Measurement Dimensions

These dimensions indicate the actual linear distance between measurement points, and are the reference dimensions for use if a tracking gauge is used for measurement.



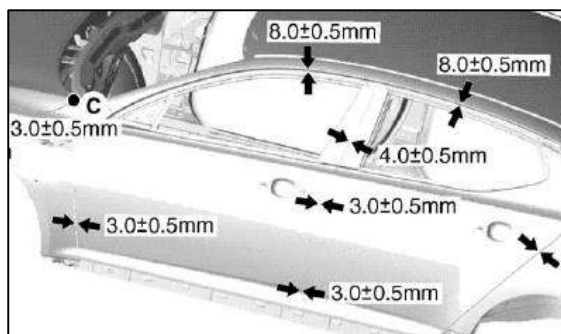
Measurement Point

Measurements should be taken at the hole centre.



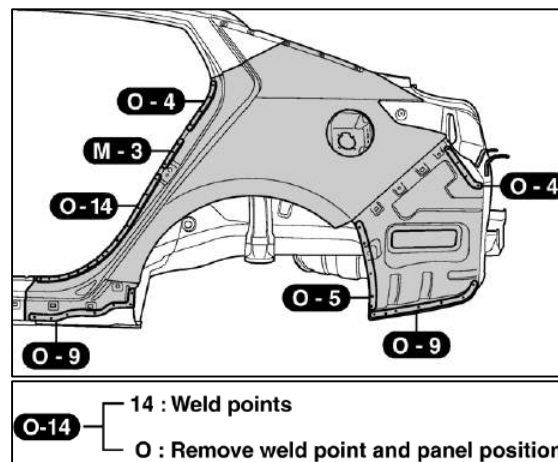
Body Panel Gaps

Kia provides the panel gaps for fitting panels, note that these are not all the same.



Body Panel Repair Procedure

Codes for Removing and Installing Body Panels



Symbols

Symbols	Used for	Figure
●	Spot weld	
O	Outside	
M	Middle	
I	Inside	
—	Cut	
⋯	Mig plug weld	

Symbol	Used for	Figure
	MIG butt weld	
	MIG lap weld	
	Sealer	
	Adhesive	

Installing a New Body Panel

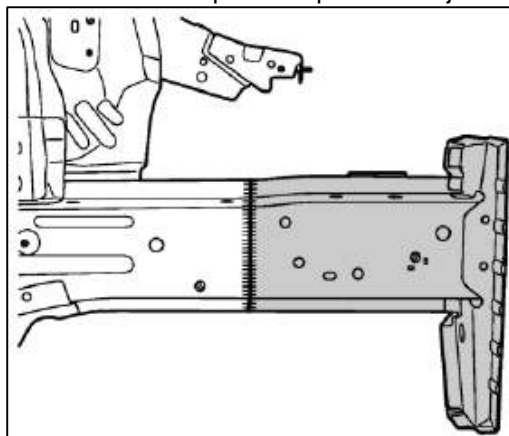
The efficiency of the transmission and load distribution are determined by many complicated factors such as thickness of plate, shape and size of a cross section, damage of parts, variance of joints, welding method, and/or welding locations. Therefore, a new part should be fitted to the body frame using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

Panel joints

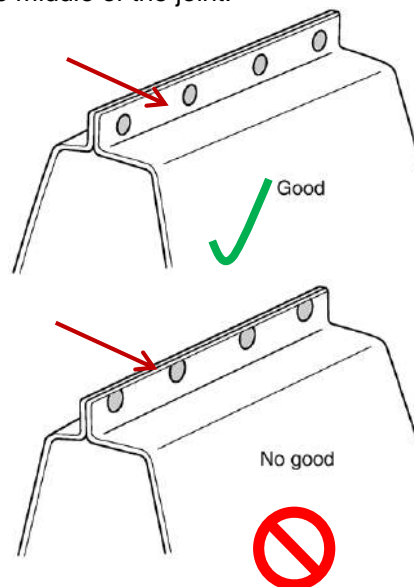
Partial replacement panel joints are shown as Open Butt Welds in the BRM, the illustration shows a front rail partial replacement joint.



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 weld by 30% (1.3 times the original number of welds).

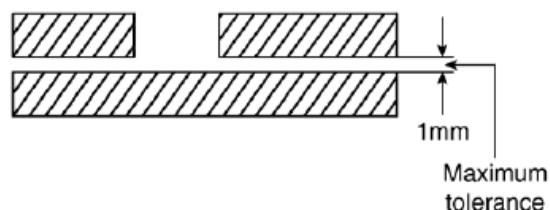
Caution; when spot welding, to achieve maximum strength the welds should be done in the middle of the joint.



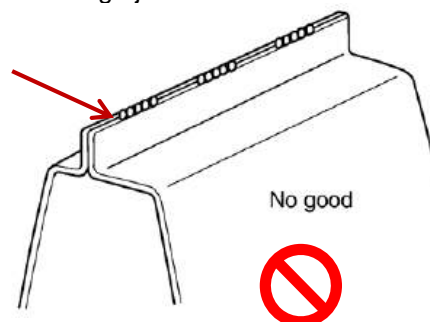
Carbon Arc (MIG steel) Welding

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 1mm of space between parts. A tolerance greater than 1mm will reduce the strength of the welded area.



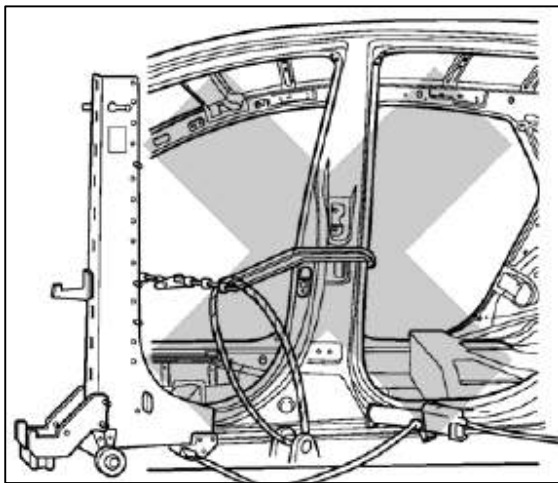
2. Weld in the middle of the flange joint.
 - a. Drill a hole 5~6mm on one side of the flange only, and weld within the hole.
 - b. Do not weld on the edge of the flange joint.



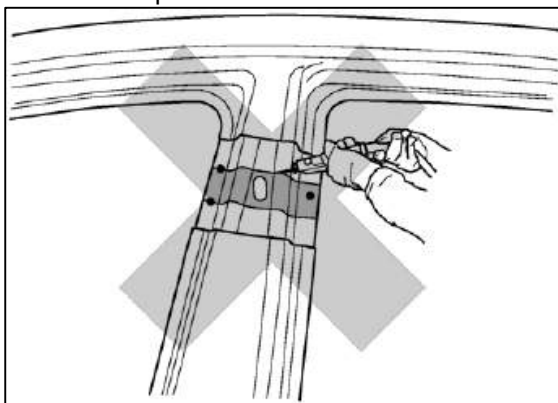
Replacing Body Panels

Removal:

1. Measuring the Body is essential before removing the damaged area according to the dimensions supplied in Body Dimension, section BD. If deformation is present, use a frame straightener to adjust. When removing a panel, apply clamps to prevent damage of each part, and support the lower end of the frame to prevent deformation during the procedure.
2. **Caution;** during ultra high strength panel repair
 - a. A damaged ultra strength panel **should not be repaired** by pulling it. Replace the whole panel with new one.



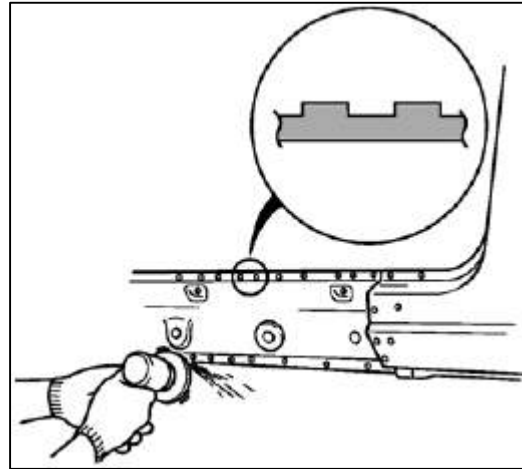
- b. A damaged ultra strength panel **should not** be partially replaced at random. Replace the whole panel with new one.



- c. When a damaged ultra strength panel is replaced with new one, spot-welding should be used, if possible. If shown in the repair method apply the epoxy adhesive and then carry out spot-welding.

Preparation for Installation

Spot weld finish. Use a disk grinder or similar tool but **do not grind more than is necessary** to smooth the surface.



Drilling a hole for plug welding

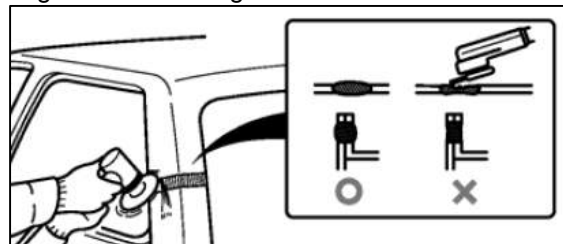
If the thickness of the part to be welded is less than 3mm, drill a 5~6mm diameter hole. If the thickness of the part to be welded is greater than 3mm, drill a hole using a 7mm diameter drill.

Caution;

Do not spot weld where the panel stack is thicker than 3mm

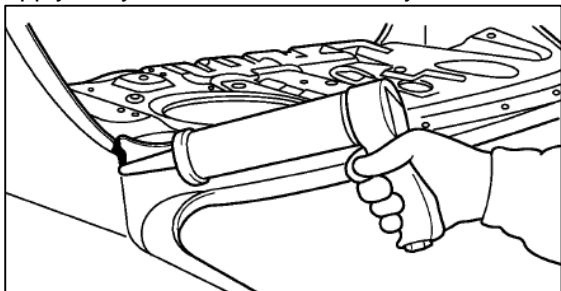
Finishing after welding

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.



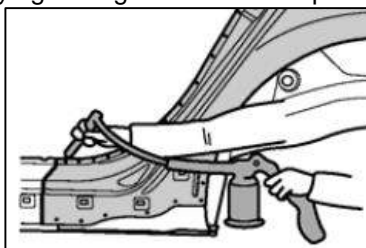
Applying anti-rust agent and body sealer

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



Anti-rust treatment

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



Module 2

Model Specific options

This module looks at the different models of the current Kia fleet and shows the partial replacement options available for each model.

Note; the introduction and general information covering the Kia recommendations for welding and panel replacement methods shown in Module 1 of this manual should be used when replacing any body panels not shown in Module 2. Full panels being replaced should only be fitted at OEM joints and not sectioned.

The following partial replacement information is taken from the Kia BRMs and was current at the time of developing this programme. The information included in this manual is a condensed overview of the options available and although in some cases this will be sufficient to carry out a full repair for outer panels the full repair method should be obtained for more involved panel replacement such as reinforcements.

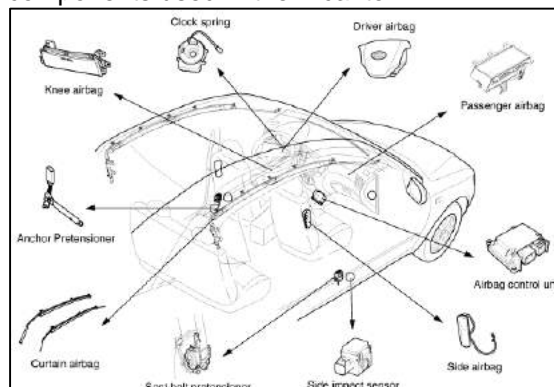
Kia Picanto (TA) ★★★★★



SRS Air-Bag

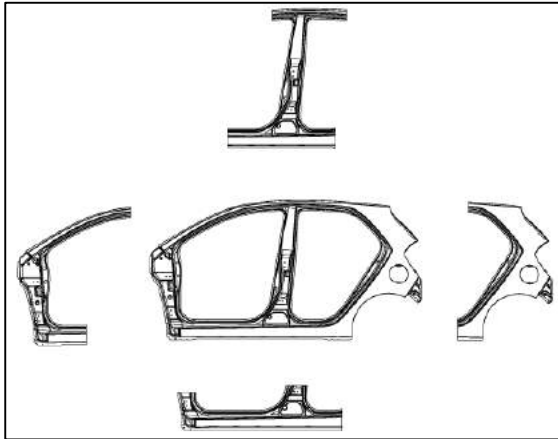
Refer to the SRS Air-Bag cautions information in general information Module 1.

The illustration below shows the Air-Bag components used in the Picanto.



Side panels available

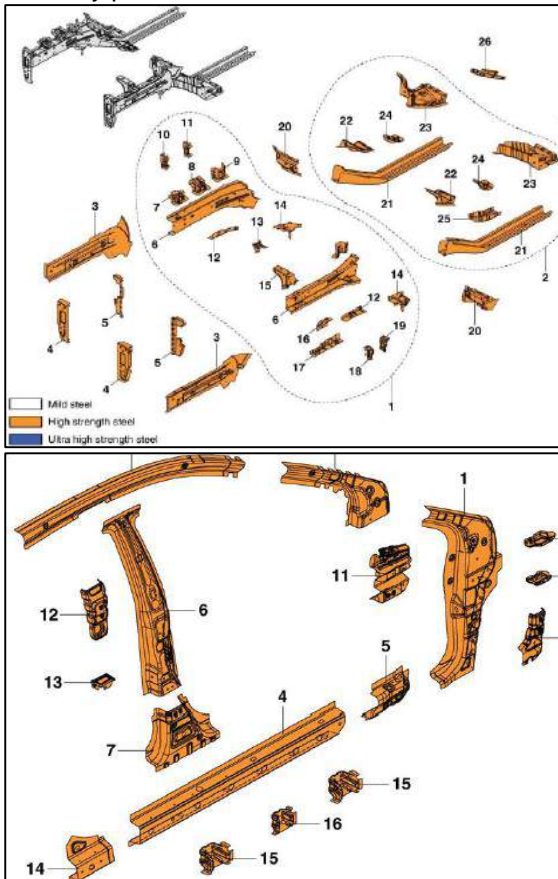
The illustration below shows the partial side panel sections available for the Picanto.



Steels used for the Picanto body

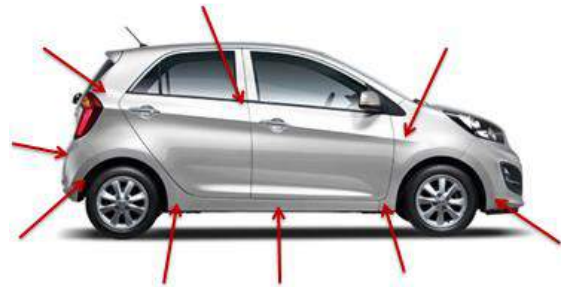
The Body Repair Manual (BRM) has a very detailed breakdown of the different grades of steel used for the Picanto body and although it shows Ultra High Strength Steel (UHSS) in the key it does not show any panels made from UHSS.

The following 2 illustrations show a large amount of High Strength Steel (HSS) used for the body panels.



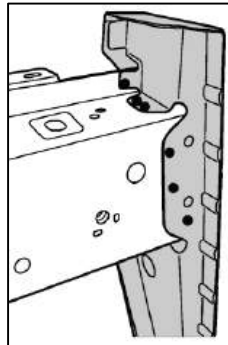
Partial replacement options

The Picanto has a good number of options

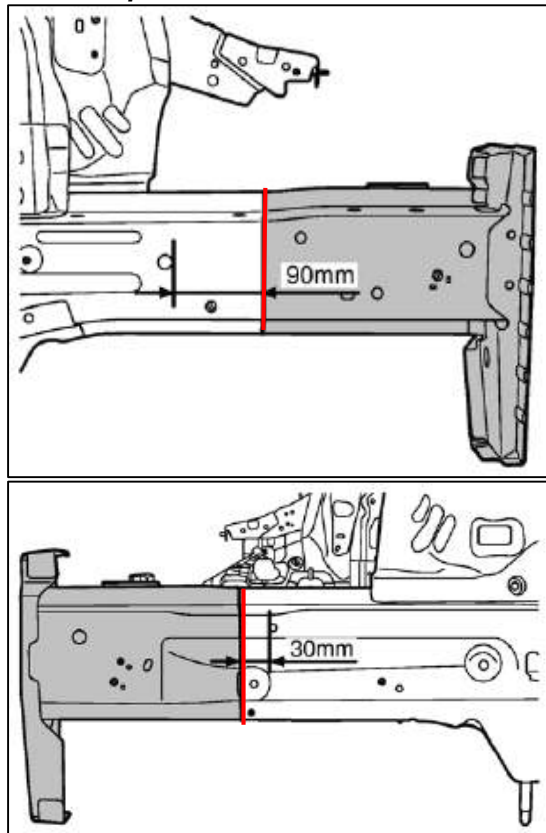


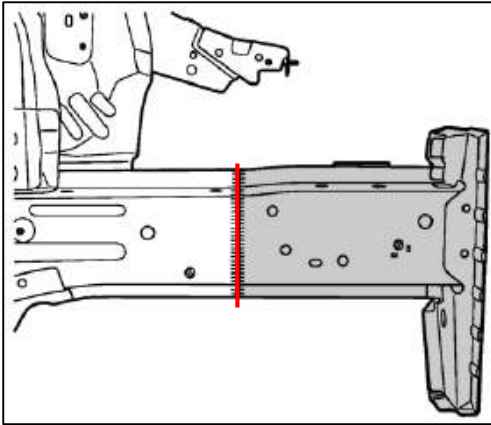
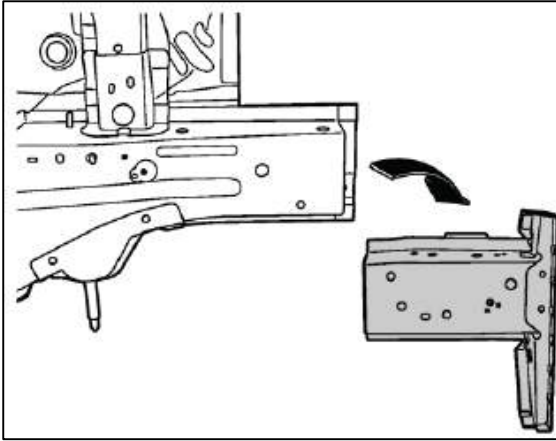
Front rail option

Carrier mounting bracket



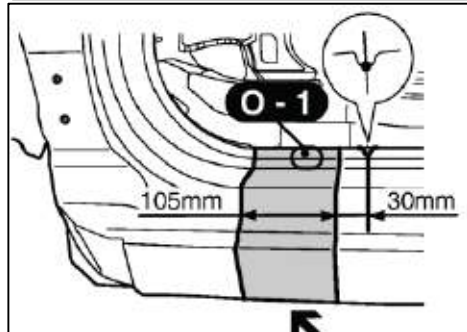
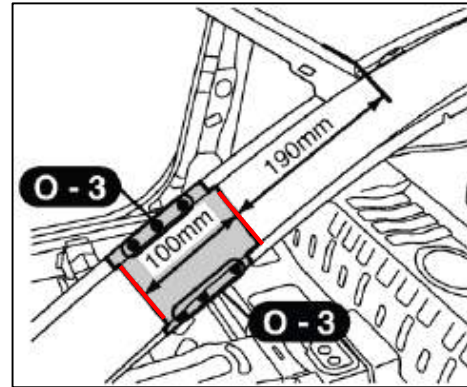
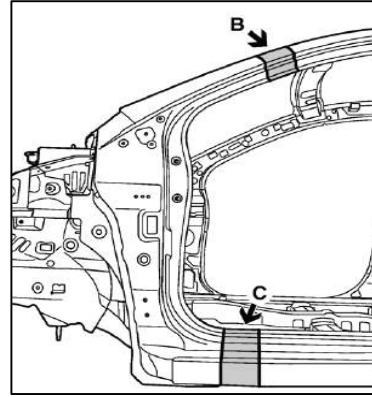
Front rail partial





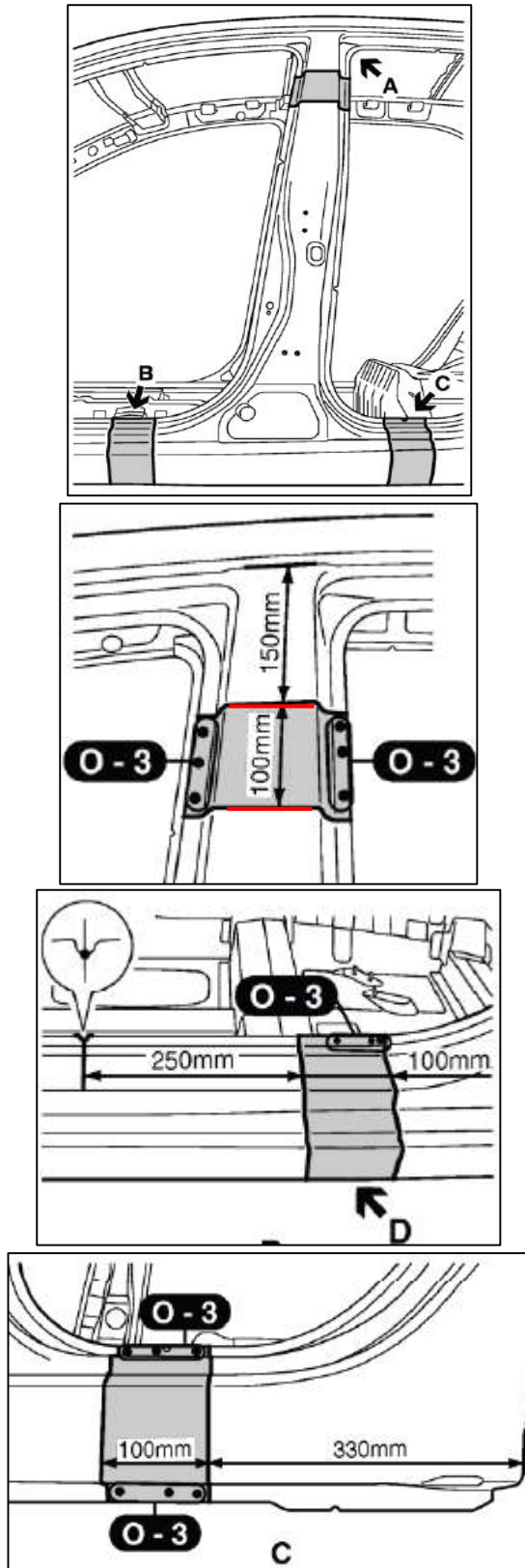
A Pillar option

The A Pillar outer and inner reinforcement can be replaced, the cut out sections (windows) shown in the illustration are for gaining access if replacing the reinforcement.



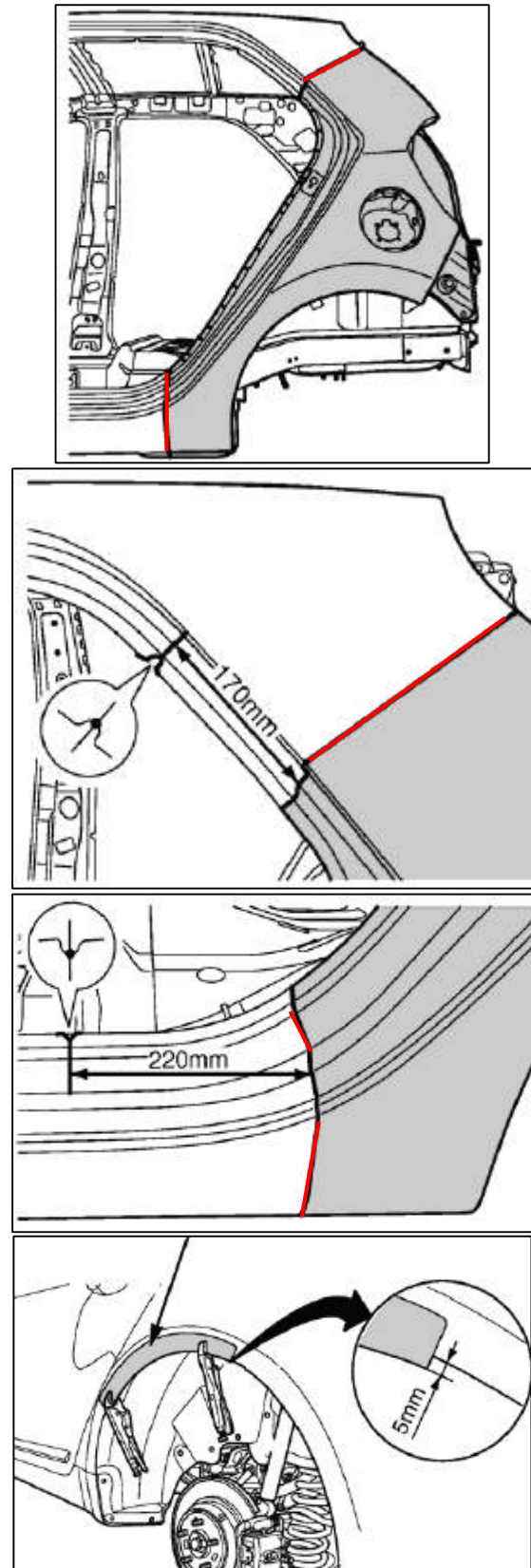
B Pillar option

The B Pillar has the option for joining through the upper section of the Pillar without needing to cut a window in the upper cant rail, get the full method if replacing the reinforcement.



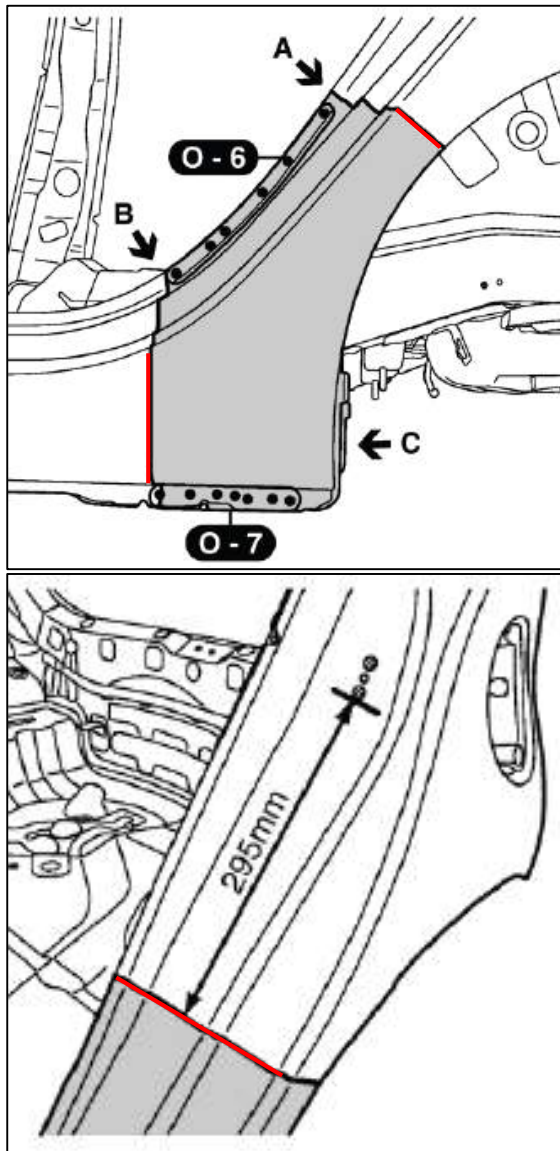
Rear quarter panel

Rear quarter panel is a straight forward cut and weld method with open butt welded joints. Has a hemmed non welded edge around the wheel arch.



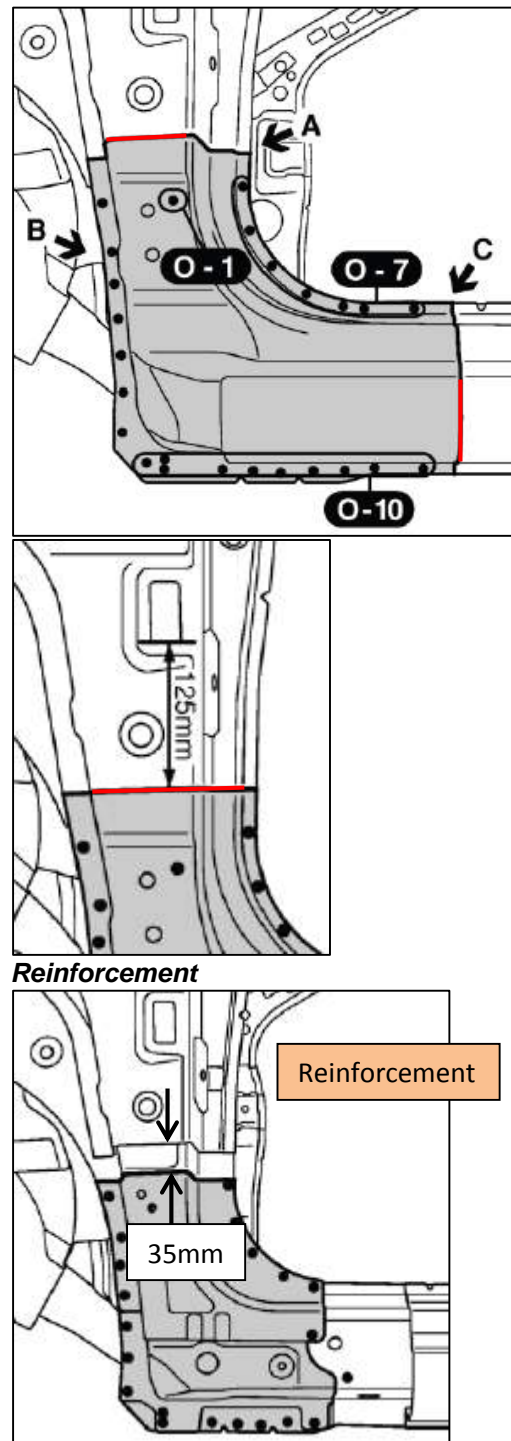
Rear Dog-leg

Handy option. The lower cut measurement is the same as the rear quarter panel.



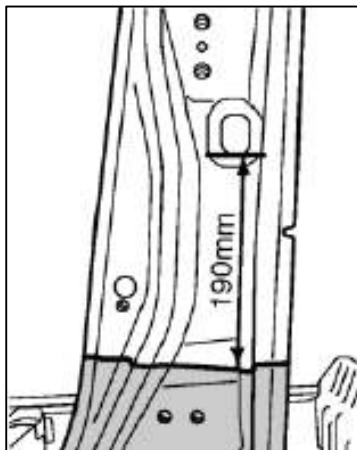
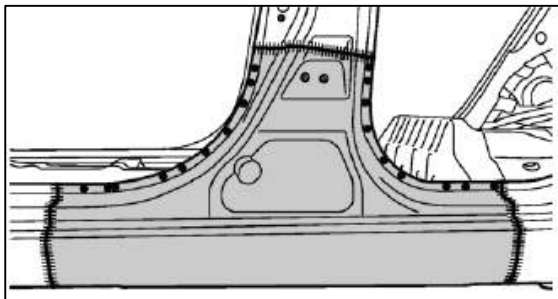
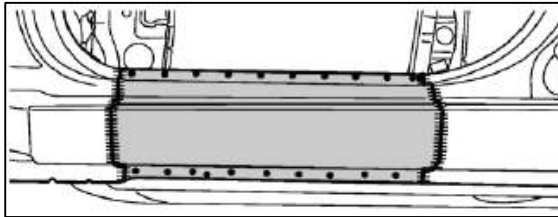
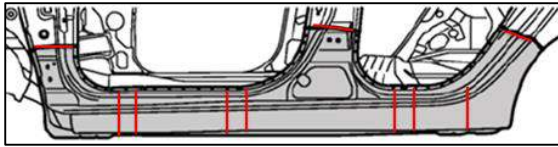
Lower A Pillar

Handy option also, plus has a method for partial replacement of the reinforcement. Check full A Pillar for lower cut measurement.



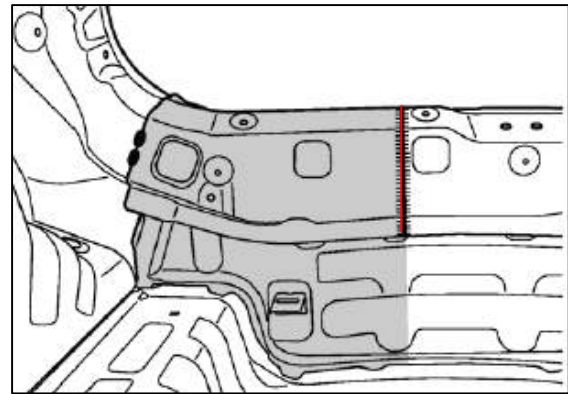
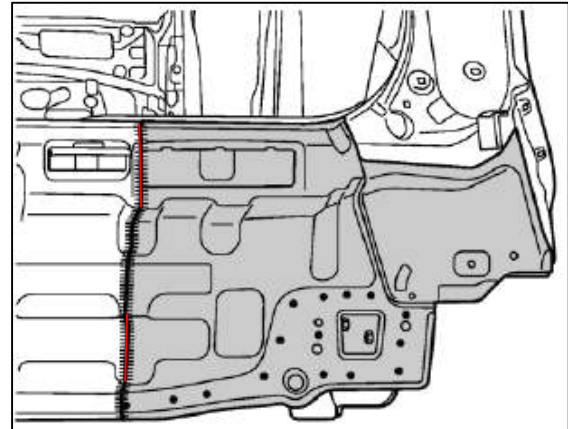
Sill panel options

The sill panel has many cut options. Check the cut option that will best fit your repair. The reinforcement can also be sectioned so get full details for this method.



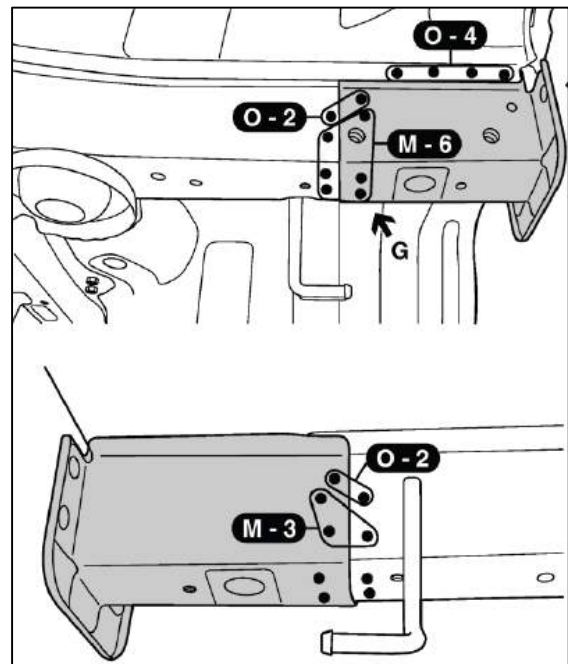
Rear panel cut option

No measurement given, the illustrations show the outer and inner panel option.



Rear Rail

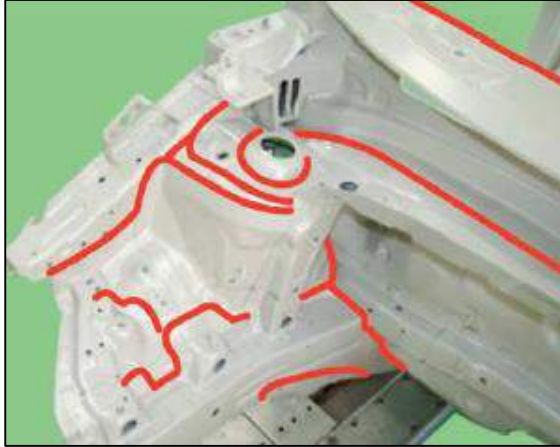
The rear rail appears to have an OEM joint that can be used for fitting the rail end.



Body sealing and corrosion protection

The BRM has full details on the joints to be sealed and the location of access holes for applying cavity wax.

Product names are not given so duplicate with equivalent aftermarket product.



NVH Foam and Torque Settings

NVH foam and the torque settings are not shown in the Picanto BRM manual.

Overview

The Picanto has some good repair options for a small vehicle, but perhaps this will change with a new model as the steels used for this model allow for a great range of repair.

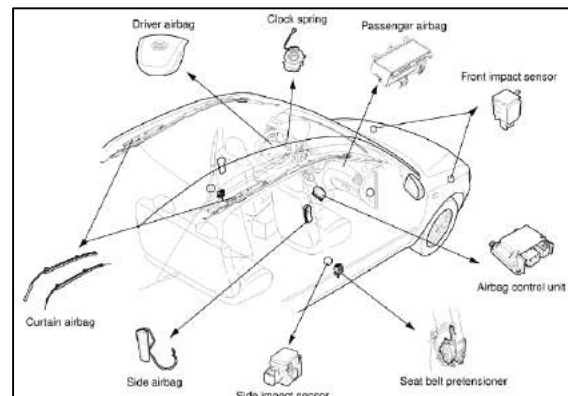
Kia Rio (UB) ★★★★★



SRS Air-Bag

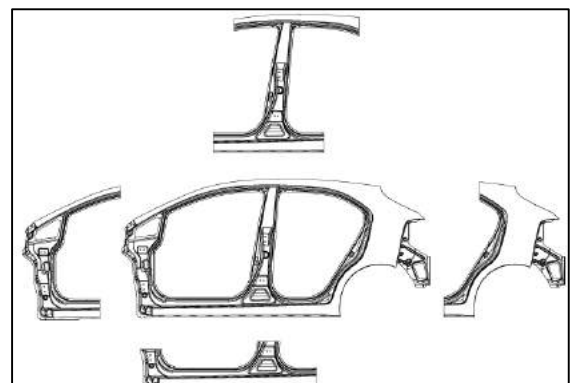
Refer to the SRS Air-Bag cautions information in general information Module 1.

The illustration below shows the Air-Bag components used in the Rio.



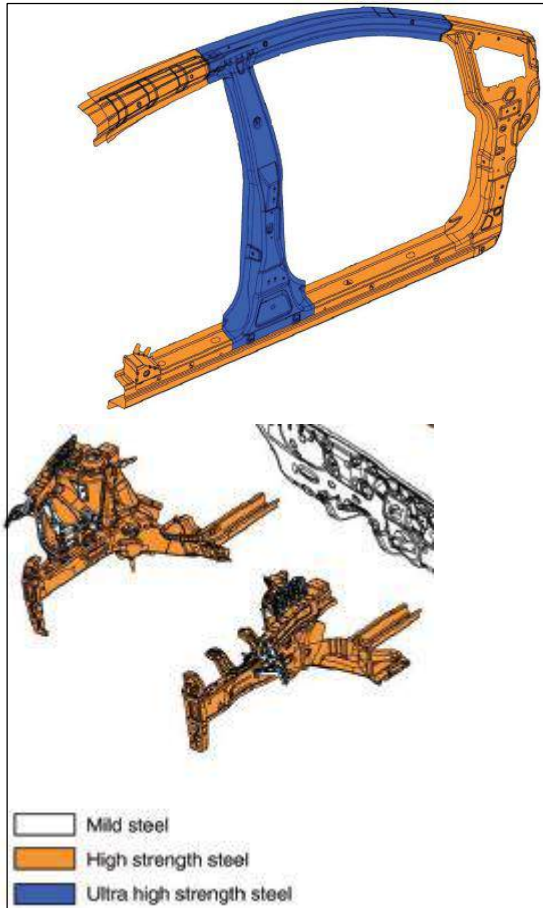
Side panels available

The illustration below shows the partial side panel sections available for the Rio.

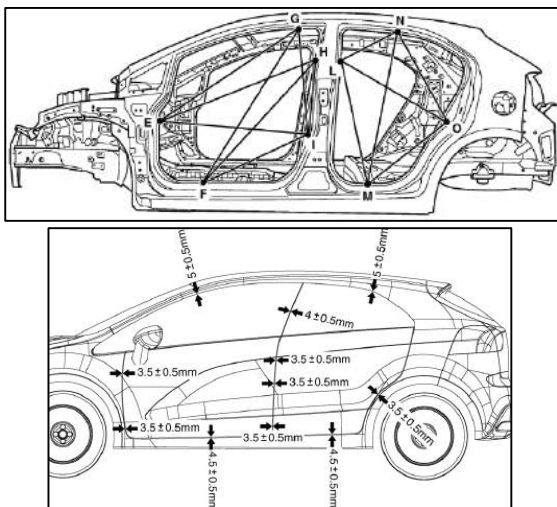


Steels used for the Rio body

HSS is used for the doors boot lid, bonnet, guards and most all other structural panels. UHSS is shown for the B Pillar and cant rail reinforcement with mild steel used for side aperture panel.

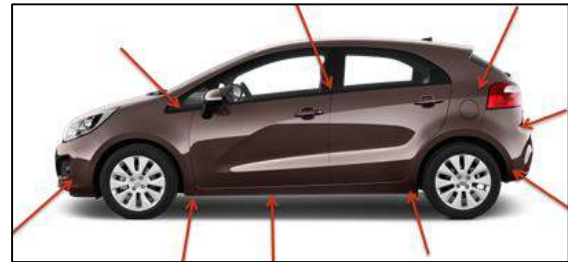


Panel gap and body measurements are given



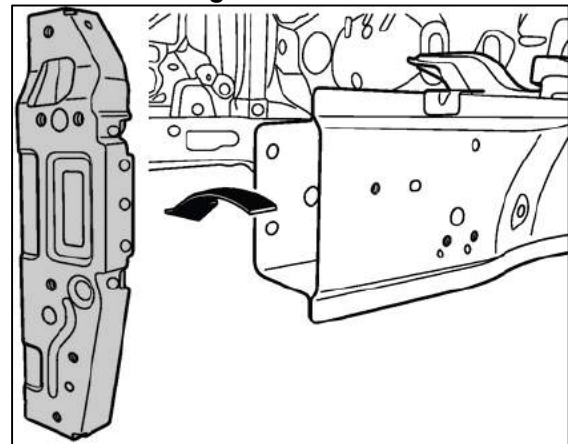
Partial replacement options

The Rio has a good number of options.

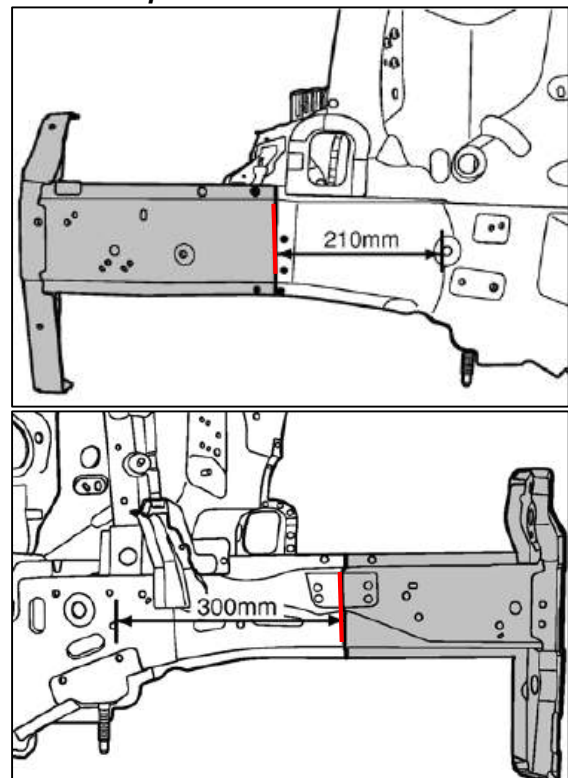


Front rail option

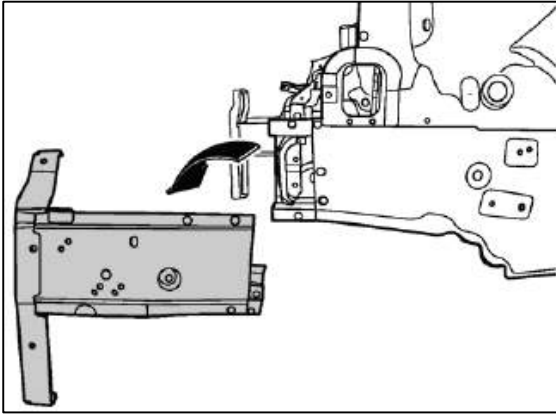
Carrier mounting bracket



Front rail option

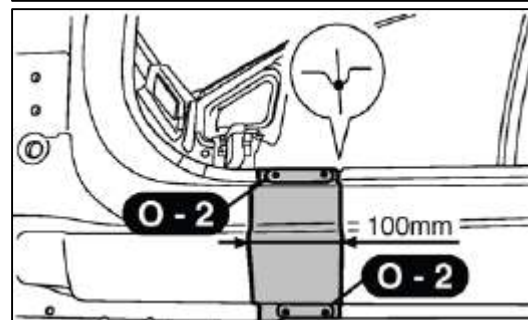
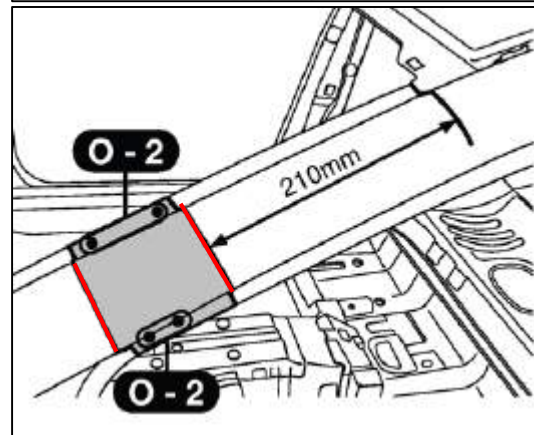
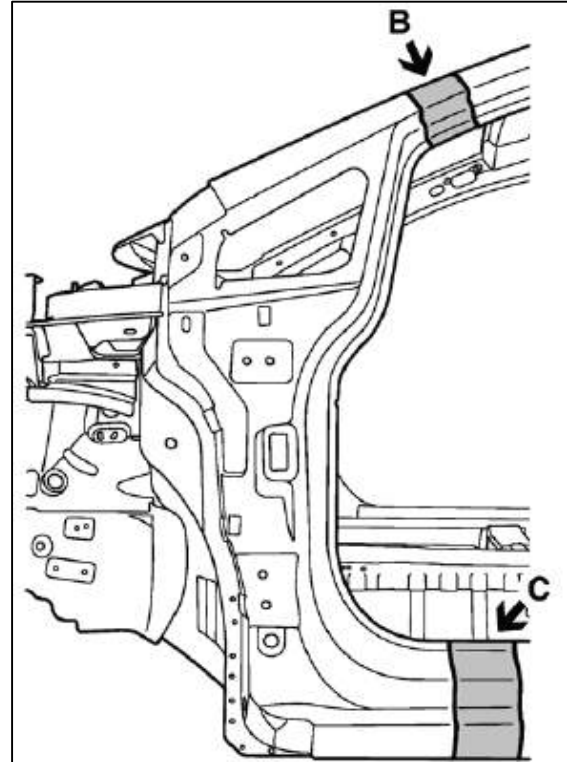


Front rail continued



A Pillar option

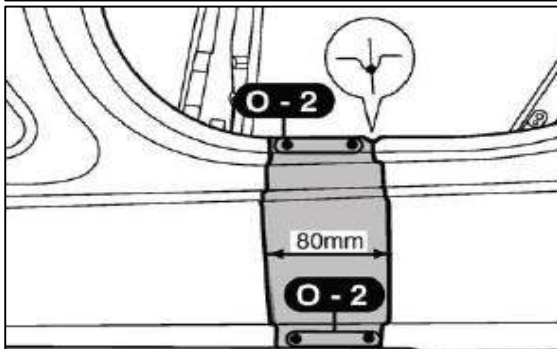
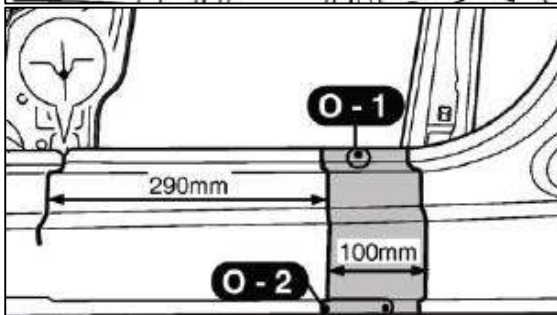
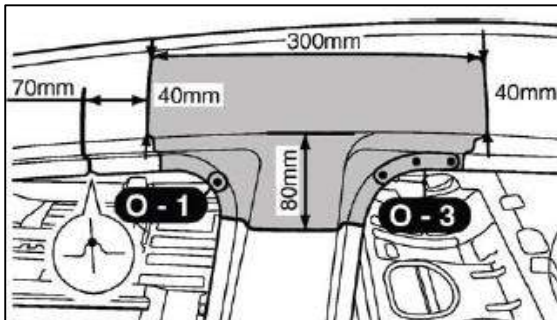
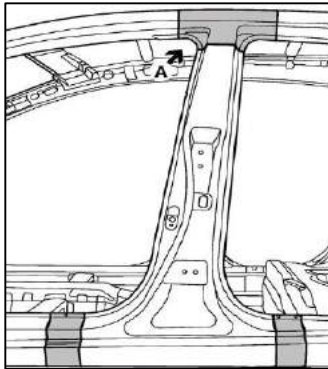
The A Pillar outer and inner reinforcement can be replaced, the cut out sections (windows) shown in the illustration are for gaining access if replacing the reinforcement, you will require the full procedure when replacing the reinforcement.



B Pillar option

The B Pillar outer requires a window cut in the upper cant rail panel if fitting the reinforcement. The reinforcement is made from UHSS so must be fitted at OEM joints and not sectioned, take care not to cut the reinforcement if removing the outer panel. Get the full method if replacing the reinforcement.

CAUTION Always apply the spotweldable sealer between the centre pillar outer panel and centre pillar outer reinforcement, and also between the centre pillar outer reinforcement and centre pillar inner panel during installation.

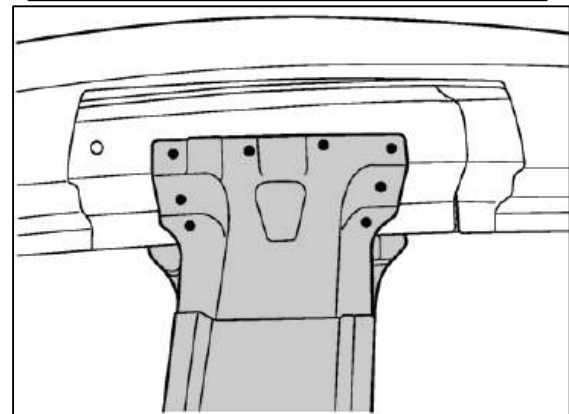
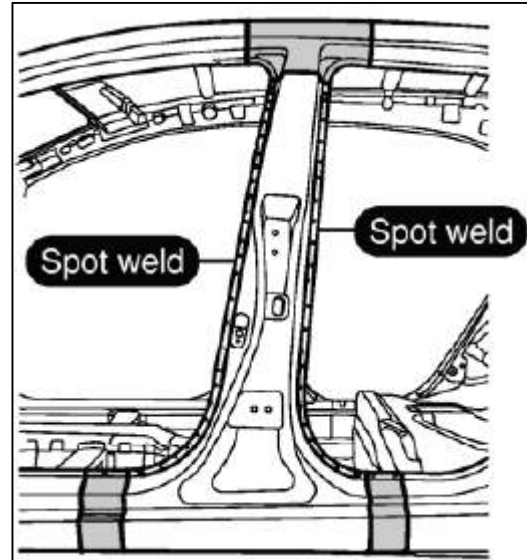


Reinforcement



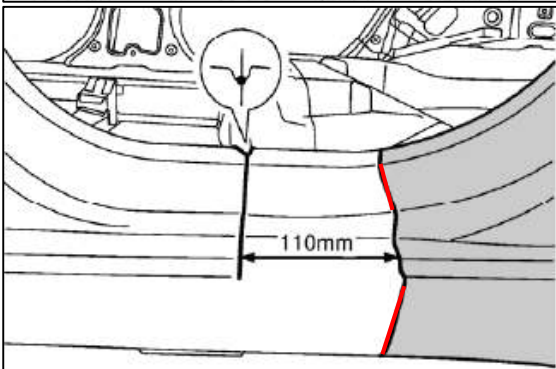
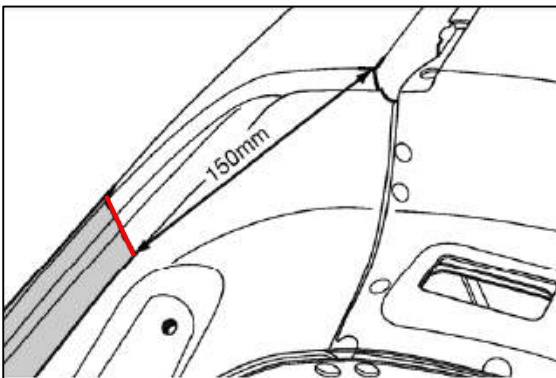
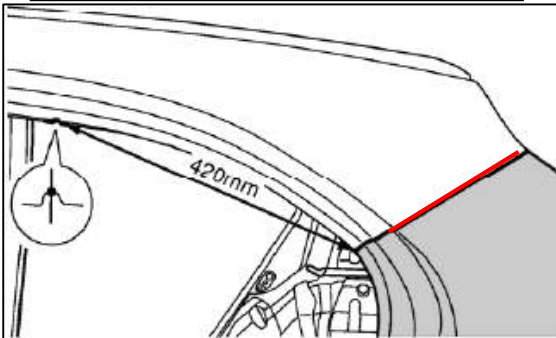
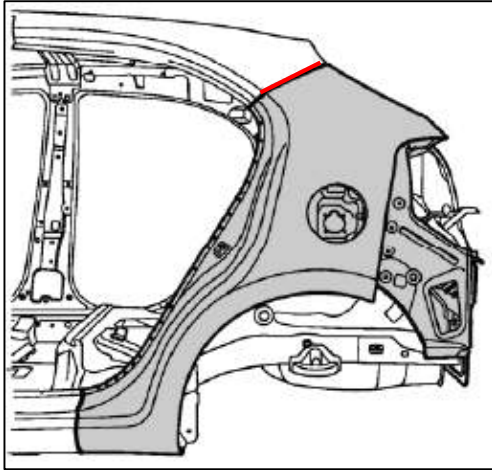
CAUTION

Always apply the spotweldable sealer between the centre pillar outer panel and centre pillar outer reinforcement, and also between the centre pillar outer reinforcement and centre pillar inner panel.

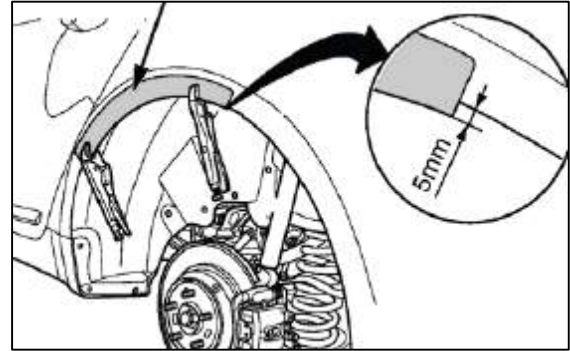


Rear quarter panel

Rear quarter panel is a straight forward cut and weld method with open butt welded joints. Has a hemmed non welded edge around the wheel arch.

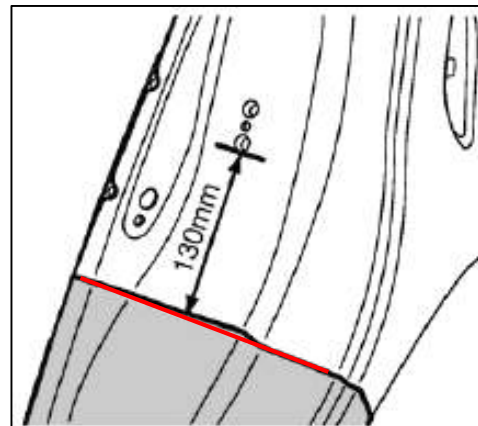
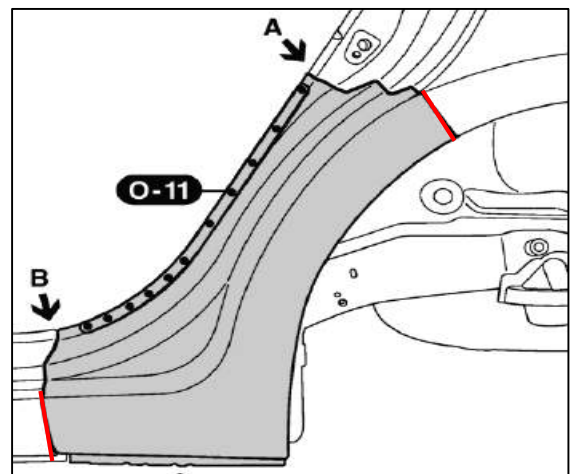


Hemmed wheel-arch



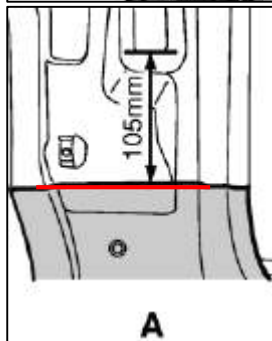
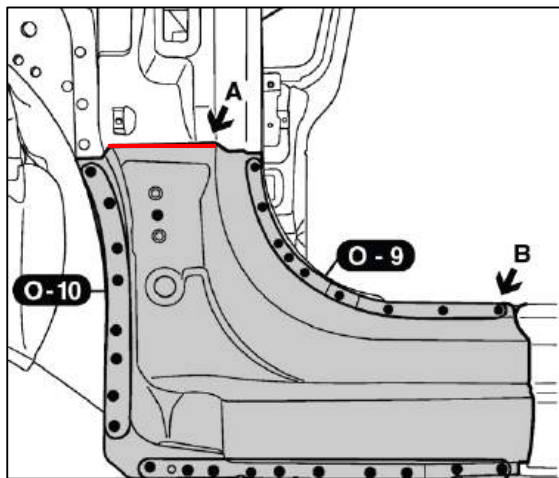
Rear Dog-leg

Handy option. The lower cut measurement is the same as the rear quarter panel.

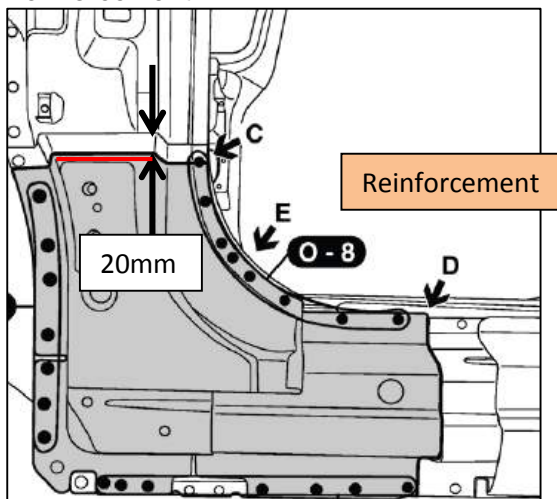


Lower A Pillar

Handy option. Also has method for partial replacement of the reinforcement. Check full A Pillar for lower cut measurement.

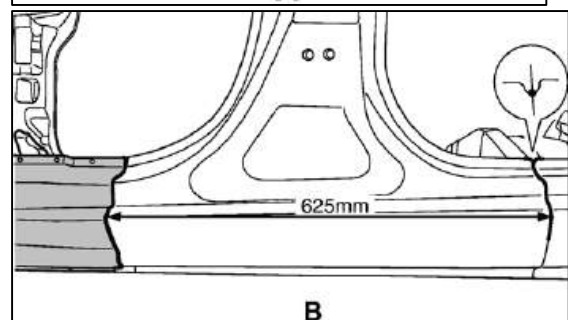
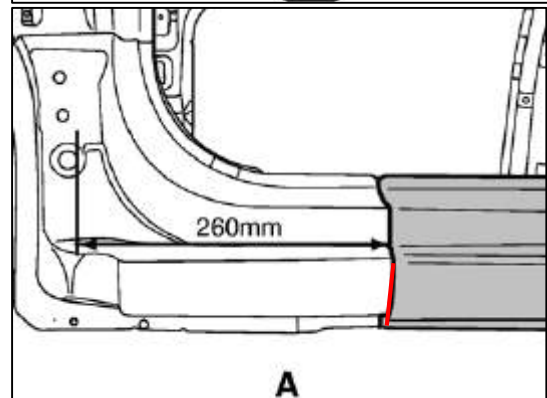
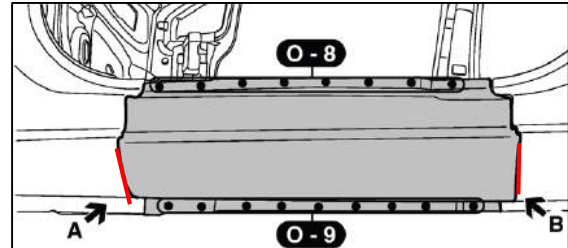


Reinforcement

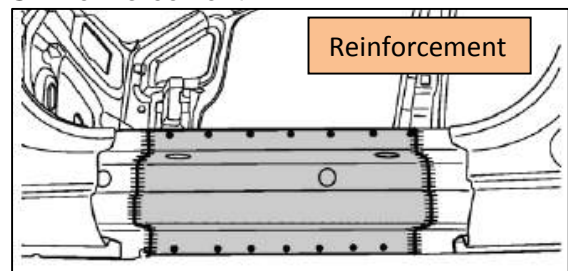


Sill panel options

The Rio has limited options for the sill panel, only the section in the front door opening is available. It also has a partial replacement option for the reinforcement (shown in the bottom illustration).

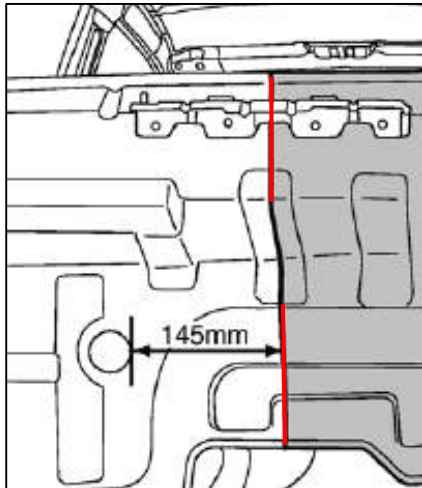
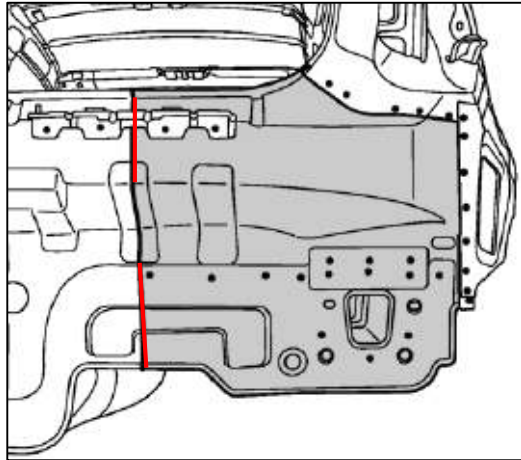


Sill Reinforcement

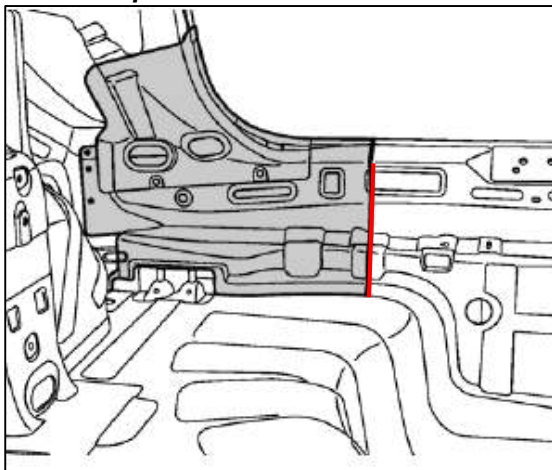


Rear panel cut option

The illustrations show the outer and inner panel option.

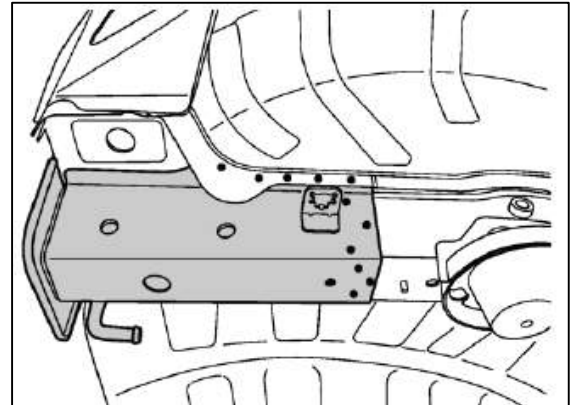


Inner rear panel



Rear rail

The rear rail appears to have an OEM joint that can be used for fitting the rail end.



NVH Foam and Torque Settings

NVH foam and the torque settings are not shown in the Rio BRM manual.

Sealing and Corrosion protection

The Rio has a very detailed section on sealing and corrosion protective wax installation.

Overview

The Rio has some good repair option.

Kia Soul (PS) 2015



SRS Air-Bag

The supplemental restraint system (SRS) is designed to supplement the seat belt to help reduce the risk or severity of injury to the driver and passenger by activating and deploying the driver, passenger, side airbag and belt pretensioner in certain frontal or side collisions.

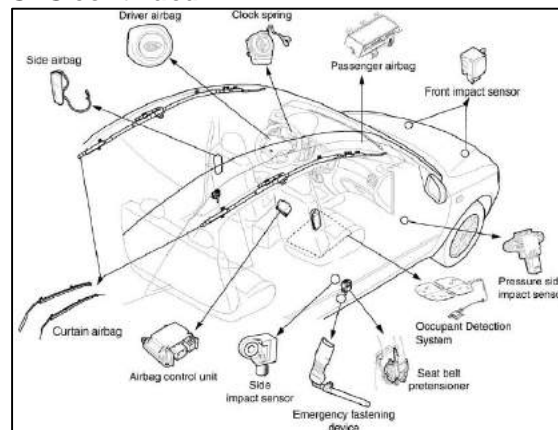
The SRS (Airbag) consists of; a driver side airbag module located in the centre of the steering wheel, which contains the folded cushion and an inflator unit; a passenger side airbag module located in the passenger side crash pad contains the folded cushion assembled with inflator unit; side airbag modules located in the front seat contain the folded cushion and an inflator unit; curtain airbag modules located inside of the headliner which contains folded cushions and inflator units.

WARNING/CAUTION labels are attached to the periphery of the air-bag components. Refer to the Shop Manual.

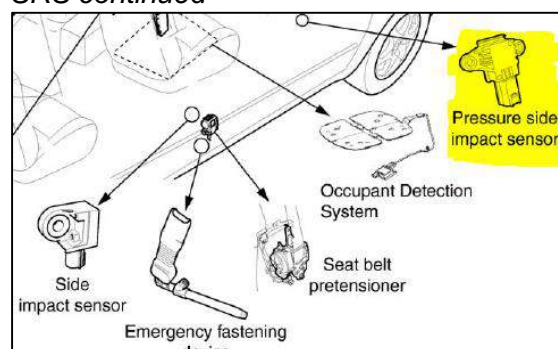
The illustration shows the different parts of the SRS system; **note** the pressure sensors in the front door cavity.



SRS continued

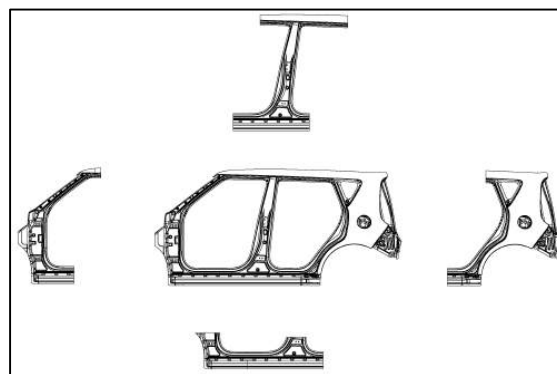


SRS continued



Side panels available

The illustration below shows the partial side panel sections available for the Soul.



Tightening Torques

Torque settings are given for the Soul mechanical. Below is an example for the Front Suspension taken from the BRM.

Tightening torque (kgf.m)

Nm kgf.m lb-ft

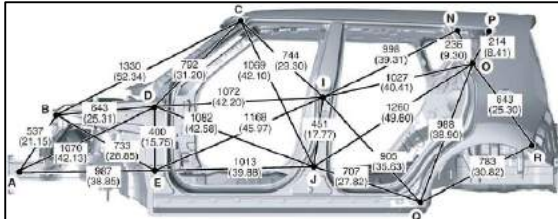
Wheel Hub nuts 88.3 ~ 107.9 9.0 ~ 11.0 65.1 ~ 79.6

Wheel speed sensor mounting bolt 6.8 ~ 10.7 0.7 ~ 1.1 5.0 ~ 7.9

Wheel speed sensor wiring bracket bolt 8.8 ~ 13.7 0.9 ~ 1.4 6.5 ~ 10.1

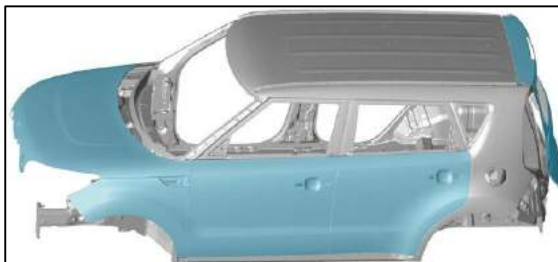
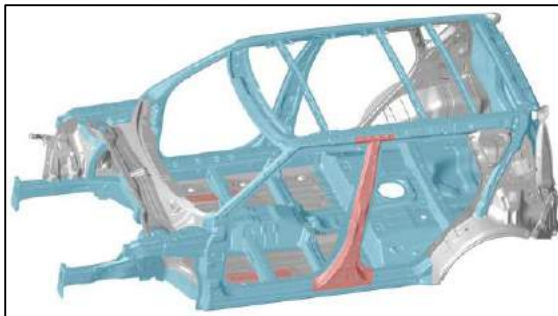
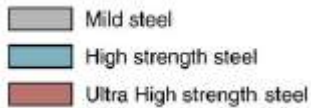
Strut assembly upper mounting nut 44.1 ~
 58.8 4.5 ~ 6.0 32.5 ~ 43.3
 Strut assembly lower mounting bolt 137.3 ~
 156.9 14.0 ~ 16.0 101.3 ~ 115.7

Panel gap and body measurements are given in the BRM



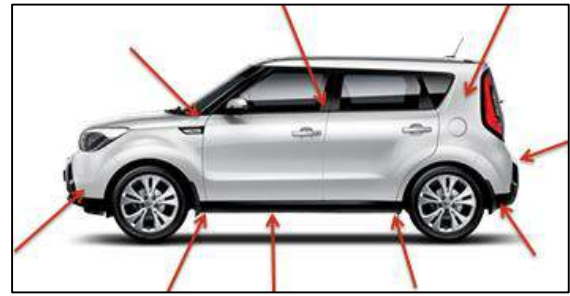
Steels used for the Soul body

HSS is used for the doors, boot lid, bonnet, guards and most all other structural panels. UHSS is shown for the B Pillar reinforcement and under floor rail with mild steel used for side aperture panel.



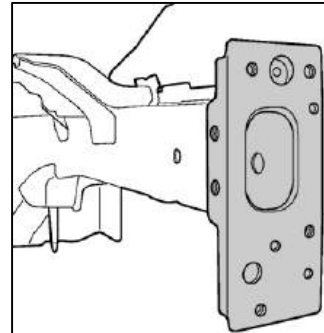
Partial replacement options

The Soul has a good number of options.

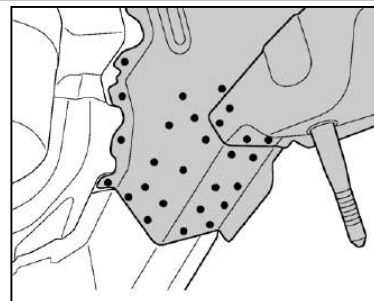
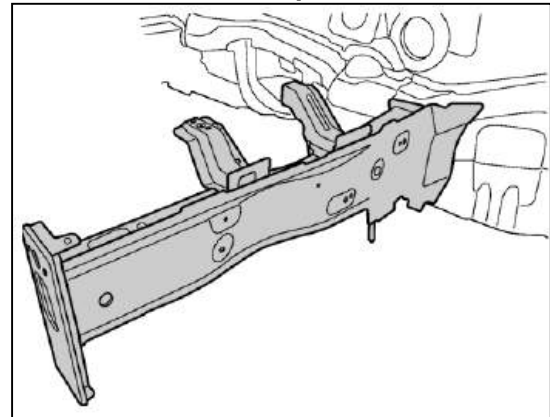


Front rail options

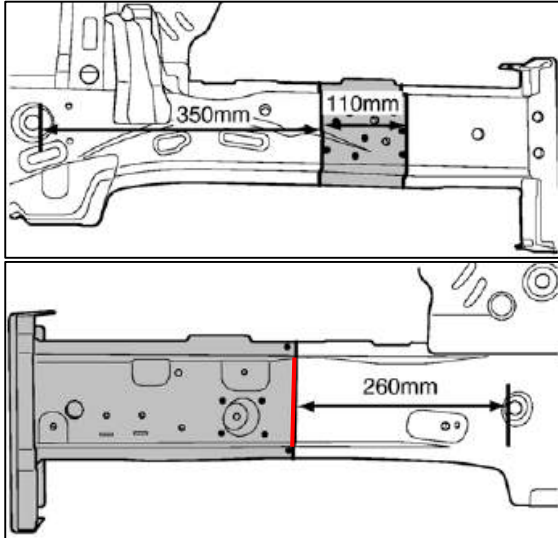
Carrier mounting bracket



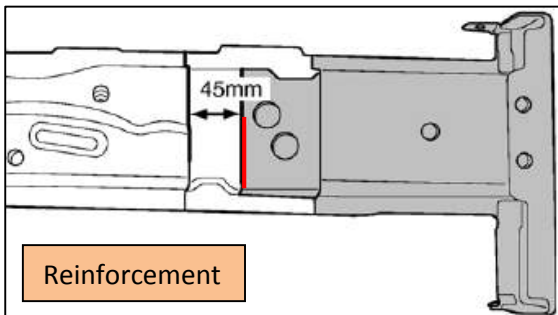
Front rail full section option



Front rail partial

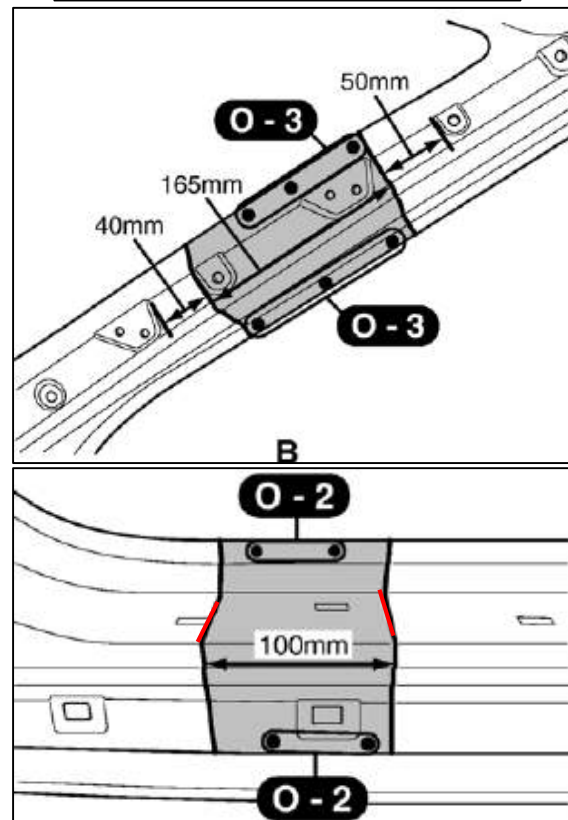
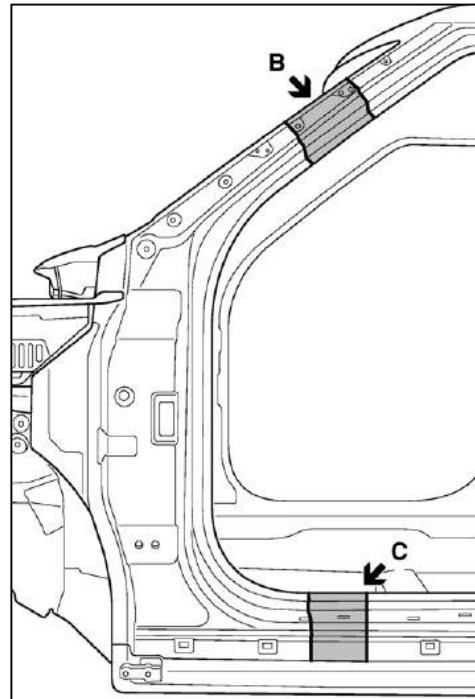


Reinforcement



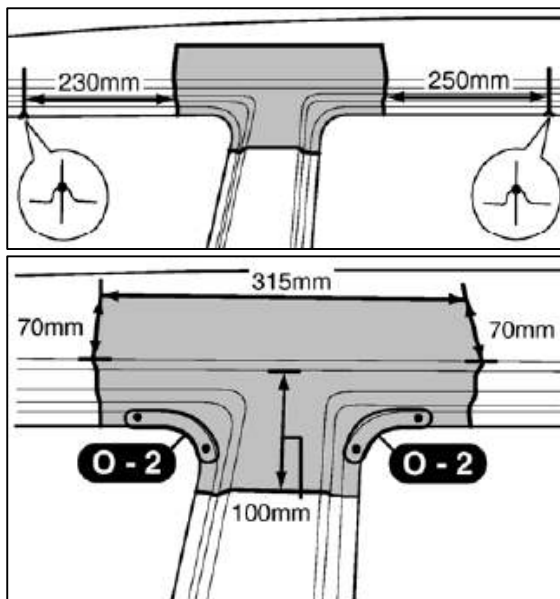
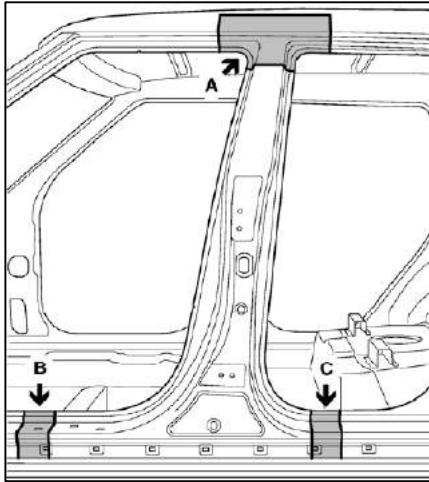
A Pillar option

The A Pillar outer and inner reinforcement can be replaced, the cut out sections (windows) shown in the illustration are for gaining access if replacing the reinforcement, you will require the full procedure when replacing the reinforcement.

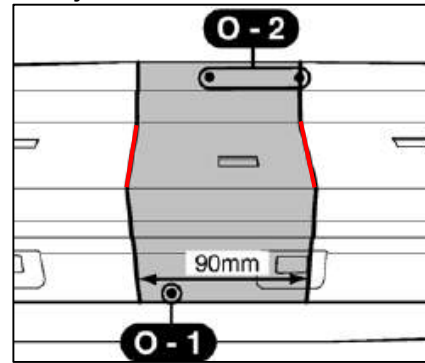


B Pillar option

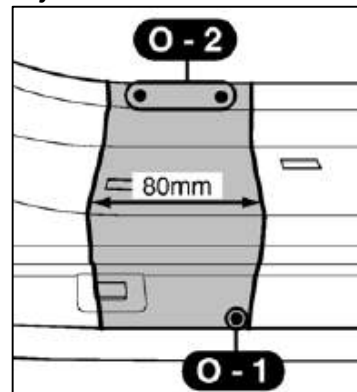
The B Pillar outer requires a window cut in the upper cant rail panel if fitting the reinforcement. The reinforcement is made from UHSS so must be fitted at OEM joints and not sectioned, take note to cut if removing the outer panel. Get the full method if replacing the reinforcement.



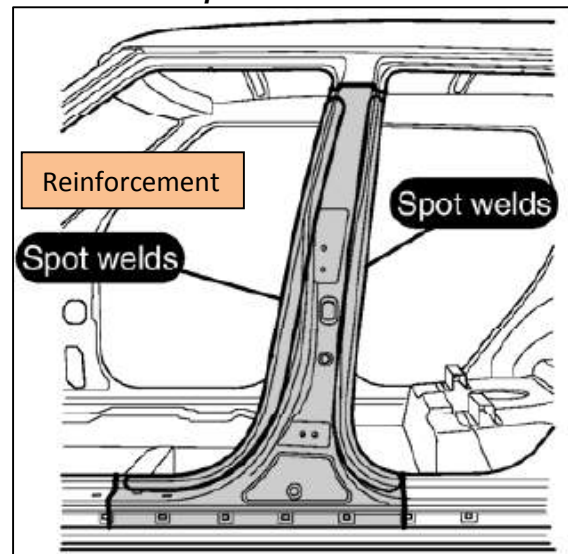
Lower sill joint B



Lower sill joint C

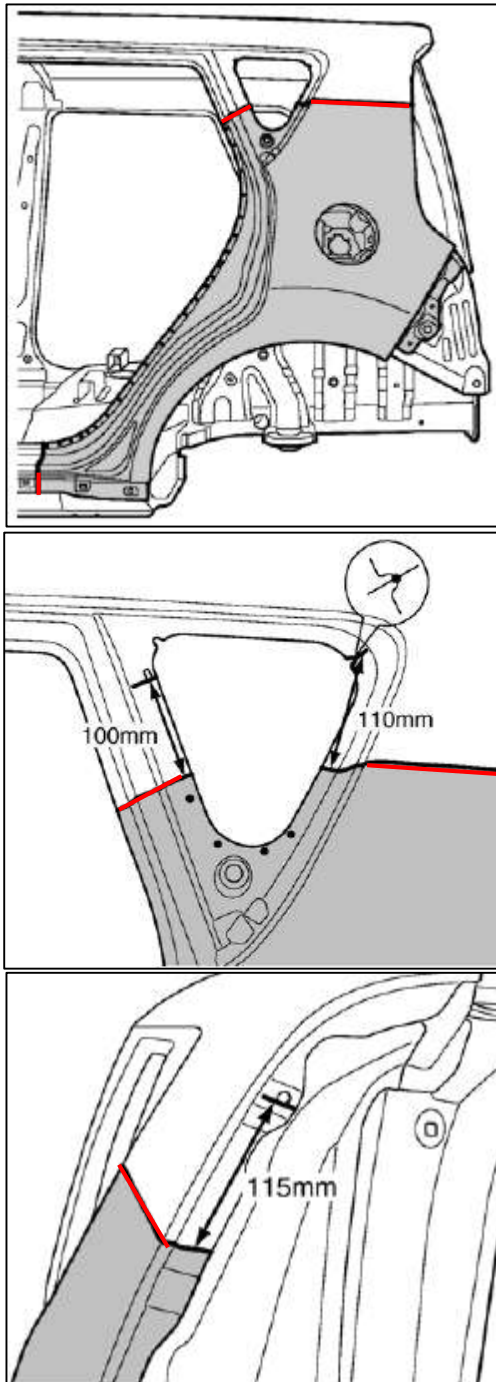


Reinforcement panel



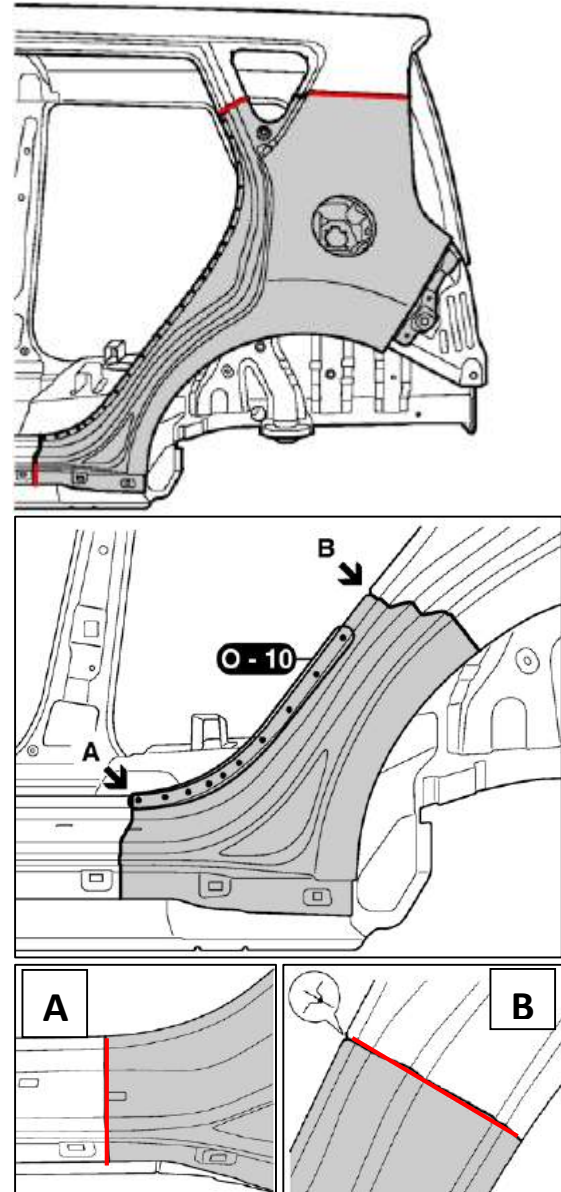
Rear quarter panel

Rear quarter panel is a straight forward cut and weld method with open butt welded joints. Has a hemmed non welded edge around the wheel arch.

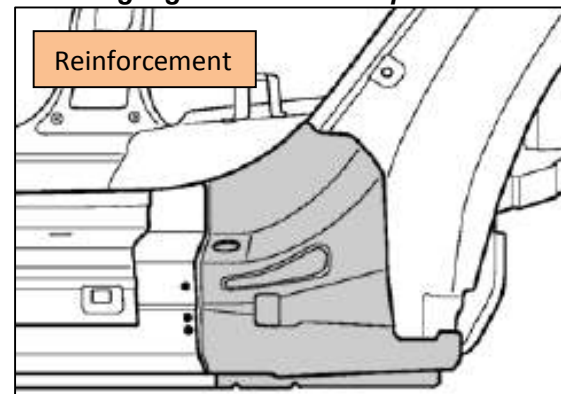


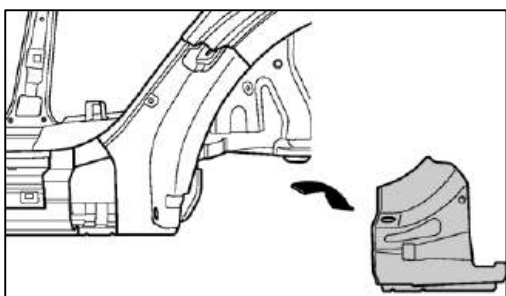
Rear Dog-leg

Handy option. The lower cut measurement **A** is the same as the rear quarter panel. **B** is cut from the V shown in the illustration (no measurement is given).



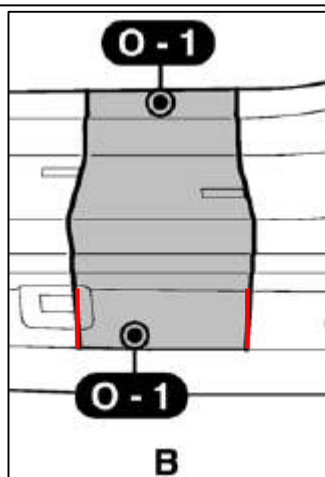
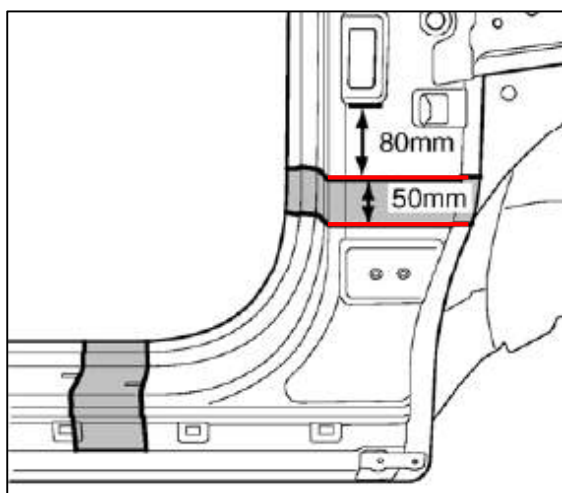
Inner dog-leg reinforcement option



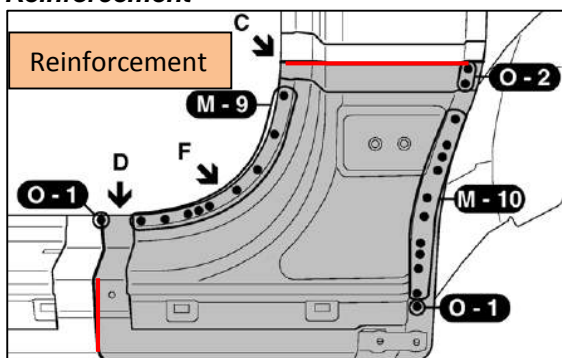


Lower A Pillar

Handy option, and also has method for partial replacement of the reinforcement. Check full A Pillar for lower cut measurement.

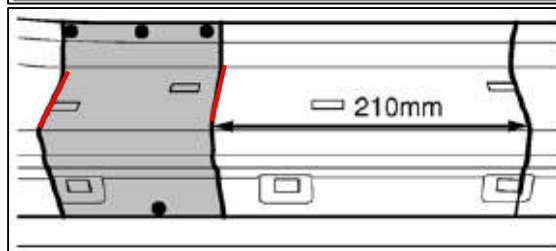
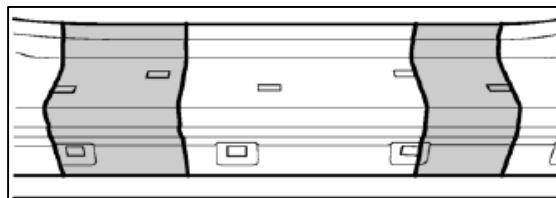


Reinforcement

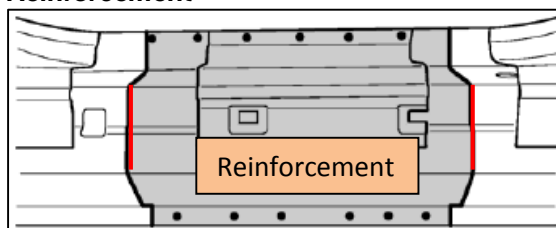


Sill panel options

The Soul has limited options for the sill panel, only the section in the front door opening is available. It also has a partial replacement option for the reinforcement (shown in the bottom illustration).

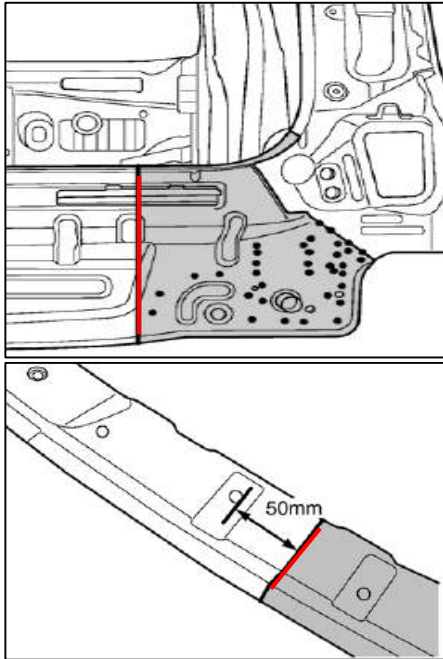


Reinforcement



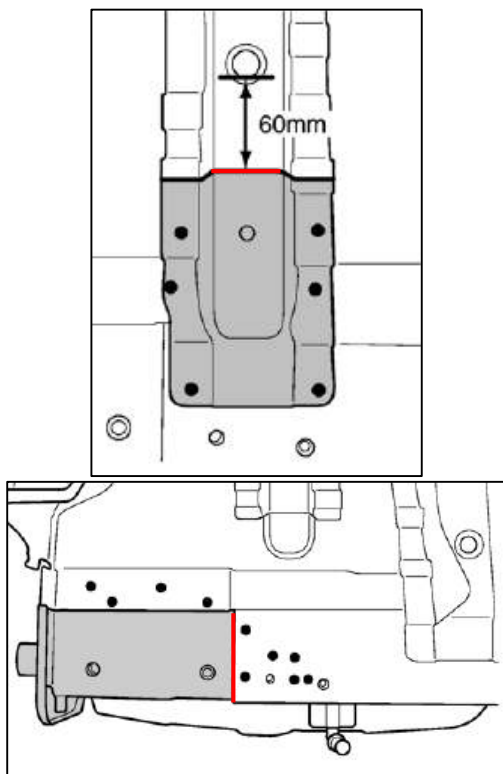
Rear panel cut option

The illustrations show a straight cut through the rear panel with only one measurement.



Rear rail

The rear rail appears to have an OEM joint that can be used for fitting the rail end.



Overview

The Rio has some good repair options.

Kia Cerato (YD) ★★★★★

4 and 5 door plus Koup 2014

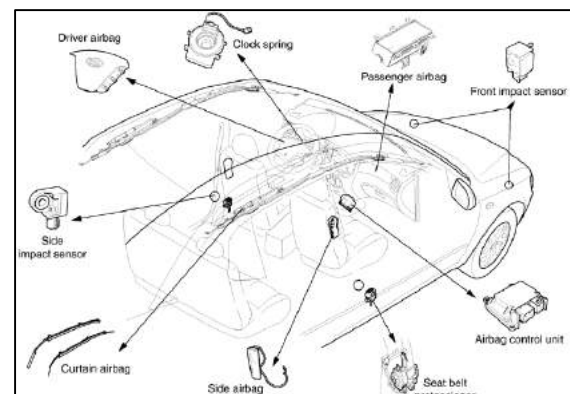
The Koup manual is 308 pages and contains all 3 models.



SRS Air-Bag

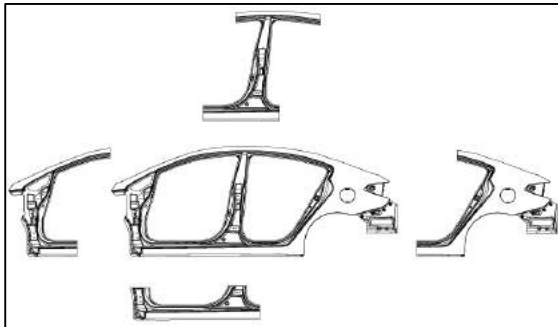
Refer to the SRS Air-Bag cautions information in general information Module 1.

The illustration below shows the Air-Bag components used in the Cerato.



Side panels available

The illustration below shows the partial side panel sections available for the Cerato.



Tightening Torque

Torque settings are shown in the BRM for all bolt on Items and are very detailed. The following examples are for the Bonnet and door hinge.

N.m Kgf.m lb-ft

Front and rear doors Door hinge to body 33.3 ~ 41.2 3.4 ~ 4.2 24.6 ~ 30.4

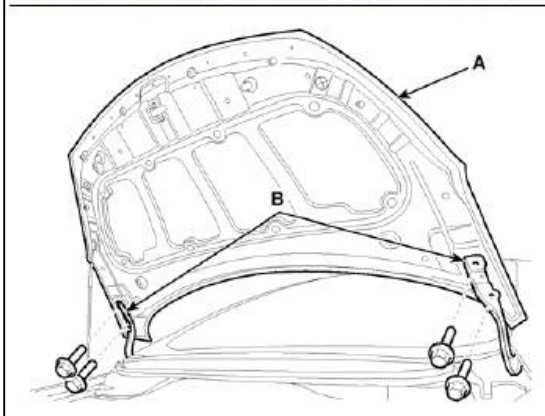
Door hinge to door 21.6 ~ 26.5 2.2 ~ 2.7 15.9 ~ 19.5

Door checker to door 3.9 ~ 5.9 0.4 ~ 0.6 2.9 ~ 4.3

Door checker to body 19.6 ~ 29.4 2.0 ~ 3.0 14.5 ~ 21.7

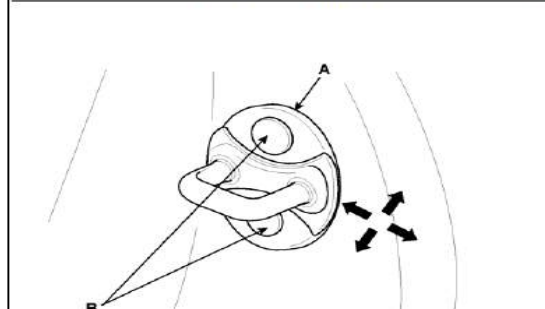
Tightening torque :

21.6~26.5 N.m (2.2~2.7 kgf.m, 15.9~19.5 lb-ft)



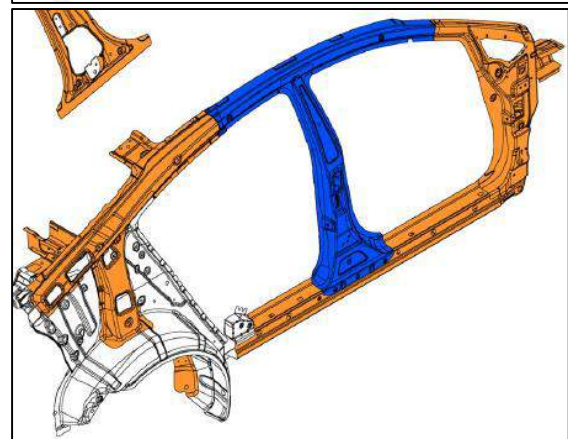
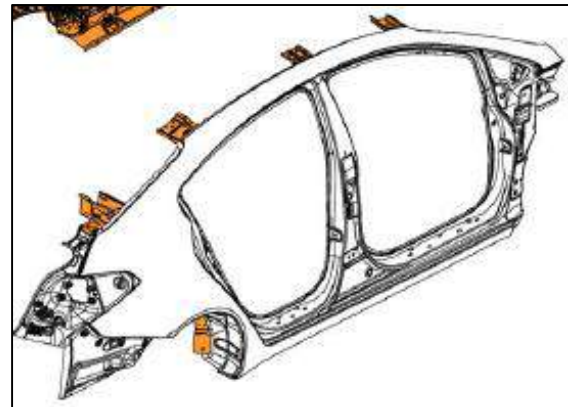
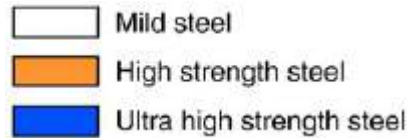
Tightening torque :

(B) : 16.7 ~ 21.6 N.m (1.7 ~ 2.2 kgf.m, 12.3 ~ 15.9 lb-ft)



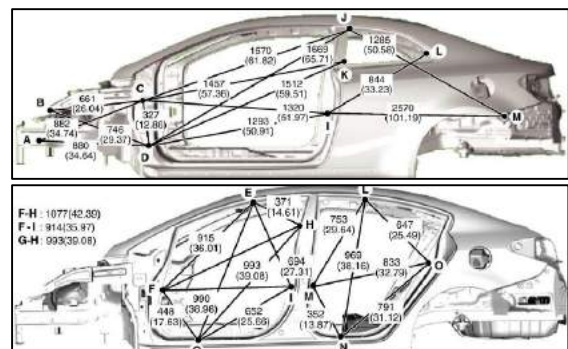
Steels used for the Soul body

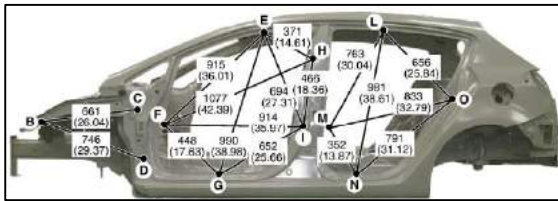
HSS is used for the doors, boot lid, bonnet, guards and most all other structural panels. UHSS is shown for the B Pillar reinforcement and under floor rail with mild steel used for side aperture panel.



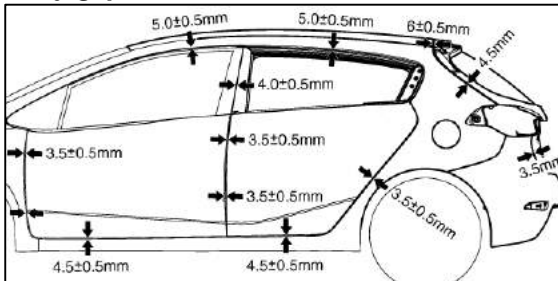
The (YD) BRM has all measurements for the 3 body structures

This also includes the body gaps.



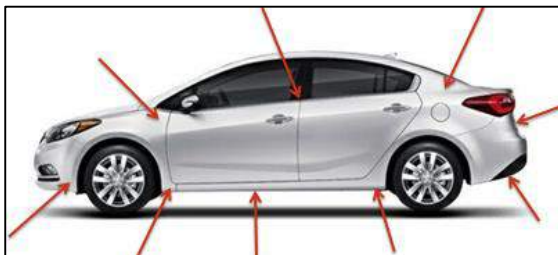


Body gap measurements



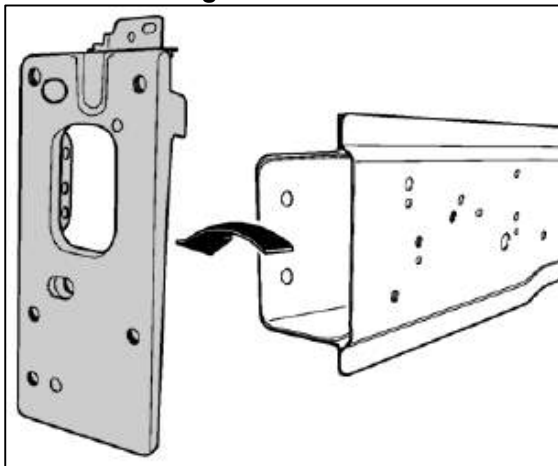
Partial replacement options

The Cerato has a good number of options.

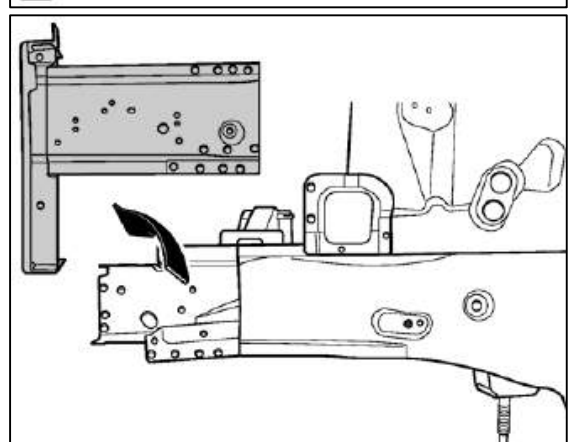
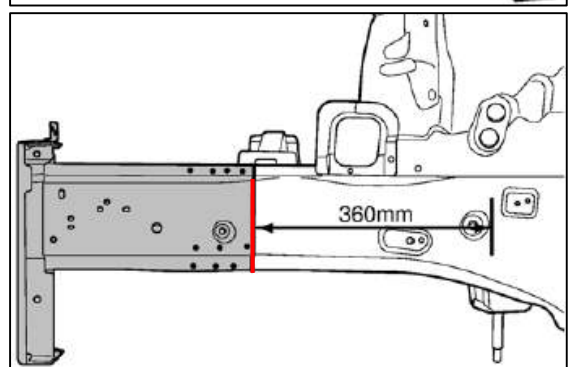
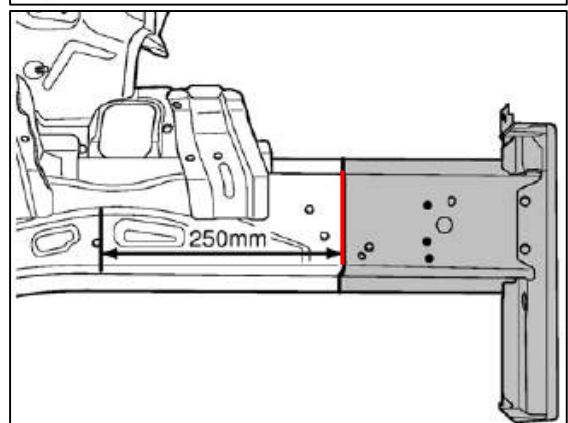
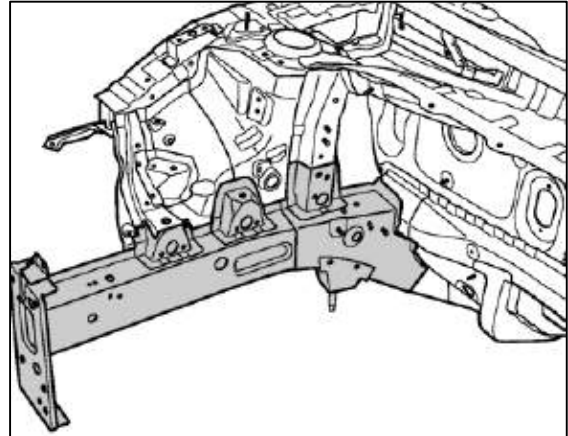


Front rail options

Carrier mounting bracket

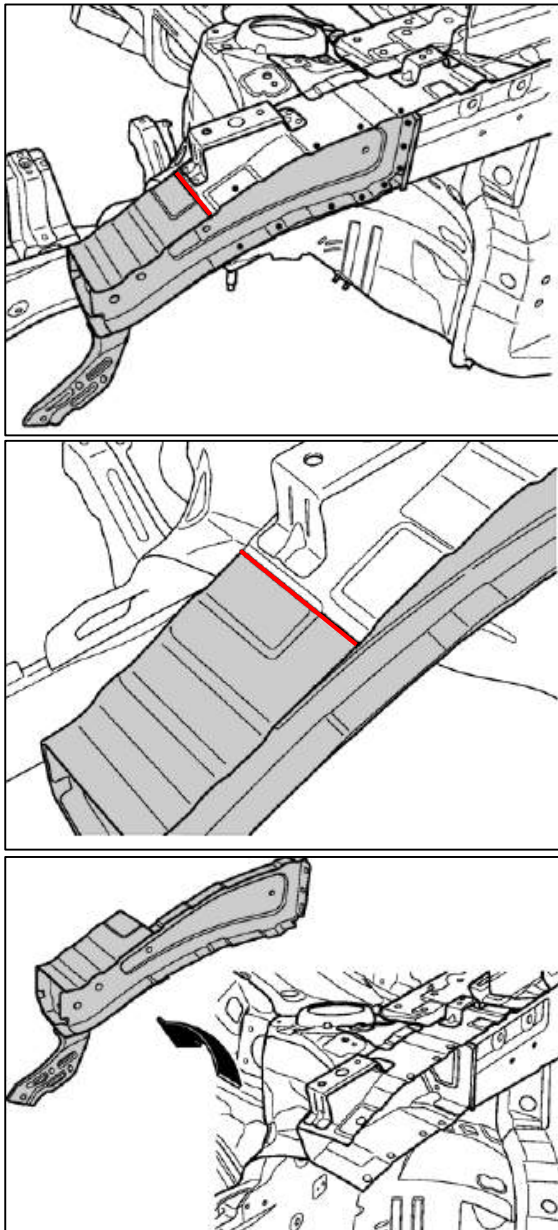


Front rail option



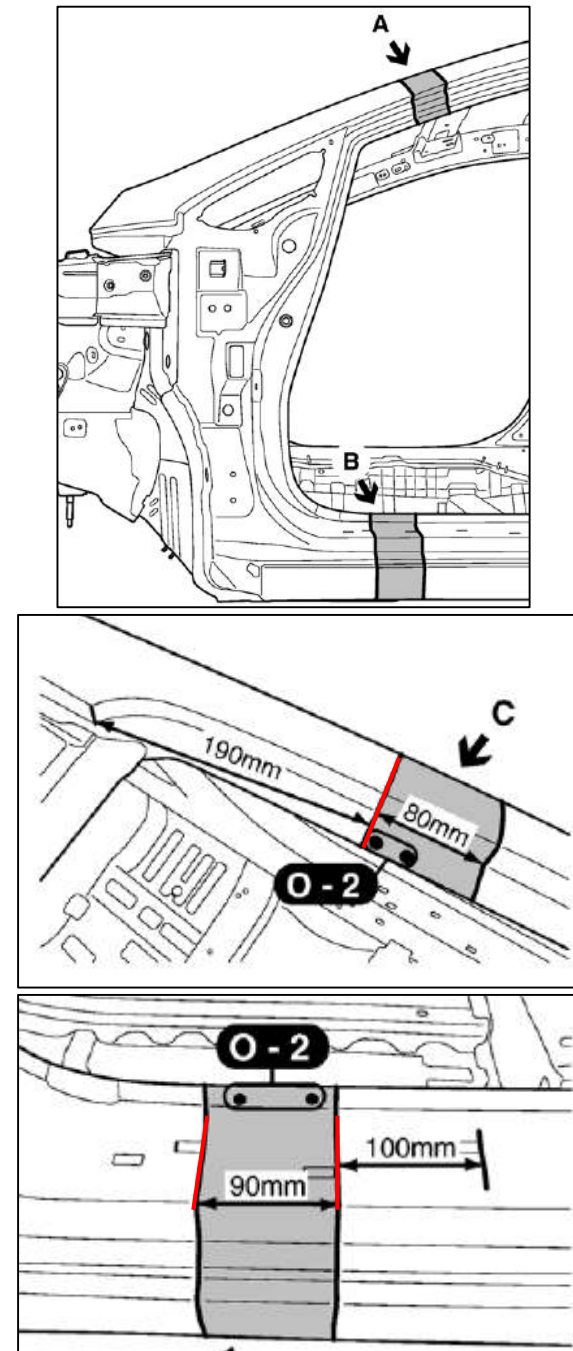
Upper apron panel

A good option for partial replacement.
No measurements are given so follow cut line shown in the illustration.



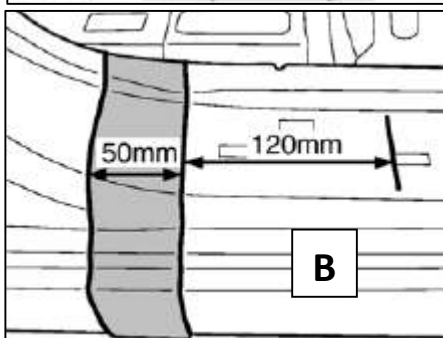
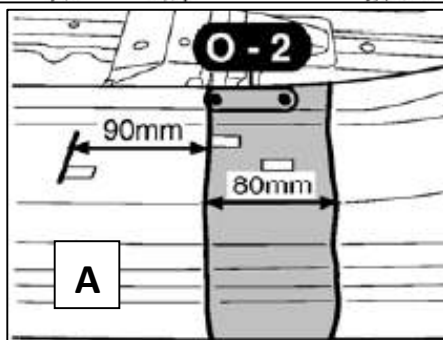
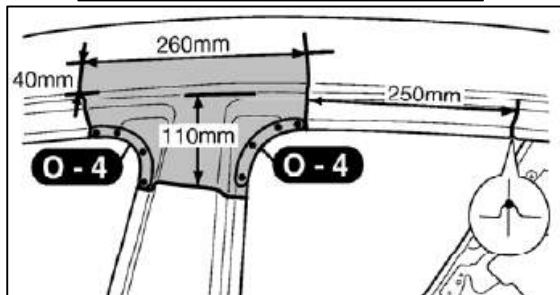
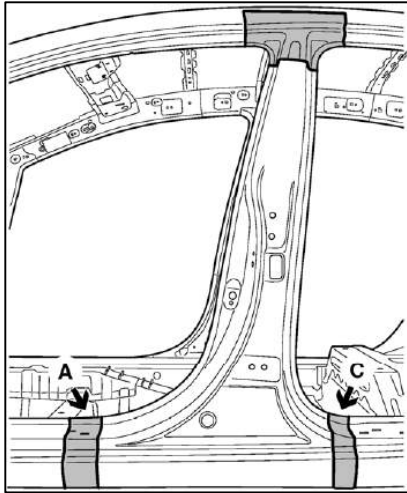
A Pillar option

The A Pillar outer and inner reinforcement can be replaced. The cut out sections (windows) shown in the illustration are for gaining access if replacing the reinforcement, you will require the full procedure when replacing the reinforcement.

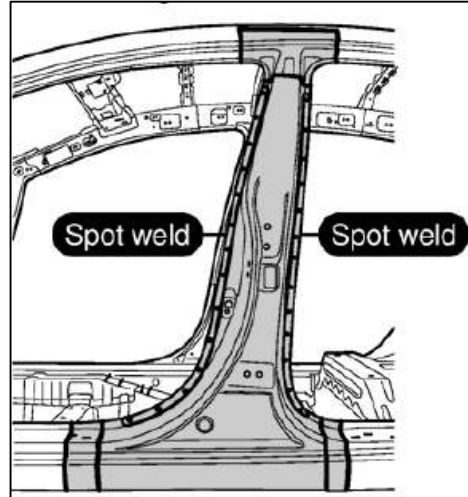


B Pillar option

The B Pillar outer requires a window cut in the upper cant rail panel if fitting the reinforcement. The reinforcement is made from UHSS so must be fitted at OEM joints and not sectioned, take care not to cut the reinforcement if removing the outer panel. Get the full method if replacing the reinforcement.



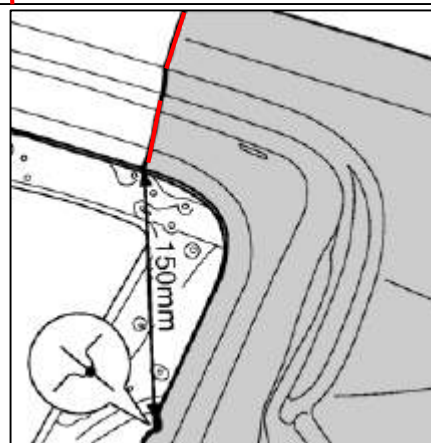
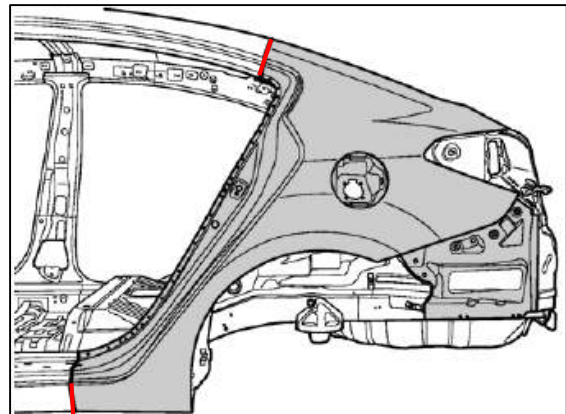
Reinforcement panel



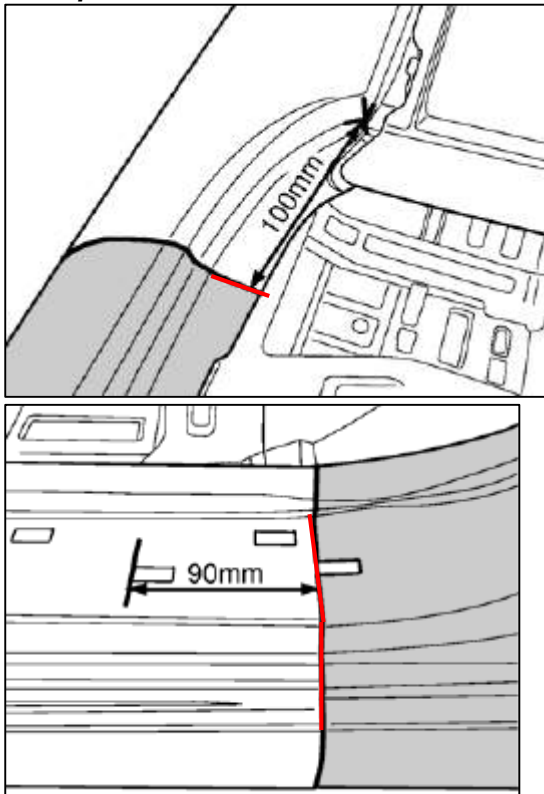
Rear quarter panel

The following illustrations show the replacement method for fitting the rear quarter of all 3 body styles. They have a hemmed wheel arch (check for glue around the wheel arch joint and replace if required).

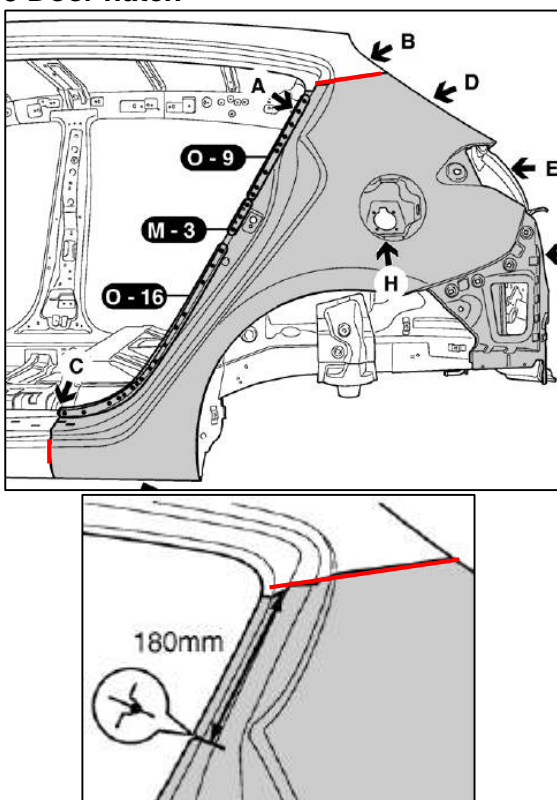
4 Door Sedan



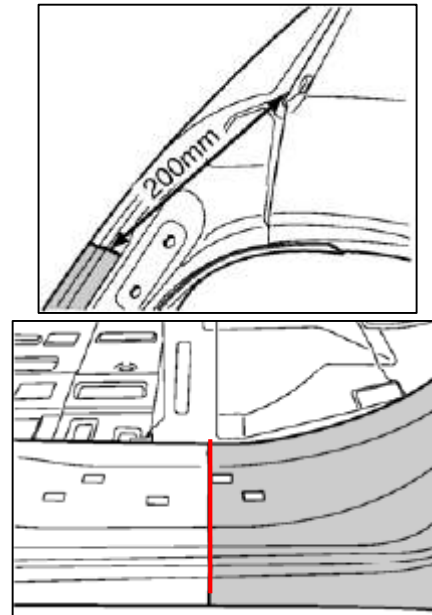
Rear quarter continued



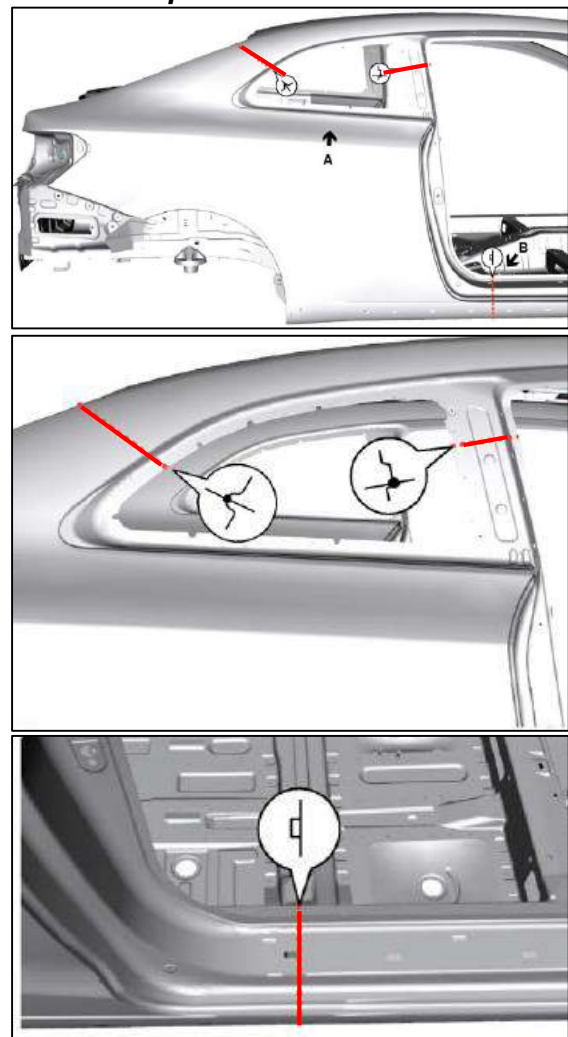
5 Door hatch



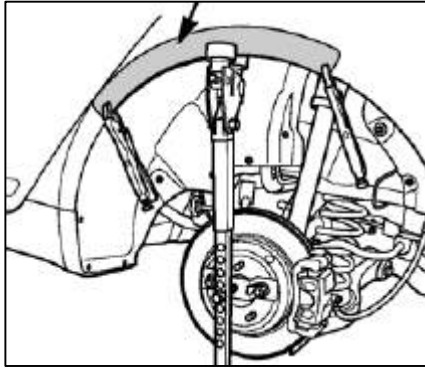
5 door hatch continued



2 Door Coup

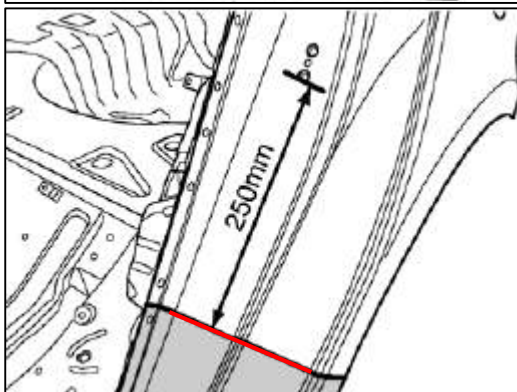
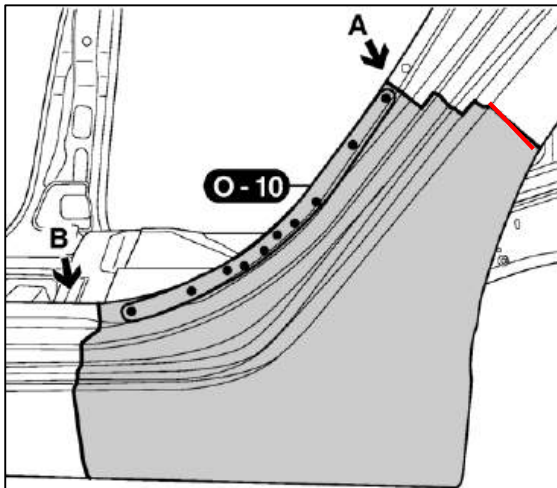


Hemmed wheel arch



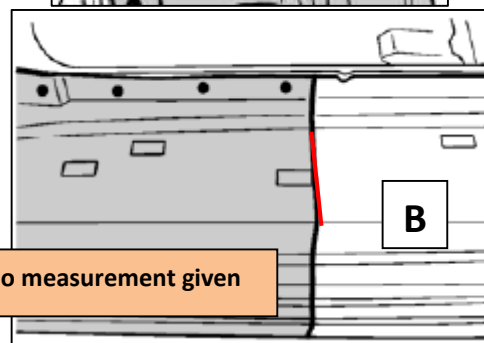
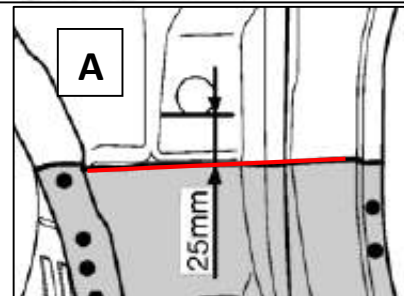
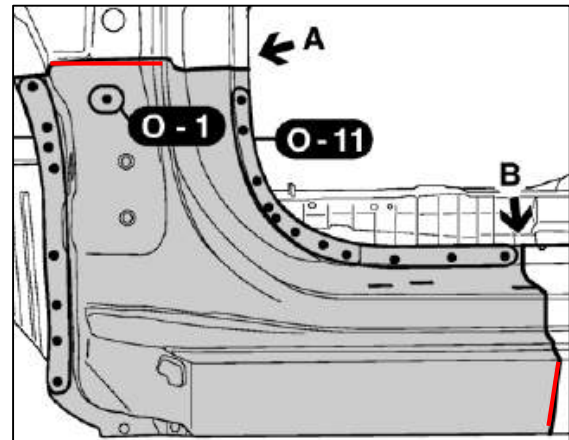
Rear Dog-leg

Handy option for the 4 and 5 door models. Lower measurement is the same as rear quarter joint.

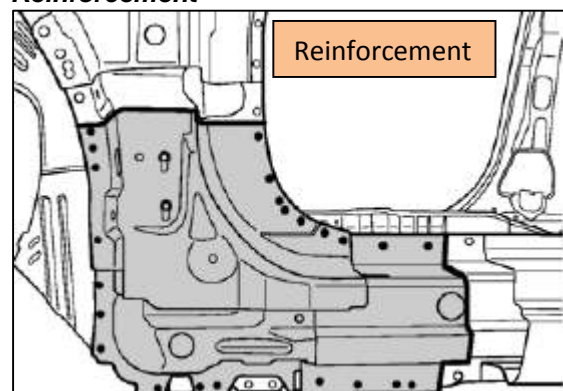


Lower A Pillar

Handy option, and also has a method for partial replacement of the reinforcement. Check full A Pillar for lower cut measurement.

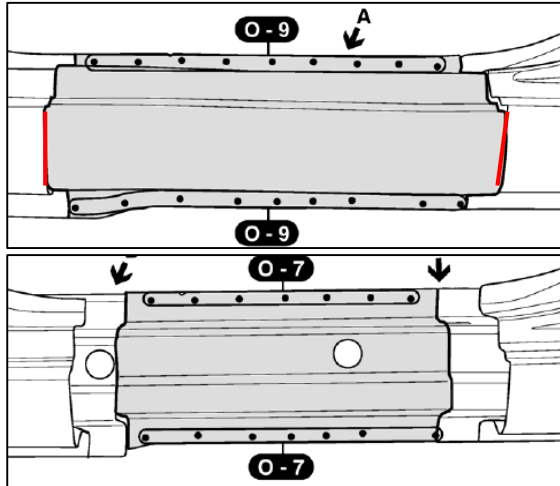


Reinforcement



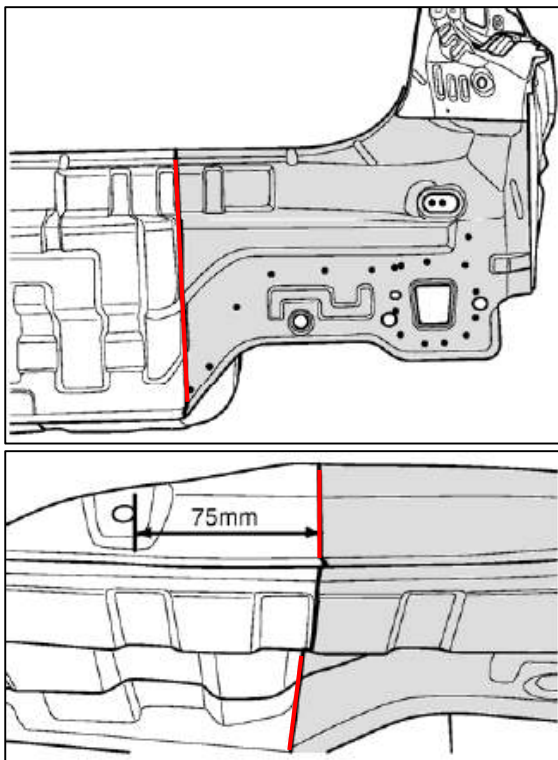
Sill panel options

The Cerato has limited options for the sill panel; only the section in the front door opening is available. It also has a partial replacement option for the reinforcement (shown in the bottom illustration).

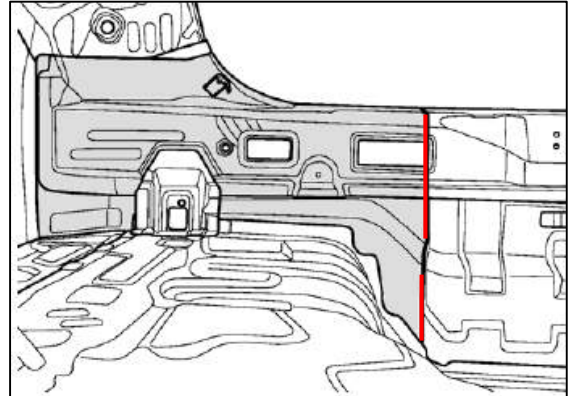


Rear panel cut option

The illustrations show a straight cut through the rear panel with only one measurement.

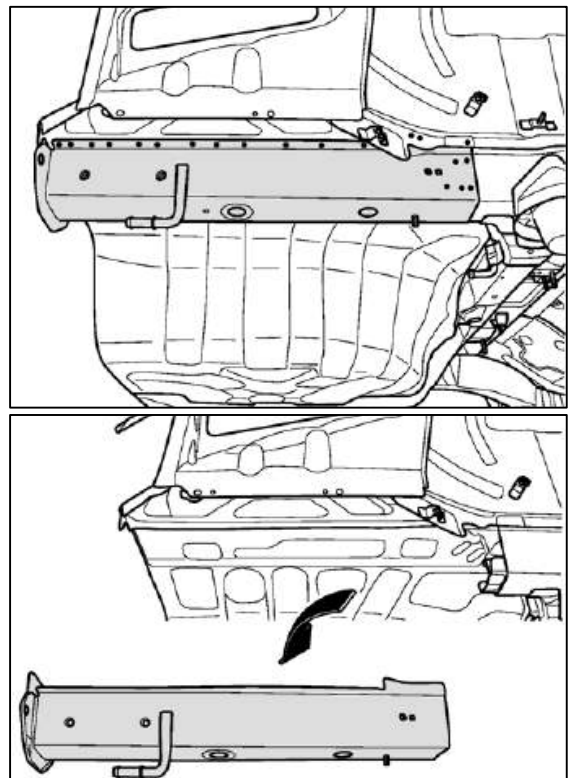


Rear panel continued



Rear rail

The rear rail appears to have an OEM joint. No measurements are given.

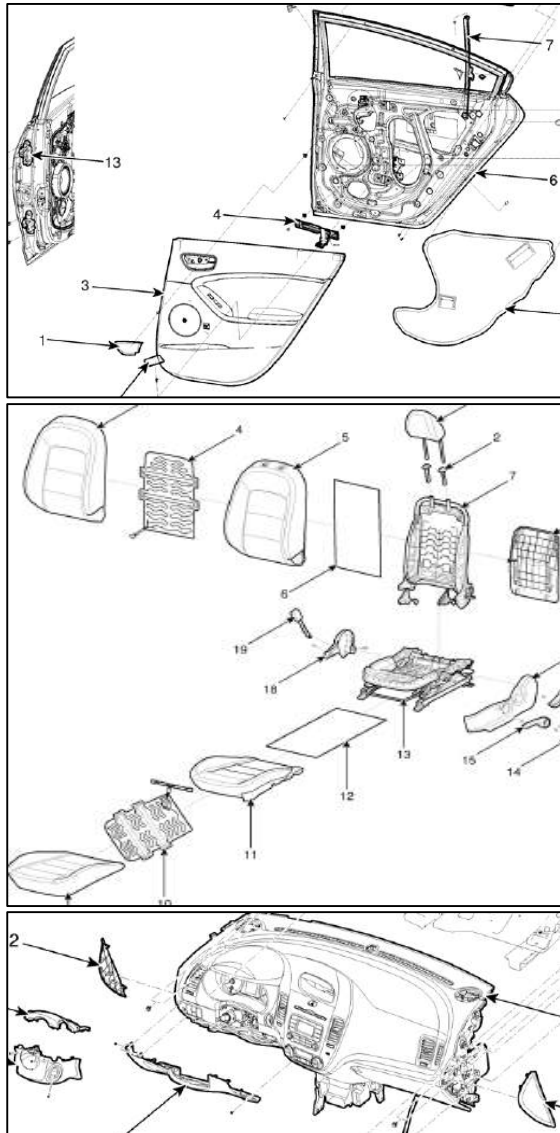


NVH Foam and adhesive

NVH foam and adhesives are not shown in the Cerato BRM manual.

Overview

The BRM for the Cerato is very informative plus has additional information not often include such as door and glass adjustments, seat-belts, seat parts removal operation. The dash pad and the components are also included.



Pro-Ceed (JD) ★★★★★

NZ has only released the 2 door model, however much of the BRM shows methods for the 5 door hatch, both models share the same platform.



SRS Air-Bag

Refer to the SRS Air-Bag cautions information in general information Module 1.

The illustration below shows the Air-Bag components used in the 4 door Pro-Ceed.



Torque settings

Some of the settings for the front suspensions are shown in the example below. The BRM also has the wheel alignment settings

Tightening torque

(kgf.m) Nm kgf.m lb-ft

Wheel Hub nuts 88.3 ~ 107.9 9.0 ~ 11.0 65.1 ~ 79.6

Strut assembly to frame 53.9~ 73.5 5.5 ~ 7.5 39.8 ~ 54.2

Strut assembly to knuckle 156.9 ~ 176.5 16.0 ~ 18.0 115.7 ~ 130.2

Strut assembly lock nut 58.8 ~ 68.6 6.0 ~ 7.0 43.4 ~ 50.6

Lower arm to sub frame (Front) 98.1 ~ 117.7 10.0 ~ 12.0 72.3 ~ 86.8

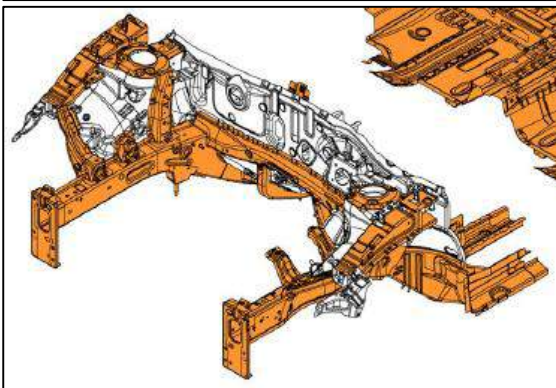
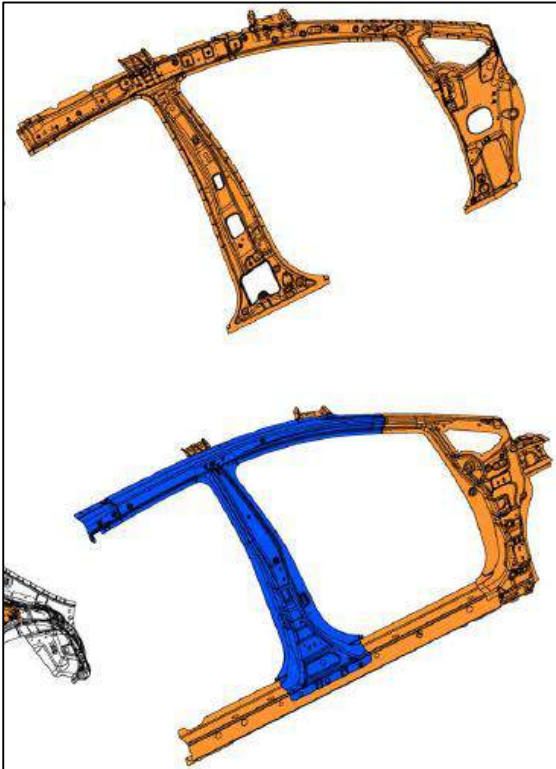
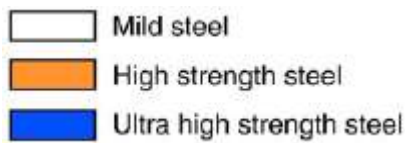
Lower arm to sub frame (Rear) 156.9 ~ 176.5 16.0 ~ 18.0 115.7 ~ 130.2

Wheel alignment

Item		Specification	
		Front	Rear
Toe-in	Total	$0.1^{\circ} \pm 0.2^{\circ}$	$0.2 \pm 0.2^{\circ}$
	Individual	$0.05^{\circ} \pm 0.1^{\circ}$	$0.1^{\circ} \pm 0.1^{\circ}$
Camber angle		$-0.5^{\circ} \pm 0.5^{\circ}$	$-1.0^{\circ} \pm 0.5^{\circ}$
Caster angle		$5.2^{\circ} \pm 0.5^{\circ}$	-
King-pin angle		$13.8^{\circ} \pm 0.5^{\circ}$	-

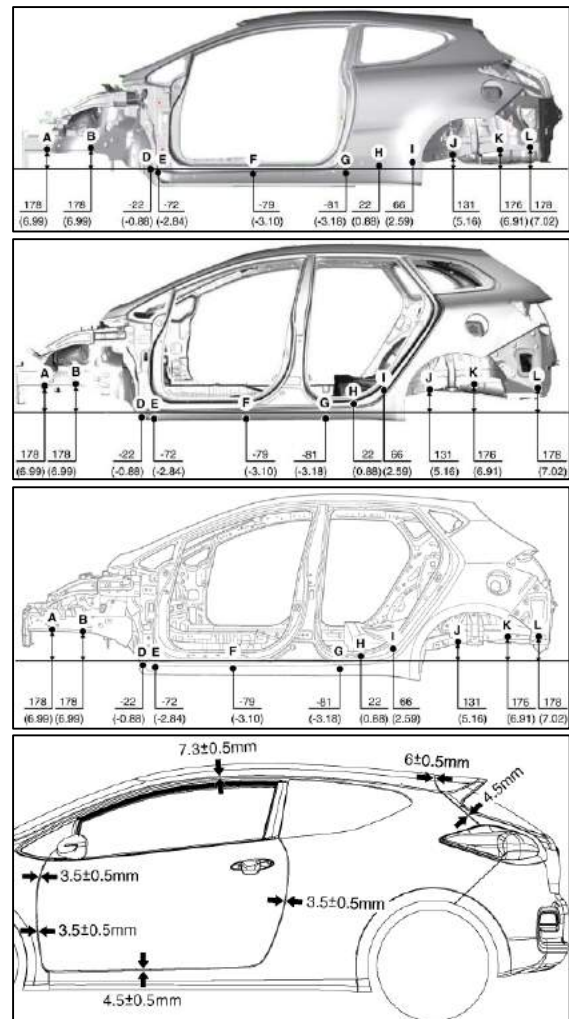
Steels used for the 4 door Pro-Ceed

HSS is used for the doors, boot lid, bonnet, guards and most all other structural panels. UHSS is shown for the B Pillar reinforcement and under floor rail with mild steel used for side aperture panel.



The (JD) BRM has all measurements for the 3 body structures

This also includes the body gaps.



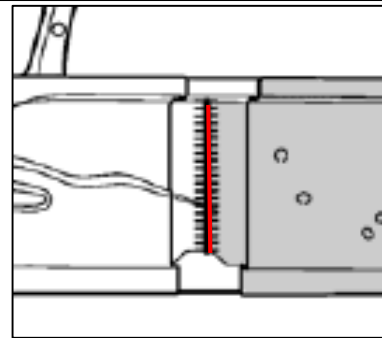
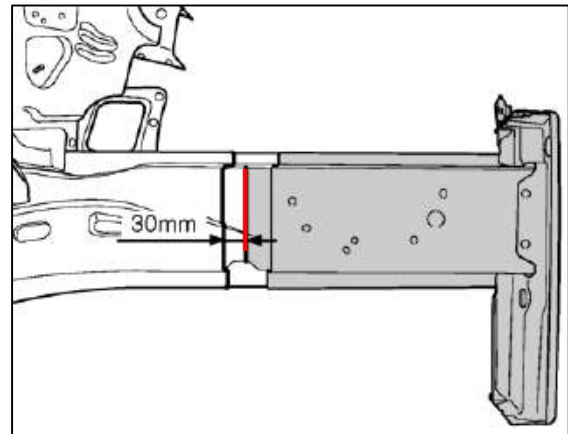
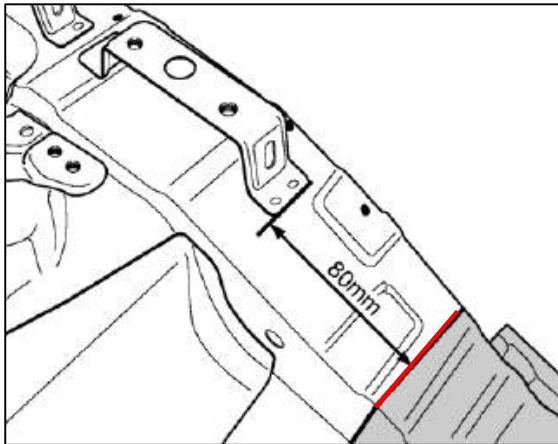
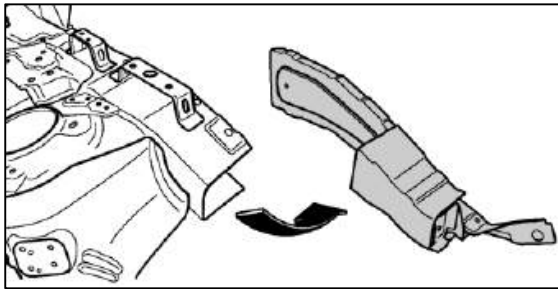
Partial replacement options

The Pro-Ceed has a good number of options.

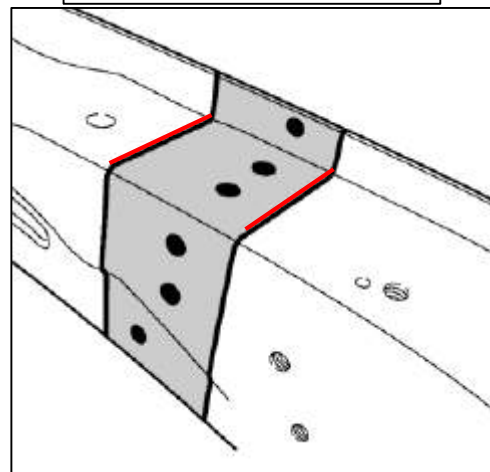
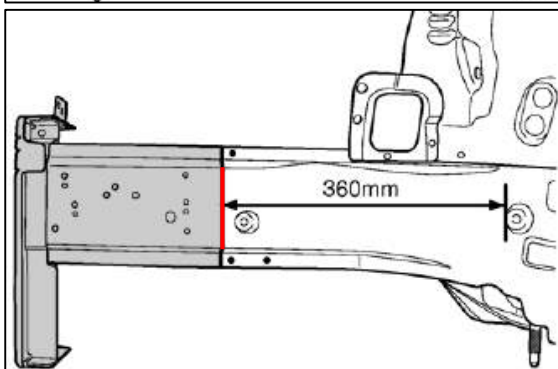
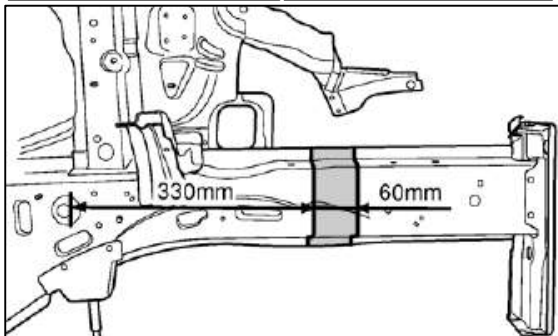
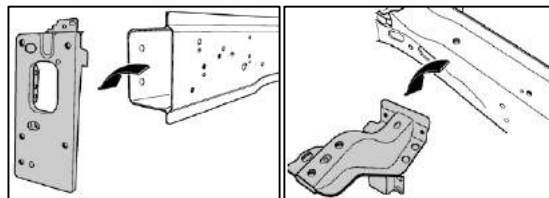


Front apron upper support

This is a good option.

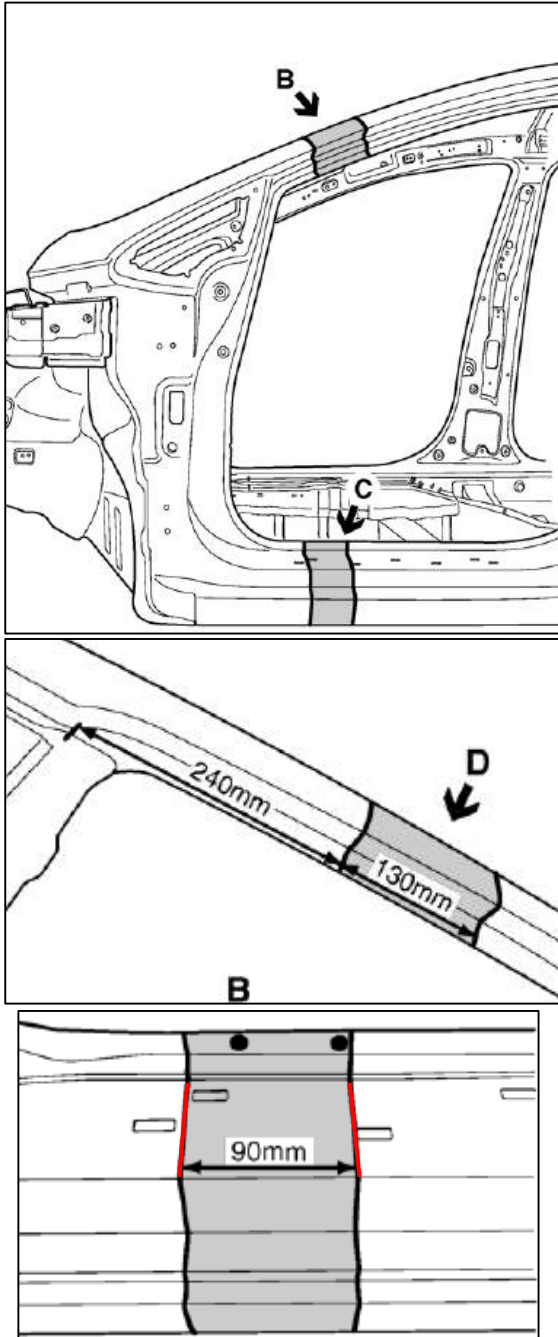


Front rail option



A Pillar

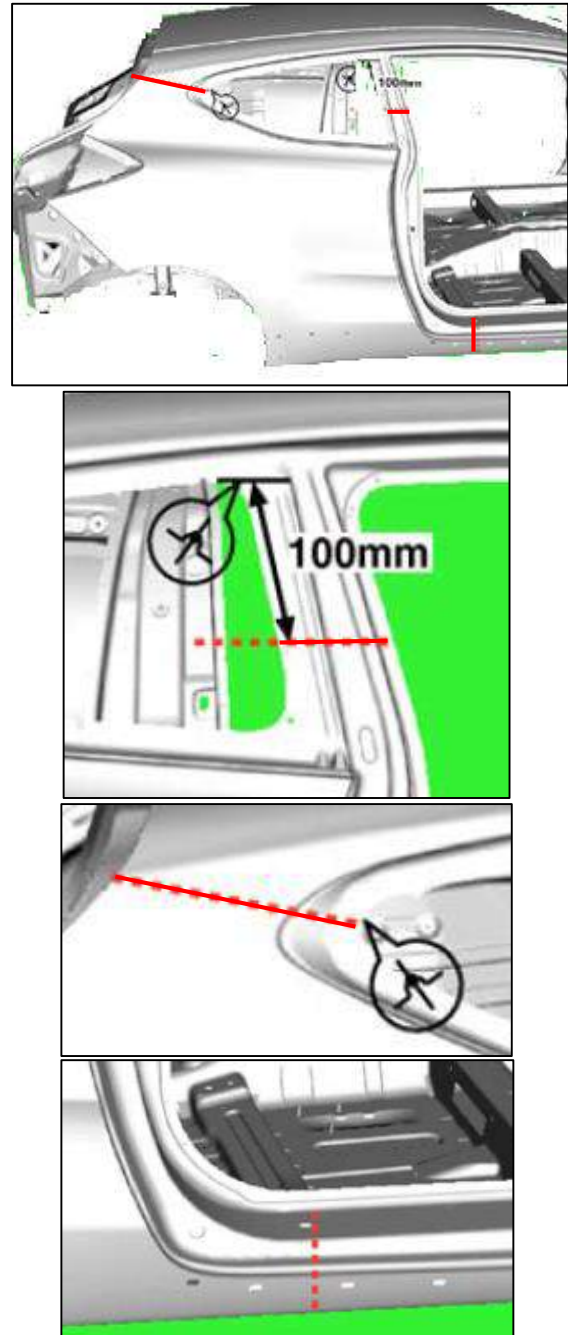
The A Pillar outer and inner reinforcement can be replaced. The cut out sections (windows) shown in the illustration are for gaining access if replacing the reinforcement, you will require the full procedure when replacing the reinforcement.



Rear quarter panel

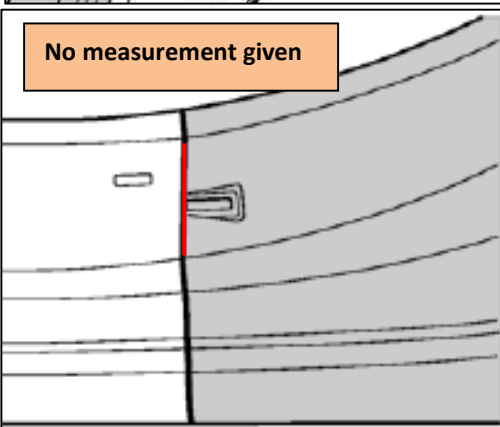
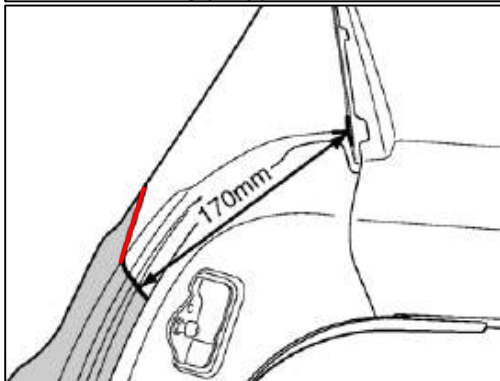
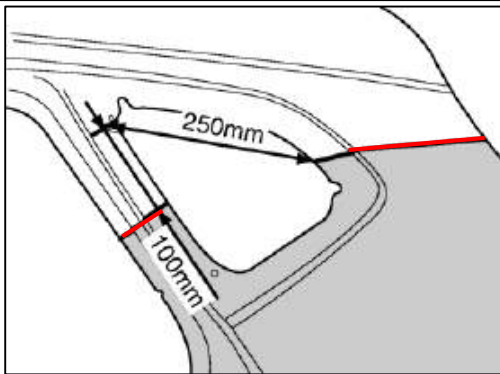
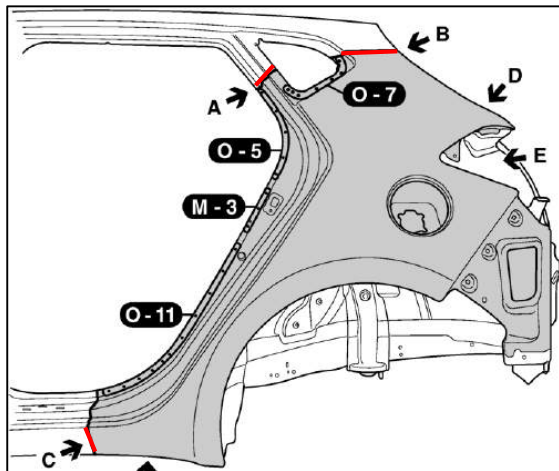
2 Door

Only shows one measurement for the pillar joint, the rear sail panel is cut at the V on the flange and the lower joint lined up with the kick plate hole.



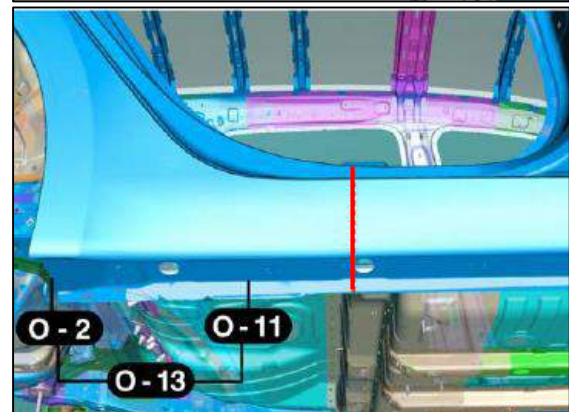
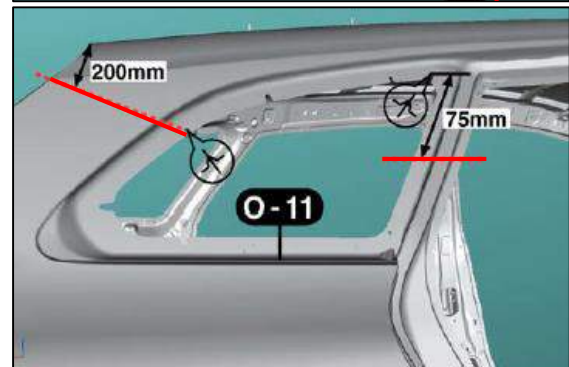
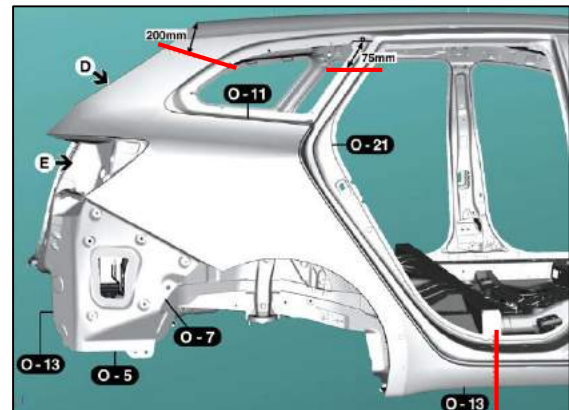
5 Door

No measurement for the lower sill joint.

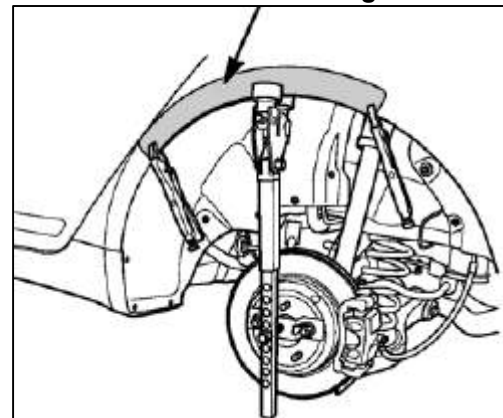


Wagon

The Pro-Ceed also has a wagon.

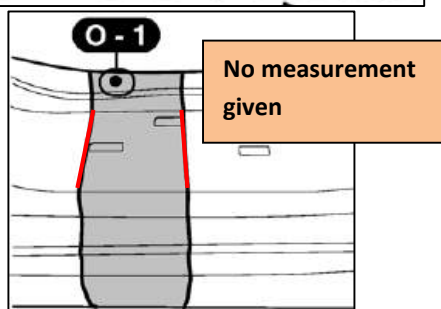
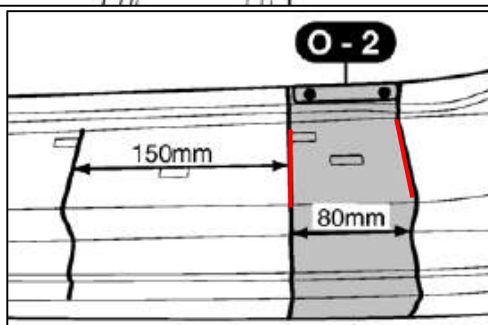
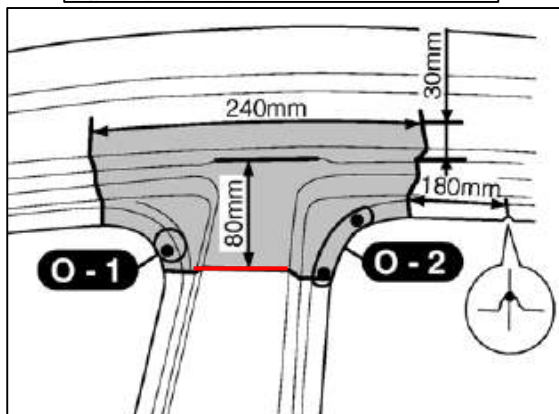
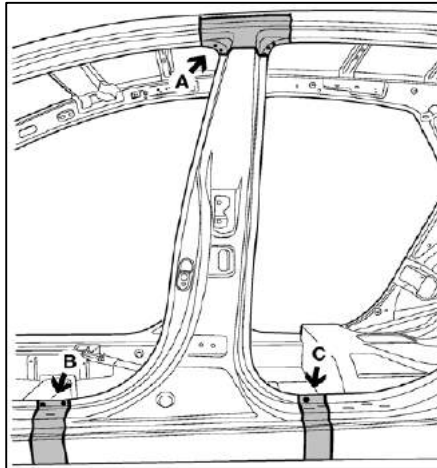


Wheel arch has hemmed edge

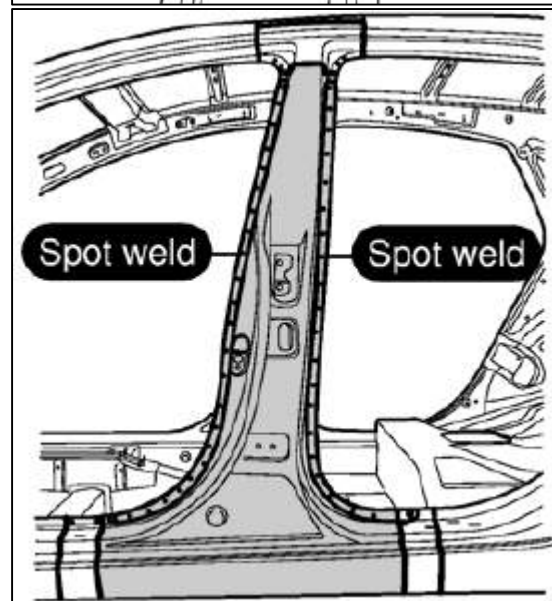
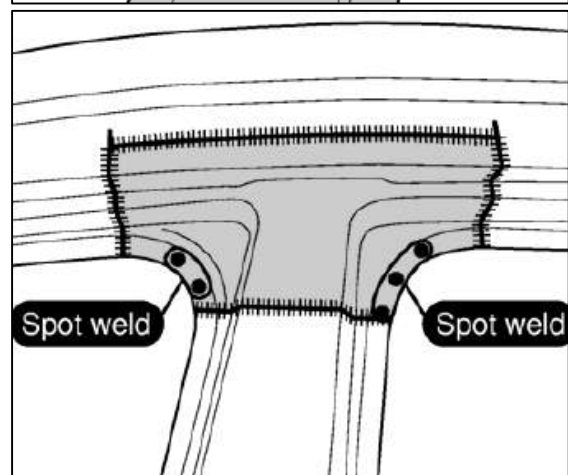
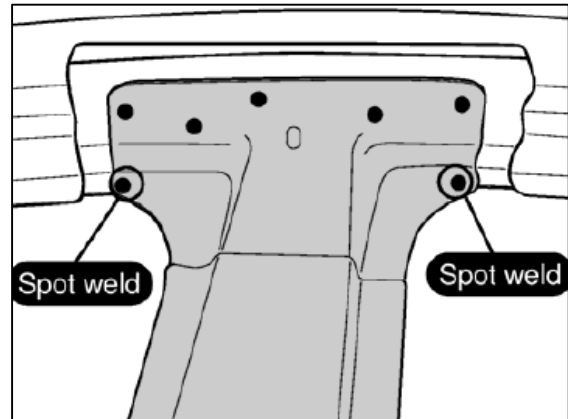


B Pillar

The B Pillar outer requires a window cut in the upper cant rail panel if fitting the reinforcement, the reinforcement is made from UHSS so must be fitted at OEM joints and not sectioned. Take care not to cut the reinforcement if removing the outer panel. Get the full method if replacing the reinforcement. Nothing is shown for the 2 door model.

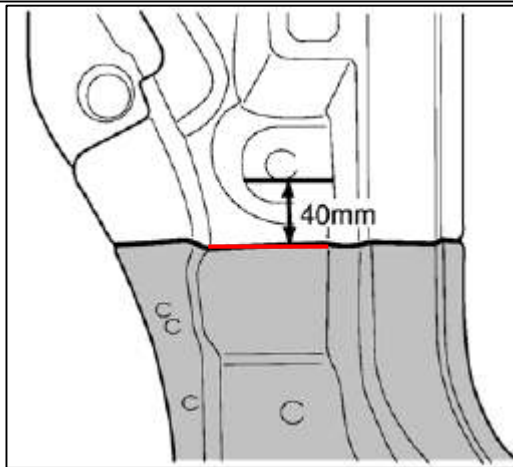
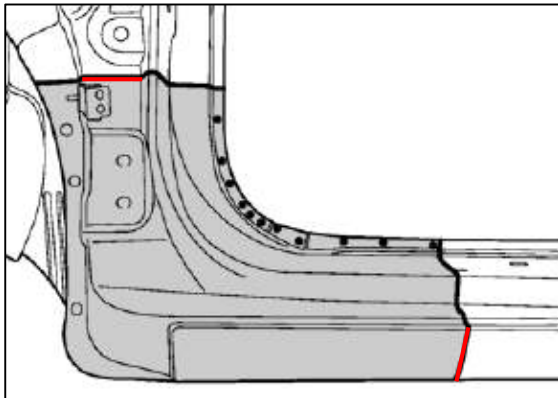


Reinforcement

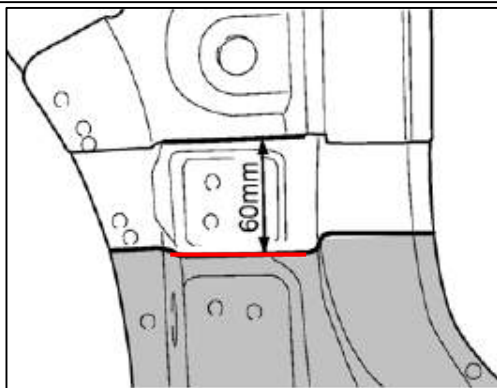
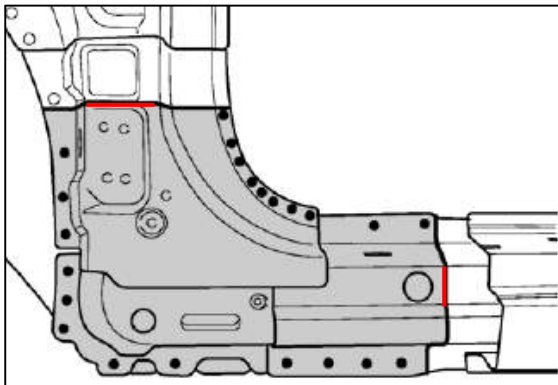


Lower A Pillar

Handy option, and also has a method for partial replacement of the reinforcement.
Check full A Pillar for lower cut measurement.

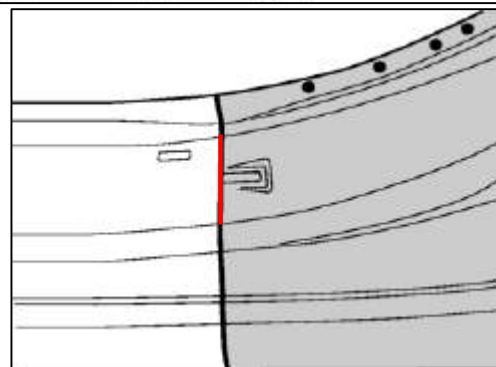
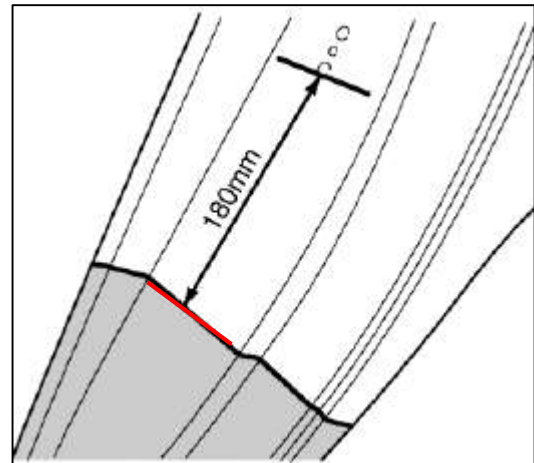
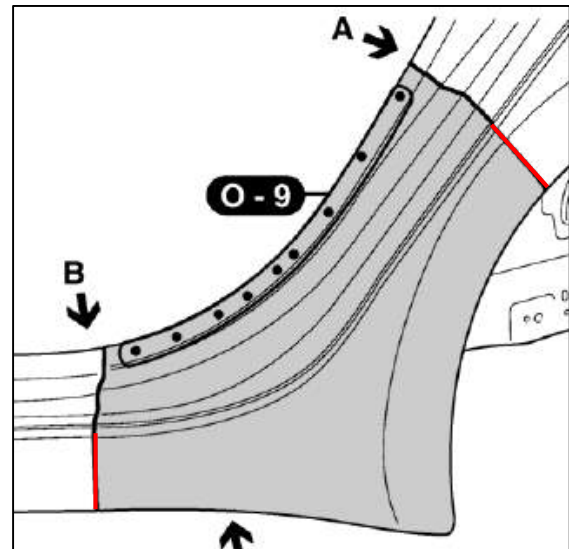


Reinforcement



Rear dog-leg option

Has option for the outer panel but nothing is shown for the reinforcement.



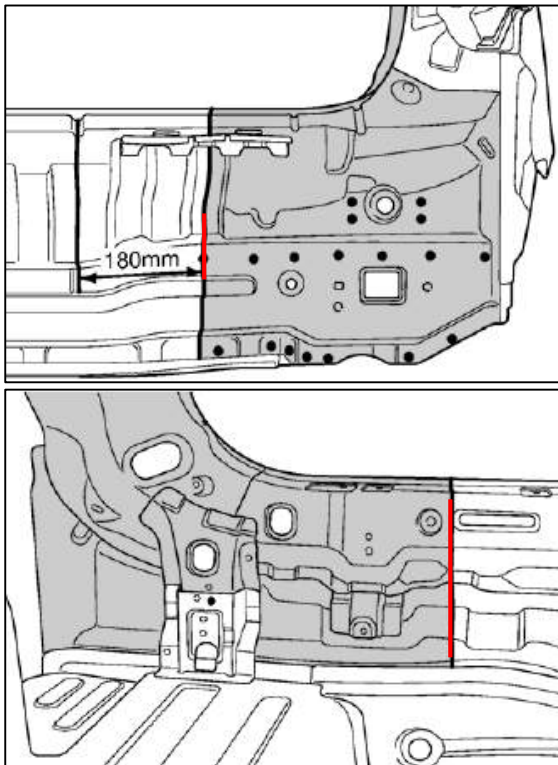
The Pro-Ceed has limited options for the sill panel; only the section in the front door opening is available. It also has a partial replacement option for the reinforcement (shown in the bottom illustration).



The rear rail has reinforcement so a window is required to be cut out.

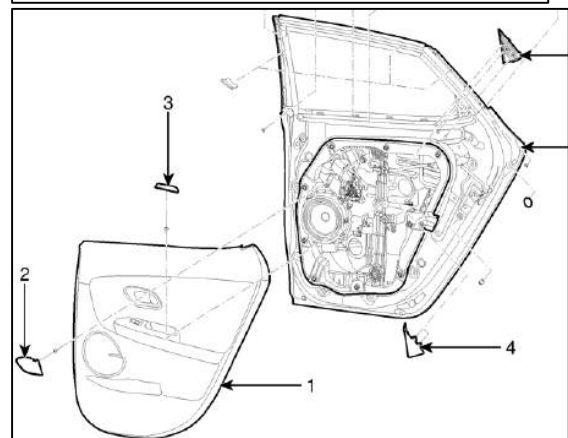
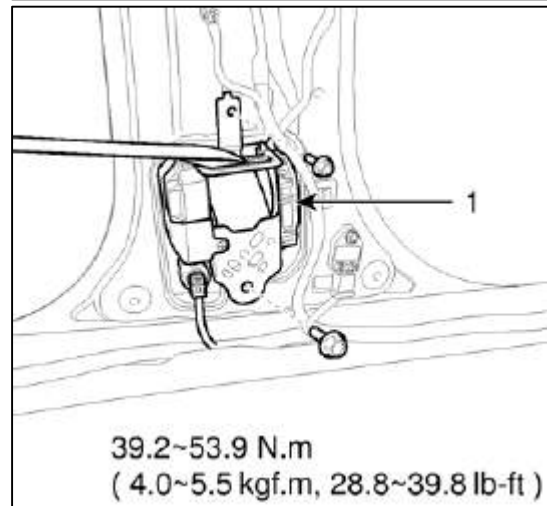
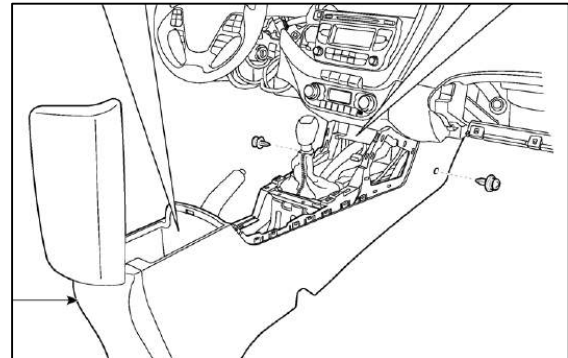


Rear Panel option



Overview

The Pro-Ceed has some good partial replacement options as well as having information not often seen, such as procedure for removing the consol along with detailed information on seat belts and door trims etc.



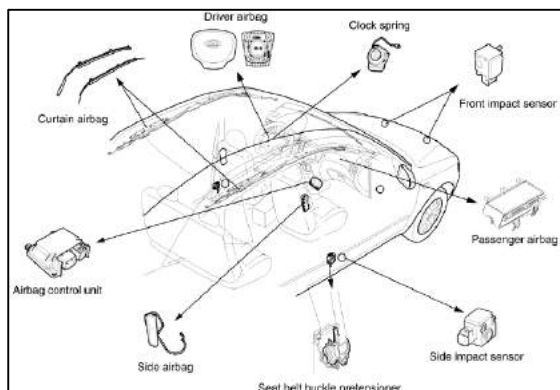
Kia Optima (TF) ★★★★★



SRS Air-Bag

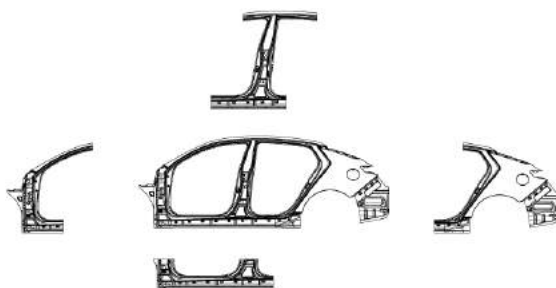
Refer to the SRS Air-Bag cautions information in general information Module 1.

The illustration below shows the Air-Bag components used in the Optima.



Side panels available

The illustration below shows the partial side panel sections available for the Optima.

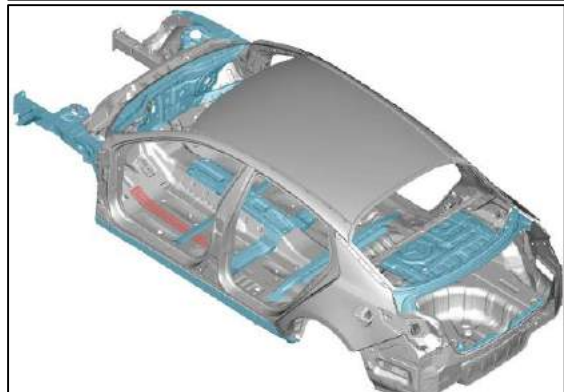
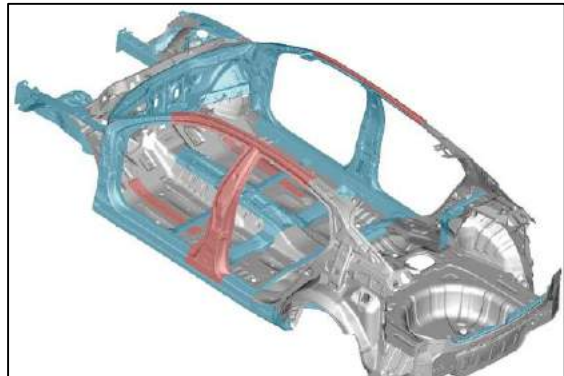
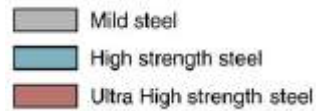


Tightening Torques

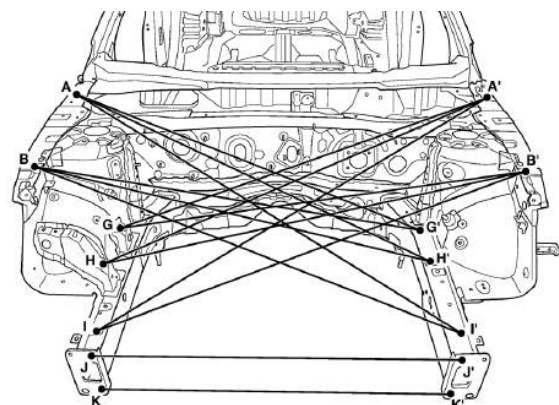
Torque settings are given in the BRM (refer to dealer workshop manual)

Steels used for the Optima body

HSS is used for the doors, boot lid, bonnet, guards and most all other structural panels. UHSS is shown for the B Pillar reinforcement and under floor rail with mild steel used for side aperture panel.



Panel gap and body measurements are given in the BRM



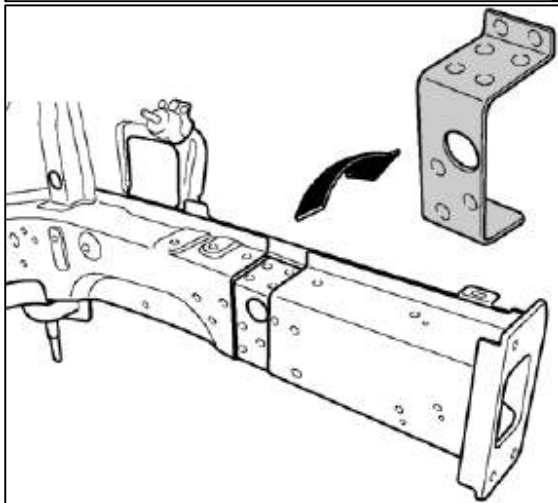
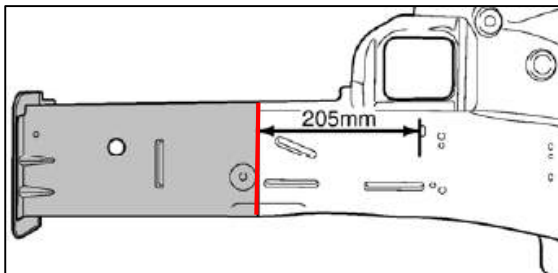
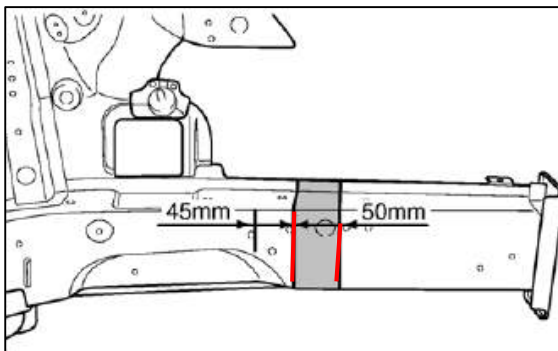
Partial replacement options

The Optima has some good options however some are a little more involved than the norm.

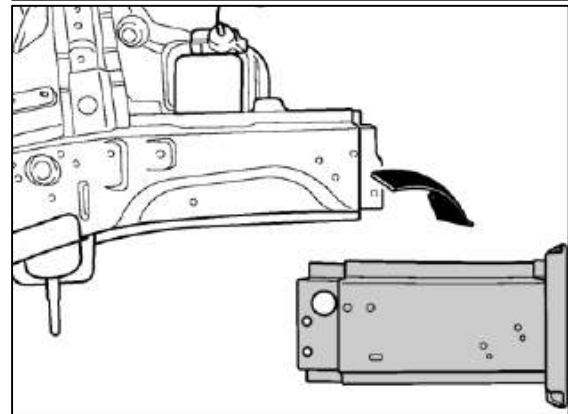
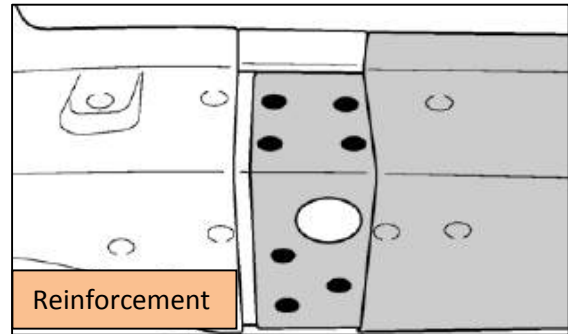


Front rail

The front rail option requires the inner reinforcement jointed at what appears to be an OEM joint.

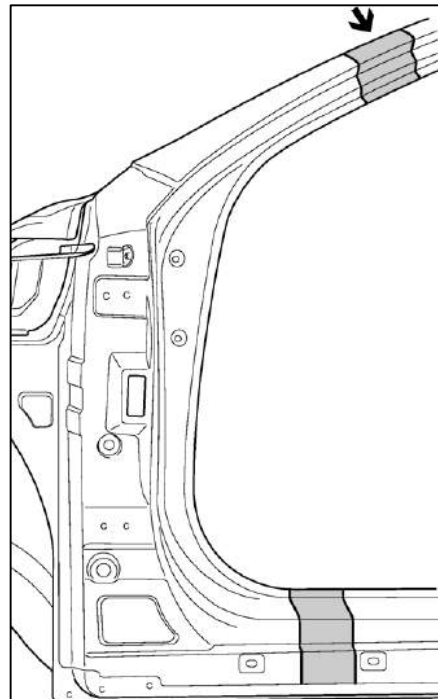


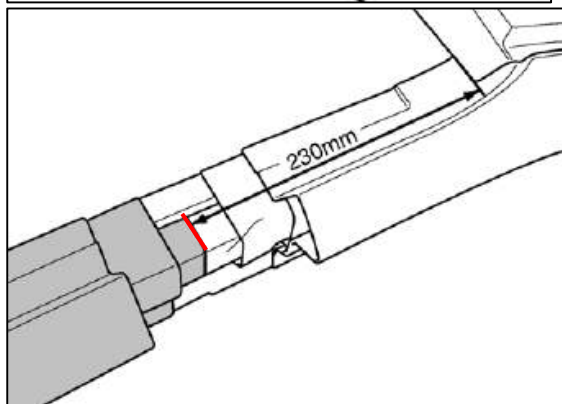
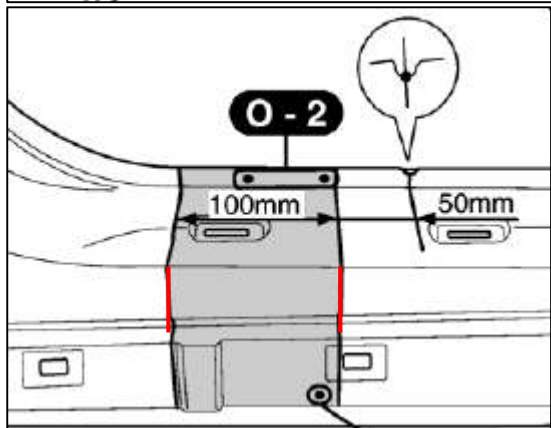
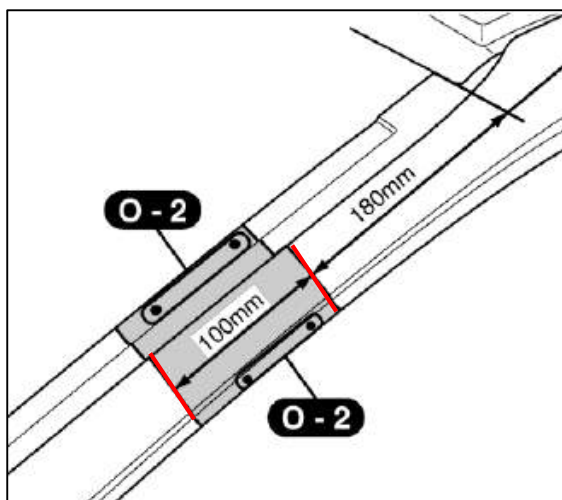
Front rail continued



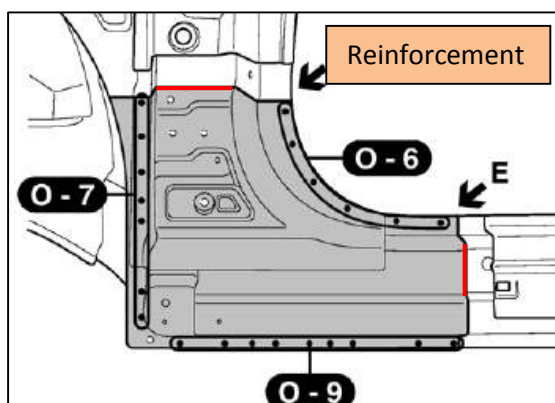
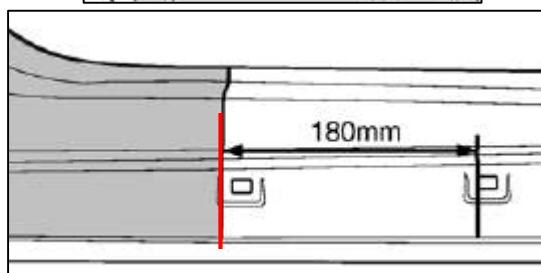
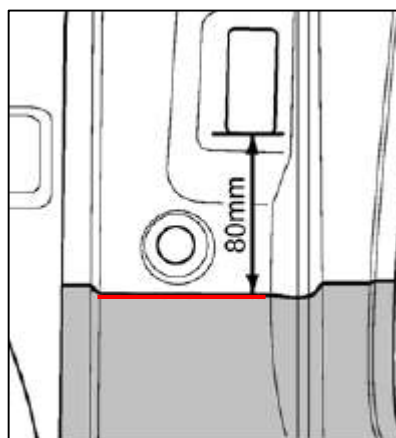
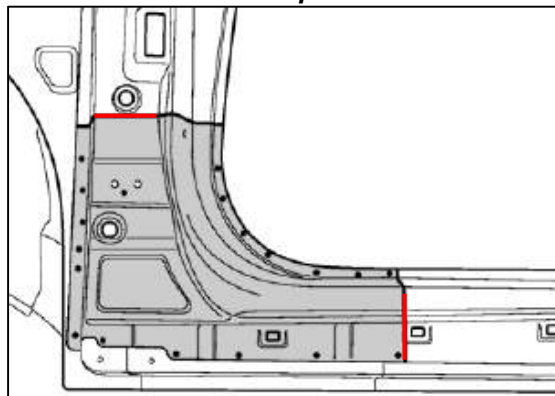
A Pillar

The A pillar has 17 pages of instructions. If fitting the reinforcements a 3 layered sectioning joint is required as shown in the last illustration, get the full repair method if fitting a full A Pillar. The Optima also has a lower A Pillar outer and reinforcement option.



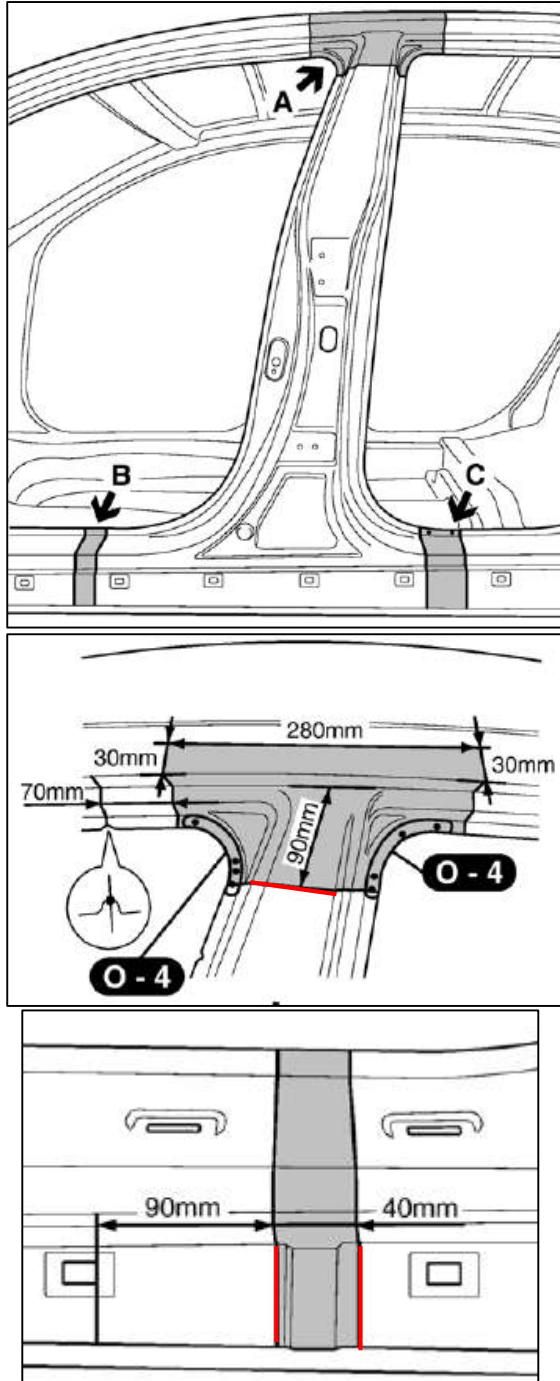


A Pillar lower section option

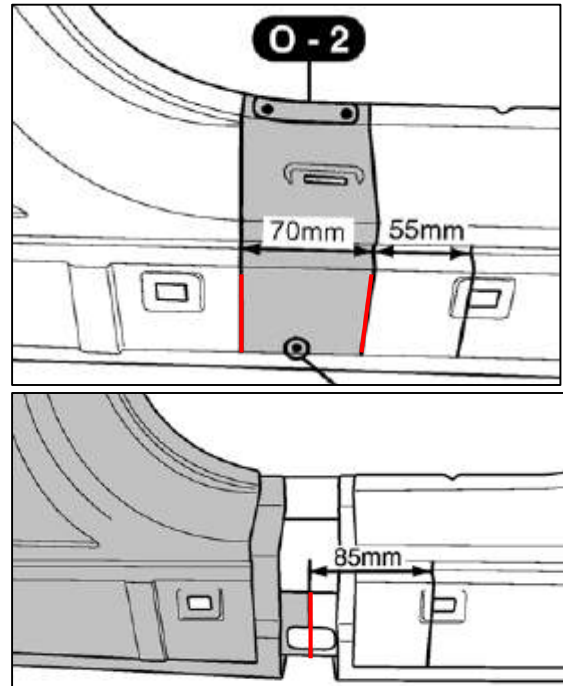


B Pillar

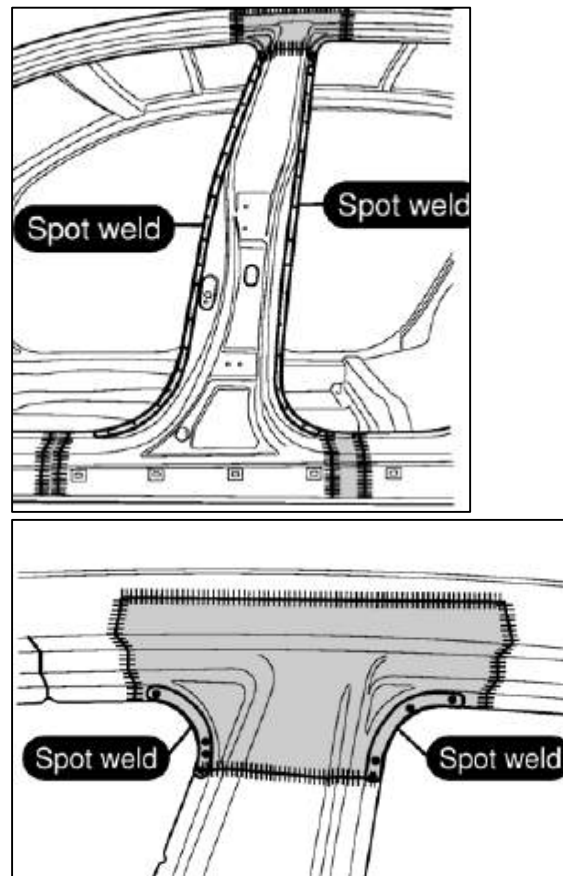
The Optima B Pillar also has a 3 layered sectioning method for the sill reinforcements; get the full method before attempting this repair.



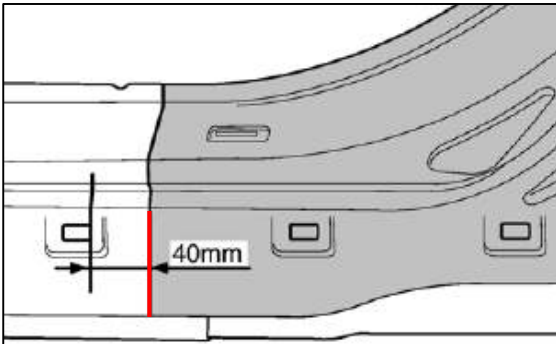
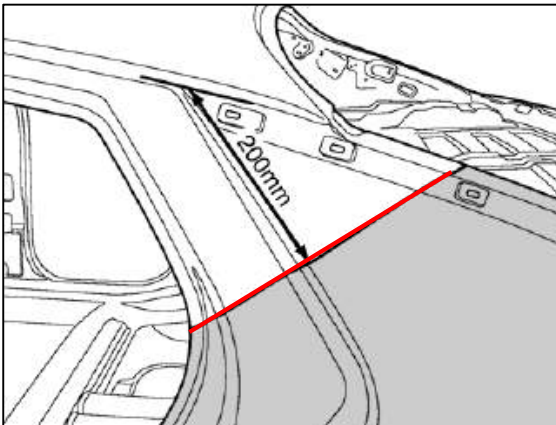
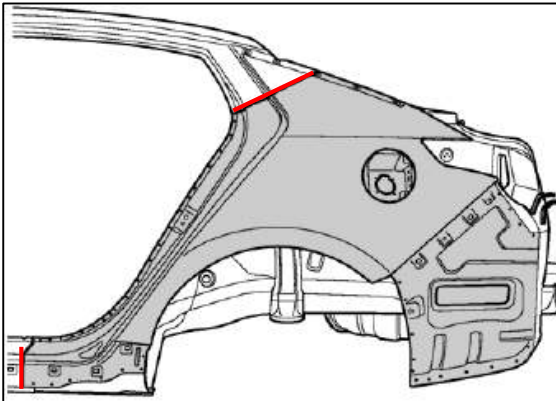
B Pillar continued



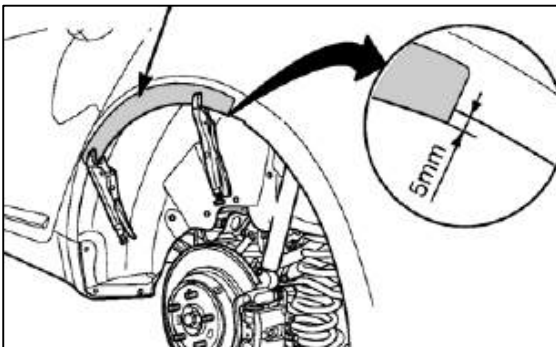
Reinforcement



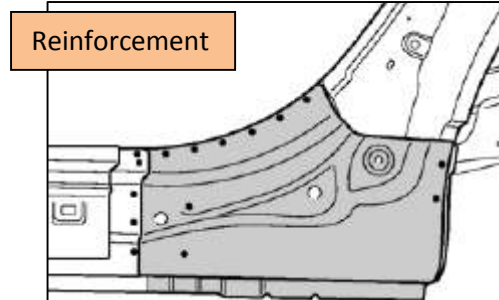
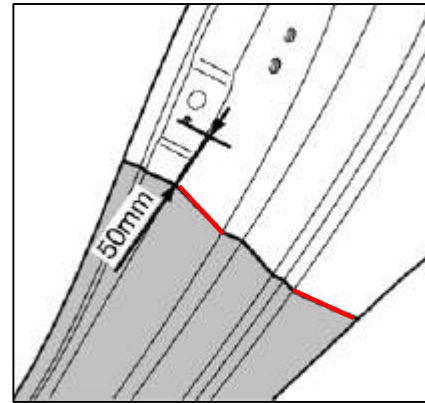
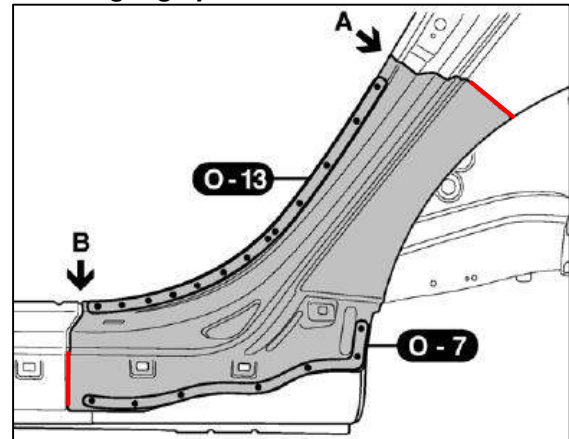
Rear quarter panel



Hemmed wheel-arch

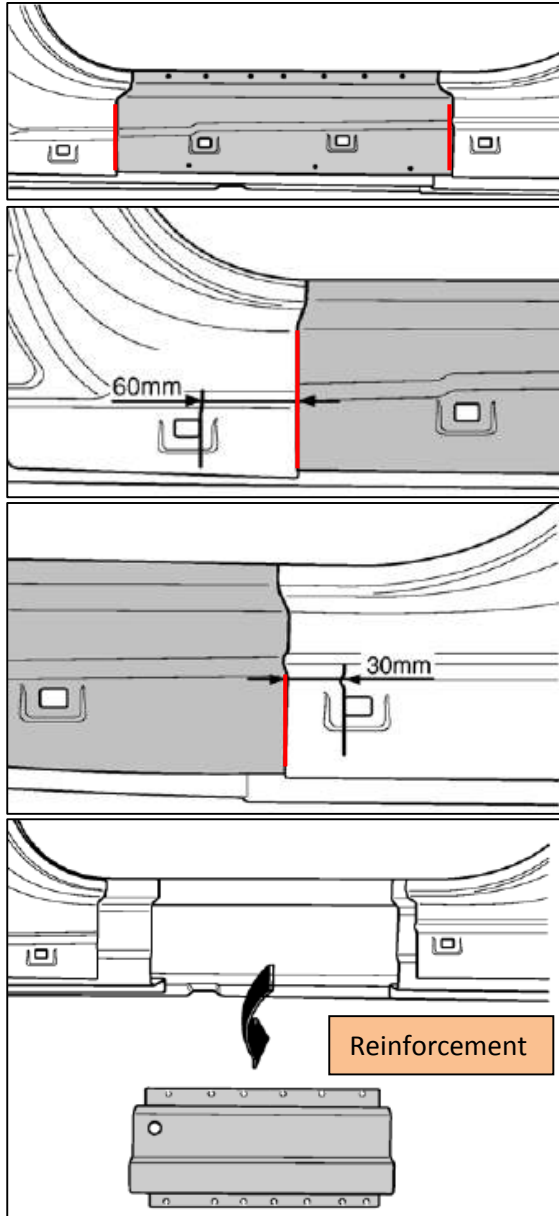


Rear dog-leg option



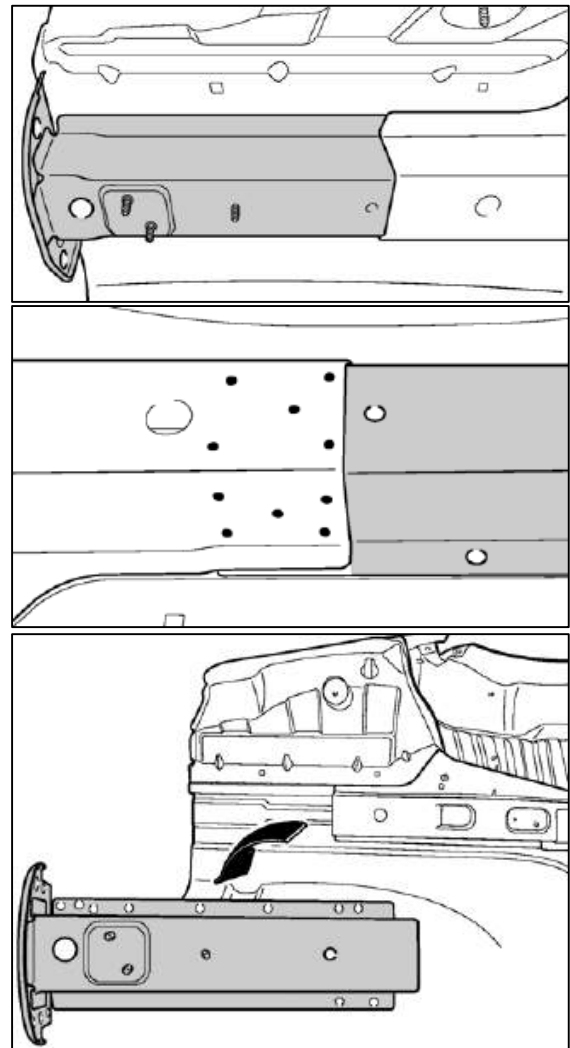
Sill panel options

The Optima has limited options for the sill panel; only the section in the front door opening is available. It also has a partial replacement option for the reinforcement (shown in the bottom illustration).



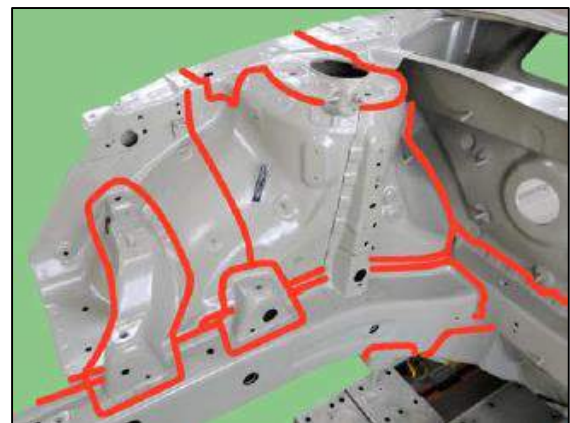
Rear rail option

The rear rail appears to be joined at an OEM joint.



NVH Adhesive and sealing

The BRM for the Optima has very detailed illustrations of sealing and anti-corrosion requirements however NVH foams and adhesives are not included.



Overview

The Optima has some good options however some of these are a little more involved than other methods recommended by Kia and should be considered at the time of preparing the estimate for repairs.

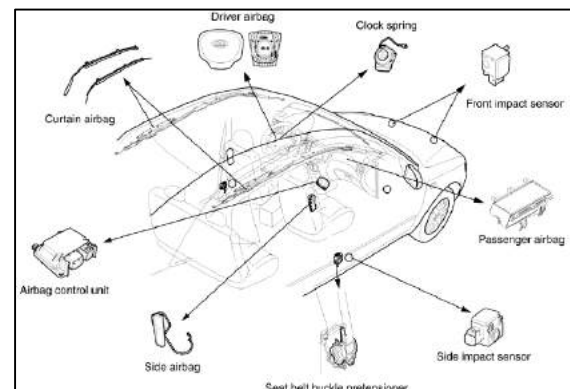
Carens (RP) ★★★★★



SRS Air-Bag

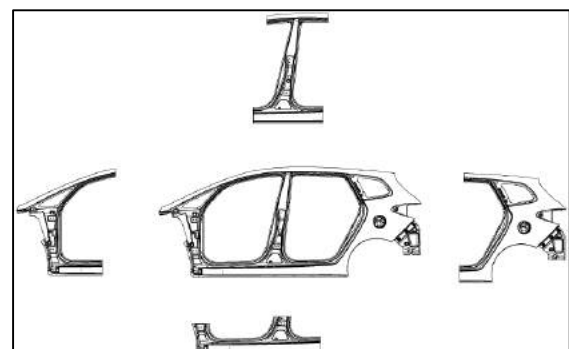
Refer to the SRS Air-Bag cautions information in general information Module 1.

The illustration below shows the Air-Bag components used in the Carens, note the pressure sensor for side impact?



Side panels available

The illustration below shows the partial side panel sections available for the Carens.

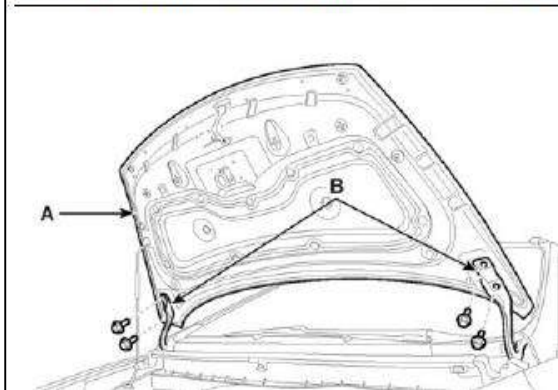


Tightening Torques

Torque settings for bolt on parts are given in the BRM. The illustration shows the bonnet hinge tightening.

Tightening torque :

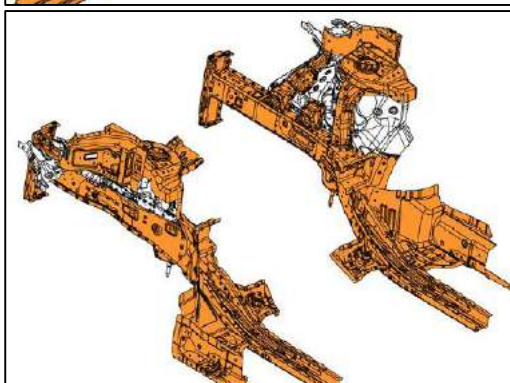
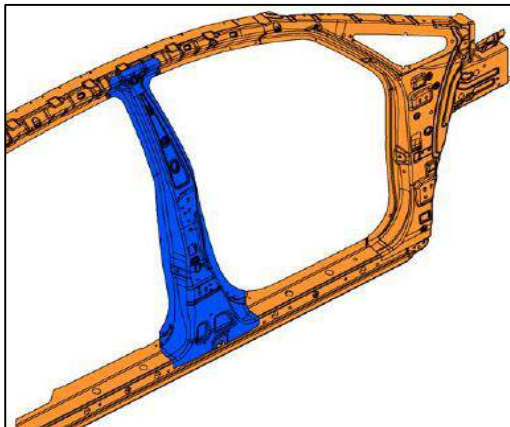
21.6–26.5 N.m (2.2–2.7 kgf.m, 15.9–19.5 lb-ft)



Steels used for the Carens body

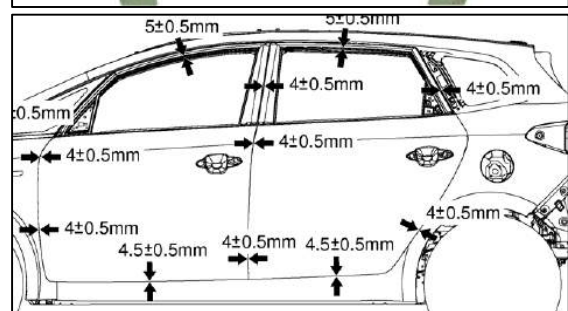
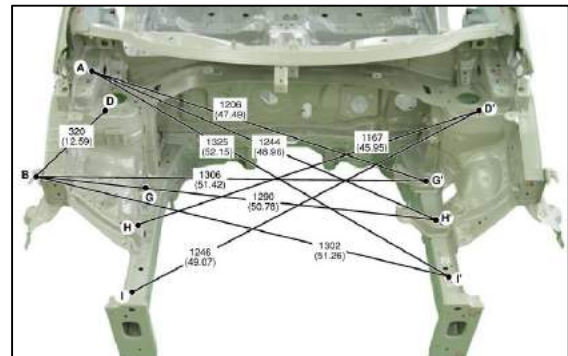
HSS is used for the doors, boot lid, bonnet, guards and most all other structural panels. UHSS is shown for the B Pillar reinforcement and under floor rail with mild steel used for side aperture panel.

- Mild steel
- High strength steel
- Ultra high strength steel



Panel gap and body measurements are given in the BRM

The following illustrations are an example of the information provided.



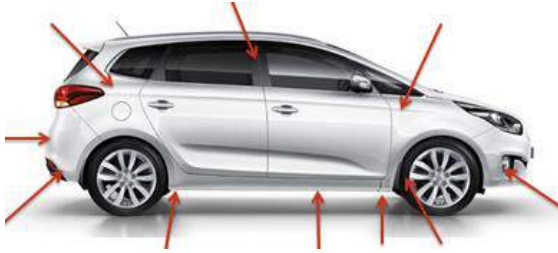
Wheel alignment settings are also given in the BRM

Wheel Alignment

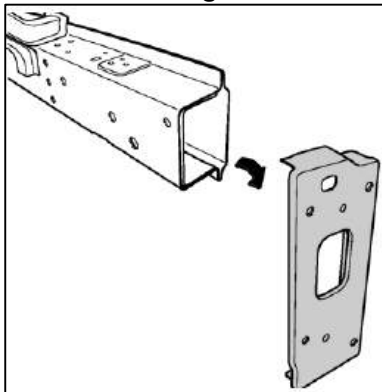
Item		Specification		
		Front	Rear	
Wheel size	All		16/17 in	18 in
	Individual	0°±0.1°	0.1° (+0.2°/-0.25°)	0.1°±0.15°
Toe-in	Total	0°±0.2°	0.2° (+0.4°/-0.6°)	0.2°±0.3°
Camber angle		-0.5°±0.5°	-1.5°±0.5°	-1.5°±0.2°
Caster angle		4.24°±0.5°	-	-
King-pin angle		14.24°	-	-
Ride height		380±10mm		

Partial replacement options

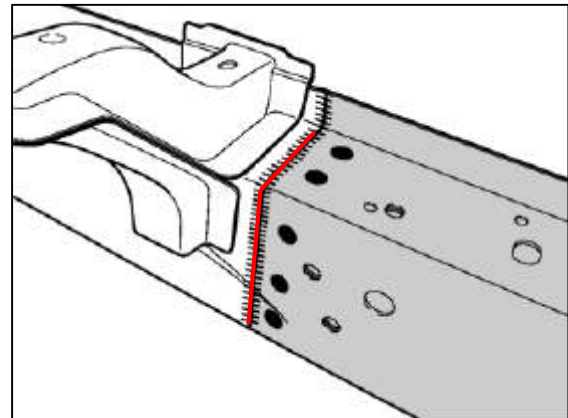
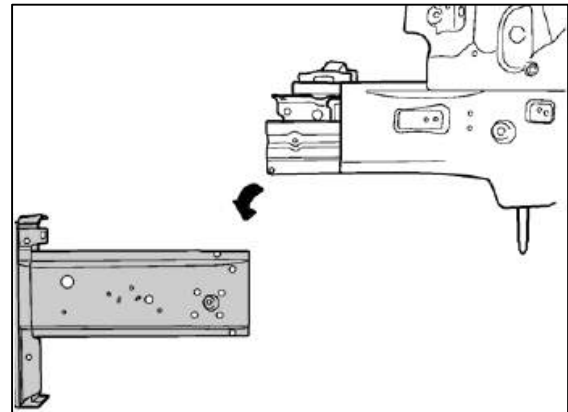
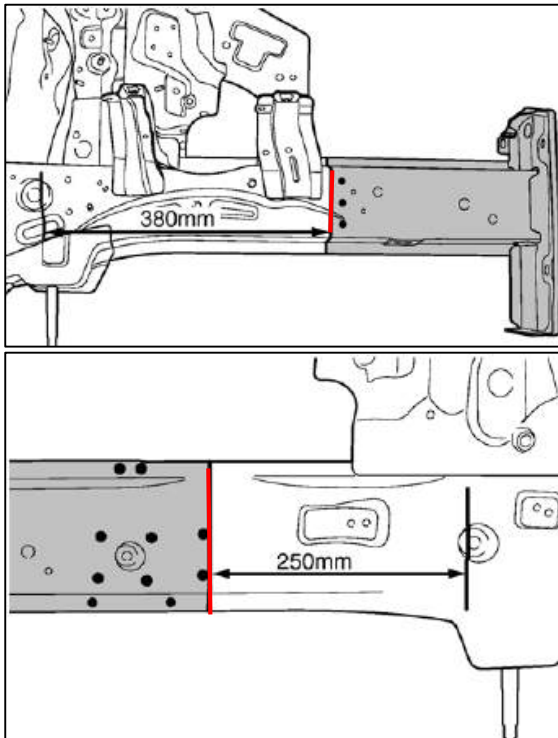
The BRM for the Carens has some good partial replacement options.



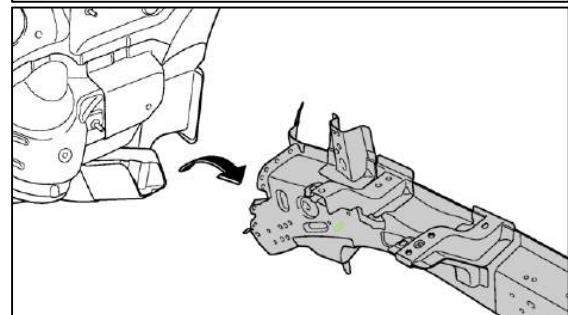
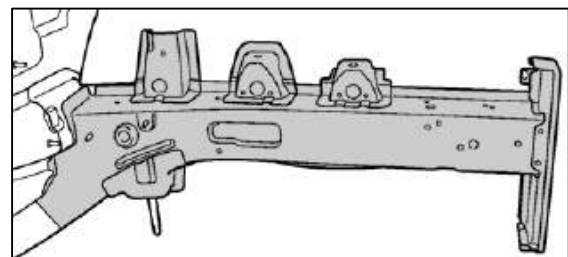
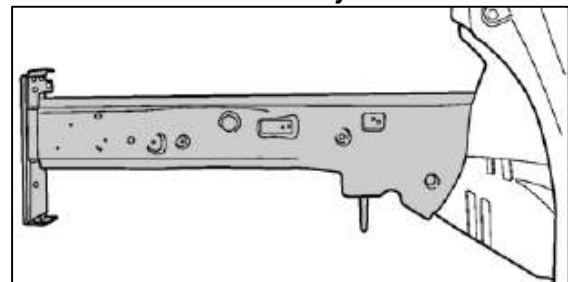
Carrier mounting bracket



Front rail front cut

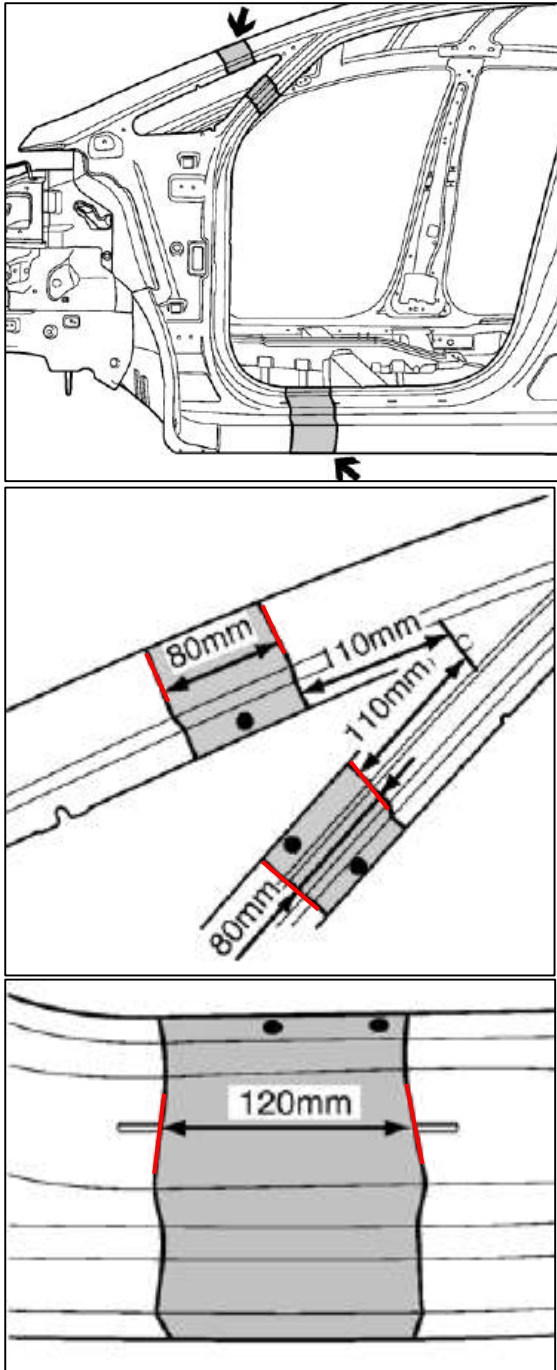


Rail to Bulk-Head at OEM joint

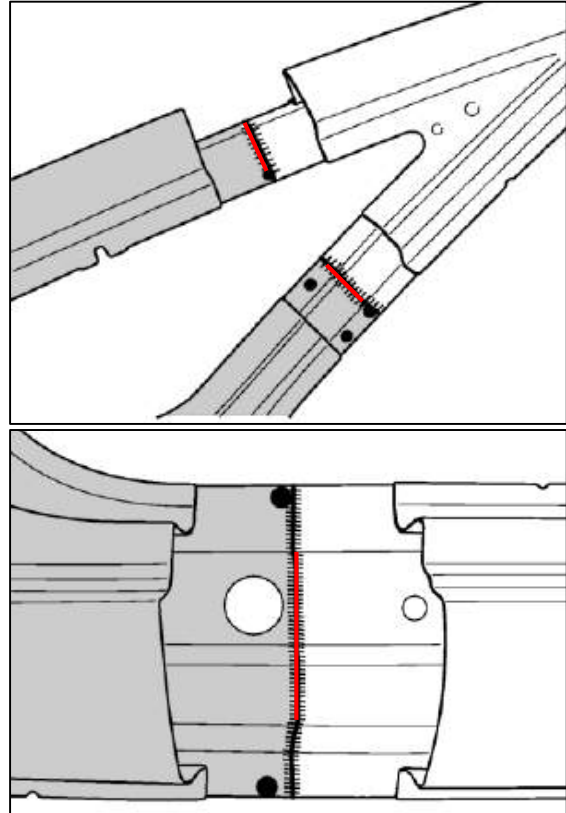


A Pillar

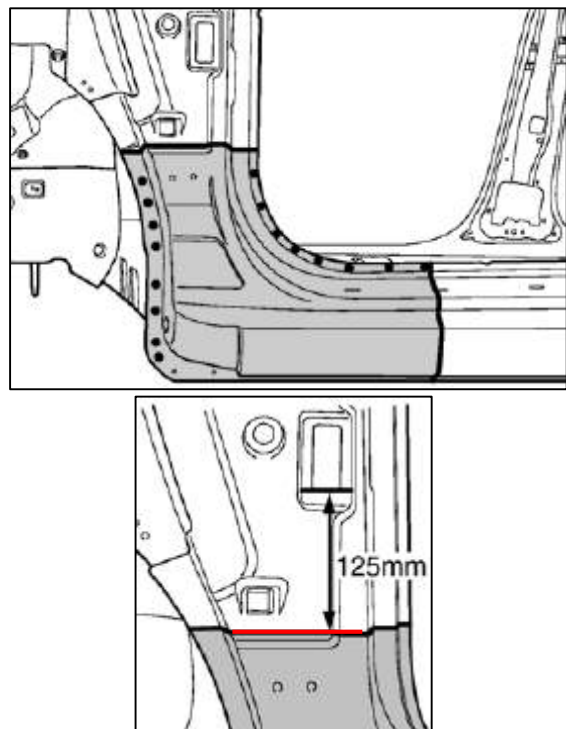
The A pillar has 17 pages of instructions. If fitting the reinforcement get the full repair method. The Carens also has a lower A Pillar and reinforcement option.



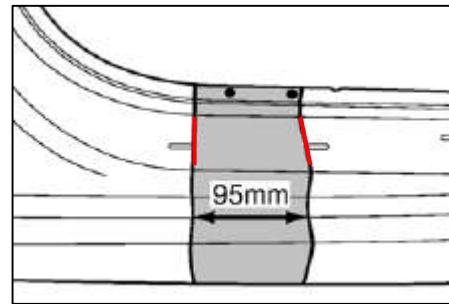
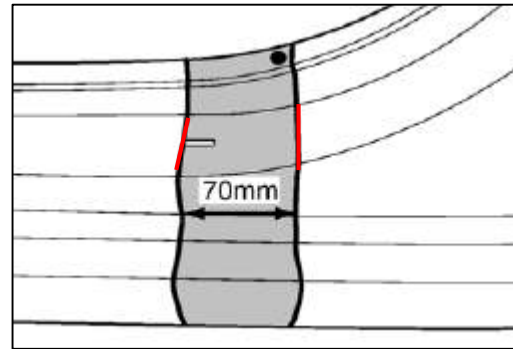
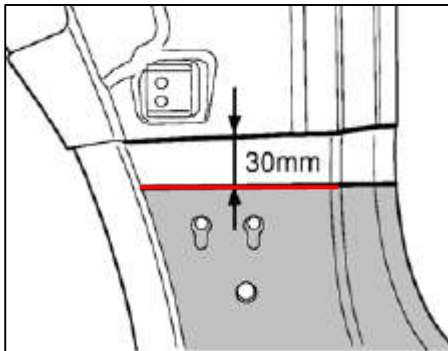
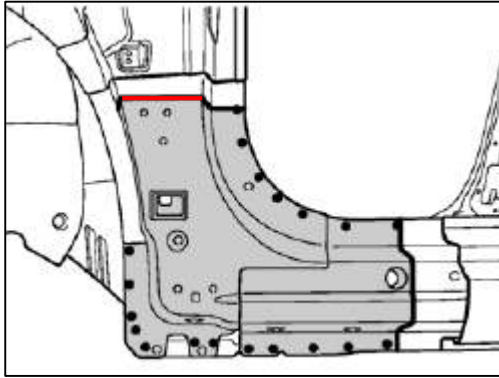
A Pillar Reinforcement joints



Lower A Pillar only option

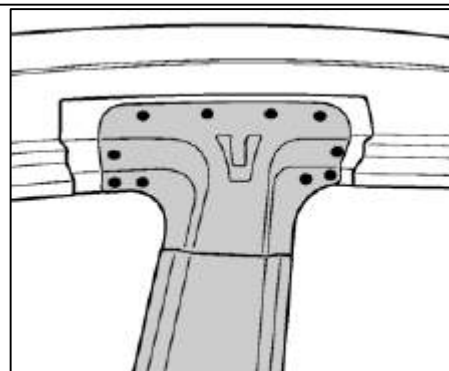
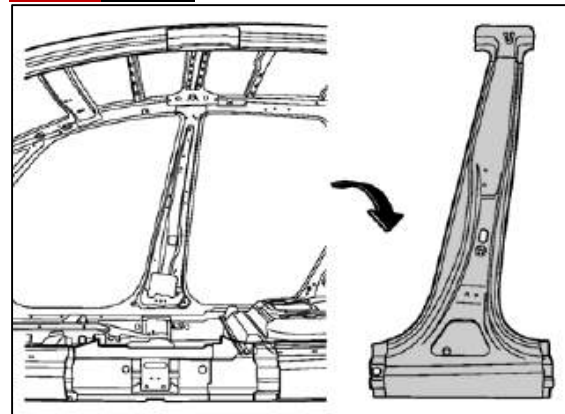
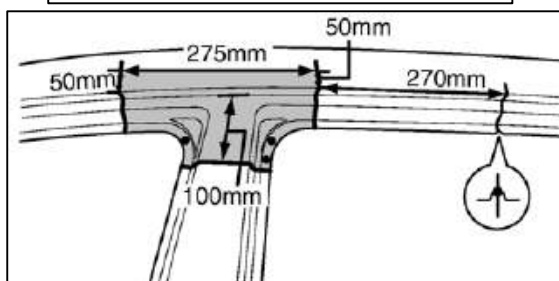
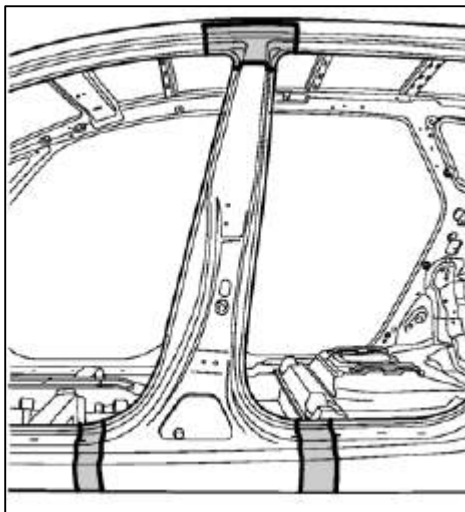


Reinforcement

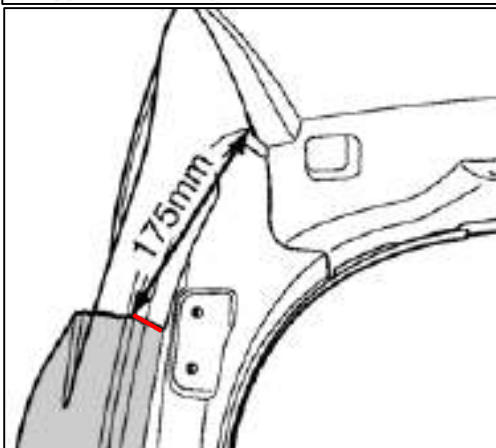
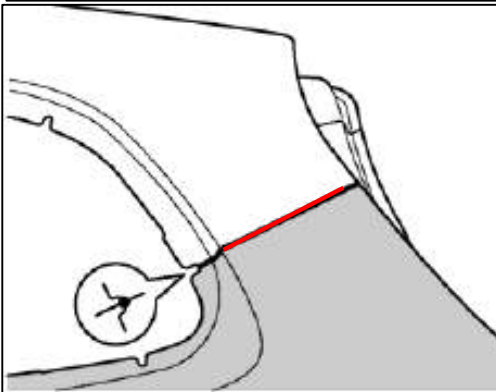
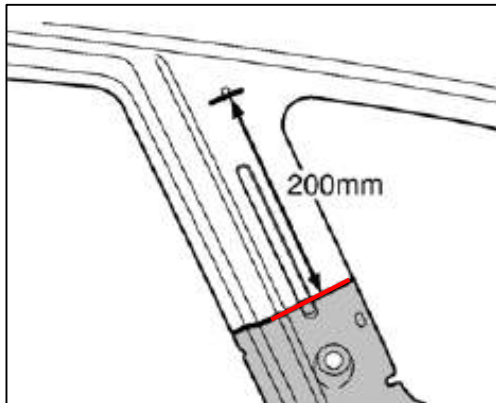
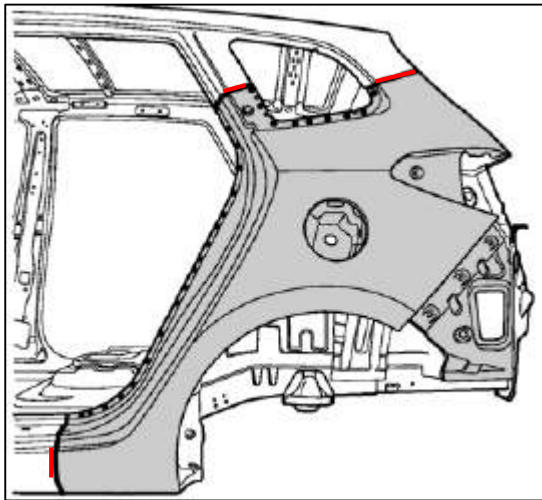


Reinforcement requires full replacement.
Do not section.

B Pillar outer

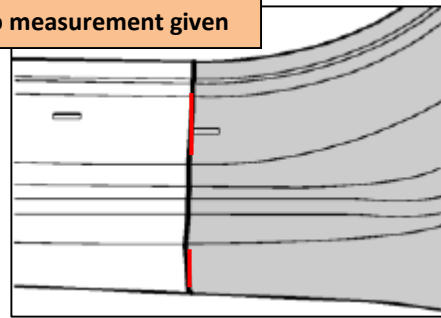


Rear quarter panel

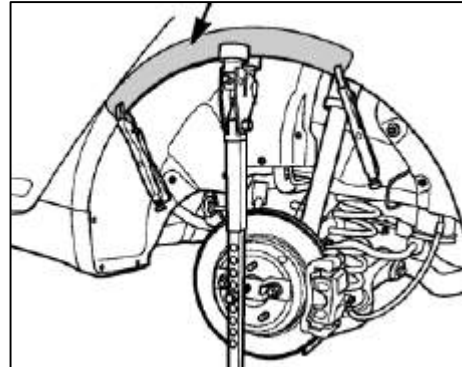


Rear quarter continued

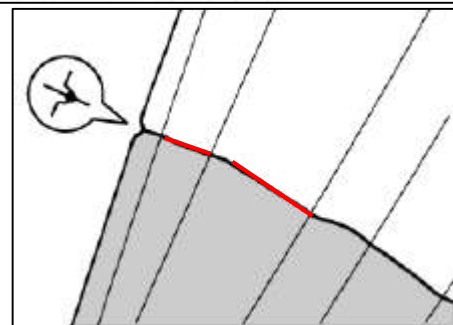
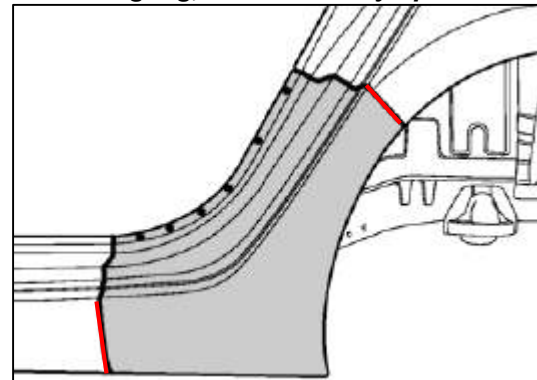
No measurement given



Hemmed wheel arch

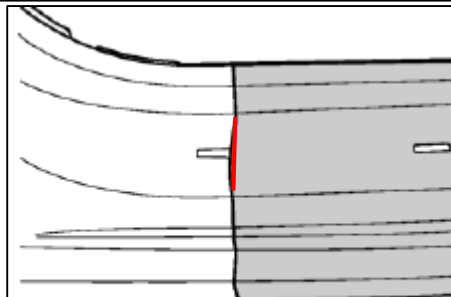
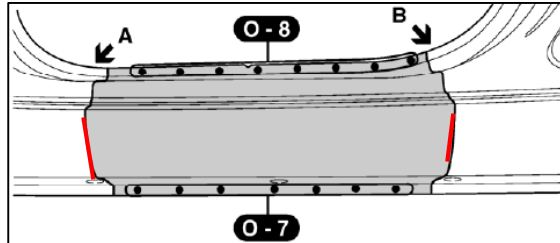


Lower dog-leg, has outer only option

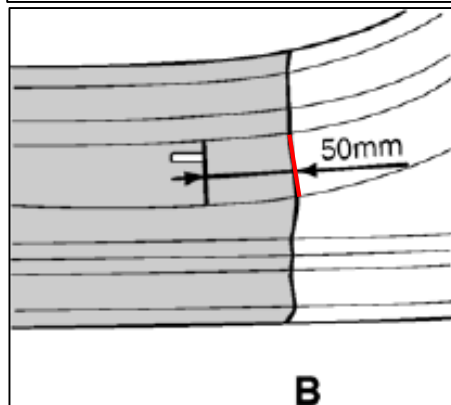


Sill panel

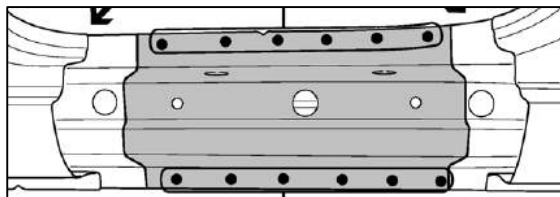
The Carens has limited options for the sill panel; only the section in the front door opening is available. It also has a partial replacement option for the reinforcement (shown in the bottom illustration).



No measurement given

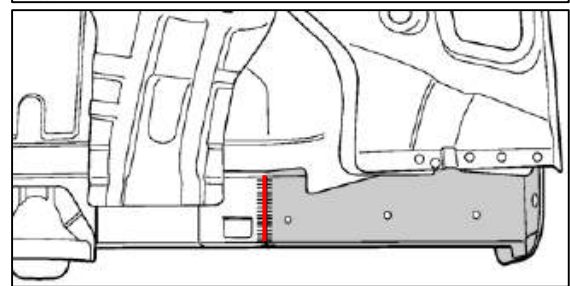
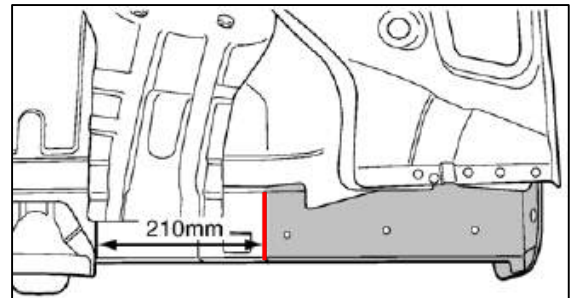
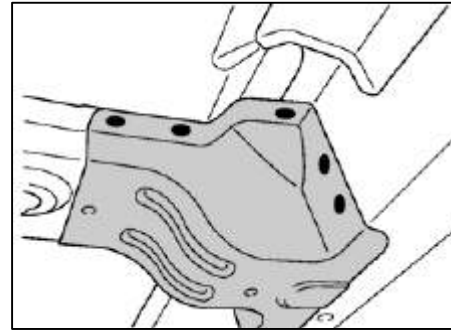


Reinforcement

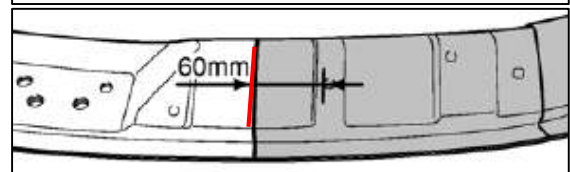
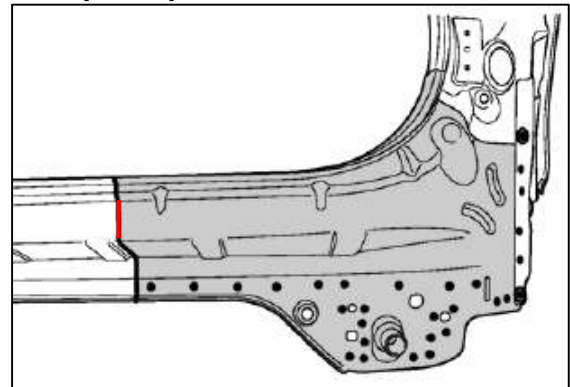


Rear rail

The rear cross-member end cap needs removing to replace the rear section of the rail.

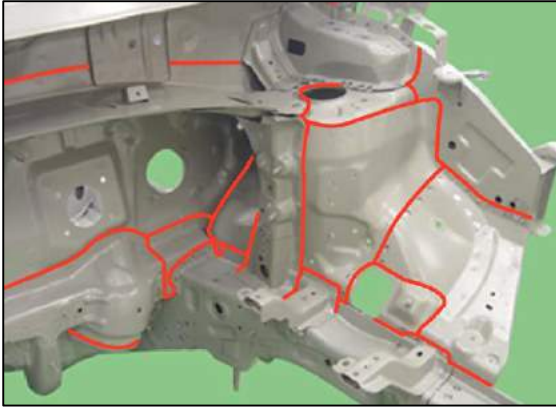


Rear panel partial



NVH Adhesive and sealing

The BRM for the Carens has very detailed illustrations of sealing and anti-corrosion requirements however NVH foams and adhesives are not included.

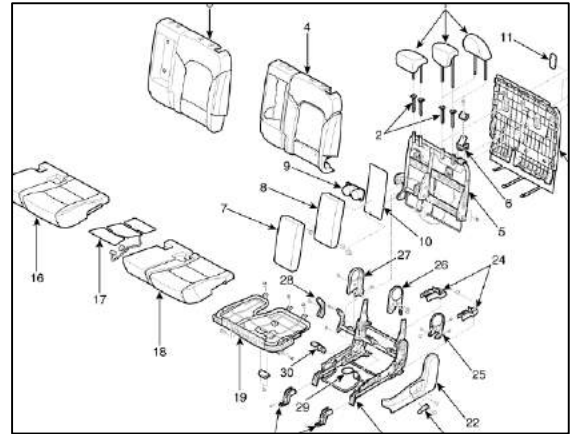
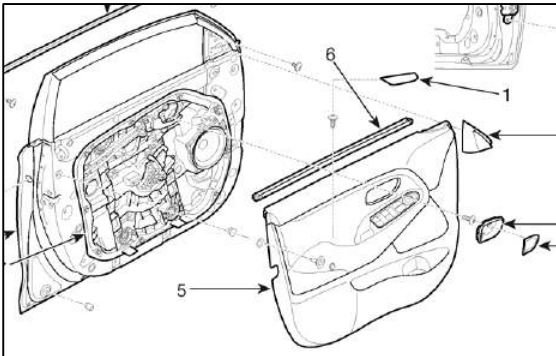


Additional BRM information

The Carens BRM has very detailed information on topics not often found in manuals such as the removal procedure for interior trims, door trims and window mechanism's, bonnet and boot panels.

The seats are shown in detail along with a full section that covers all seat belts and the installation requirements.

The illustrations below show an example of the door trim and seat construction information that is in the BRM.



Overview

The Carens has some good repair options along with some very detailed additional information not always shown in the BRM. It appears that more information is now being included for each new model produced.

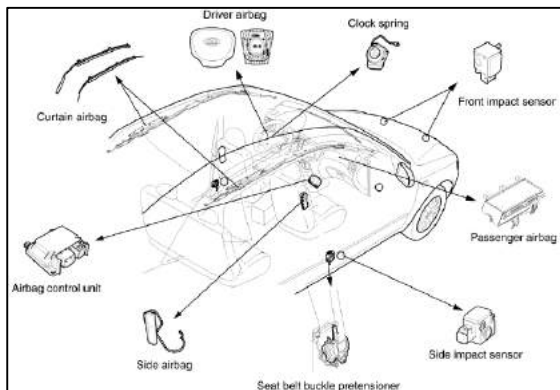
Sportage (SL) ★★★★★



SRS Air-Bag

Refer to the SRS Air-Bag cautions information in general information Module 1.

The illustration below shows the Air-Bag components used in the Sportage, note the pressure sensor for side impact?



Side panels available

The illustration below shows the partial side panel sections available for the Sportage. The BRM has a full breakdown of all panels used for the Sportage body.

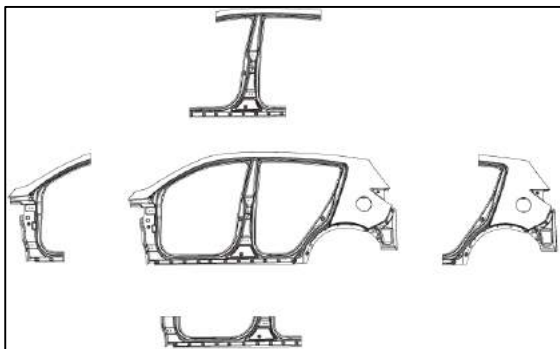
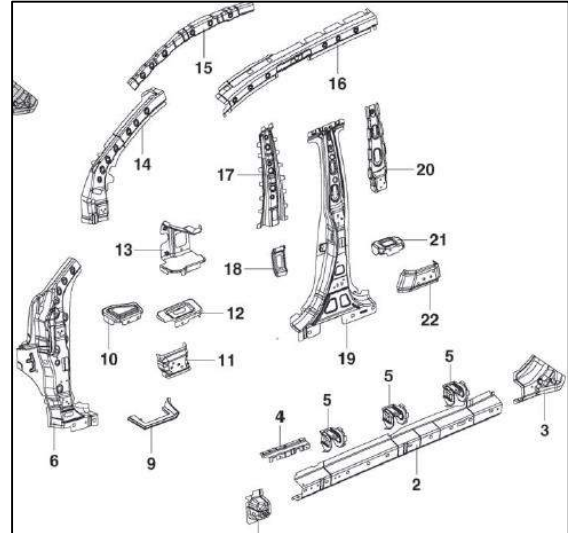
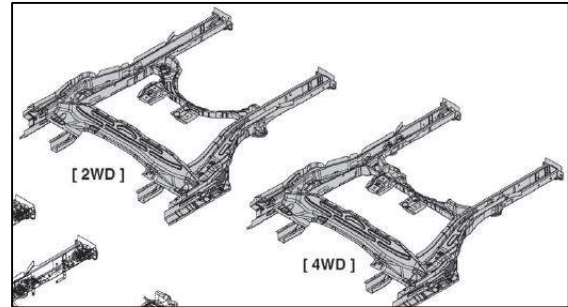


Illustration showing side panel breakdown



There are differences between the 2 and 4 wheel drive

Take care when ordering parts.



Tightening Torques

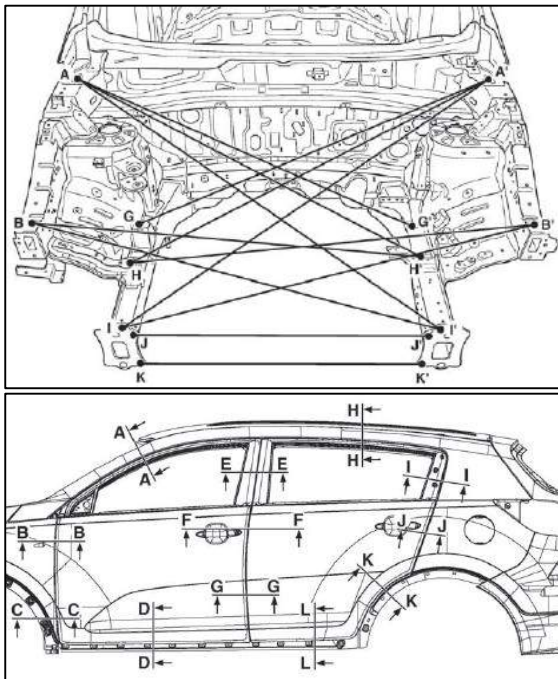
Torque settings for bolt on parts are not given in the BRM so refer to the Kia dealership workshop manual.

Steels used for the Sportage body

Steel grades used for the Sportage are not shown in the BRM so be sure to follow the recommended repair method shown if replacing welded panels.

Panel gap and body measurements are given in the BRM

The following illustrations are an example of the information provided.



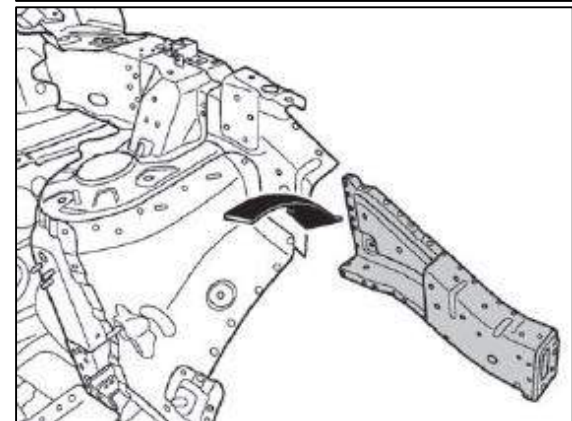
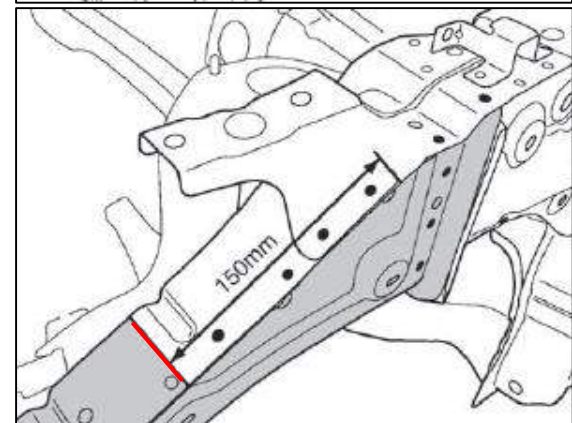
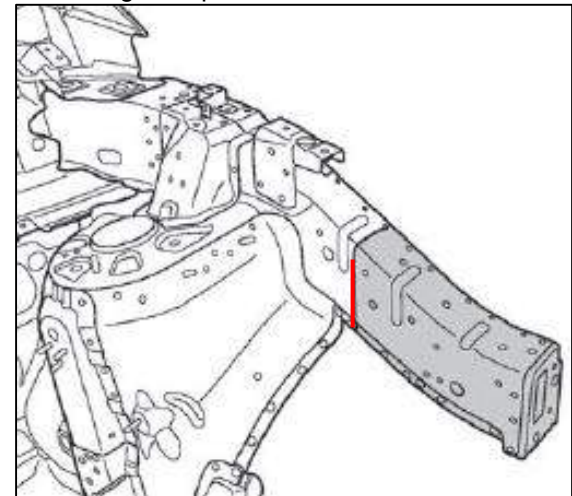
Partial replacement options

The BRM for the Sportage has some good partial replacement options.



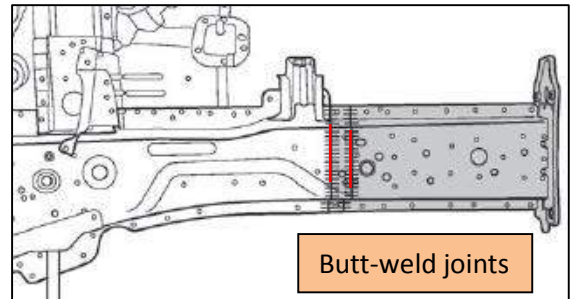
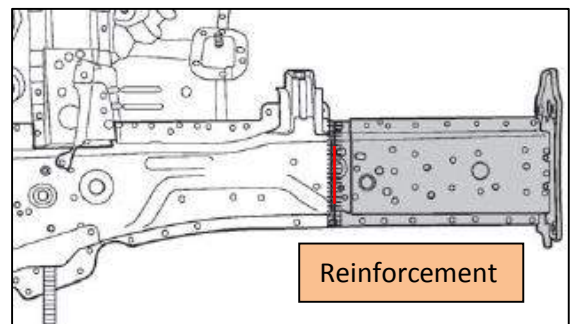
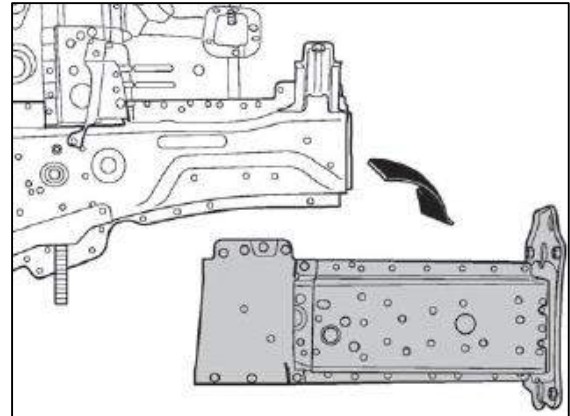
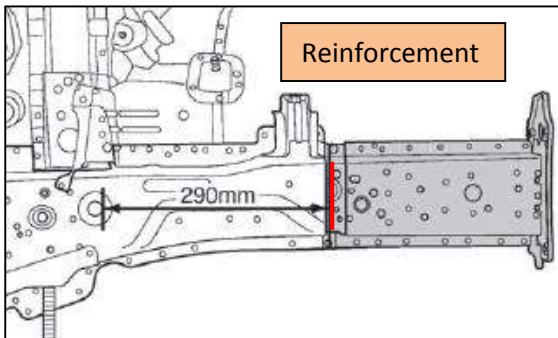
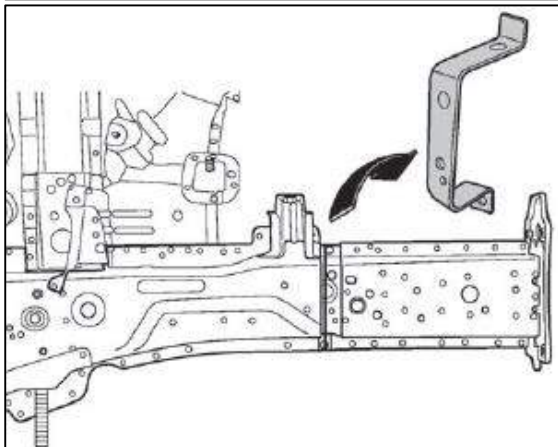
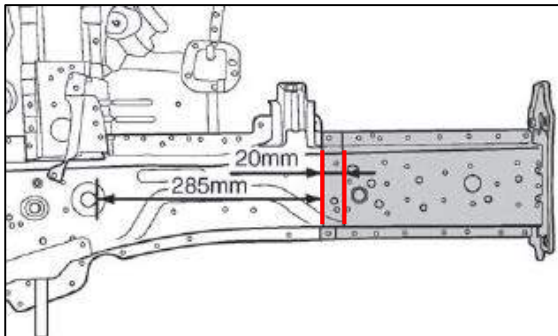
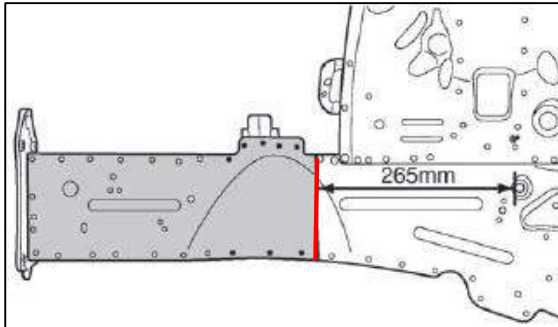
Front apron upper support

This is a good option.



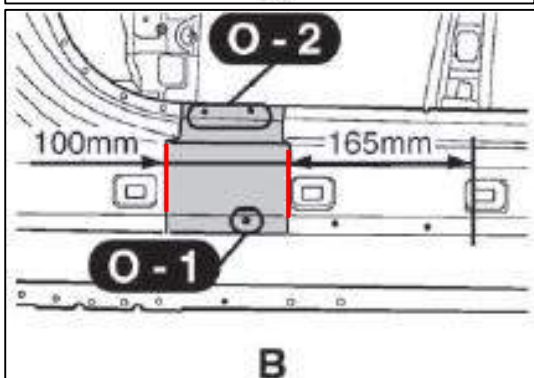
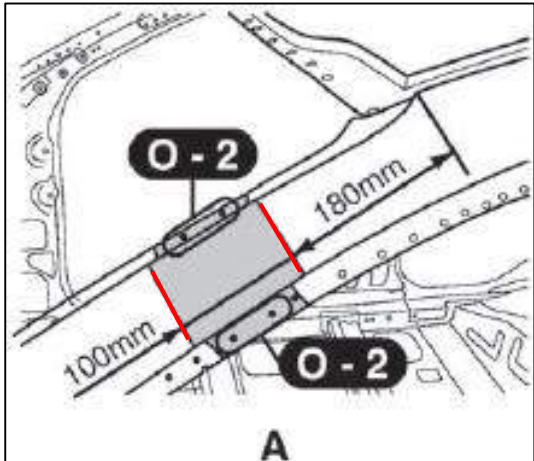
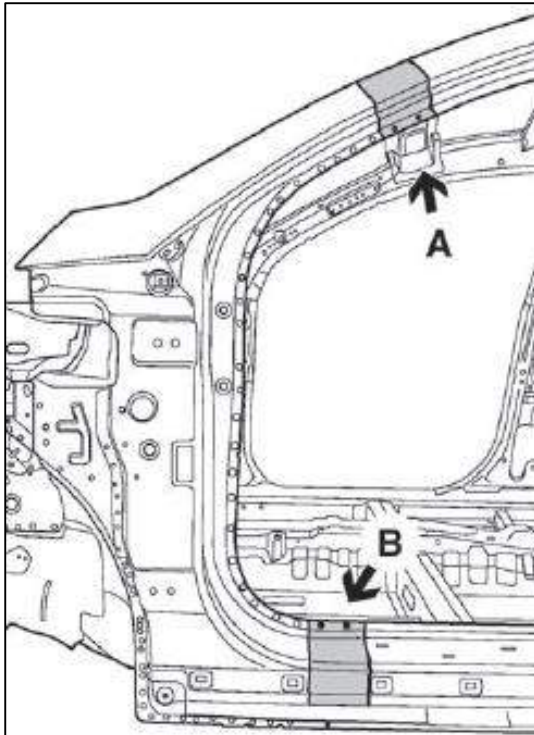
Front rail

Front rail requires a window cut out for access to the reinforcement.

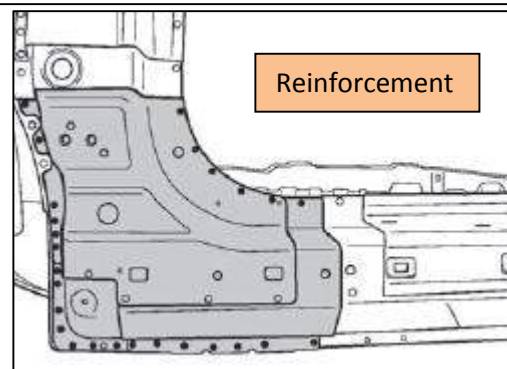
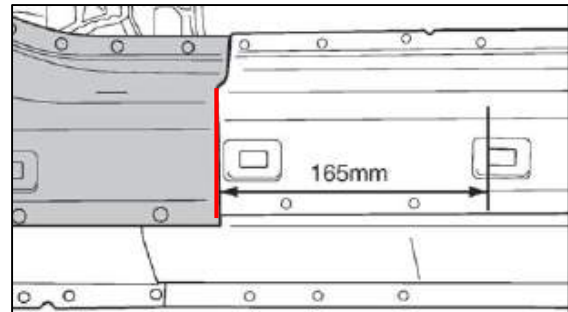
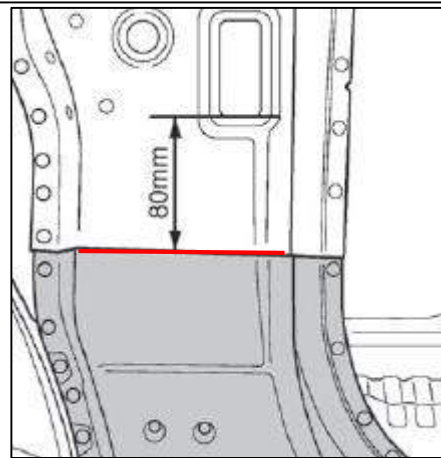
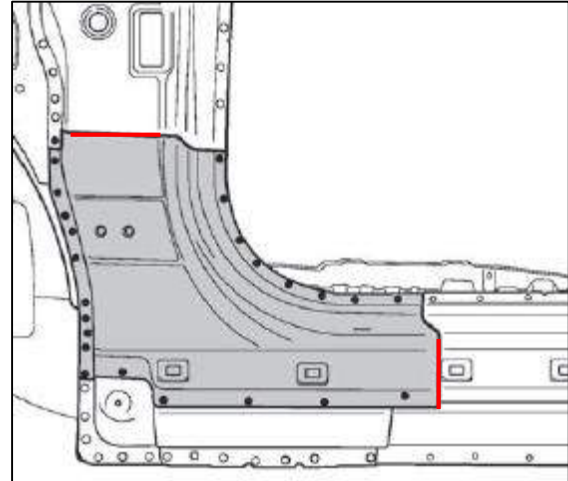


A Pillar

The A Pillar has a 3 layer sectioning joint, so get the full repair method if fitting an A Pillar reinforcement. The Sportage also has a lower A Pillar and reinforcement option.

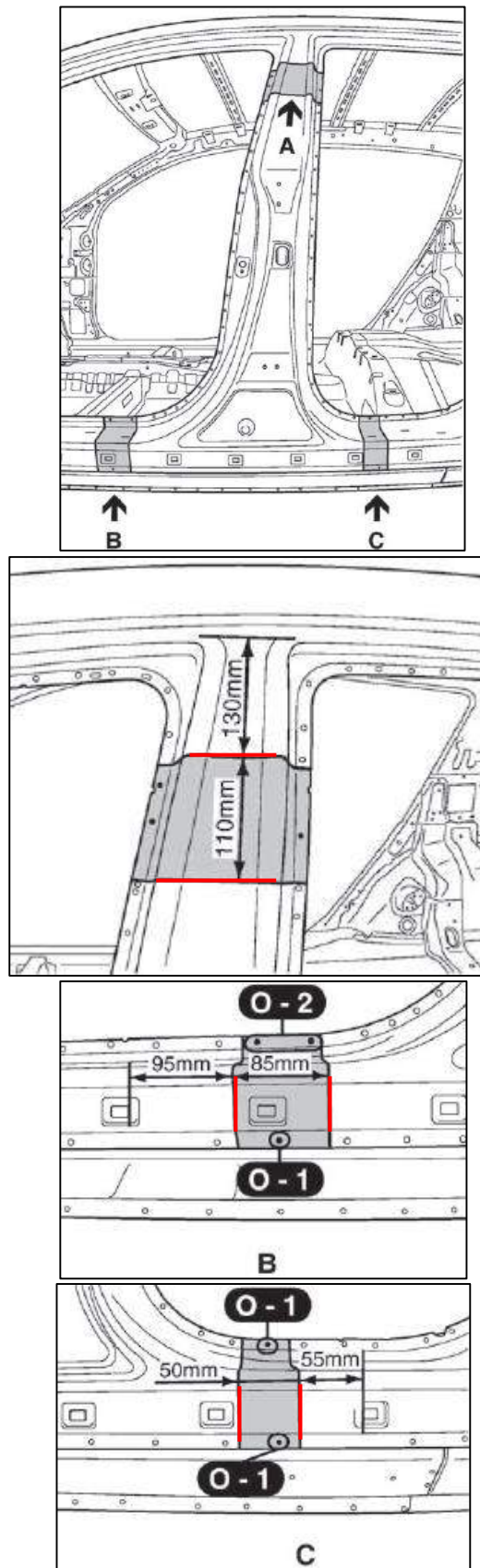


A Pillar continued

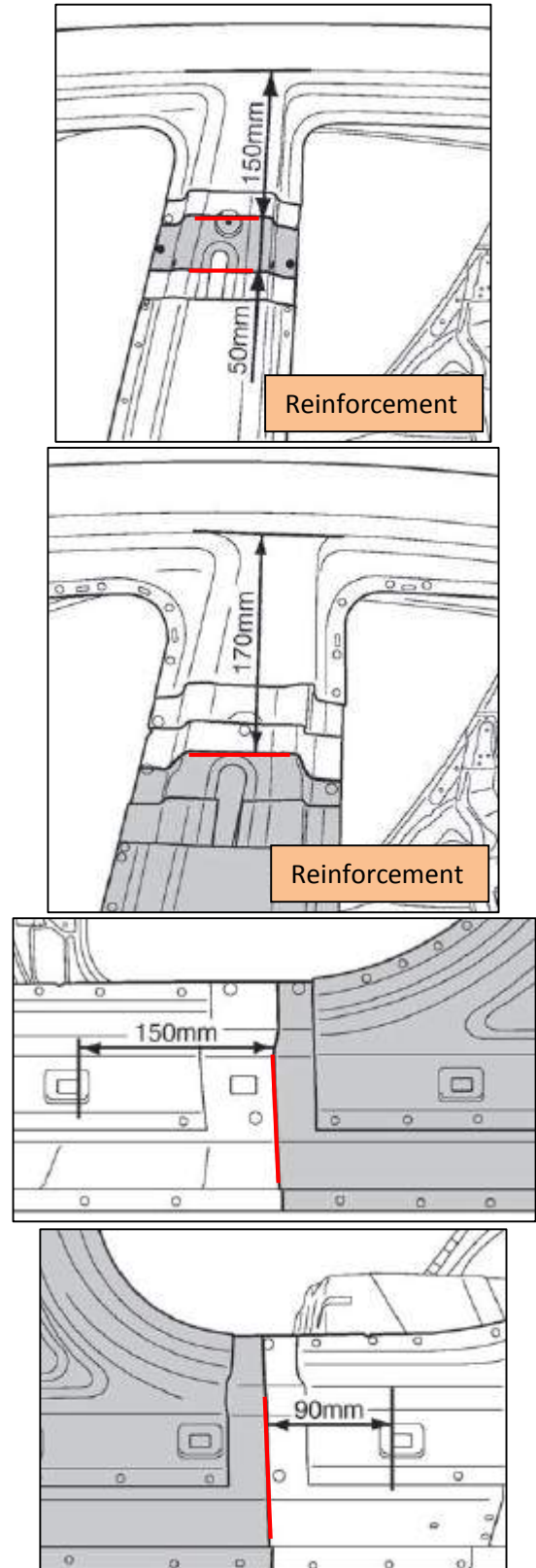


B Pillar

The B Pillar inner and outer can be sectioned; this requires cutting windows in the upper pillar and sill panels. The upper joint is 3 layers.

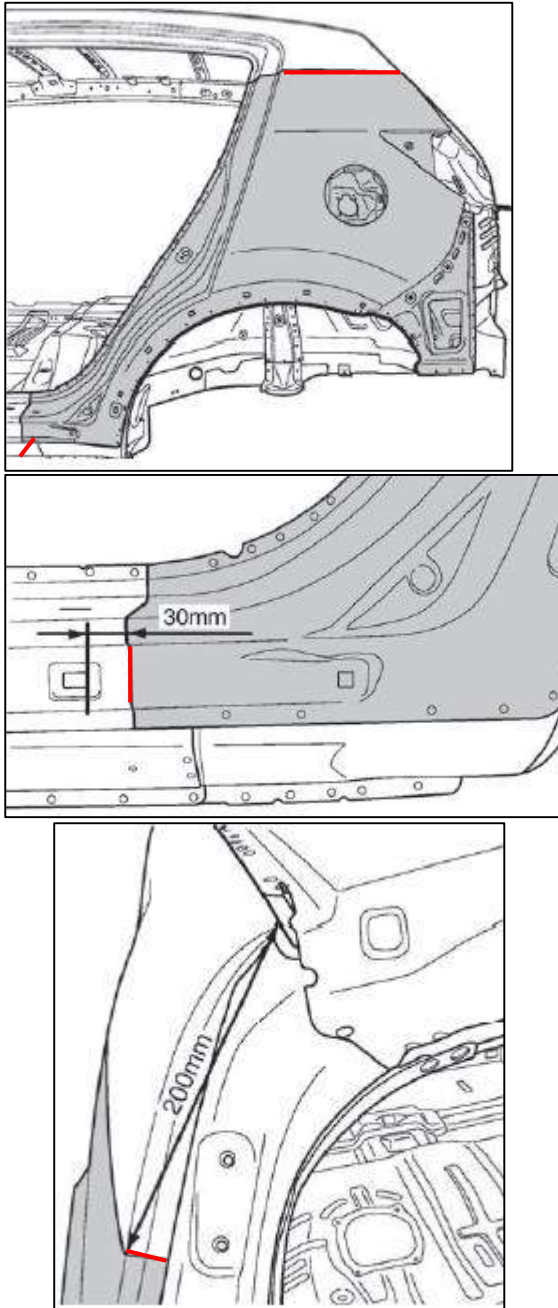


Inner reinforcements



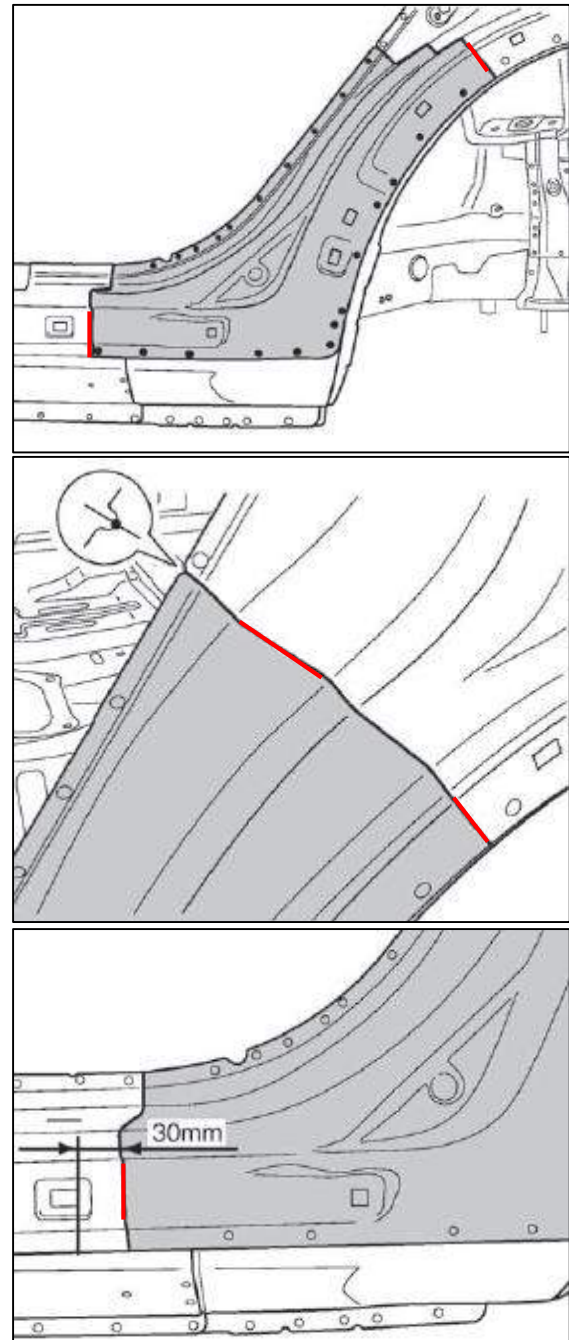
Rear quarter panel

Rear quarter panel also has a lower dog-leg only option.



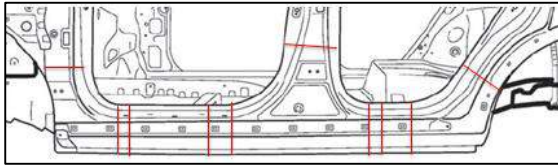
Lower dog-leg option

Outer panel only option; no option shown for sectioning the reinforcement.

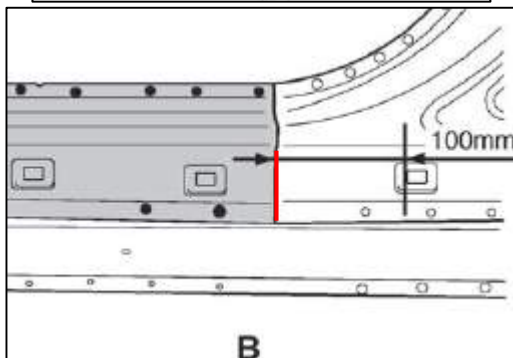
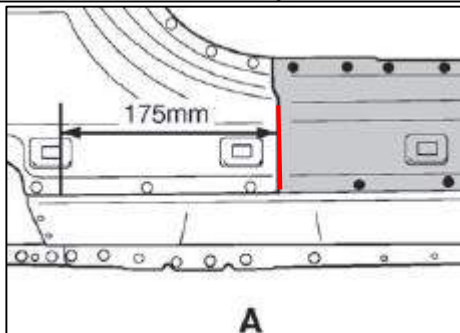
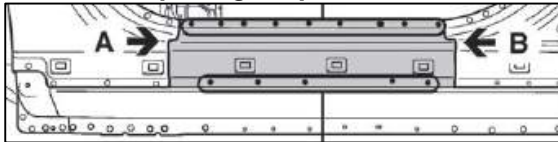


Sill panel

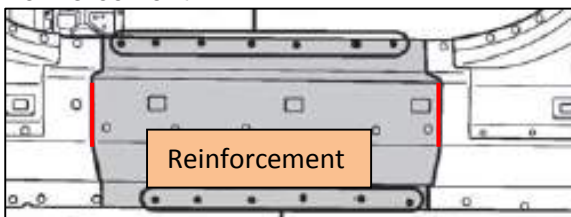
The Sportage has a good range of sill replacement options.



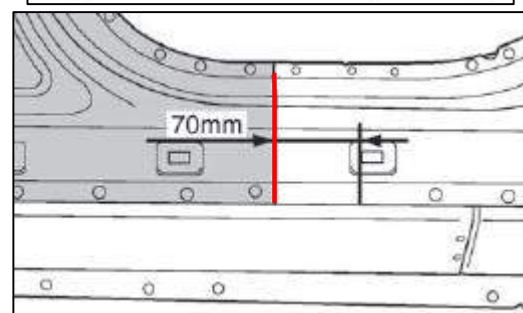
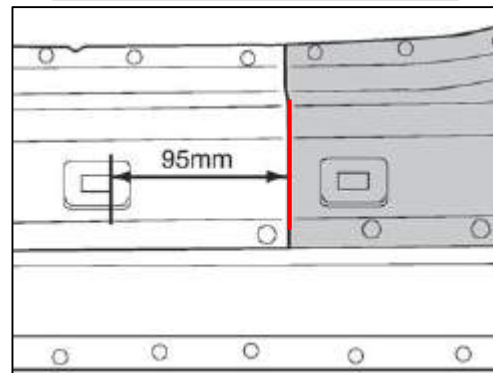
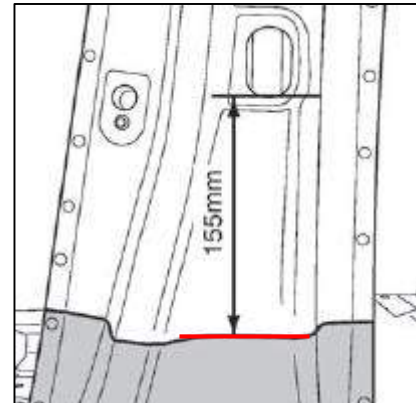
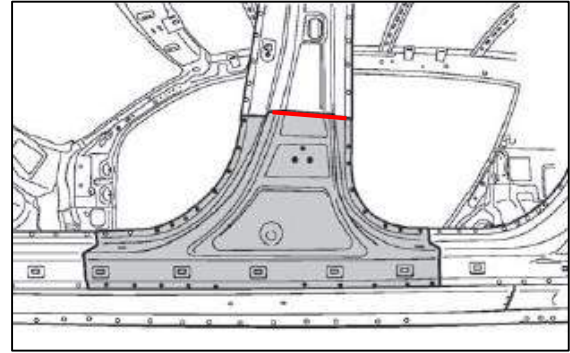
Front door opening sill panel



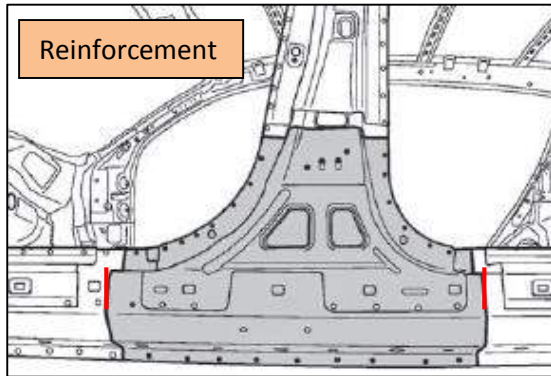
Reinforcement



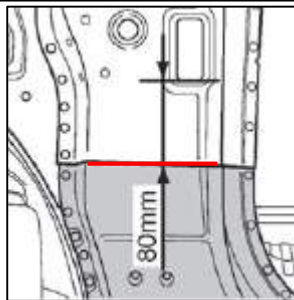
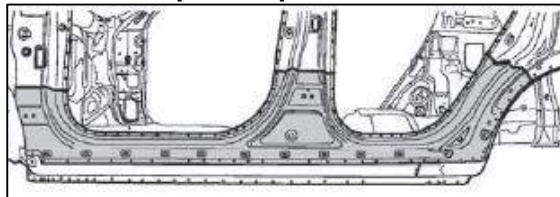
Lower B Pillar and sill section



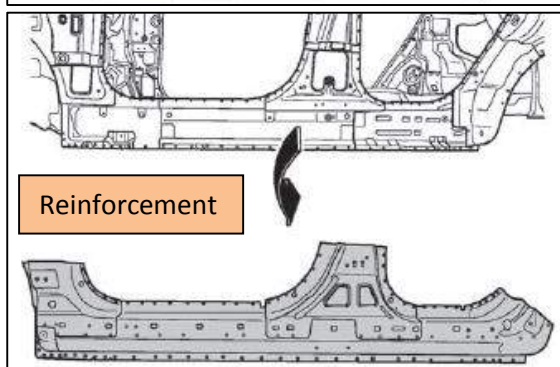
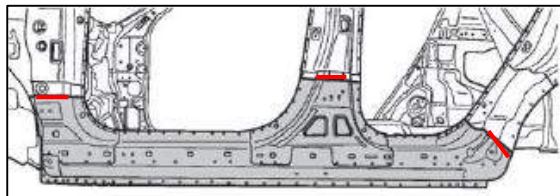
Lower B Pillar reinforcement



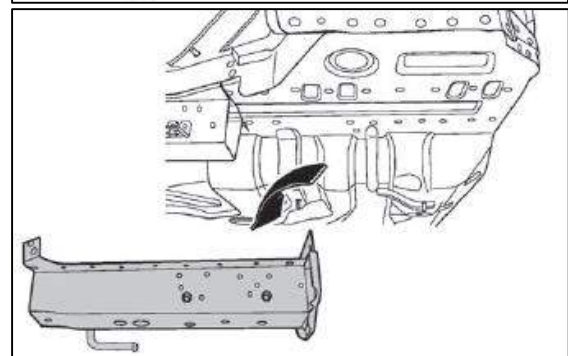
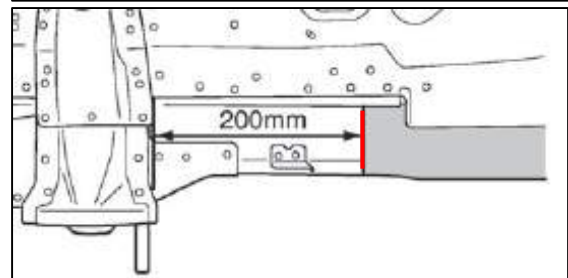
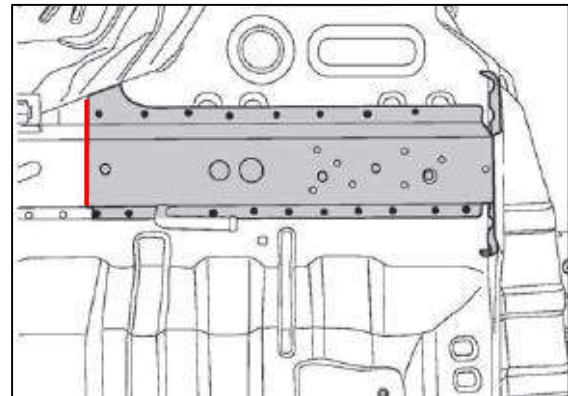
Full outer sill panel replacement



Reinforcement



Rear rail



NVH and adhesives

NVH and adhesives are not shown in the BRM however it does have a detailed section on sealing and corrosion protection application.

Overview

The Sportage has some good repair options; this is perhaps because the steels used don't limit what can be sectioned?

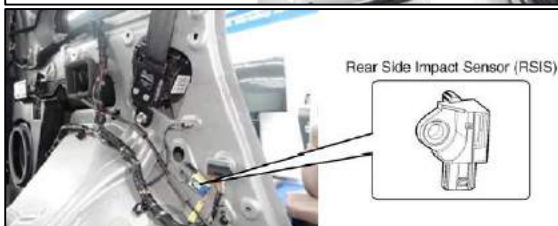
Sorento (UM12) ★★★★★



SRS Air-Bag

Refer to the SRS Air-Bag cautions information in general information Module 1.

The illustration below shows the Air-Bag used in the Sorento, also shown are the side impact sensor mounting locations, note the pressure sensor for side impact?



Adhesives used in the Sorento

Kia; Operation Procedures and Cautions in Using Epoxy Adhesives

Products stated in the BRM are (3m-PN8115) and (HENKEL–Terokal 5055)

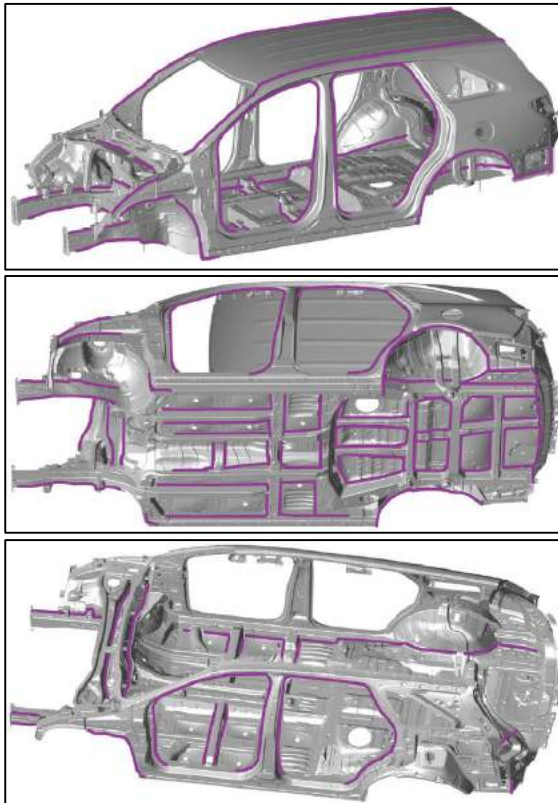
Be sure to follow the instructions of the product you use

Kia

1. Heat up the adhesive face on the panel to remove it. Heating temperature should be in the range of 110°C - 140°C. Use a torch or a heating gun.
2. Using a scraper, completely remove the remaining adhesive on the panel.
3. Using #50 - #80 sand paper, neatly grind off the adhesive area. Any remaining paint or surfacer must be removed from the adhesive area.
4. After grinding, clean the surface with a cleaner (adhesive cleaner). Cleaning the epoxy adhesive area is important as dust or oiliness may greatly decrease the adhesive strength.
5. Follow the same procedure of removing the paint and cleaning with a cleaner when applying adhesive on new panels.
6. Apply a light coat of adhesive on new panels or body panels, and then use a scraper to apply a second coat as thin as possible so that the metal surface is not visible (Skin coat). Ordinary adhesives are two-component types where the resin and hardener are filled in separate cartridges before being released from a nozzle or a gun. As the nozzle used for two-component type adhesive may harden after approximately 60 minutes without application, in case of delayed application, replace with a new nozzle. Check that the resin and hardener in the adhesive are released simultaneously before mounting the nozzle to the adhesive gun. This is important as non-simultaneous release of resin and hardener may affect the hardening process.
7. Use the adhesive for a secondary application. The adhesive strength is generated on the panel in the secondary application in which the adhesive should be applied in a width of approximately 10mm. Apply in a width of 5 to 6mm on flange areas.
8. Mount the panel onto the body.

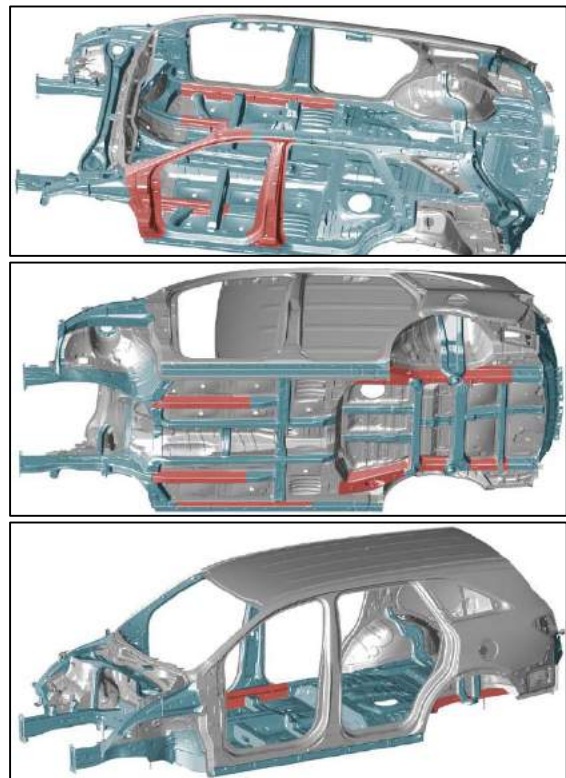
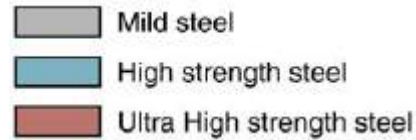
9. After mounting the panel, use a clamp to firmly fix it so that there are no gaps or shaking. While the gaps and clearing of the panel may be adjusted before the adhesive is dry, caution is needed as adhesive must be applied again in case the mounted panel is detached. Maintain a distance of approximately 100 ó 150mm to the panel fixing clamp.
10. Using a scraper, remove any leaking adhesives during mounting process. As the adhesive is difficult to remove after it has been hardened, it must be removed before hardening.
11. Heat up the panel to harden. The adhesive is heat hardening type; it must be heated to harden.

Illustrations show where adhesive is used



Steels used for the Sorento body

HSS is used for the doors, boot lid, bonnet, guards and most all other structural panels. UHSS is shown for the Sill, A and B Pillar reinforcements plus the under floor and rear rails with mild steel used for side aperture and roof panels.

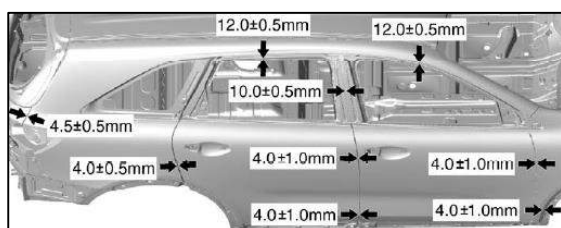
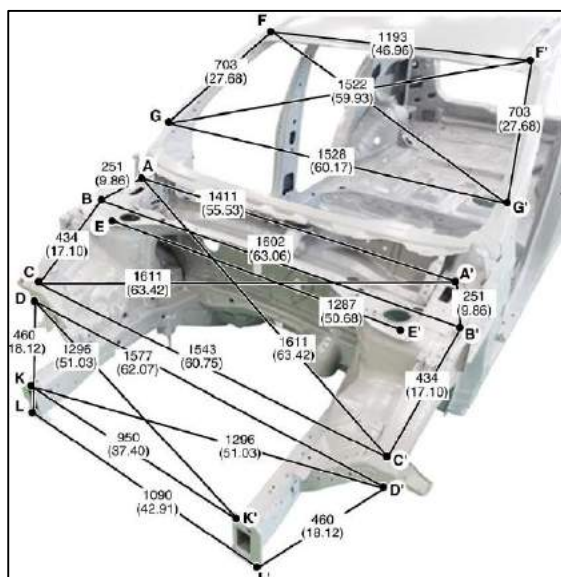


Welding

When a damaged ultra high strength steel panel is replaced with a new one, spot welding should be used, if possible. Apply the epoxy adhesive and then carry out spot welding.

Measurements and panel gaps

These are shown in the BRM with good illustrations.



Torque settings

Some of the settings for the front suspensions are shown in the example below. The BRM also has the wheel alignment settings.

Tightening Torque

Front Suspension

Tightening torque (kgf.m) Nm kgf.m lb-ft

Tire wheel hub nuts 88.3 ~ 107.9 9.0 ~ 11.0 65.1 ~ 79.6

Strut assembly to knuckle 196.1 ~ 215.7 20.0 ~ 22.0 144.7 ~ 159.1

Strut assembly lock nut 53.9 ~ 73.5 5.5 ~ 7.5 39.8 ~ 54.2

Lower arm to sub frame (Front) 117.7 ~ 137.3 12.0 ~ 14.0 86.8 ~ 101.3

Lower arm to sub frame (Rear) 156.9 ~ 176.5 16.0 ~ 18.0 115.7 ~ 130.2

Partial replacement options

The Sorento has some good options however some of these are very complex. Most of the panel replacement operations require some adhesive but be sure to check the BRM as the adhesive application is very specific.



Example of adhesive application

The following illustrations show the Kia instructions for the adhesive application.

NOTICE

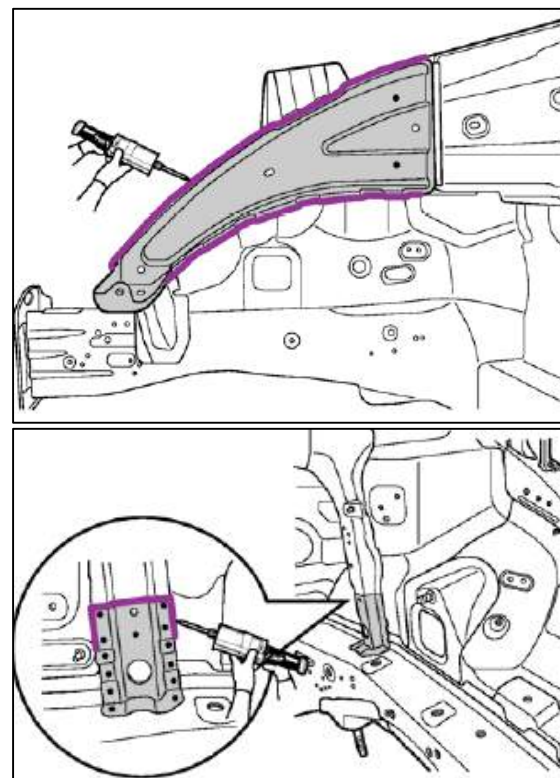
Adhesive

Spot weld and MIG plug weld all holes, MIG lap weld the seam.

If spot welding is impossible, MIG plug weld all holes.

Apply epoxy adhesive to the weld points of new panel or body panel. Be sure to use the recommended epoxy adhesive.

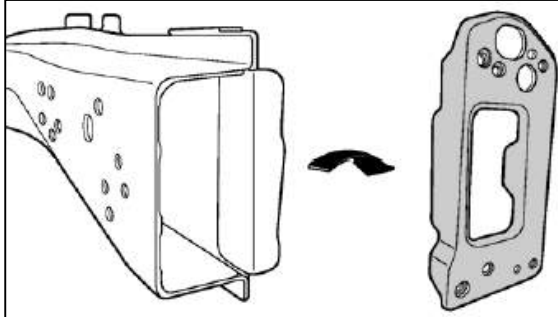
Epoxy adhesive : 3M(PN8115), Henkel (Terokal 5055) or equivalent.



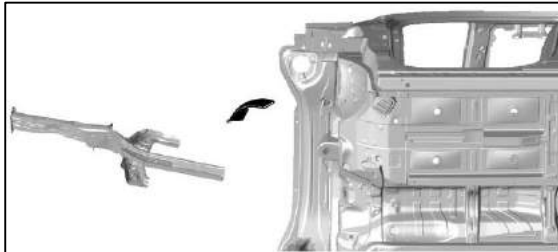
Front rail options

The BRM has 29 pages referring to the front rail replacement options. The following examples look at these options, the joint location and replacement methods required.

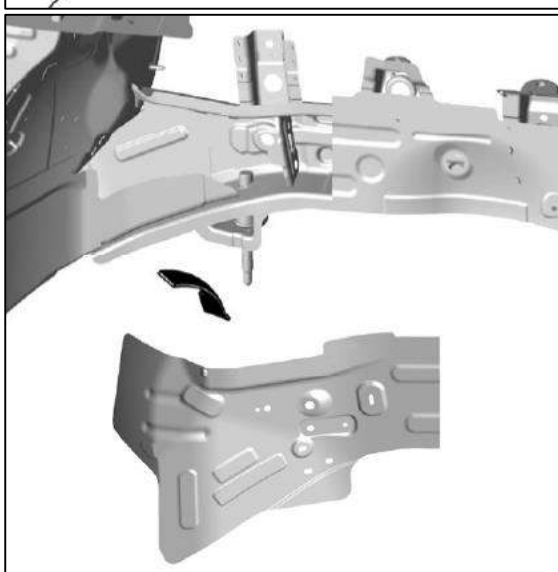
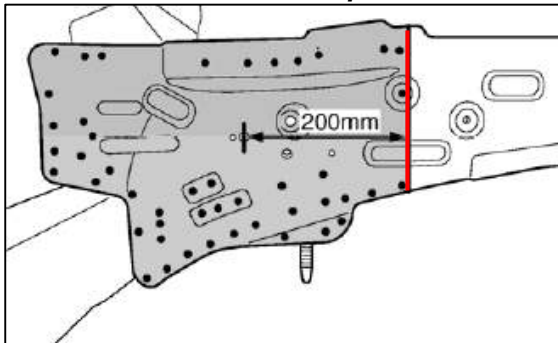
Carrier mounting bracket



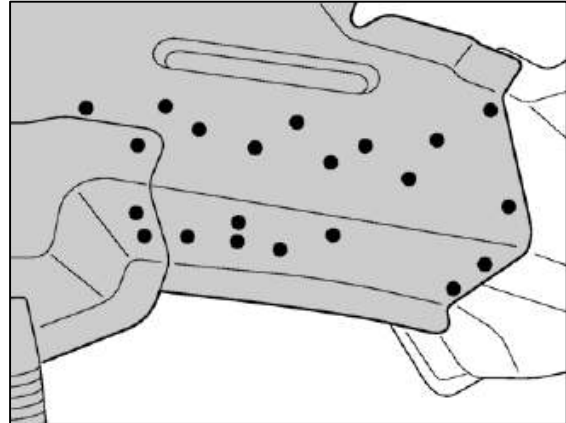
Full rail replacement



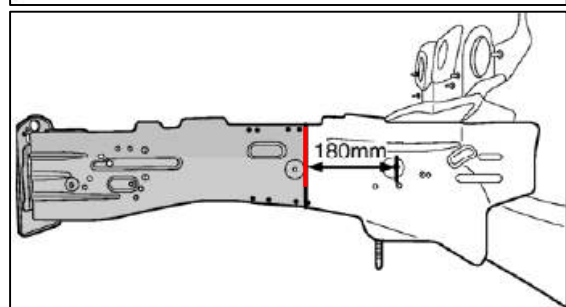
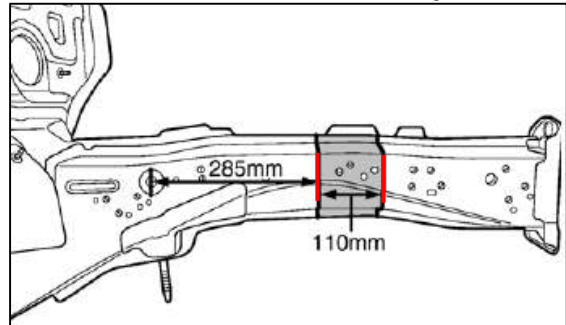
Partial front rail bulkhead option



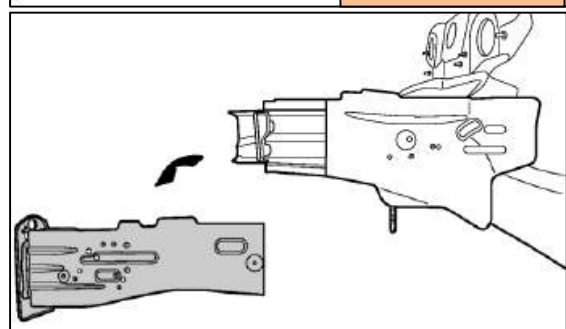
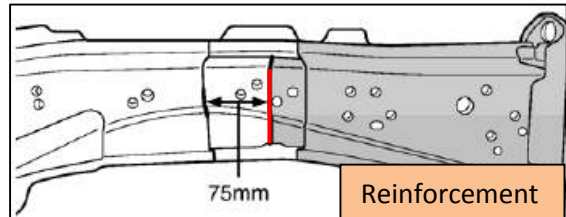
Partial front rail bulkhead option continued



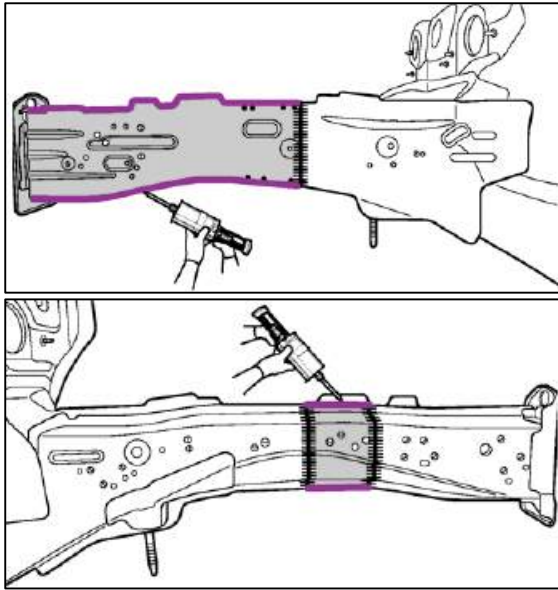
Partial front rail forward section option



Reinforcement cut

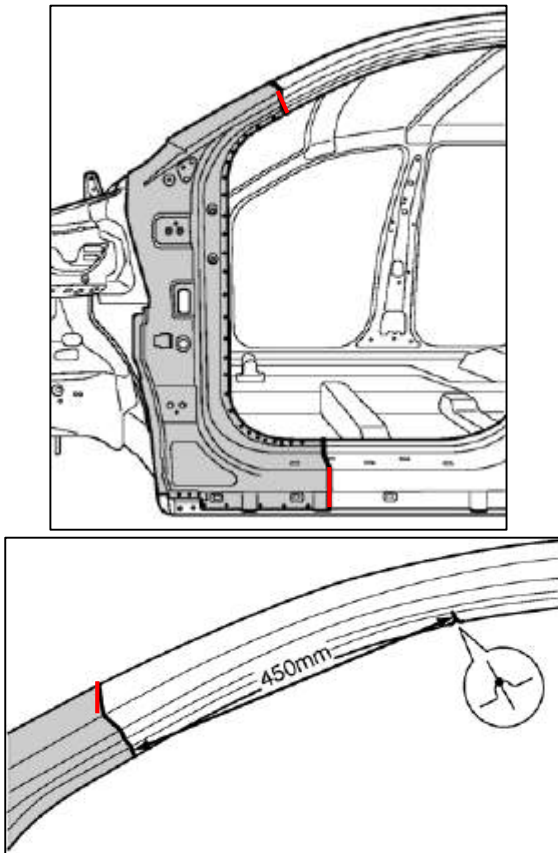


Assembly using weld bonding method

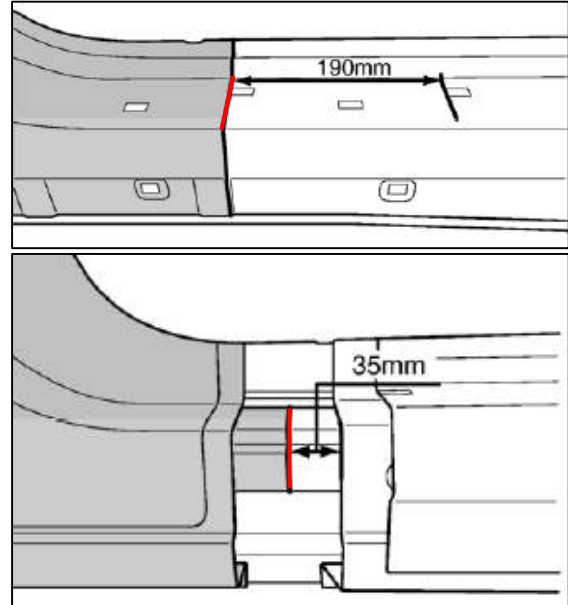


A Pillar option

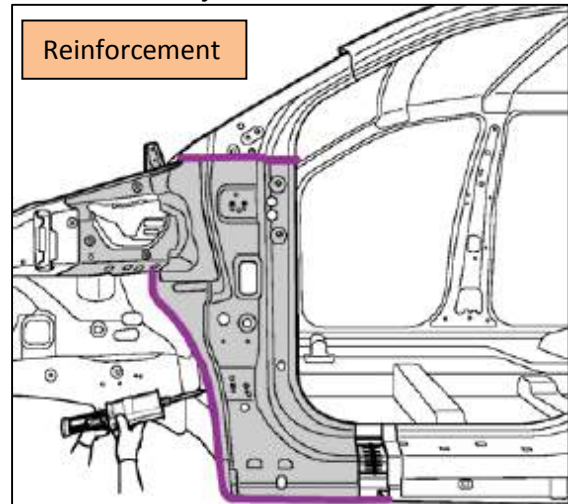
The A Pillar has a 3 layer sectioning joint on the sill panel and the upper joint appears to be single layer. Reinforcements appear to be joined at the upper bulkhead region. Be sure to get the full method if replacing the reinforcement.



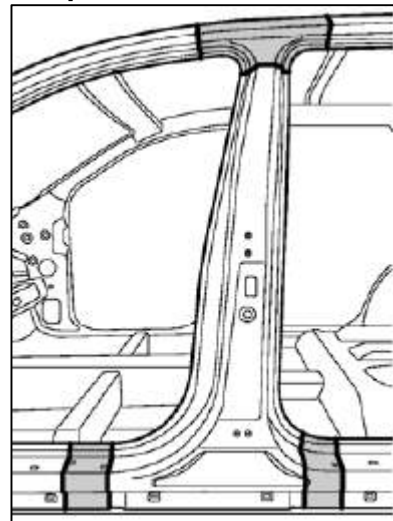
A Pillar continued

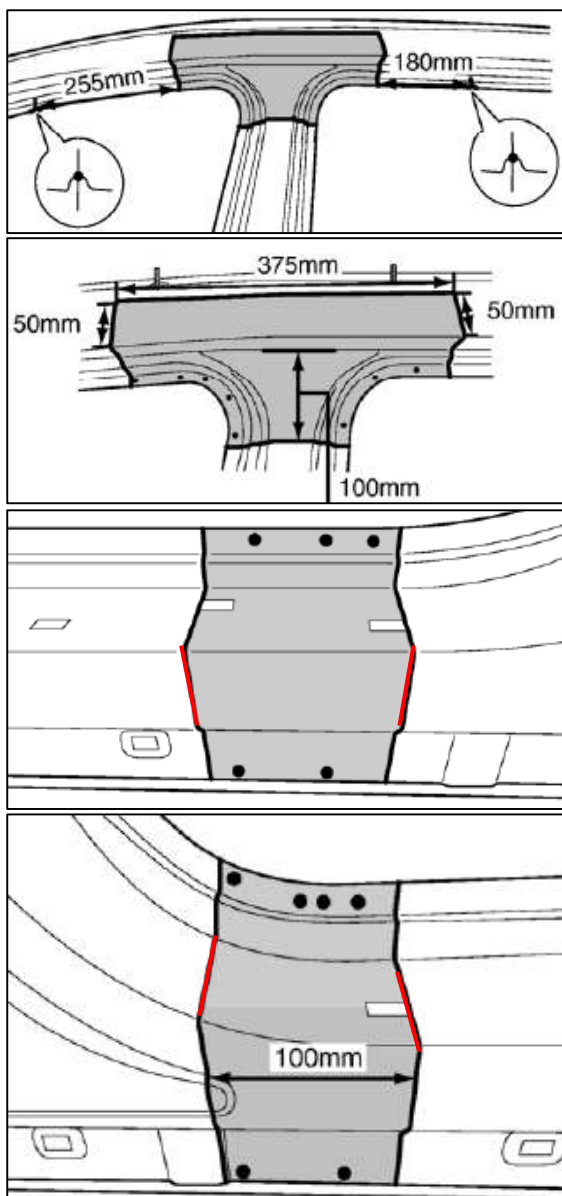


Reinforcement joint location

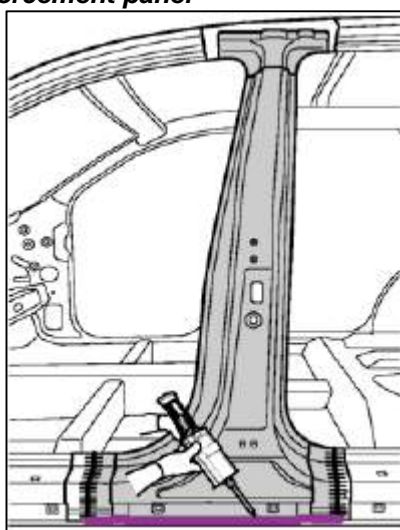


B Pillar replacement

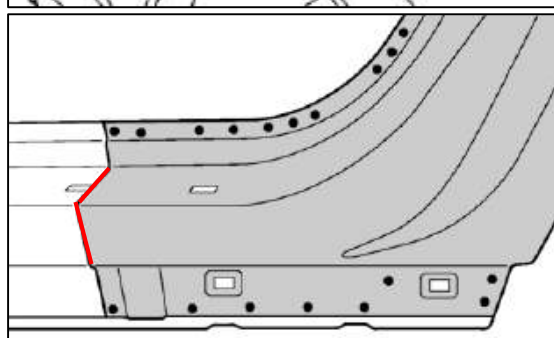
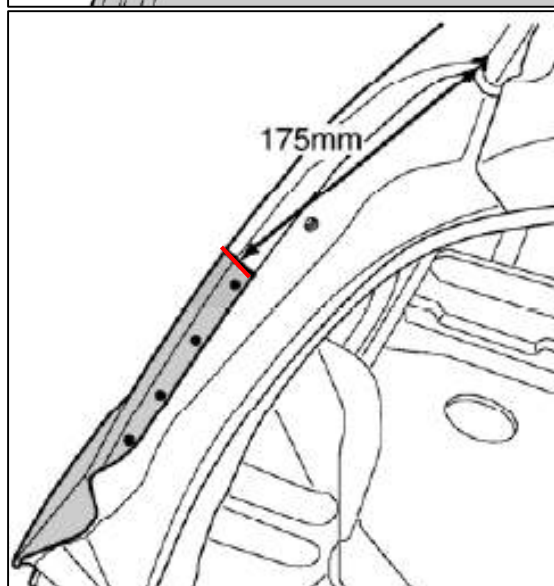
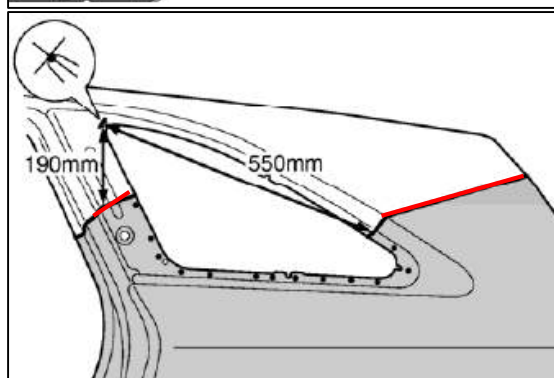
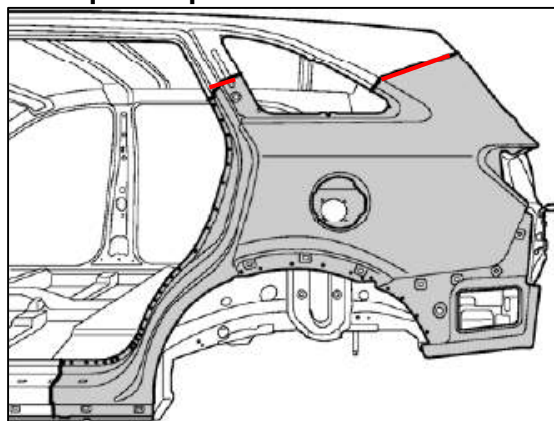




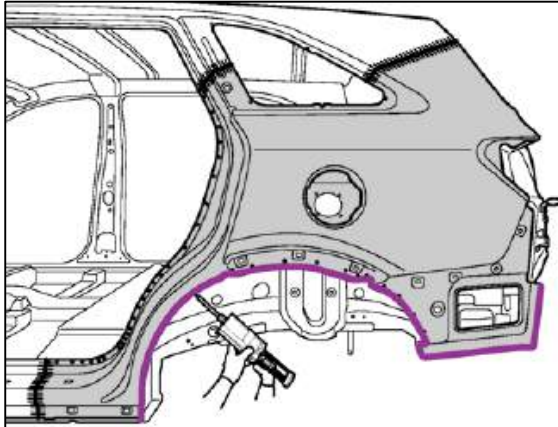
Reinforcement panel



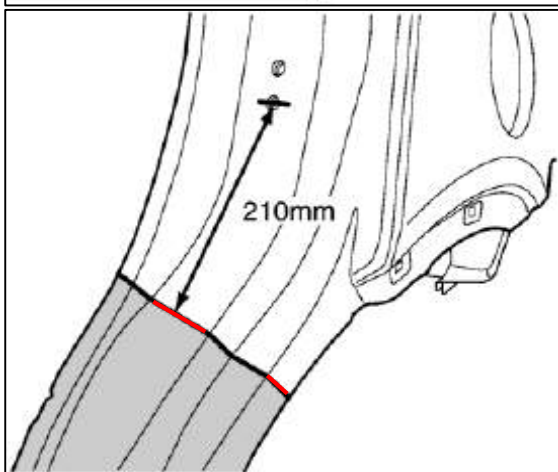
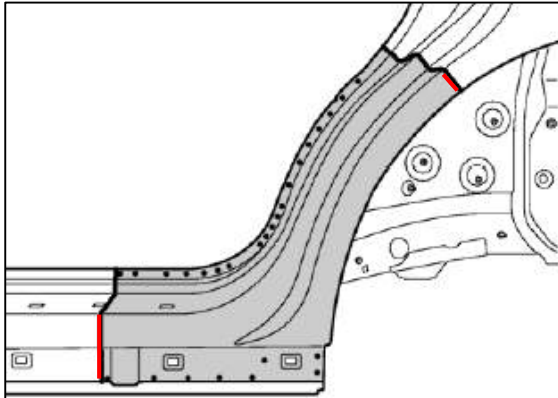
Rear quarter panel



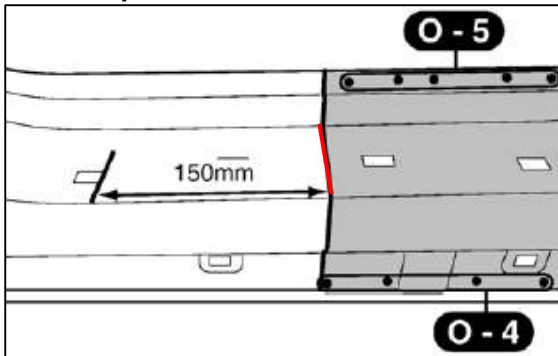
Adhesive used around wheel-arch



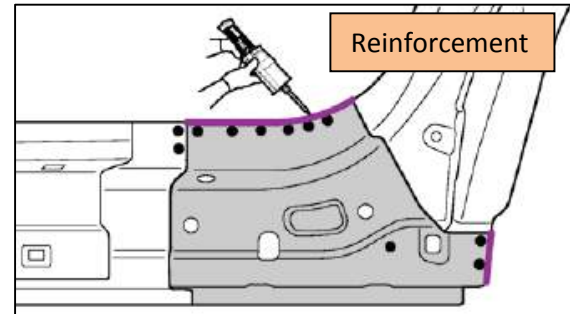
Lower dog-leg option



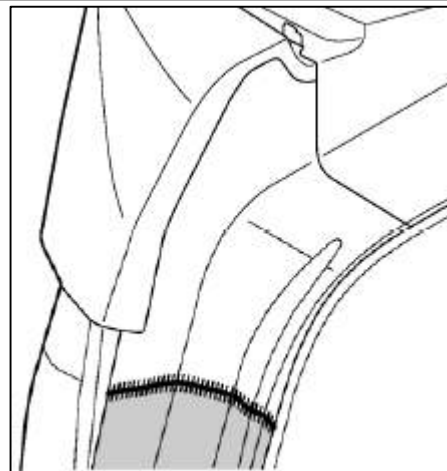
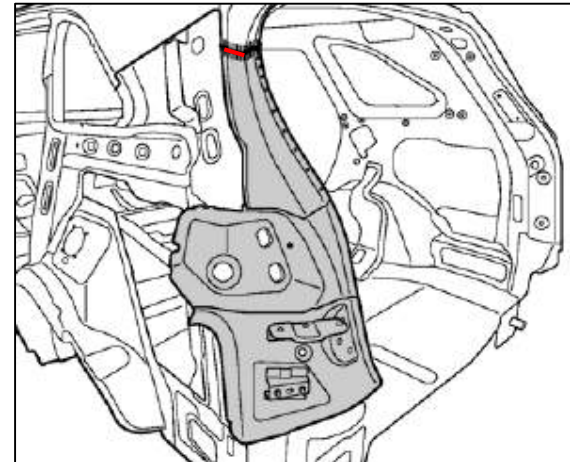
Another sill cut option given if replacing the inner panels



Lower reinforcement

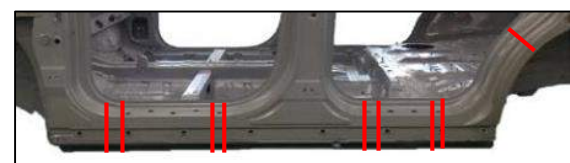


Tailgate opening reinforcement joint



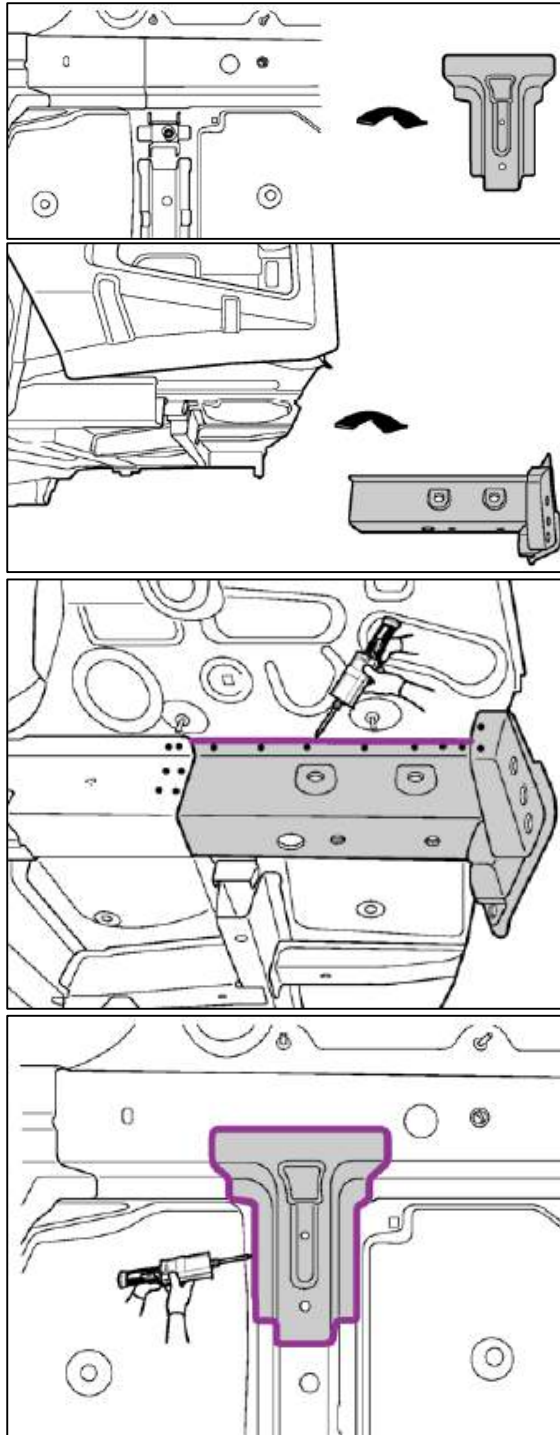
Sill panel options

The BRM does not show any options for the sill panel however the sill cut options for the A and B pillar and rear guard do have sectioning options as shown in the illustration. (Example only, check for the correct measurements)



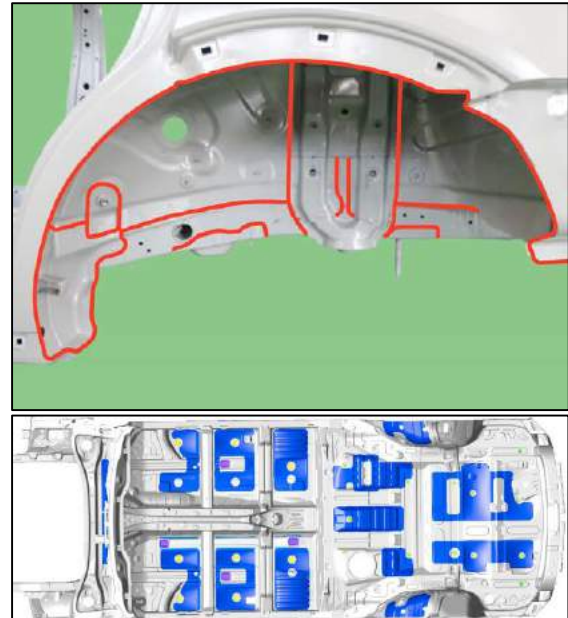
Rear rail option

The cross member end cap needs to be removed to allow access to the rail sectioning joint location. The join location appears to be at an OEM joint.



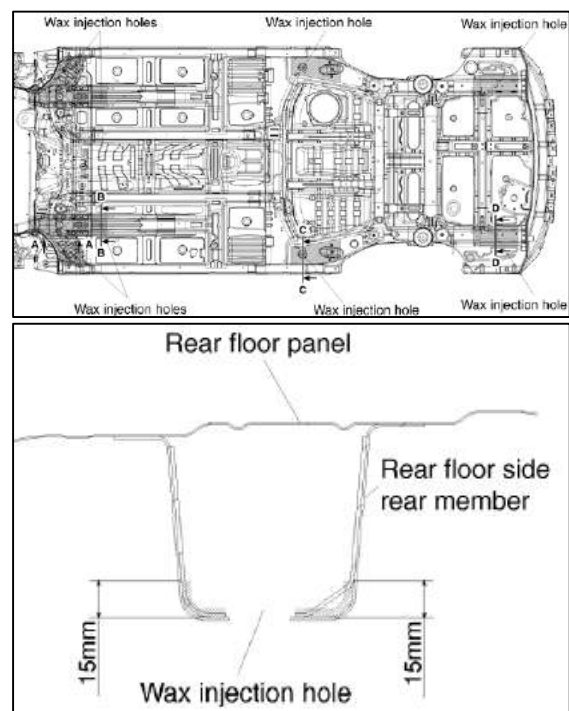
Sealing and NVH

The BRM has very detailed information on sealing and antivibration pads however it does not give the foam locations, the illustrations show examples from the BRM.



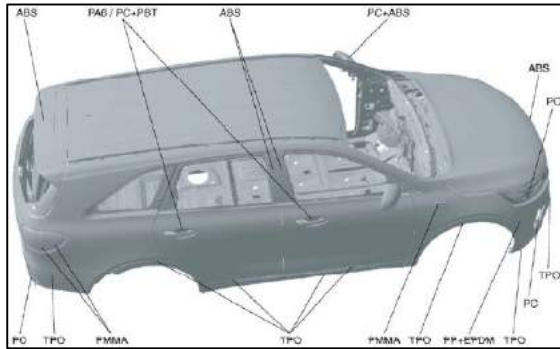
Cavity Wax Injection

Like most BRM for Kia, the Sorento also has very detailed cavity wax installation and show the application holes available.



Plastic Parts

All plastic parts are identified along with a how to repair section. This is common for all Kia BRMs



Overview

The Sorento is a vehicle that uses a lot of UHSS so some repairs are perhaps limited. Along with this the Sorento uses a good amount of adhesive for replacing body panels. This is common for many new vehicles being manufactured today.

Carnival YP ★★★★★ ANCAP

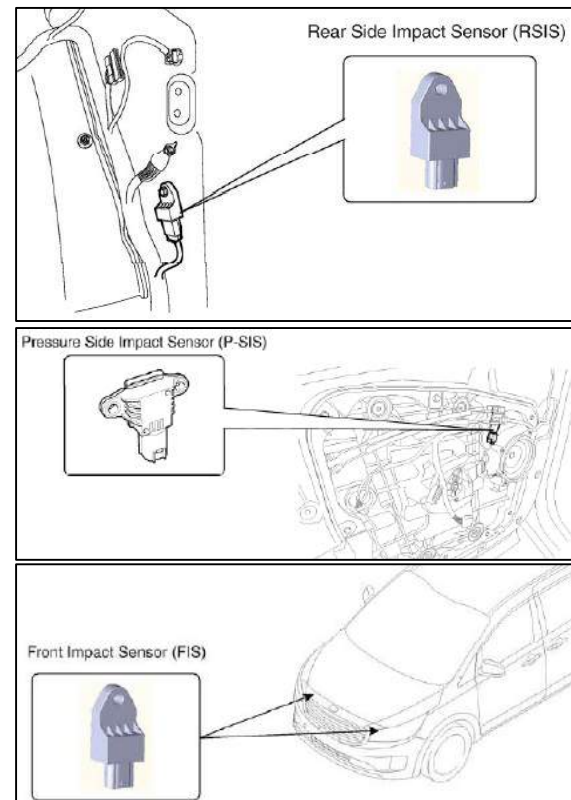
The 2015 Carnival has limited sectioning options. This is perhaps because of the UHSS used for its construction. It is important to check if and where sectioning can be done as it appears this is limited to areas that are not UHSS panels.



SRS Air-Bag

Refer to the SRS Air-Bag cautions information in general information Module 1.

The following illustrations show the Carnival front and side impact sensor locations mounting note the pressure sensor for side impact?



Adhesives used in the Sorento

Kia; Operation Procedures and Cautions in Using Epoxy Adhesives

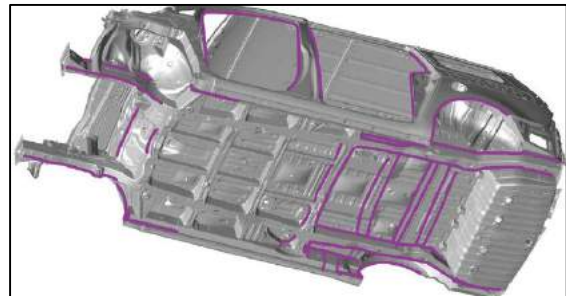
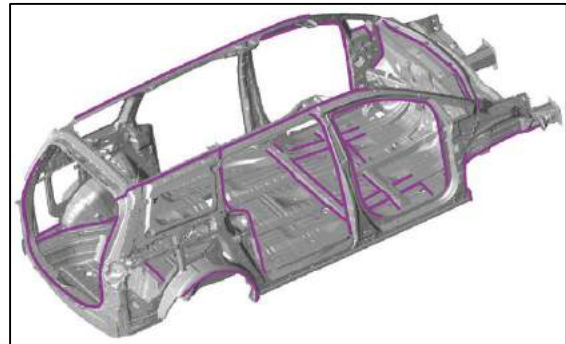
Products stated in the BRM are (3m-PN8115) and (HENKEL–Terokal 5055)

Be sure to follow the instructions of the product you use

Kia

1. Heat up the adhesive face on the panel to remove it. Heating temperature should be in the range of 110°C - 140°C. Use a torch or a heating gun.
2. Using a scraper, completely remove the remaining adhesive on the panel.
3. Using #50 - #80 sand paper, neatly grind off the adhesive area. Any remaining paint or surfacer must be removed from the adhesive area.
4. After grinding, clean the surface with a cleaner (adhesive cleaner). Cleaning the epoxy adhesive area is important as dust or oiliness may greatly decrease the adhesive strength.
5. Follow the same procedure of removing the paint and cleaning with a cleaner when applying adhesive on new panels.
6. Apply a light coat of adhesive on new panels or body panels, and then use a scraper to apply a second coat as thin as possible so that the metal surface is not visible (Skin coat). Ordinary adhesives are two-component types where the resin and hardener are filled in separate cartridges before being released from a nozzle or a gun. As the nozzle used for two-component type adhesive may harden after approximately 60 minutes without application, in case of delayed application, replace with a new nozzle. Check that the resin and hardener in the adhesive are released simultaneously before mounting the nozzle to the adhesive gun. This is important as non-simultaneous release of resin and hardener may affect the hardening process.
7. Use the adhesive for a secondary application. The adhesive strength is generated on the panel in the secondary application in which the adhesive should be applied in a width of approximately 10mm. Apply in a width of 5 ó 6mm on flange areas.
8. Mount the panel onto the body.
9. After mounting the panel, use a clamp to firmly fix it so that there are no gaps or shaking. While the gaps and clearing of the panel may be adjusted before the adhesive is dry, caution is needed as adhesive must be applied again in case the mounted panel is detached. Maintain a distance of approximately 100 ó 150mm to the panel fixing clamp.
10. Using a scraper, remove any leaking adhesives during mounting process. As the adhesive is difficult to remove after it has been hardened, it must be removed before hardening.
11. Heat up the panel to harden. The adhesive is heat hardening type; it must be heated to harden.

Illustrations show where adhesive is used



Torque settings

Some of the settings for the rear suspensions are shown in the example below. The BRM also has the wheel alignment settings.

Rear Suspension

Tightening torque (kgf.m) Nm Kgf.m lb-ft

Tire wheel Hub nuts 88.3 ~ 107.9 9.0 ~ 11.0 65.1 ~ 79.6

Trailing arm to body 98.1 ~ 117.7 10.0 ~ 12.0 72.3 ~ 86.8

Assist arm to sub frame 137.3 ~ 156.9 14.0 ~ 16.0 101.3 ~ 115.7

Assist arm to knuckle 68.6 ~ 83.4 7.0 ~ 8.5 32.5 ~ 39.8

Lower arm to knuckle 137.3 ~ 156.9 14.0 ~ 16.0 50.6 ~ 61.6

Wheel Alignment

Specification Front Rear

Toe-in Individual $0.05^\circ \pm 0.1^\circ$ $0.1^\circ \pm 0.1^\circ$

Total $0.1^\circ \pm 0.2^\circ$ $0.2^\circ \pm 0.2^\circ$

Camber angle $-0.5^\circ \pm 0.5^\circ$ $-1^\circ \pm 0.5^\circ$

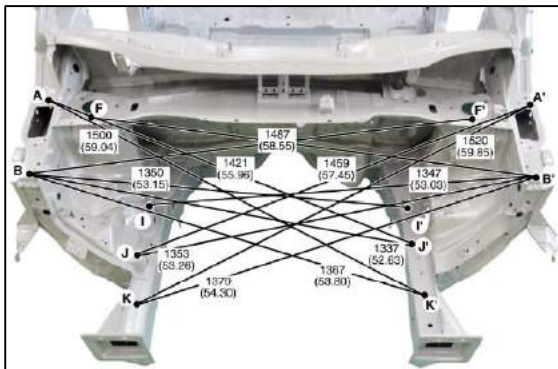
Caster angle $4.14^\circ \pm 0.5^\circ$ -

King-pin angle $13.63^\circ \pm 0.5^\circ$ -

Ride height 433.73mm \pm 10mm (17.076 \pm 0.3937 in.)

Body dimensions are given

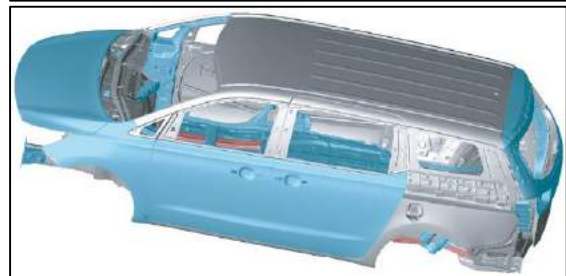
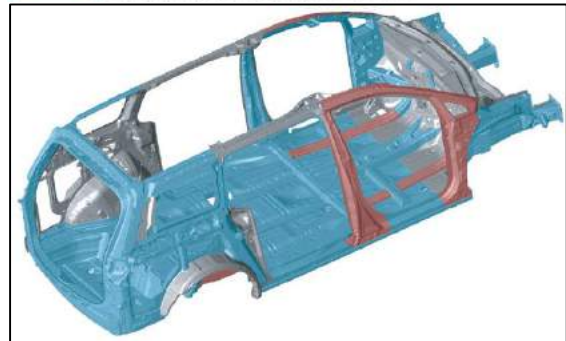
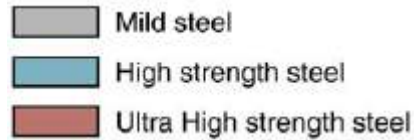
The BRM has a full section with very detailed information giving all the body dimensions and panel gaps.



Steels used for the Carnival body

HSS is used for the doors, boot lid, bonnet, guards, floor, rails and most all other structural panels.

UHSS is shown for the Sill A and B Pillar reinforcements plus the under floor and rear rails with mild steel used for side aperture and roof panel.



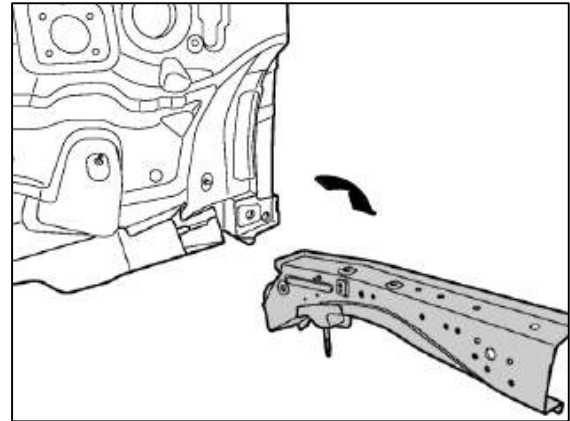
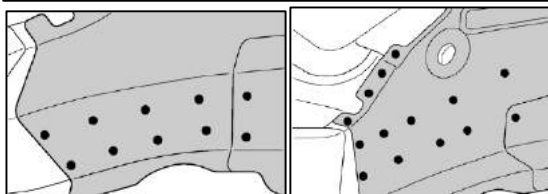
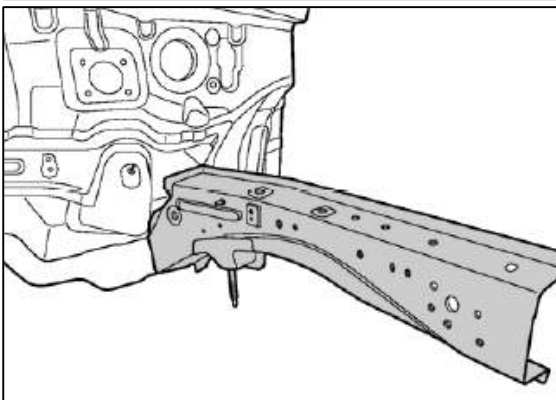
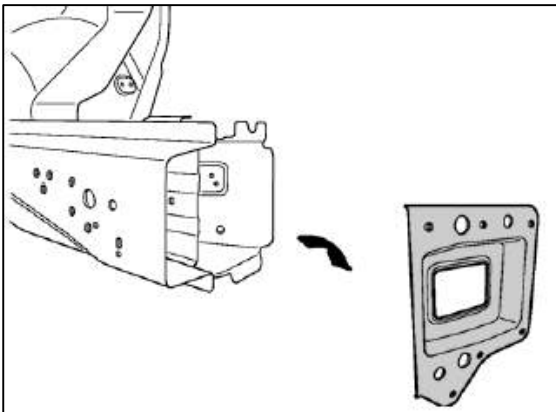
Partial replacement options

The Carnival has very limited partial replacement options. This is perhaps due to the increased use of UHSS. Always check if sectioning is permitted as it appears that this is never on UHSS panels. Most of the panel replacement operations require some adhesive but be sure to check the BRM as the adhesive application is very specific.



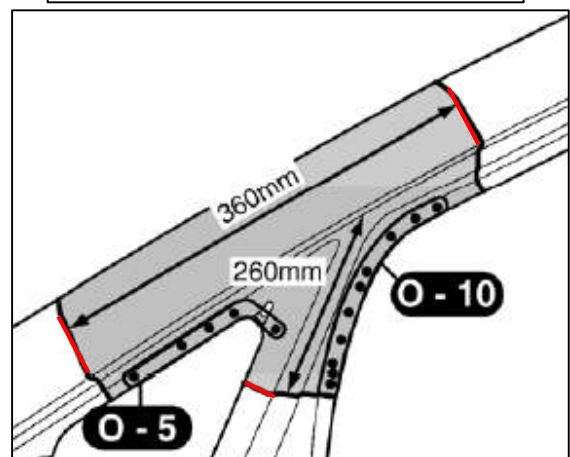
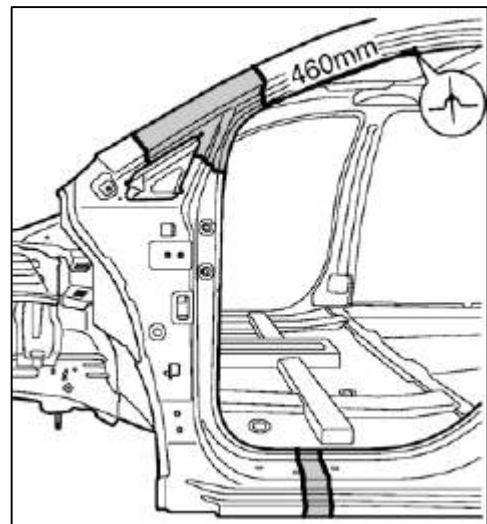
Front rail

The front rail only shows a full rail fitted at the OEM joint at the bulkhead. The carrier mounting bracket can be replaced as shown in the illustration.



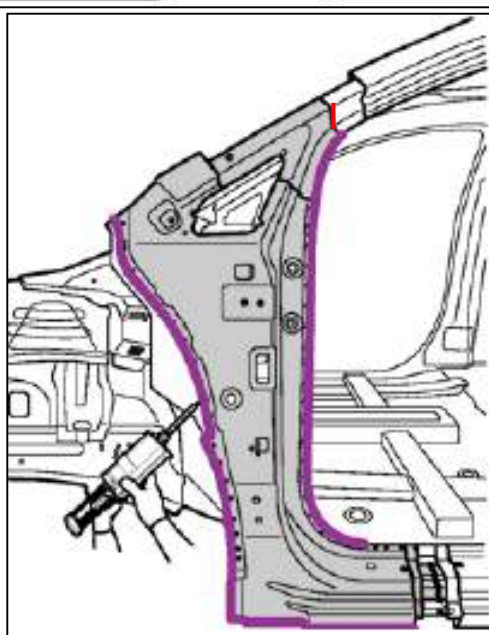
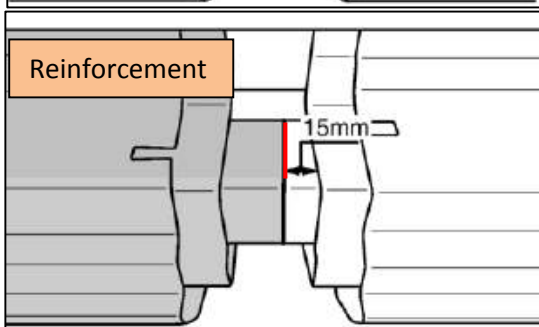
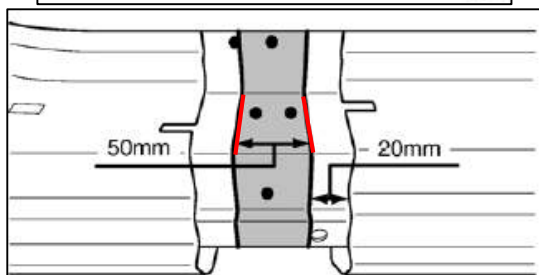
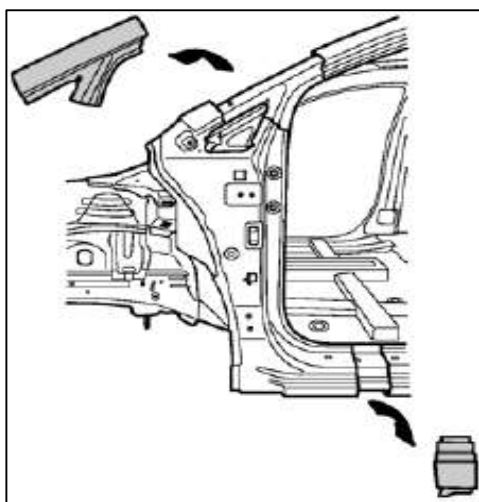
A Pillar replacement

The A Pillar has a 3 layer sectioning joint on the sill panel and the upper joint appears to be single layer. Be sure to get the full method if replacing the reinforcement.



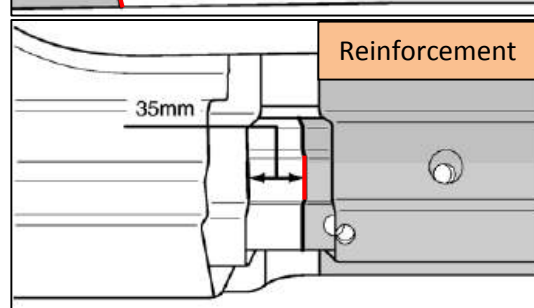
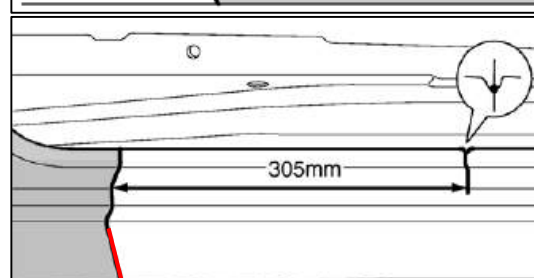
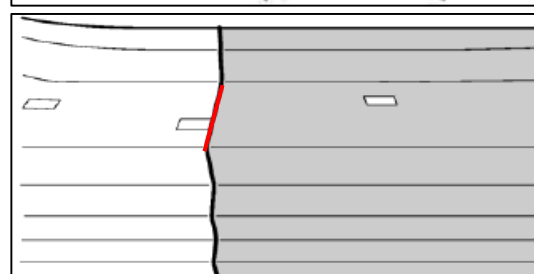
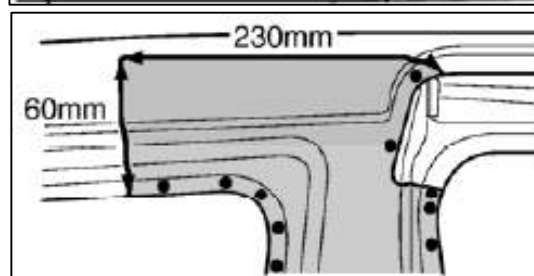
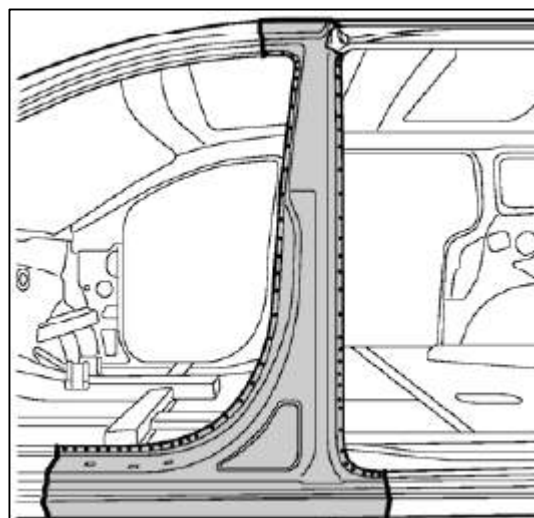
NOTICE

When cutting the side sill outer reinforcement, take care not to cut through the matting flanges or the side sill inner reinforcement.

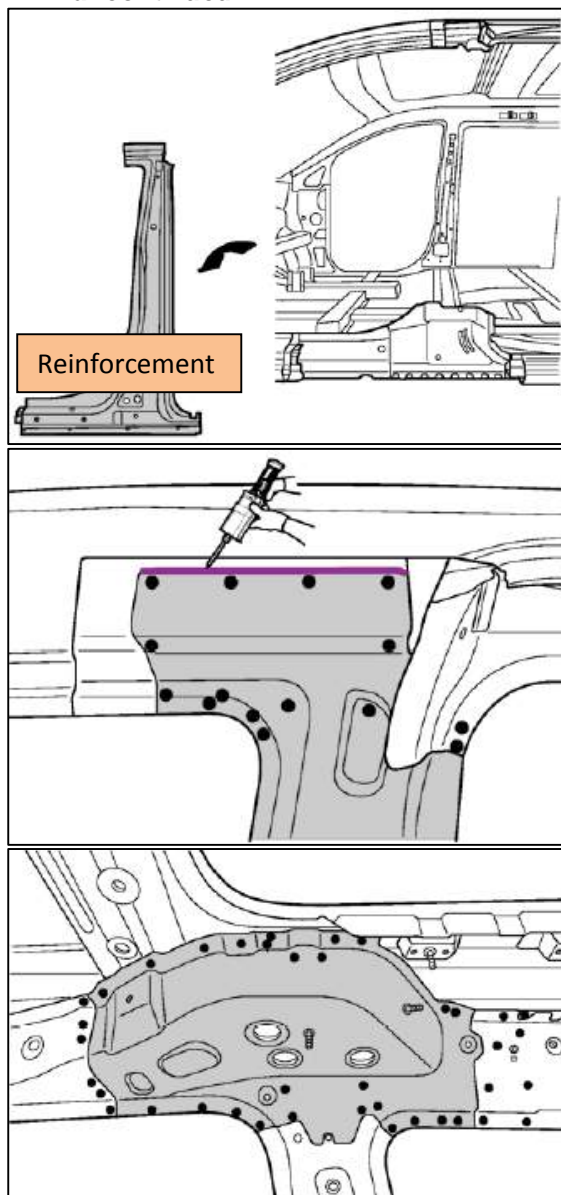


B Pillar option

The B Pillar requires the full reinforcement cut into the upper roof rail. Note the front sill cuts are not cutting into the UHSS reinforcement.

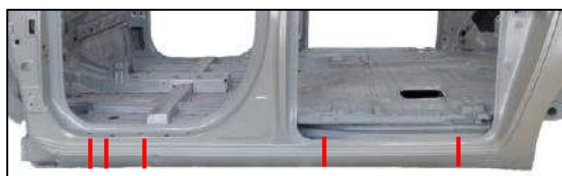


B Pillar continued

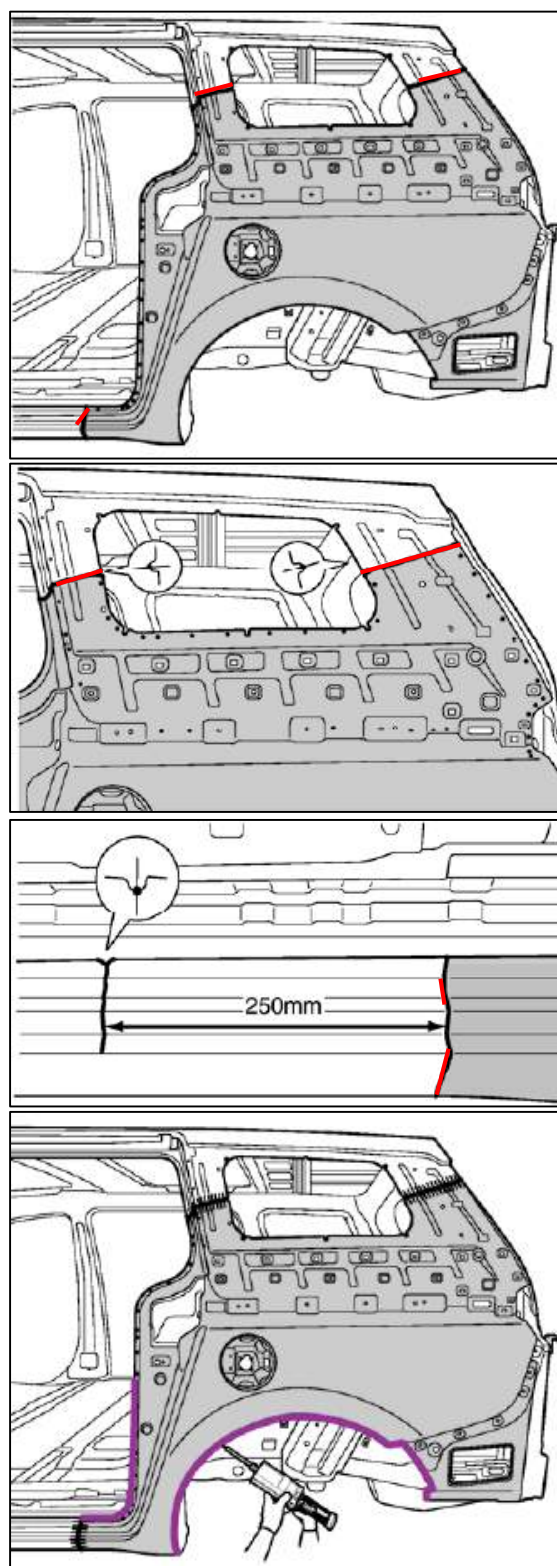


Sill panel options

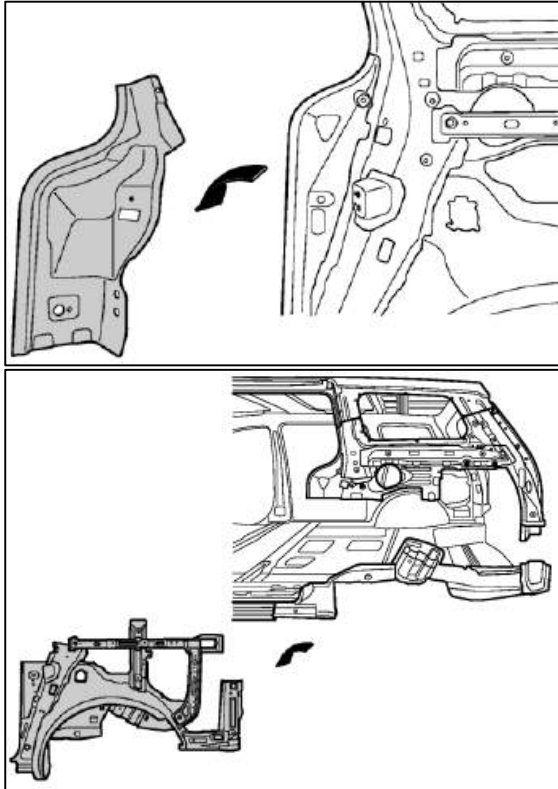
The BRM does not show any options for the sill panel apart from the sill cut options for the A and B Pillar and rear guard as shown in the illustration. (Example only, check for the correct measurements)



Rear quarter panel

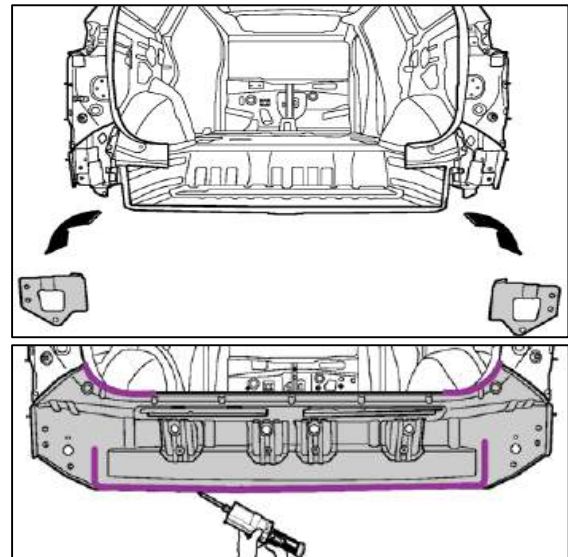
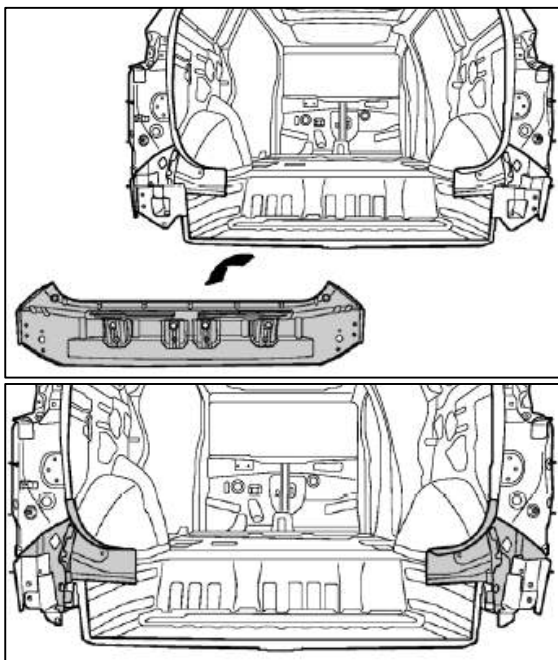


Inner quarter panels



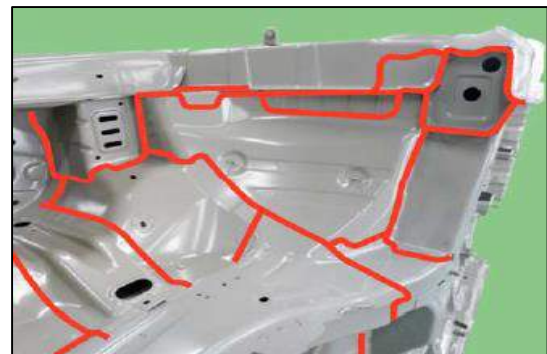
Rear panel

The Carnival has a rear panel and rail end cap replacement method but no method is given for the rear rail. (Perhaps because they are UHSS)



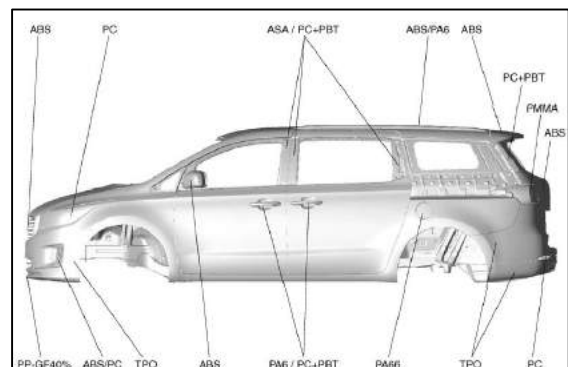
Sealing and NVH

The BRM has very detailed information on sealing and anti-vibration pads however it does not give the foam locations, the illustrations show an example from the BRM.



Cavity Wax Injection

Like most BRM for Kia, the Carnival also has very detailed cavity wax installation and shows the application holes available.



Overview

The Carnival is very limited for partial replacement options.

The K2500 has no body repair information; the Kia general repair instructions covered in **Module 1** of this manual should be followed.



Dimensions are available for both the 2 and 4 wheel drive models long and extra-long body. Cab options are;

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This manual was developed as a quick reference tool showing the Kia replacement methods available for the current Kia fleet. This technical information is for fitting new genuine Kia parts only. Your local Kia dealerships are happy to provide the detailed repair information when ordering panel parts.