31 - Collision Information

Warning

SAFETY NOTICE

CAUTION: **All service and rebuilding instructions contained herein are applicable to, and for the convenience of, the automotive trade only. All test and repair procedures on components or assemblies in non-automotive applications should be repaired in accordance with instructions supplied by the manufacturer of the total product.**

Proper service and repair is important to the safe, reliable operation of all motor vehicles. The service produces recommended and described in this publication were developed for professional service personnel, and are effective methods for performing vehicle repair. Following these procedures will help ensure efficient economical vehicle performance and service reliability. Some service procedures require the use of special tools designed for specific procedures. These special tools should be used as recommended throughout this publication.

Special attention should be exercised when working with spring-or tension-loaded fasteners and devices such as E-Clips, Circlips, Snap rings, etc., since careless removal may cause personal injury. Always wear safety goggles when working on vehicles or vehicle components.

It is important to note that this publication contains various Cautions and Warnings. These should be read carefully in order to minimize risk of personal injury or the possibility that improper service methods may damage the vehicle or render it unsafe. It is important to note that these Cautions and Warnings cover only the situations and procedures FCA US LLC has encountered and recommended. FCA US LLC cannot possibly know, evaluate, and advise the service trade of all conceivable ways in which service may be performed, or of the possible hazards of each. Consequently, FCA US LLC has not undertaken any such broad service review. Accordingly, anyone uses a service procedure or tool that is not recommended in this publication must be certain that neither personal safety, nor vehicle safety, will be jeopardized by the service methods they select.

USE OF HEAT DURING REPAIR

WARNING: **FCA US LLC engineering's position on the use of heat during collision repair is as follows:**

- **Any body panel or frame component damaged which is to be repaired and reused, must be repaired using the "cold straightening" method. No heat may be used during the straightening process.**
- **During rough straightening prior to panel replacement, damaged panels or frame components may be heated to assist in body/frame realignment. The application of heat must be constrained to the parts which will be replaced and not allowed to affect any other components.**

This "no heat" recommendation is due to the extensive use of high strength and advanced high strength steels in FCA US LLC products. High-strength materials can be substantially and negatively affected from heat input which will not be obviously known to the repairer or consumer.

Ignoring these recommendations may lead to serious compromises in the ability to protect occupants in a future collision event, reduce the engineered qualities and attributes, or decrease the durability and reliability of the vehicle.

This statement supersedes any previously released information by the FCA US LLC.

Failure to follow these instructions may result in serious or fatal injury.

RESTRAINTS WARNING

WARNING: To avoid serious or fatal injury on vehicles equipped with the Supplemental Restraint System (SRS), never attempt to repair the electrically conductive circuits or wiring components related to the SRS for which there is no Mopar® wiring repair kit. It is important to use ONLY the recommended splicing kit and procedure. For applicable and available Mopar® wiring repair kits, please visit the Mopar® Connection Repair Kit Web Site. Inappropriate repairs can compromise the conductivity and current carrying capacity of those critical electrical circuits, which may cause SRS components not to deploy when required, or to deploy when not required. Only minor cuts or abrasions of wire and terminal insulation where the conductive material has not been damaged, or connector insulators where the integrity of the latching and locking mechanisms have not been compromised may be repaired using appropriate methods.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with side curtain or seat (pelvic and thorax) airbags, disable the Supplemental Restraint System (SRS) before attempting any Occupant Restraint Controller (ORC) diagnosis or service. The ORC contains a rollover sensor, which enables the system to deploy the side curtains or seat airbags in the event of a vehicle rollover event. If an ORC is accidentally rolled during service while still connected to battery power, the side curtain and seat airbags will deploy. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbags, airbag curtains, knee blocker, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect the Intelligent Battery Sensor (IBS)/negative battery cable assembly from the negative battery post, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid potential physical injury or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the Occupant Restraint Controller (ORC) capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 12 inches (30 centimeters) of an electronic module or wiring harness, then that module or harness should be relocated out of the way, or disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens.

WARNING: To avoid serious or fatal injury, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate or bring into contact with electricity. Do not store at temperatures exceeding 93° C (200° F). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 17.24 kPa (2500 psi). Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: **To avoid serious or fatal injury when handling a seat belt tensioner retractor or buckle, proper care should be exercised to keep fingers out from under the retractor or buckle cover and away from the seat belt webbing or cable where it exits from the retractor or buckle cover.**

WARNING: **To avoid serious or fatal injury, replace all Supplemental Restraint System (SRS) components only with parts specified in the Mopar® Parts Catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.**

WARNING: **To avoid serious or fatal injury, the fasteners, screws, and bolts originally used for the Supplemental Restraint System (SRS) components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the SRS. Anytime a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the Mopar® Parts Catalog.**

WARNING: **To avoid serious or fatal injury when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down. Failure to follow these instructions may result in possible serious or fatal injury.**

Position Statements

RECONDITIONED WHEEL USAGE

FCA US LLC Position

FCA US LLC does not recommend that customers use “reconditioned” wheels (wheels that have been damaged and repaired) because they can result in a sudden catastrophic wheel failure which could cause loss of control and result in injury or death.

For clarification:

- Cosmetic refinishing for the purpose of repairing a superficial flaw is an acceptable procedure providing it is limited to paint or clear coat only, the wheel is not modified in any way, and there is no exposure to paint curing heat over 93 degrees Celsius (200 degrees Fahrenheit).
- Damaged wheels are those which have been bent, broken, cracked or sustained some other physical damage which may have compromised the wheel structure.
- Repaired indicates that the wheel has been modified through bending, welding, heating, straightening, or material removal to rectify damage.
- Re-plating of chrome plated wheels, or chrome plating of original equipment painted or polished wheels is not an acceptable procedure as this may alter mechanical properties and affect fatigue life. Additionally, FCA US LLC Global Warranty Administration does not allow refinishing of wheels under warranty.

This statement supersedes any previously released information by FCA US LLC.

Release Date: August 11, 2010

For more information, log on to www.MoparRepairConnection.com.

REPLACEMENT SEAT COVERS AND SEAT COVER REPAIRS

FCA US LLC Position

FCA US LLC vehicles, systems and components are engineered, tested and manufactured to help protect vehicle occupants based upon government mandated and internal corporate requirements relative to durability, noise vibration & harshness, occupant protection and vehicle safety.

Supplemental Seat-Mounted Side Air Bags provide enhanced protection to help protect an occupant during a side impact. When the seat-mounted side air bag deploys, it opens the seam between the front and side of the seat's trim cover. Modifications to the seat system, including the seat cover, may change the way the air bag deploys, which could adversely affect the performance of the Supplemental Seat-Mounted Side Air Bag causing serious injury.

"Modifications" include:

- Any change to the seat back cover such as material, thread, stitch design and alterations or misplacement of the features which guide the deploying air bag into position.
- Any non-approved seat-cover replacements.

Only Authentic Mopar® Repair Parts, and approved Mopar® accessories such as Katzkin® Leather seat covers, are designed, engineered, manufactured and tested to the FCA US LLC internal and government mandated standards. The use of parts not specifically designed and tested by FCA US LLC may compromise the integral balance between these safety systems.

FCA US LLC only approves of repairs or modifications to the supplemental seat-mounted side air bag system, including the seat system or seat cover, where Authentic Mopar Repair Parts or Mopar Accessories are used for Chrysler, Jeep® Dodge and Ram vehicles. Any unapproved repairs or modifications performed not using Mopar parts, or not following FCA US LLC approved published repair guidelines and procedures, may increase the risk of injury to current or future vehicle owners and occupants.

This statement supersedes any previously released information by FCA US LLC.

Release Date: June 21, 2011

For more information, log on to www.MoparRepairConnection.com.

SALVAGED AIR BAGS OR OTHER SALVAGED RESTRAINT SYSTEM COMPONENT UASAGE

FCA US LLC Position

FCA US LLC does not support the use of any Supplemental Restraint System (SRS) component, seatbelt component, or any other occupant protection component which has been removed from a vehicle previously damaged, flooded, burned, scrapped or removed from use for any other reason – commonly referred to as “salvage parts”.

Restraint system components are engineered, tested and manufactured to protect vehicle occupants based upon both government mandated and internal corporate requirements relative to vehicle safety and occupant protection. New Mopar® replacement parts are required to be equivalent to the originally installed parts and are tested to ensure these requirements are met. While some salvage parts may visually appear equivalent, there can be dramatic differences in the design and functional characteristics which could have a negative effect on the vehicle occupants in a future collision event. These specific design and functional characteristics can only be determined through destructive testing.

Salvage components may have been affected by:

- Crash impact loads
- Incorrect, improper or inadequate disassembly and removal procedures
- Weathering or environmental exposure outside of that expected during normal use
- Flooding
- Smoke or heat damage
- Abuse

Additionally, salvage components are not traceable should a component recall be required in the future.

It is in the best interest of the current or future vehicle owner and/or occupants that repairs to the SRS, seatbelt and occupant protection system are made using new original equipment parts. Anything less than this may expose operators and occupants too unnecessary risk.

This statement supersedes any previously released information by FCA US LLC. Release Date: August 11, 2010

For more information, log on to www.MoparRepairConnection.com.

SCAN TOOL POSITION STATEMENT

FCA US LLC vehicles, systems and components are engineered, tested and manufactured to help protect vehicle occupants. They are engineered to meet or exceed both government mandated and internal corporate requirements relative to durability, Noise Vibration and Harshness (NVH) and vehicle safety. Use of the Mopar® wiTECH vehicle diagnostic tester (Mopar Scan Tool) is an important part of FCA US vehicle service and maintenance. This tool contains software that aftermarket tools may not contain and can assess whether any FCA US vehicle's safety and security systems contain active or stored Diagnostic Trouble Codes (DTCs).

Safety and security related systems, such as Anti-lock Brake System (ABS), Supplemental Restraint Systems (SRS) - air bags, Occupant Restraint Controller (ORC), seat belts, active head restraints, forward facing camera and radar, blind spot monitoring, and other automated electronic driver assistance systems, MUST be tested for fault codes (DTCs) that could be active (current) or stored following a collision. Use of the Mopar wiTECH vehicle diagnostic tester is necessary before and after collision repair.

ANY of the following conditions could trigger DTCs prior to or during collision repairs, which could result in improper vehicle performance:

- Vehicle is involved in an accident or collision, even though the damage may appear minor
- Vehicle has been in an accident with or without air bag deployment
- Voltage loss, including battery disconnects and hybrid battery disabling
- Significant vehicle disassembly including, but not limited to, bumpers, door handles, headlamps and mirrors
- Interior trim repair or removal
- Glass removal and replacement operations

Any repairs performed without using Mopar parts and not following published repair guidelines and procedures, may expose current or future vehicle owners and occupants to unnecessary risk.

If faults were stored in the DTC memory for any safety or security system, then these systems MUST be serviced according to the repair procedures in Service Information. After performing repairs, recheck the system to determine if any active or stored DTCs remain; if so, take appropriate service action to ensure proper function.

SRS AIR BAG SQUIB STATUS

Multistage air bags with multiple initiators (squibs) MUST be checked to determine that all squibs were used during the deployment event. The Driver Air Bag (DAB) and Passenger Air Bag (PAB) are deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the driver or passenger squib circuits (up to 3) to the initiators in the air bag inflators. Typically, all initiators are exhausted and all potentially hazardous chemicals are burned during an air bag deployment event.

However, it is possible for only one initiator to be exhausted; therefore, you MUST always confirm that all initiators have been cycled to minimize the risk of improper handling or disposal of potentially live pyrotechnic or hazardous materials. This procedure must be performed using the Mopar wiTECH diagnostic scan tool or at a company such as Collision Diagnostic Services that diagnostically remotely scans the vehicle using FCA US scan tools in conjunction with their patented asTech device, to verify the status of all air bag squibs, prior to removing deployed air bags from the vehicle for disposal.

- Service Information can be obtained at www.oem1stop.com
- Mopar wiTECH scan tools can be purchased from https://mopar.snapon.com

STRUCTURAL REPAIR PARTS USAGE

FCA US LLC Position

FCA US LLC vehicles, systems and components are engineered, tested and manufactured to protect vehicle occupants based upon both government mandated and internal corporate requirements relative to durability, Noise/Vibration/Harshness (NVH), occupant protection and vehicle safety.

The overall structural integrity of the vehicle is dependent on its inherent design specifications. Sheet metal and glass are critical elements in the design of specific crush zones that allow the energy of a collision to be absorbed in a predictable way and maximize the effectiveness of the restraint system to protect the occupants. The use of parts not specifically designed and tested by FCA US LLC may compromise the integral balance between these safety systems.

Only Authentic Mopar® Repair Parts and glass are designed, engineered, manufactured and tested to the FCA US LLC internal and government mandated standards and are the only ones equivalent to the originally installed parts.

FCA US LLC does not approve of or recognize structural repair procedures where Authentic Mopar Parts are not used for Chrysler, Jeep® Dodge and Ram vehicles. Any repairs performed not using Mopar parts, and not following published repair guidelines and procedures, may expose current or future vehicle owners and occupants to unnecessary risk.

When restoring a collision damaged vehicle to pre-loss condition, consideration must be given to the following:

- All structural distortion has been identified and corrected using appropriate structural straightening equipment (“frame rack”) and a three-dimensional measuring system.
- All damaged panels have been repaired or replaced.
- All replaced panels provide the as-built structural equivalence and corrosion protection of the original panels.
- Unless partial replacement procedures are documented in a FCA US LLC publication, structural panels must be installed in their entirety – partial replacement or “sectioning” of panels may compromise vehicle structure.
- FCA US LLC does not support the use or re-use of any structural component which has been removed from a vehicle previously damaged, flooded, burned, scrapped or removed from use for any other reason - commonly referred to as “salvage parts”.
- While some salvage parts may “appear” equivalent, there can be dramatic differences in the design and functional characteristics which cannot be determined by a visual inspection and which could have a negative effect on the vehicle occupants in a future collision event.
- Salvage components may have been affected by crash impact loads, incorrect, improper or inadequate disassembly and removal procedures, weathering or environmental exposure outside of that expected during normal use.
- Salvage components are not traceable should a component recall be required in the future.

This statement supersedes any previously released information by FCA US LLC. Release Date: August 11, 2010

For more information, log on to www.MoparRepairConnection.com.

USE OF HEAT DURING REPAIR

FCA US LLC Position

FCA US LLC Service Engineering's position on the use of heat during collision repair is as follows:

- Any damaged body panel or frame component, which is to be repaired, must be repaired using the "cold straightening" method. No heat may be used during the straightening process.
- During rough straightening prior to replacement, damaged panels or frame components may be heated to assist in body/frame realignment. This application of heat, if absolutely necessary, must be constrained to the parts which will be replaced and not allowed to affect any other components.

This "no heat" recommendation is due to the extensive use of high-strength and advanced high-strength steels in FCA US LLC vehicles. High-strength materials can be substantially and negatively affected from heat input which will not be obviously known to the repairer or consumer. Additionally, application of heat will alter or destroy material coatings utilized for corrosion protection and which may not be restorable.

Ignoring these recommendations may lead to serious compromises in the ability to protect occupants in a future collision event, reduce the engineered qualities and attributes, or decrease the durability and reliability of the vehicle.

This statement supersedes any previously released information by FCA US LLC.

Release Date: August 11, 2010

For more information, log on to www.MoparRepairConnection.com.

Standard Procedure

SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT

Any vehicle which is to be returned to use following a Supplemental Restraint System (SRS) component deployment must have the deployed restraints replaced. In addition, the following guidelines MUST be observed.

- **Following ANY major vehicle impact damage in the vicinity of an impact sensor or the ORC** - It is critical that the mounting surfaces and mounting brackets for the Occupant Restraint Controller (ORC), front impact sensors and side impact sensors located within the proximity of the impact damage be closely inspected and restored to their original conditions. Because the ORC and each impact sensor are used by the SRS to monitor or confirm the direction and severity of a vehicle impact, improper orientation or insecure fastening of these components may cause airbags not to deploy when required, or to deploy when not required.
- **Following ANY airbag deployment event** - The Lower Anchors and Tethers for CHildren (LATCH) provisions, upper tether anchors (if equipped) and all interior trim panels must also be inspected.
- **If the driver airbag is deployed** - If the Driver AirBag (DAB) has been deployed, the DAB, the clockspring, the steering column assembly including the intermediate shaft and coupler, both front seat belt retractor and tensioner assemblies, and all other seat belt retractors and buckles in use must be replaced. The front impact sensors and the steering wheel must also be inspected.
- **If the passenger airbag is deployed** - If the Passenger AirBag (PAB) has been deployed, the PAB, the PAB door and the PAB wire harness or connector must be replaced. The instrument panel must also be inspected.
- **If a seat airbag is deployed** - If a Seat AirBag (SAB) has been deployed, the SAB, the seat back frame, the seat back foam, the seat back trim cover and the side impact sensors on the same side of the vehicle as the deployed airbag must replaced. Both front seat belt retractor and tensioner assemblies, the front seat belt buckles in use and any rear seat belt retractors and buckles in use must also be replaced.
- **If a seat belt tensioner is deployed** - The seat belt tensioners are deployed in conjunction with the front airbags, but can also be deployed with a SAB. All seat belt tensioners must be replaced if any airbag in the vehicle has been deployed.

The components identified with the deployed SRS components in the preceding list are not intended for reuse and will be damaged or weakened as a result of an airbag deployment, which may or may not be obvious during a visual inspection. All other vehicle components should be closely inspected following any SRS component deployment, but are to be replaced only as required by the extent of the visible damage incurred.

AIRBAG SQUIB STATUS

Multistage airbags with multiple initiators (squibs) which must be checked to determine that all squibs were used during the deployment event. The Driver AirBag (DAB) and Passenger AirBag (PAB) in these vehicles are deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the driver or passenger squib 1 and squib 2 and squib 3 circuits to the three initiators in the airbag inflators. Typically, these initiators are used and all potentially hazardous chemicals are burned during an airbag deployment event. However, it is possible for only one initiator to be used; therefore, it is always necessary to confirm that all initiators have been used in order to avoid the improper handling or disposal of potentially live pyrotechnic or hazardous materials. The following procedure should be performed using a diagnostic scan tool to verify the status of both airbag squibs before either deployed airbag is removed from the vehicle for disposal.

CAUTION: Deployed front airbags have initiators (squibs) in the airbag inflator may or may not have live pyrotechnic material within the inflator. Do not dispose of these airbags unless you are certain of complete deployment. Refer to the Hazardous Substance Control System for information regarding the potentially hazardous properties of the subject component and the proper safe handling procedures. Then dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local and federal regulations.

1. Be certain that the diagnostic scan tool contains the latest version of the proper diagnostic software. Connect the scan tool to the 16-way Data Link Connector (DLC). The DLC is located on the driver side lower edge of the instrument panel, outboard of the steering column.
2. Turn the ignition to ON.
3. Using the scan tool, read and record the active (current) Diagnostic Trouble Code (DTC) data.

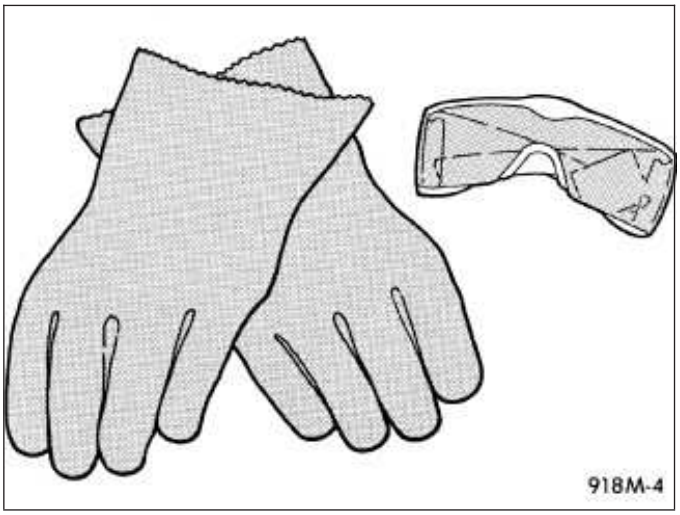
Using the active DTC information, refer to the **Airbag Squib Status** table to determine the status of both DAB squibs and both PAB squibs.

AIRBAG SQUIB STATUS		
IF THE ACTIVE DTC IS:	**CONDITIONS**	**SQUIB STATUS**
Driver or Passenger Squib 1 open	**AND** the stored DTC minutes for both Driver or Passenger squibs are within 15 minutes of each other	Squib 1, 2, and 3 were used.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 3 open		
Driver or Passenger Squib 1 open	**AND** the stored DTC minutes for Driver or Passenger Squib 2 open is GREATER than the stored DTC minutes for Driver or Passenger Squib 1 by 15 minutes or more	Squib 1 was used; Squib 2 and 3 are live.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 3 open		
Driver or Passenger Squib 1 open	**AND** the stored DTC minutes for Driver or Passenger Squib 1 open is GREATER than the stored DTC minutes for Driver or Passenger Squib 2 by 15 minutes or more	Squib 1 and 3 are live; Squib 2 was used.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 3 open		
Driver or Passenger Squib 1 open	**AND** Driver or Passenger Squib 2 and 3 open is NOT an active code	Squib 1 was used; Squib 2 and 3 are live.
Driver or Passenger Squib 2 open	**AND** Driver or Passenger Squib 1 and 3 open is NOT an active code	Squib 1 and 3 are live; Squib 2 was used.
Driver or Passenger Squib 3 open	**AND** Driver or Passenger Squib 1 or 2 open is NOT an active code	Squib 1 and 2 are live; Squib 3 was used.

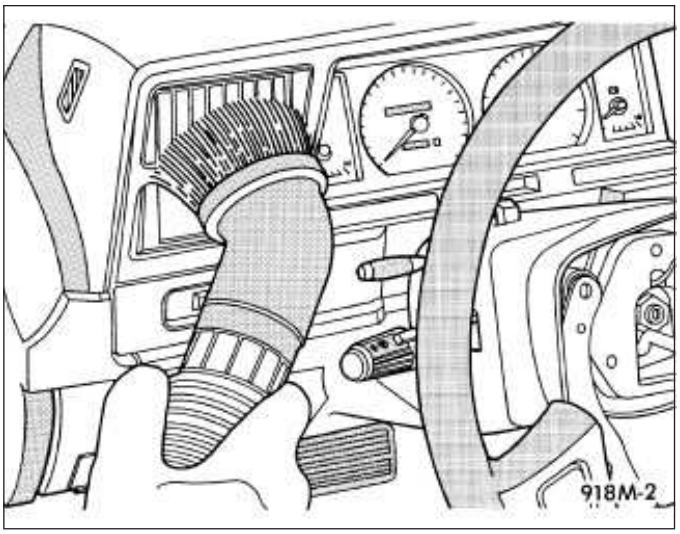
NOTE: **If none of the Driver or Passenger Squib 1, 2, or 3 open are active codes, the status of the airbag squibs is unknown. In this case the airbag should be handled and disposed of as if the squibs were both live.**

CLEANUP PROCEDURE

WARNING: **To avoid serious or fatal injury, if you experience skin irritation during cleanup, run cool water over the affected area. Also, if you experience irritation of the nose or throat, exit the vehicle for fresh air until the irritation ceases. If irritation continues, see a physician.**



Following a SRS component deployment, the vehicle interior will contain a powdery residue. This residue consists primarily of harmless particulate by-products of the small pyrotechnic charge that initiates the propellant used to deploy a SRS component. However, this residue may also contain traces of sodium hydroxide powder, a chemical by-product of the propellant material that is used to generate the inert gas that inflates the airbag. Since sodium hydroxide powder can irritate the skin, eyes, nose, or throat, be certain to wear safety glasses, rubber gloves, and a long-sleeved shirt during cleanup.



1. Begin the cleanup by using a vacuum cleaner to remove any residual powder from the vehicle interior. Clean from outside the vehicle and work toward the inside, in order to avoid kneeling or sitting on a non-cleaned area.
2. Be certain to vacuum the heater and air conditioning outlets as well. Run the heater and air conditioner blower on the lowest speed setting and vacuum any powder expelled from the outlets.

   CAUTION: Deployed front airbags have initiators (squibs) in the airbag inflator may or may not have live pyrotechnic material within the inflator. Do not dispose of these airbags unless you are certain of complete deployment. Refer to the AIRBAG SQUIB STATUS heading within this information. All damaged, ineffective, or non-deployed Supplemental Restraint System (SRS) components which are replaced on vehicles are to be handled and disposed of properly. If an airbag or seat belt tensioner unit is ineffective or damaged and non-deployed, refer to the Hazardous Substance Control System for information regarding the potentially hazardous properties of the subject component and the proper safe handling procedures. Then dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local and federal regulations.
3. Next, remove the deployed SRS components from the vehicle. Refer to the appropriate service removal procedures.
4. It may be necessary to vacuum the interior of the vehicle a second time to recover all of the powder.

SQUIB CIRCUIT DAMAGE

In addition to the preceding guidelines, be aware that the heat created by the initiator during an airbag or tensioner deployment will cause collateral damage to the connected wiring (squib circuits) and connector insulators. There are two methods by which an airbag or seat belt tensioner may be connected to the vehicle electrical system. The first method involves a short pigtail harness and connector insulator that are integral to the airbag or tensioner unit and are replaced as a unit with the service replacement airbag or seat belt tensioner. This connection method typically requires no additional wiring repair following a deployment.

However, the second connection method involves a wire harness takeout and connector insulator that are connected directly to the airbag or tensioner initiator or squib. These direct-connect type take outs and connector insulators **MUST** be repaired following an airbag or seat belt tensioner deployment using the approved Supplemental Restraint System Wiring Repairs procedure (Refer to 10 - Restraints - Standard Procedure).

HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

At no time should any source of electricity be permitted near the inflator on the back of a non-deployed airbag or seat belt tensioner. When carrying a non-deployed airbag, the trim cover or airbag cushion side of the unit should be pointed away from the body to minimize injury in the event of an accidental deployment. If the airbag unit is placed on a bench or any other surface, the trim cover or airbag cushion side of the unit should face upward to minimize movement in the event of an accidental deployment.

When handling a non-deployed seat belt tensioner, take proper care to keep fingers out from under the retractor or buckle cover and away from the seat belt webbing or cable where it exits from the retractor or buckle cover. In addition, the SRS should be disarmed whenever any steering wheel, steering column, seat belt tensioner, airbag, impact sensor or instrument panel components require diagnosis or service. Failure to observe this warning could result in accidental airbag deployment and possible personal injury.

All damaged, ineffective or non-deployed airbags and seat belt tensioners which are replaced on vehicles are to be handled and disposed of properly. If an airbag or seat belt tensioner unit is ineffective or damaged and non-deployed, refer to the Hazardous Substance Control System for information regarding the potentially hazardous properties of the subject component and the proper safe handling procedures. Then dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local and federal regulations.

POST COLLISION SEAT BELT INSPECTION

Following any collision inspect the seat belts for proper function and operation prior to returning the vehicle to the customer.

If the collision event was severe enough to activate any of the Supplemental Restraint System (SRS) components refer to (Refer to 31 - Collision Information/Standard Procedure/Service After Supplemental Restraint Deployment) to determine if there are any mandatory replacement of seat belt components.

NOTE: The following inspections, where applicable, are for the driver and all passenger positions, including the Lower Anchors and Tethers for Children (LATCH) restraint systems.

- Inspect the seat belt, for fraying, cuts, fading and torn or loose stitching. If any of these condition exist replace the seat belt.
- Inspect all of the seat belt buckles for proper latching and releasing operation. If it does not function properly, replace the seat belt buckle.
- Inspect the seat belt retractor by slowly extending the seat belt fully. It should extend smoothly without binding or locking. If it does not function properly, replace the seat belt.
- Inspect the seat belt retractor by latching the seat belt and then pulling the belt quickly. The seat belt should lock. If it does not function properly, replace the seat belt.
- Inspect the seat belt shoulder turning loop to be certain it rotates freely without binding. If it does not travel freely, replace the seat belt.
- Inspect the seat belt turning loop height adjuster. It should move freely and lock firmly into the different height positions. If it does not function properly, replace the seat belt turning loop height adjuster.

NOTE: If any of the seat belt components have physical damage or are doubtful of proper operation, replace the component.

POST COLLISION SCAN TOOL INSPECTION

Before any repair decisions are made, access to FCA US LLC service information is required. Diagnostic Trouble Codes (DTCs) do not identify which part needs to be replaced, rather DTCs are a piece of the diagnostic process that will lead a trained and qualified technician to the correct test to accurately diagnose the damage. Be certain of proper battery support when scanning.

Collision damage pre-scan before repairs- All vehicles that are in a collision need to have a diagnostic scan done at the beginning of the repair process, preferably during the estimating process, to determine damaged systems that may not be obvious. If proper battery support is not possible due to collision damage the scan should be performed during the repair process as soon as the battery can support the system and operate safely. After the repair process is completed the vehicle will need to be scanned again to be certain the systems involved are functioning properly. A Malfunction Indicator Light (MIL) may not illuminate for a particular system yet a DTC may be present, active or stored, compromising the proper function of the system. Identifying system faults will significantly reduce unexpected repairs at or near the end of the repair process. It will reduce the need for additional charges and benefit the vehicle being delivered without delay. The use of the Mopar scan tool wiTECH™ will be necessary to access DTC's. and to perform many of the programming and initialization of modules. If the wiTECH™ scan tool is not available it can be obtained through an FCA US dealership service center or through a company such as Collision Diagnostics Services that can remotely use the wiTECH™ scan tool in conjunction with their patented asTech™ device. DTC identification is only part of the repair process as it will most likely be necessary to access the service and diagnostic information to understand proper operation, wiring and diagnosis and testing of the system and DTC.

The vehicle will also need to have a diagnostic scan done upon the completion of repairs to determine that all systems are functioning properly and if any of the systems are in need of repair, reprogramming or initialization.

Pre-Scan Process

1. Conduct a customer consultation.
   a. Gain customer authorization to scan the vehicle and to share the data with the appropriate parties involved (sublet technician, insurer, repair facility personnel).
2. Check for Malfunction Indicator Lamps (MILs) and/or information display messages.
   a. The 12-volt electrical system must be enabled to identify any MILs.
   b. Not all systems will illuminate MILs, even if there is damage to that system.
3. Document any MILs and/or information display messages.
4. Identify Driver Assistance Systems (DAS) which the vehicle is equipped with. These systems include but are not limited to Adaptive Cruise Control (ACC), Forward Collision Warning (FCW), Lane Sensing.
5. Document the DAS the vehicle is equipped with.
6. Document potential damage to DAS component(s), DAS mounting location(s), damage that may affect DAS , or parts that will need to be removed and installed near DAS.
7. Identify any calibration, initialization and aiming requirements for DAS parts, including required calibration, initialization and aiming requirements following removal and installation.
   a. FCA US LLC service information as found on TechCONNECT
   b. Mopar TECH AUTHORITY
   c. RTS - OEM Calibration Requirements Search (https://rts.i-car.com/oem-calibration-requirements-search.html
8. Identify enable and disable switches.
   a. The system may require enablement/disablement for calibration procedure.
   b. If the system is turned off, it may not be able to be calibrated.
   c. Systems that can be enabled or disabled should be documented, so that the system can be set to the customer's preferences.
9. Perform the pre-scan.
   a. A pre-scan is not possible if the 12-volt electrical system and vehicle communication networks are disabled or cannot be maintained throughout the scan.
   b. If the pre-scan is not possible due to vehicle damage, it should be done as soon as the repair progress allows it to be done safely.
10. Document DTCs and other data.
    a. Does not include black box info, speed of accident/accident recreation.
    b. Include pending, current and past DTCs.
11. Access the service information to identify system(s) affected by DTCs.
    a. Access the FCA vehicle specific service and diagnostic information.
    b. Check FCA vehicle specific information for service bulletins and recalls information that relate to DTCs.
12. Determine likely related and unrelated DTCs.
    a. Key cycles/time stamps/freeze frame data.

Post Repair Calibrations and Post Scan Process

1. Perform all required calibration/initialization/aiming steps, following the FCA service information procedures.
   a. Some systems will require the vehicle to be driven to perform calibration/initialization/aiming within the require driving parameters.
   b. Some systems will not detect issues within the system until the vehicle is driven within the required parameters.
   c. Some systems will require special tools and/or aiming equipment for calibration/initialization/aiming equipment
   d. Some systems will require both.
2. Perform post-scan.
3. If related DTC's return, access the diagnostic information to troubleshoot the cause of the error.

RECALIBRATION OF SENSORS AND MODULES

During the collision repair process, depending on the type and location of the damage, sensors and modules of electronic systems that are removed and/or replaced. These system sensors, modules and motors may require recalibration, relearning, initialization or verification testing.

These systems and components may include but are not limited to-

- Occupant restraint systems such as- air bags, seat belt tensioners. impact sensors and Occupant Restraint Controller (ORC)
- Vehicle safety systems such as- Lane Departure Warning (LDW), Adaptive Cruise Control (ACC), Anti-lock Brake System (ABS) and park assist
- Vehicle options such as- power liftgate, power roof systems, power windows and power seat systems.
- Vehicle standard functions such as- Body Control Module (BCM), Powertrain Control Module (PCM) and door module

Access to the service information will be necessary to perform the procedures. The service information can be found on techCONNECT™ and techAUTHORITY™.

The procedures may require one or a combination of-

The procedures may require one or a combination of-

- wiTECH™ scan tool
- Specialty tools or equipment (for example; Forward Facing Camera (FFC)
- Established driving parameters
- Operation of the component's switches

If the wiTECH™ scan tool is not available it can be obtained through an FCA US dealership service center or through a company such as Collision Diagnostics Services that can remotely use the wiTECH™ scan tool in conjunction with their patented asTech™ device.

BASECOAT/CLEARCOAT FINISH

CAUTION: Do not use abrasive chemicals, abrasive compounds or harsh alkaline based cleaning solvents on the painted surfaces of a vehicle. Failure to follow this caution can result in damage to vehicle finish.

The original equipment paint finish is a multi step process that involves multi step cleaning, applying electro deposition primer (E-coat), anti-chip primer, basecoat, and clearcoat steps.

On most vehicles a two-part paint application (basecoat/clearcoat) is used. The vehicle's "color" paint that is applied over primer is called basecoat. A clearcoat paint is then applied to protect the basecoat from ultraviolet light and provides a durable high-gloss finish.

FINESSE SANDING, BUFFING, AND POLISHING

CAUTION: Do not remove more than 0.5 mils of clearcoat finish when sanding, hand buffing or polishing. Basecoat paint must retain clearcoat for durability.

CAUTION: If the finish has been finesse sanded in the past, it cannot be repeated. Failure to follow this caution can result in damage to vehicle finish.

NOTE: Finesse sanding should only be performed by a trained automotive paint technician.

Minor acid etching, orange peel, or smudging in a clearcoat or single-stage finish can be reduced with light finesse sanding, hand buffing and polishing. Use a Paint Thickness Gauge #PR-ETG-2X or equivalent to determine clearcoat or single-stage paint thickness before and after the repair.

PAINT TOUCH-UP

If the painted metal surface of a vehicle becomes scratched or chipped to metal, it should be touched-up as soon as possible to avoid corrosion.

WARNING: Use an OSHA approved respirator and safety glasses when spraying paint or solvents. Failure to follow this warning may result in possible personal injury or death.

When repairing painted metal surfaces, for best results, use MOPAR® Scratch Filler/Primer, Touch-Up Paints and Clear Top Coat.

1. Scrape any loose paint and corrosion from inside the scratch or chip.

   WARNING: Avoid prolonged skin contact with petroleum or alcohol–based cleaning solvents. Failure to follow this warning can result in possible personal injury or death.

   NOTE: Skin contact with petroleum or alchohol-based cleaning solvents can be avoided by wearing nitrile gloves.
2. Clean affected area with MOPAR® Tar/Road Oil Remover or equivalent, and allow to dry.
3. Fill the inside of the scratch or chip with a coat of filler/primer. Do not overlap primer onto good surface finish. The applicator brush should be wet enough to puddle-fill the scratch or chip without running. Do not stroke brush applicator on body surface. Allow the filler/primer to dry hard.
4. Cover the filler/primer with color touch-up paint. Do not overlap touch-up color onto the original color coat around the scratch or chip. Butt the new color to the original color, if possible. Do not stroke applicator brush on body surface. Allow touch-up paint to dry hard.
5. On vehicles with clearcoat, apply clear top coat to touch-up paint with the same technique as described in step 4. Allow clear top coat to dry hard. If desired, the clearcoat can be lightly finesse sanded (1500 grit) and polished with rubbing compound.

NET, FORM AND PIERCE REPAIR

CAUTION: Failure to follow these recommendations could result in damage or failure to the part and the related parts.

Net, form and pierce is a manufacturing process which takes place during the original build of the vehicle. The original part will have a beveled platform that will decrease toward the fastener location mounting hole. Replacement parts in these areas may not include bevel (form) or fastener hole (pierce) and will need to be adapted for proper fit and finish.

The primary locations which may utilize net, form and pierce are:

- Fender reinforcement (at front end module mount)
- Fender tower mounts
- Hood hinge (lower half)
- Rear body header (liftgate hinge mounts)
- Strut tower (at upper control arm mount)

NOTE: Shock tower is net, pierce only.

NOTE: The thickness of shims is not to exceed the original thickness of the factory bevel. If more shims are needed damage is still present and must be repaired properly.

If the replacement part did not come with a fastener hole, one of equal size and location will have to be drilled. Body shims should be used in the fender reinforcement to front end module. The hood hinge area, fender tower mounts, and rear body header will utilize washers as spacers where a specific spacer does not exist. The shims and spacers should be sealed between each other and to the stationary surface. Care should be taken when smoothing sealer around washers to give an undetectable repair. Refinish the repair area per the paint manufacturer's recommendations for corrosion resistance and appearance purposes.

RIVET NUT PROCEDURE

CAUTION: Failure to follow these recommendations could result in damage to the vehicle

Rivet nuts are used for parts installations, when access to the back mounting area is limited or boxed in. It is important to achieve a full seat on the first attempt due to the lack of accessibility on the back side of the rivet nut. Poor seating of the rivet nut will result in part failure, loose parts and possible water leaks.

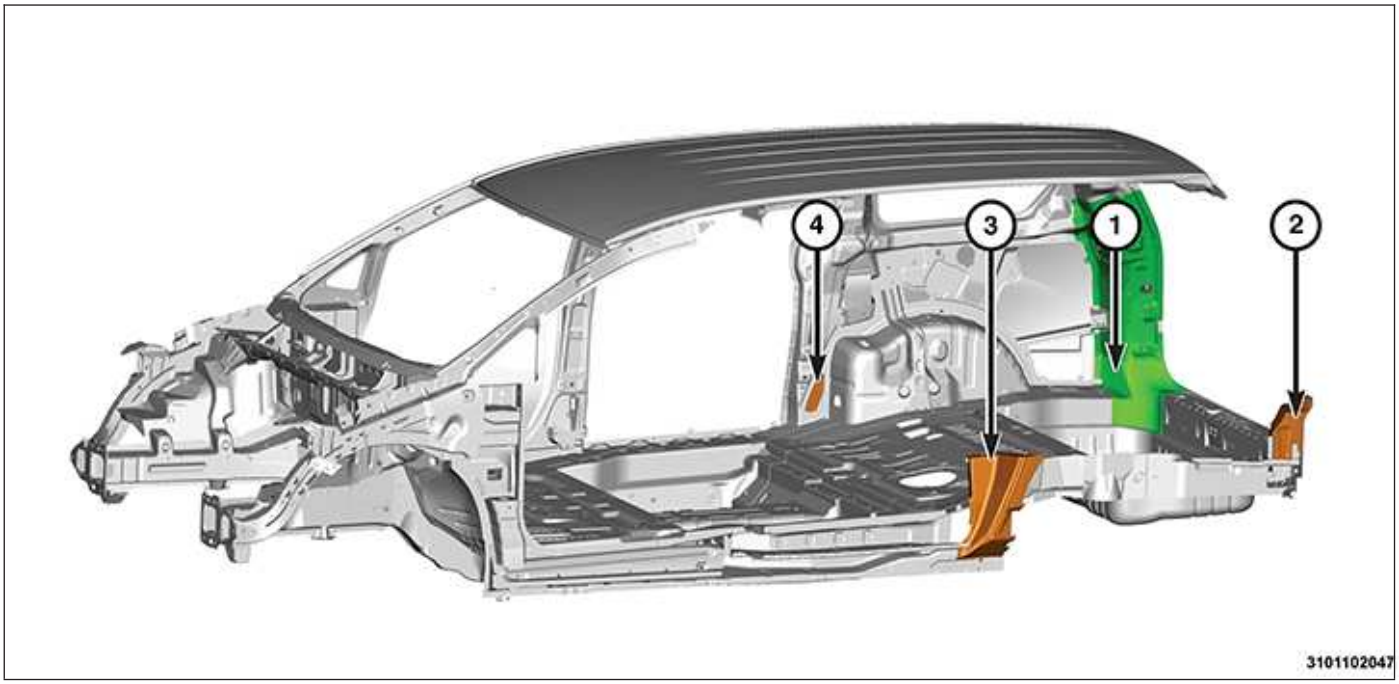
The use of a commercially available threaded insert tool will be necessary. There are several styles and types readily available. Examples of multi fit choices are the Matco® 203F and the Snap On® HP650M, or you may select one with equivalent capabilities. If a multi fit option is not chosen, it must be capable of a thread size of **M6×1.00**. Follow the tool manufacturer recommended directions for proper installation.

POLYURETHANE FOAM REMOVAL

CAUTION: All NVH foam must be removed from the repair area of the vehicle, as material is flammable.

PolyURethane (PUR) foam, is used in certain locations of the vehicle for Noise Vibration Harshness (NVH) purposes and structural strengthening. The PUR foam creates a hazard in the repair process as it can be flammable. Damage location and extensiveness will vary in the repairs to be performed. Therefor, it is necessary for the technician to determine if the location of the foam will create a hazard and remove it as necessary.

The locations of PUR foam, used throughout the vehicle, can be found in the Sound Deadener Locations **(Refer to 31 - Collision Information/Locations/Sound Deadener Locations)**.



NOTE: Vehicle model and PUR foam locations are shown for example purposes only.

Often the foam can be removed during the removal of the damaged components. If this is not possible, examine to see if access is possible through existing holes or openings. The example above shows the left side C-pillar PUR foam (3) shown for clarity and the right side C-pillar PUR foam (4) accessible through an existing opening. It also shows the left side D-pillar PUR foam (2) shown for clarity and that it is not accessible in the D-pillar area (1).

PUR foam removal options-

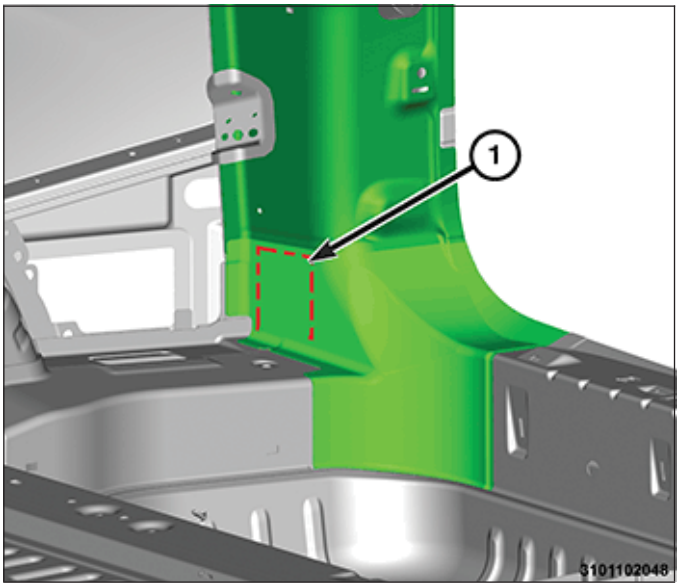
1. When the components to be replaced are removed from the vehicle.
2. Through openings in the adjacent components.

NOTE: Only use the following options when the first two options are not possible.

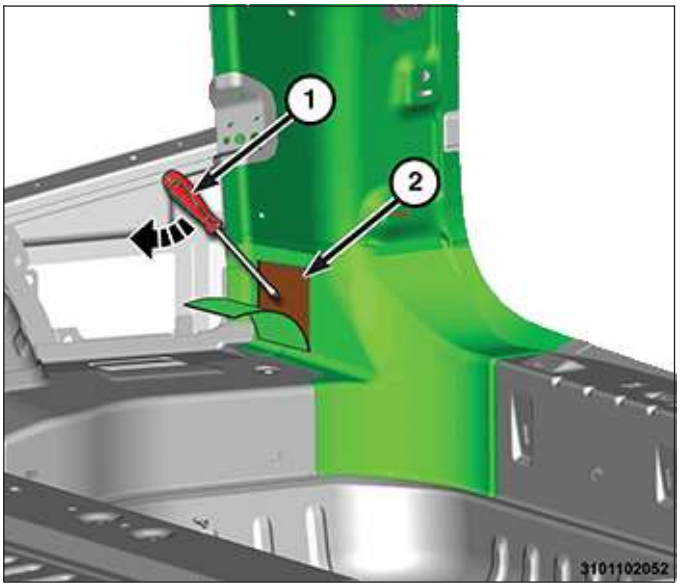
3. Gain access by performing one of the following procedures.Determine which procedure will work best in the situation, either the Window Access Procedure or Hole Access Procedure.

Window Access Procedure

1. Remove or protect components and the surrounding areas from sparks and welding spatter as necessary
2. With the use of a cut-off wheel, cut a “U” shaped access point (1) in the area of the PUR foam location.



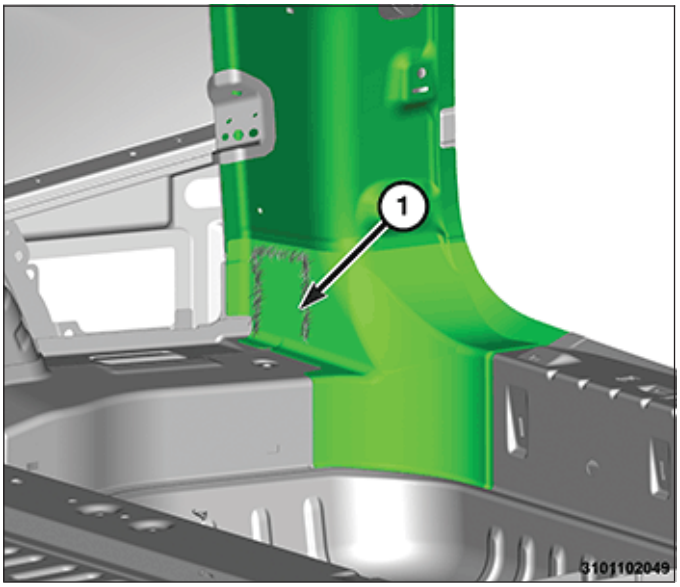
3. Carefully, pry open the window to gain access to the PUR foam (2).
4. With the use of a flat bladed tool (1) or equivalent, remove the foam from the cavity.



5. Close the window back into the original position.
6. Close the access hole by either welding or alternatively with a structural adhesive patch.

Weld

a. Grind the edges to remove the coatings to expose the bare metal.
b. Stitch weld the window (1) closed using the appropriate method as found in Standardized Steel Identification (Refer to 31 - Collision Information/ Specifications/Standardized Steel Identifications).
c. With the use of a grinding disc, smooth the weld.



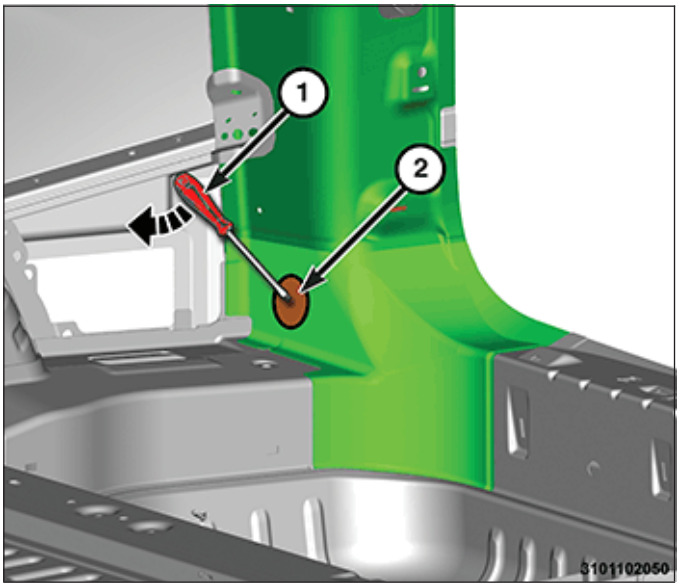
NOTE: For additional information on recommended structural adhesives and cure times refer to (Refer to 31 - Collision Information/ Standard Procedure/Non-Structural Sheet Metal Repair/Types of Structural Adhesives).

Structural Adhesive

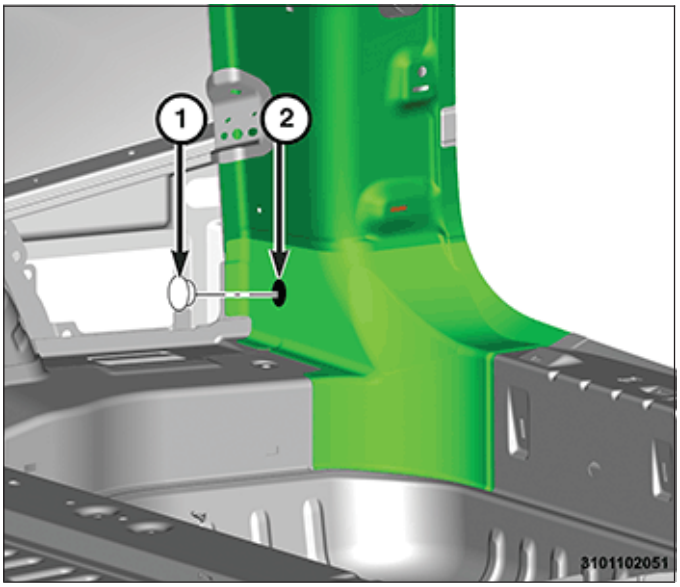
a. Create a metal patch 25 mm (1 in) larger than the opening.
b. Grind 13 mm (0.5 in) of the outer edge of the patch and the opening to expose bare metal.
c. Apply structural adhesive to the bare metal on the patch.
d. Position the patch to the opening and clamp into place.
e. Remove any squeeze-out adhesive and allow to cure per recommendations.
7. Refinish as necessary.
8. Apply inner panel corrosion inhibiting materials (Mopar Cavity Wax part #68042970AA, or equivalent).

Hole Access Procedure

1. Drill a 25 mm (1 in.) access hole (2) in the necessary area.
2. With the use of a flat bladed tool (1) or equivalent, remove the foam from the cavity.



3. Touch up the edges with an epoxy primer and allow to cure fully.
4. Touch up with paint and allow to cure fully.
5. Install a 25 mm (1 in.) body plug.



NON-STRUCTURAL SHEET METAL REPAIR

Safety Notice

CAUTION: All Service and rebuilding instructions contained herein are applicable to, and for the convenience of, the automotive repair industry only.

Proper service and repair is important to the safe, reliable operation of all motor vehicles. The service procedures recommended and described in this publication were developed for professional service personnel, and are effective methods for performing vehicle repair. Following these procedures will help ensure efficient and economical vehicle performance and service reliability. Some service procedures require the use of special tools designed for specific procedures. These special tools should be used as recommended throughout this publication.

It is important to note this publication contains various **Cautions** and **Warnings**. These should be read carefully in order to minimize risk of personal injury or the possibility that improper service may damage the vehicle or render it unsafe. It is important to note that these cautions and warnings cover only the situations and procedures FCA US LLC has encountered and recommended. FCA US LLC cannot possibly know, evaluate, and advise the service trade of all conceivable ways in which service may be performed, or the possible hazards of each. Consequently, FCA US LLC has not undertaken any broad service review. Accordingly, anyone that uses a service procedure or tool that is not recommended in this publication must be certain that neither personal safety, nor vehicle safety will be jeopardized by the service methods they select.

Types of Structural Adhesives

Overview: There are three basic chemistries used in the collision repair industry. The types of adhesives used include Acrylic, Epoxy and Urethane. To achieve optimal results, it is best to use the chemistry that bonds best to the substrate being repaired, is easiest to use and offers the most permanent, non-detectable repair at the most economical repair cost. All three chemistries have their strengths and weaknesses.

NOTE: Structural adhesives that meet FCA US LLC's approved replacement materials specifications include - LORD Fusor 2098, LORD Fusor 112B and 3M 08116

Adhesive Types:

- **Acrylic Adhesives -** Bond all types of bare metals and are excellent for cross bonding aluminum to steel. They have good Noise Vibration Harshness (NVH) properties and offer anti-corrosion properties, so primers must be removed in the bond area. Most acrylics have a fast room temperature cure and respond well to force curing. They are stable with regards to temperature and moisture during cure. However, both of these can effect shelf life. Acrylics are the most forgiving of the three chemistries with regards to mix ratio accuracy.
- **Epoxy Adhesives -** Bond well to ridged and semi-ridged plastics, steel and aluminum and are generally easy to sand and feather edge. Some may be too ridged for flexible substrates and they often require primers on bare metal applications. Epoxies can be heat cured to increase strength and accelerate the curing process. They have a long and stable shelf life. Always purge the air out of the cartridges and use mix nozzles.
- **Urethane Adhesive -** Typically flexible and bond well to plastics. However, they usually require primers on metal surfaces to protect against corrosion. Urethanes have good seam sealing and NVH qualities and are frequently the optimal choice for seam sealers. They are sensitive to moisture during cure, packaging and storage. Single component urethanes usually have a much shorter shelf life than two component urethanes. Mix ratios are critical for urethanes. In most cases it cannot vary more than ± 5%. Therefore, hand mixing is not recommended. Urethanes are the most unforgiving of the three chemistries with regards to mix ratio accuracy.

LORD Fusor 2098 Curing Chart

Cure Time x Cure Temperature = Pounds Per Square Inch

CURE TIME	CURE TEMPERATURE				
	10°C (50°F)	21°C (70°F)	38°C (100°F)	65°C (150°F)	65°C (200°F)
10-minutes	X	X	X	5.7 psi	1689.4 psi
20-minutes	X	X	0.0 psi	1199.3 psi	3175.2 psi
40-minutes	X	X	0.0 psi	2710.0 psi	3574.7 psi
1-hour	X	X	49.1 psi	2925.7 psi	X

CURE TIME	CURE TEMPERATURE				
	10°C (50°F)	21°C (70°F)	38°C (100°F)	65°C (150°F)	65°C (200°F)
2-hours	X	X	1368.7 psi	3776.1 psi	X
4-hours	X	23.8 psi	2713.2 psi	X	X
5-hours	X	90.4 psi	X	X	X
6-hours	X	292.0 psi	X	X	X
8-hours	39.1 psi	914.5 psi	X	X	X
16-hours	754.1 psi	1758.2 psi	X	X	X
1-day	1571.1 psi	2656.2 psi	X	X	X

JOINT AND REPAIR TYPES	REFERENCE
Backer Panel Joint	Backer Panel Joint
Door Skin	Door Skin Replacement
Body Side Aperture / Quarter Panel	Body Side Aperture / Quarter Panel
Metal Fatigue/Stress Cracks	Metal Fatigue / Stress Crack

Backer Panel Joint

Overview: Backer panel procedures may be used to achieve a smooth joint between panel sections. The backer panel works well in areas where there is not enough room to smooth or feather in an overlap joint. The backer panel joint is a common repair for rocker panels, quarter panels and body side apertures.

NOTE: OEM panel replacement such as a quarter panel, side aperture and rocker panel will always require the weld bonding procedure at the pinch weld flange area(s).

Preparation:

NOTE: Be certain vehicle is evenly supported at normal suspension points.

1. Restore structural dimensions as well as all related mating flanges.

   NOTE: It will be difficult to abrade the underside mating surface of the original panel, however this is an important step and should be done effectively.
2. Create a 50 mm. (2 in.) backer panel out of an unused portion of original or new sheetmetal panel, whichever contains the appropriate shape. Be certain it has a precise fit to the back of the panels it will join.
3. All paint, primer, adhesive and any other corrosion protective coatings must be removed from the mating surfaces as well as the backer panels themselves, prior to application of adhesive. Grind a 25 mm. (1 in.) contact area on all panels where backer panel bonding will take place. The metal should be completely bare and shiny in appearance, if the metal appears pewter in color all of the galvanized coating has not been removed.
4. Pre-fit the backer panel to the panel(s) being joined, to ensure proper fit. If screws will be used to hold the panels in place during curing, dry fit them now to be certain of proper fit later. There should be a 0.8 - 1.6 mm. (1/32 - 1/16 in.) gap between the two outer panels, no gap on backer panels.
5. Without a mixing tip attached, purge a small amount of structural adhesive from the cartridge. This will ensure an even flow of both components.
6. Attach a mixing tip and dispense a mixing tube's length of adhesive from the cartridge.
   Application:

   NOTE: Review temperature curing chart before application of any adhesive.

   NOTE: Refer to the structural adhesives manufacturer for information on work, handling and curing times.
7. Apply a 10 - 13 mm. (3/8 - 1/2 in.) bead of structural adhesive to the bare metal mating surfaces of the backer panels. Evenly apply the adhesive over the complete bonding surface. Apply a 10 - 13 mm. (3/8 - 1/2 in.) bead of structural adhesive to bare metal mating surfaces. Use a body filler applicator to level the adhesive, making

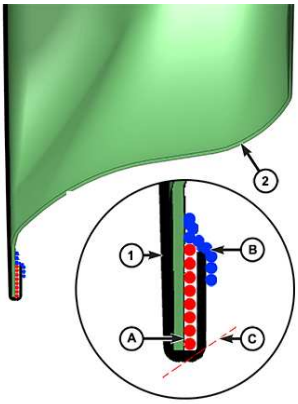
sure to cover all bare metal to protect against corrosion.
8. Position the new backer panel(s), making sure not to separate after contact. Lifting will create air bubbles and weaken the bond. **Adjustments must be made by sliding, not lifting the panel(s).**
9. Clamp tightly and evenly. Adhesive has glass beads that will prevent complete squeeze out. Install screws to the "hard to clamp areas".
10. Remove excess adhesive from all joints prior to adhesive cure.
11. Allow adhesive to cure, per manufacturer recommendations. When fully cured, expect the acrylic adhesive to be a little tacky, as this is a normal characteristic of the adhesive.
12. Remove clamps and screws.
13. Repeat procedure for installation of new panel.
14. Remove any remaining adhesive with a grinder or abrasive disc. All adhesive must be removed from the cosmetic repair area to ensure proper adhesion of further repair and refinish materials.
15. Bevel the center of the screw holes and apply fiber-reinforced waterproof body filler to the screw holes and section seam. When cured, sand and apply conventional body filler and block sand as necessary. Prime and paint per paint manufacturer recommendations.
16. Apply inner panel corrosion inhibiting materials (Mopar Cavity Wax part #6804292970 or equivalent) to panel areas that do not have foam injected in them.

Door Skin Replacement

Overview: Depending on the type of door to be repaired, a full skin or a belt cut will be required. Belt cut replacement is necessary when a door with a full skin, around the window opening, has an angle that makes it to difficult to get tools into to do a quality hem flange installation. A butt-joint is used at this seam.

CAUTION: When working with aluminum always use dedicated tools, grinding discs and sandpaper to prevent steel cross contamination with the aluminum. Cross contamination of these two materials will cause galvanic corrosion.

Preparation:
1. Belt cut skins will require determining and cutting of the sectioning locations on the original panel and on the replacement panel.
2. Remove the door skin by grinding the outer edge (C) until the hem flange is perforated.
3. Cut around weld nuggets and spot welds with a spot weld cutting bit or similar weld removal tool, if necessary.
4. If panel is attached with adhesive you may use heat, from a heat gun or inductor only, up to 204°C. (400F°). This will aid in loosening the bond.
5. With an air chisel and a flat bladed bit, remove outer skin and any remaining hem flange.
6. Grind any remaining weld nuggets flush with door frame, and remove all adhesive, paint, E-coating and corrosion protective coatings from the area where the **structural adhesive** will be applied, and where the 'butt-joint" is to take place. The metal should be completely bare and shiny in appearance, if the metal appears pewter in color all of the galvanized coating has not been removed.
7. Straighten door flange and any remaining damage on door shell using the hammer and dolly method.
8. The area of the new door skin that will make contact with the door shell will need to be scuffed with a course abrasive pad or ground with a 50 grit grinding disc. This will vary upon adhesive manufacturers, be certain to check adhesive manufacturer recommendations.
9. Dry fit the new panel for margin and beltline alignment. Determine where to place clamps to hold the panel in place, as necessary.



Door Skin

NOTE: Drain holes must remain clear of obstructions from adhesives and sealers.

1 - DOOR SKIN (OUTER)
2 - DOOR SHELL (INNER)
A - STRUCTURAL ADHESIVE
B - SEAM SEALER
C - HEM FLANGE CUT LINE (BOTTOM EDGE SHOWN, SURROUNDING EDGES TYPICAL)

CAUTION: Be certain the fit is good from the skin to door and door to door opening. Cured adhesive is extremely strong and will not allow for ″adjustments″.

10. Without a mixing tip attached, purge a small amount of structural adhesive from the cartridge. This will make certain that an even flow of both components is extruded.
11. Attach a mixing tip and dispense a mixing tube's length of adhesive from the cartridge.

NOTE: Refer to the structural adhesives manufacturer for information on work, handling and curing times.

Installation:

12. Apply a 10 - 13 mm. (3/8 - 1/2 in.) bead of structural adhesive to bare metal mating surfaces. Use a body filler applicator to level the adhesive, making certain to cover all bare metal to protect against corrosion.

NOTE: When applying adhesives be certain any and all drain holes remain open and clear of obstructions.

13. Apply a second bead of adhesive to ensure proper bead thickness.
14. Position the new panel. If repositioning is necessary slide the panel, do not lift or separate panels. **Adjustments must be made by sliding, not lifting the panel(s).** Apply clamps to hold panel in position, as necessary.

NOTE: There are many tools readily available to aid in the hem flange folding process.

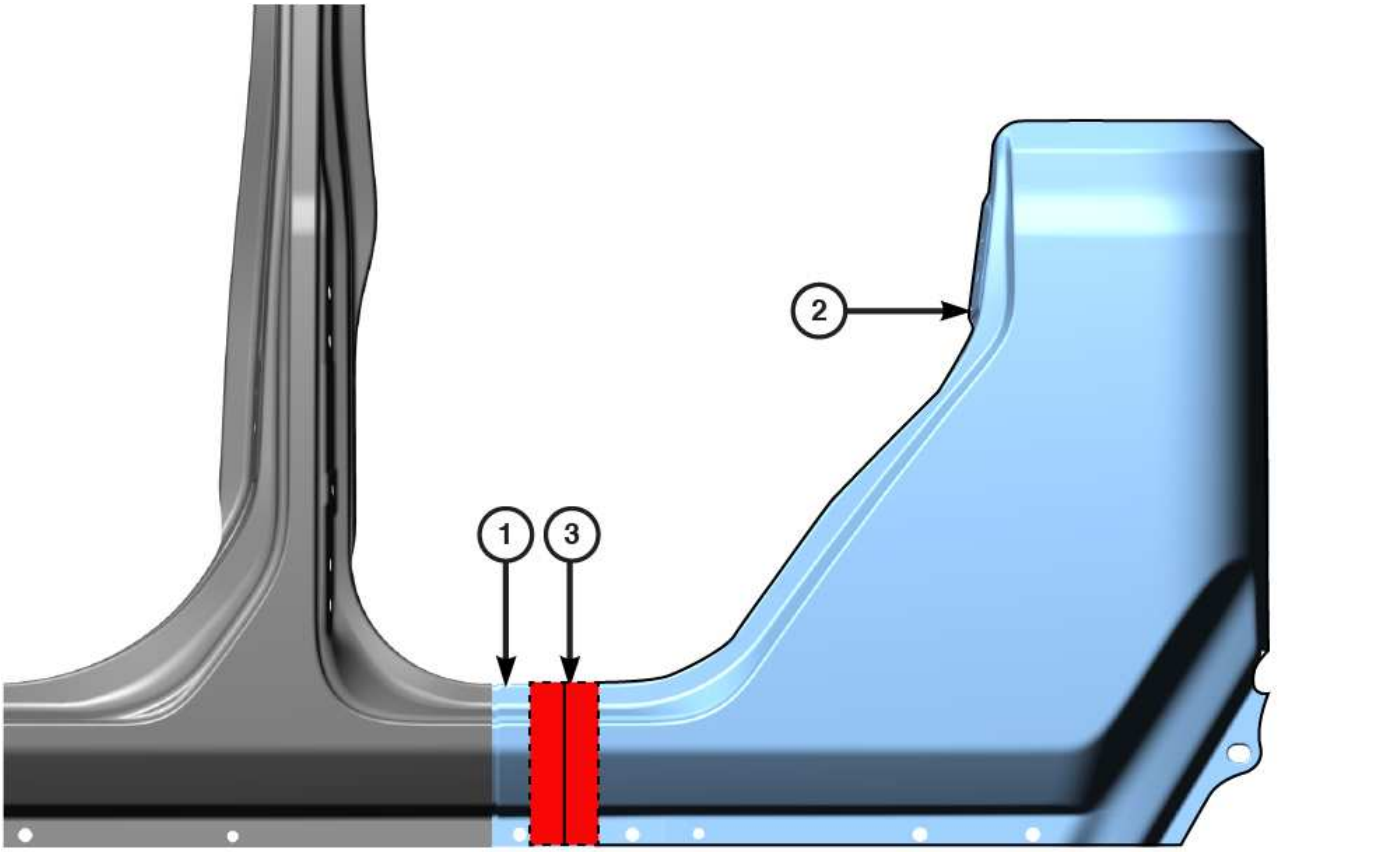
15. Roll the hem flange over. Remove any excess adhesive. This will save time, as compared to waiting until cured.
16. Re-check gap and flushness to the vehicle opening and adjust as necessary.
17. Allow the adhesive to cure per manufacturer recommendations. When fully cured, expect the adhesive to be a little tacky, as this is a normal characteristic of the adhesive. Remove clamps, if used.
18. Remove any excess cured adhesive with a grinder or abrasive disc. All adhesive must be removed from the cosmetic repair area to ensure proper adhesion of repair and refinish materials.
19. Apply an epoxy or anti-corrosion primer. When cured, lightly scuff.
20. Seam seal the entire door. Duplicate the factory seam sealer. Apply a discrete bead around the rest of the door to seal and protect, maintaining the original appearance.
21. Prime and paint per paint manufacturers recommendations.
22. Apply inner panel corrosion inhibiting materials (Mopar Cavity Wax part #68042970AA , or equivalent).

Body Side Aperture / Quarter Panel

Overview: FCA US LLC's recommended repair procedure for body side aperture / quarter panel replacement include butt joints using backer panels with structural adhesive at the sectioning joint, or a welded backer panel with a welded butt joint using Gas Metal Arc Welding (GMAW). Resistance spot welding with structural adhesive, referred to as weld bonding, should be used at all pinch welds and may be used at the drain trough and tail panel areas as well. With the exception of the sectioning joint, the rule to follow is "Re-assemble as it was built from the OEM". For further information on Weld / Weld Bonding, (Refer to Collision Information - Standard Procedure). GMAW (plug or puddle) welds may be used in place of Squeeze Type Resistance Spot Welding (STRSW) only in areas that specifically use spot welds and in areas that access limitations will not allow STRSW. GMAW cannot be used in the weld bonding process. Never weld with GMAW within 25 mm. (1 in.) of any area where structural adhesive is used. The weld "heat zone" will destroy the properties of the adhesive.

Vehicle design will determine if the sectioning location is to be in the pillar or the roof line area. For locations and warnings that may apply to the body side aperture / quarter panel sectioning locations reference Sectioning

Procedures (Refer to Collision Information / Standard Procedure).



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Rear Body Side Aperture

NOTE: Left side shown, right side similar.
1 - REAR BODY SIDE APERTURE
2 - WELD BONDING AREAS (WHERE ACCESSIBLE)
3 - ADHESIVE SECTION JOINT WITH BACKER PANEL

Preparation:

NOTE: Be certain vehicle is evenly supported at normal suspension points.

1. Restore structural dimensions as well as all related mating flanges.
2. Once the sectioning location has been established, cut original and replacement panels at the pre-determined locations. Remove spot welds within sectioned parameter.

   NOTE: Be careful not to destroy any areas that may be able to be used as backer panels (4).
3. If the panel is attached with adhesive, you may use heat, from a **non-flame** heat source, up to 204°C. (400F°). This will aid in loosening the bond.
4. Use an air chisel with a flat bladed bit to remove original panel.
5. Using a hammer and dolly, restore any and all damage to mating surfaces.
6. Create backer panels (4) to be used at the butt joint. Refer to Backer Panel Joint.

   NOTE: It will be difficult to abrade the underside mating surface of the original panel, where backer panel is to be used, however this is important step and should be done effectively.
7. Grind all mating surfaces with a 50 grit grinding disk. Remove all adhesive, sealers, paint, E-coating and corrosion protective coatings from the area where the structural adhesive and welds will be applied. The metal should be completely bare and shiny in appearance, if the metal appears pewter in color all of the galvanized coating has not been removed.
8. Pre- drill any GMAW plug / puddle weld holes that may be necessary, with a 8 mm. (5/16 in.) hole.
9. With the aid of an assistant, dry fit the panel. Apply clamps or Clecos to hold panel in place, making note of locations. Install screws or Clecos where accessibility prohibits the use of clamps. This will aid in proper alignment during installation.

10. Without a mixing tip installed, purge a small amount of structural adhesive from the cartridge. This will ensure an even flow of both components.
11. Attach a mixing tip and dispense a mixing tube's length of adhesive from the cartridge.

NOTE: Using scrap metal and adhesive, make test coupon samples and perform peel test to ensure your STRSW equipment is ready to apply welds as required. The Weld/Weld Bonding section will provide further information on peel testing and equipment set-up (Refer to Collision Information - Standard Procedure/Welding and Weld Bonding).

NOTE: Refer to the structural adhesives manufacturer for information on work, handling and curing times.

LORD Fusor 2098 Curing Chart

Cure Time x Cure Temperature = Pounds Per Square Inch

CURE TIME	CURE TEMPERATURE				
	10°C (50°F)	21°C (70°F)	38°C (100°F)	65°C (150°F)	65°C (200°F)
10-minutes	X	X	X	5.7 psi	1689.4 psi
20-minutes	X	X	0.0 psi	1199.3 psi	3175.2 psi
40-minutes	X	X	0.0 psi	2710.0 psi	3574.7 psi
1-hour	X	X	49.1 psi	2925.7 psi	X
2-hours	X	X	1368.7 psi	3776.1 psi	X
4-hours	X	23.8 psi	2713.2 psi	X	X
5-hours	X	90.4 psi	X	X	X
6-hours	X	292.0 psi	X	X	X
8-hours	39.1 psi	914.5 psi	X	X	X
16-hours	754.1 psi	1758.2 psi	X	X	X
1-day	1571.1 psi	2656.2 psi	X	X	X

Installation:

12. Install backer panels, refer to Backer Panel Joint.
13. Apply 10 - 13 mm. (3/8 - 1/2 in.) bead of structural adhesive to the area where the two panels are to be bonded and weld bonded. **Do not apply to areas that will only be MIG or GMAW welded.**
14. Smooth the adhesive with a body filler spreader or equivalent, to cover all bare metal surfaces. Apply a second bead of adhesive to ensure proper adhesive thickness.

NOTE: Adjustments must be made by sliding, not lifting the panel(s). Lifting will cause air bubbles and weaken the bond.

15. With the aid of an assistant place the panel to the vehicle. If the panel needs to be adjusted, slide the panel.
16. Install clamps and screws to locations determined during the dry fit process.
17. Remove all squeeze out of adhesive, prior to curing.

NOTE: Structural adhesive manufacturers will vary on time allowed for completion of STRSW in weld bond zones. Check and follow adhesive manufacturer recommendations.

18. Apply STRSW to weld bond area immediately.
19. Once fully cured, remove clamps and screws. When fully cured, expect adhesive to remain a little tacky, as this is a normal characteristic of the adhesive.
20. Complete STRSW and / or GMAW (plug / puddle) welds.
21. Finish / Dress the welds as necessary. If screws were necessary bevel the screw holes. Prepare the joint and screw holes by grinding the area with 50 grit grinding disc. Get in seams as best as possible without thinning the metal.
22. Remove any excess cured adhesive with a grinder or abrasive disc. All adhesive must be removed from the cosmetic repair area to ensure proper adhesion of repair and refinish materials.
23. Apply fiber-reinforced waterproof body filler to screw holes and joint. Complete the repair using conventional body filler, and block sanding.
24. Apply an epoxy or anti-corrosion primer. When cured, lightly scuff and then apply seam sealer as necessary.

25. Prime and paint per paint manufacturer recommendations.
26. Apply inner panel corrosion inhibiting materials (Mopar Cavity Wax part #68042970AA, or equivalent).

Metal Fatigue/Stress Crack

Overview: On rare occasions you may encounter metal fatigue, also referred to as stress cracks. This will appear as a crack starting at an edge and trailing away. Follow these steps for a proper repair:

1. Locate the trailing end of the crack and drill a 3 mm. (1/8 in.) hole at the very point at which it stops. This is referred to as "Stop Drilling".
2. Remove all contaminants and coatings including primer, paint and anti-corrosion, from the repair area. Surface should be clean and shiny (if pewter in color then anti-corrosion has not been removed).
3. Identify the type of metal to be welded and the recommended welding process for that metal as found in Standardized Steel Identification (Refer to 31 - Collision Information/Specifications/Standardized Steel Identification).
4. Stitch weld the seam/crack closed using the recommended welding process and in accordance with the welding guidelines as found in Weld/Weld Bonding (Refer to 31 - Collision Information/Standard Procedure/ Welding and Weld Bonding).
5. Dress the welds as necessary. **Careful not to thin the base metal.**
6. Depending on the location and visibility of the repair surface refinishing will vary from body filler, finishing and painting to simply applying an epoxy or anticorrosion primer and rubberized undercoating, Mopar part #05093417AA or equivalent.
7. Apply inner panel corrosion inhibiting materials (Mopar Cavity Wax part #68042970AA or equivalent).

WELDING AND WELD BONDING

Safety Notice

CAUTION: All Service and rebuilding instructions contained herein are applicable to, and for the convenience of, the automotive repair industry only

The service procedures recommended and described in this publication were developed for professional service personnel, and are effective methods for performing vehicle repair.

It is important to note this publication contains various **Cautions** and **Warnings**. These should be read carefully in order to minimize risk of personal injury or the possibility that improper service may damage the vehicle or render it unsafe. FCA US LLC cannot possibly know, evaluate and advise the service trade of all conceivable ways in which service may be performed, or the possible hazards of each. Consequently, FCA US LLC has not undertaken any broad service review. Accordingly, anyone that uses a service procedure or tool that is not recommended in this publication must be certain that neither personal safety, nor vehicle safety will be jeopardized by the service methods they select.

Safety Precautions

WARNING:

- **When Welding or working with Adhesives always wear safety goggles and gloves to prevent contact with chemicals and to prevent weld spatter, sparks, and sharp metal from causing bodily injury.**
- **Wear an approved respirator while welding and during the application of adhesives to prevent inhalation of harmful vapors.**
- **Always remove NVH (Noise Vibration and Harshness) foam from welding repair area, as material is flammable.**

WARNING: Failure to follow these instructions may result in possible serious or fatal injury

Welding

- Comply with all federal, state and local regulations to avoid any injuries due to shock, fires, fumes, sparks and liquids.
- All flammable materials or liquid should be stored in tightly sealed and labeled containers, and used only in well ventilated areas.
- No spark producing equipment should be permitted in any area where flammable materials are being handled or stored.

Adhesives:

- Safety Data Sheets (SDS) must be available and understood before adhesives are handled.
- All personnel should be instructed on the proper procedures to prevent skin contact with solvents, curing agents, and uncured base adhesives, which could cause allergic reactions or sensitization.

Introduction

The purpose of this document is to clearly explain the welding options available to the collision repair technician and how to determine that welding repairs are made properly. The primary types of welding covered in this section are Squeeze Type Resistant Spot Welding (STRSW), Gas Metal Arc Welding (GMAW), Metal Inert Gas (MIG) Brazing and Weld Bonding (a combination of STRSW and structural adhesive). Proper training and weld testing are required to ensure that a safe, high quality, vehicle repair is made.

INDEX	REFERENCE
Training and Qualification	Training and Qualification

Panel Removal

WARNING: Always Wear Safety Goggles, Work Gloves, Hearing Protection and a Dust Mask when removing welded panels this way. Failure to follow these instructions could result in serious or fatal injury.

When removing panels and components for replacement, care must be taken not to damage the underlying component. On welded and "Weld Bonded" panels spot welds must be removed using a spot weld cutting type tool, or equivalent. On panels that are adhesive bonded or weld bonded it is acceptable to use heat up to **204°C. (400°F.)**, from a **Non-Open Flame** heat source such as a heat gun. This will loosen the bond, so less damage is inflicted to the mating surface. After panel is removed, any remaining weld nugget should be ground smooth. Cut-off wheels should not be used, as there is potential to remove material from the base material which would weaken the final repair. Place an air hammer with a flat bladed chisel bit (or equivalent) in between panels and remove the panel. Care should be taken as to not damage mating flanges and the surrounding components.

Key Points of a Welding Repair

- Poor fit up will adversely affect weld quality and may result in a weld failure due to excessive metal stretching around the nugget.
- Clamps/Clecos should be used to bring parts together and hold them in position.
- Clamps/Clecos should be insulated when using STRSW to control weld current shunting (This can be accomplished with specialized clamps or by placing a insulating material such as cardboard between the clamp jaws and the panels.)
- Number, size and location of welds should closely duplicate the original assembly. Do not place the new spot weld directly on the original spot weld location. Placement of a new weld over an original weld location may lead to metal fatigue or poor weld quality.
- Surface of the steel parts should be clean and free of scale, rust, paint, cured adhesives/sealers and any other contaminants that could adversely affect the quality of the weld joint. This includes the removal of any E-coat applied to the service part within 25 mm. (1 in.) of any welds.
- Proper corrosion protection must be installed when repairs are complete, (Refer to 31 - Collision Information/ Standard Procedure/Corrosion Protection).
- If the joint originally had adhesive, all E-coat must be removed where the adhesive is to be reapplied.
- "Weld-thru" primers are not recommended anywhere.
- Do not remove base material from the base panel when releasing welds.

NOTE: FCA US LLC recommends the same quantity of welds as the original panel, but placement of the new weld should NOT be put directly on the original spot weld location. Placement of a new weld over an original weld location may lead to metal fatigue or poor weld quality.

Requirements of a Welding Repair

The number one requirement of any welding repair is to restore the vehicle to its OEM condition. Materials and technologies should duplicate original OEM conditions as much as possible. To meet this requirement, the technician must ensure the following:

- Panel layering (shingling) is the same as original
- Part fit up is correct
- Equivalent sealers and/or adhesives are utilized
- Welds are replaced in the same size, quantity and location
- "Weld-thru" primers are NOT recommended
- Structural adhesives and sealers must be replaced where they were located

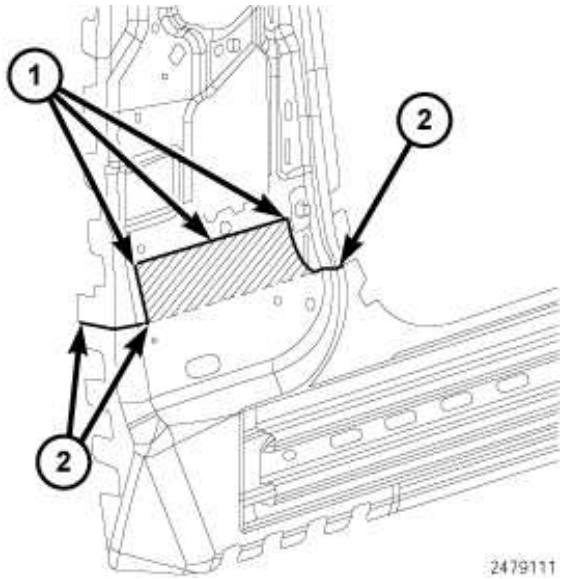
A significant amount of structural adhesive is used at the OEM to improve joint strength. It may be difficult to determine if the material between the panels is an adhesive or a sealer, and for this reason, the following guideline should be used: **If in doubt, use a two-component, corrosion inhibiting, structural adhesive.** GMAW welding is not recommended within 25 mm. (1 in.) of the adhesive as it creates heat that will destroy the adhesive. STRSW on the other hand, can weld through the adhesive and will not destroy its properties.

NOTE: Structural adhesives that meet FCA US LLC materials recommendations for adhesive strength and corrosion protection qualities include Lord Fusor #2098, Lord Fusor #112B and 3M #08116.

Modified Lap Joint

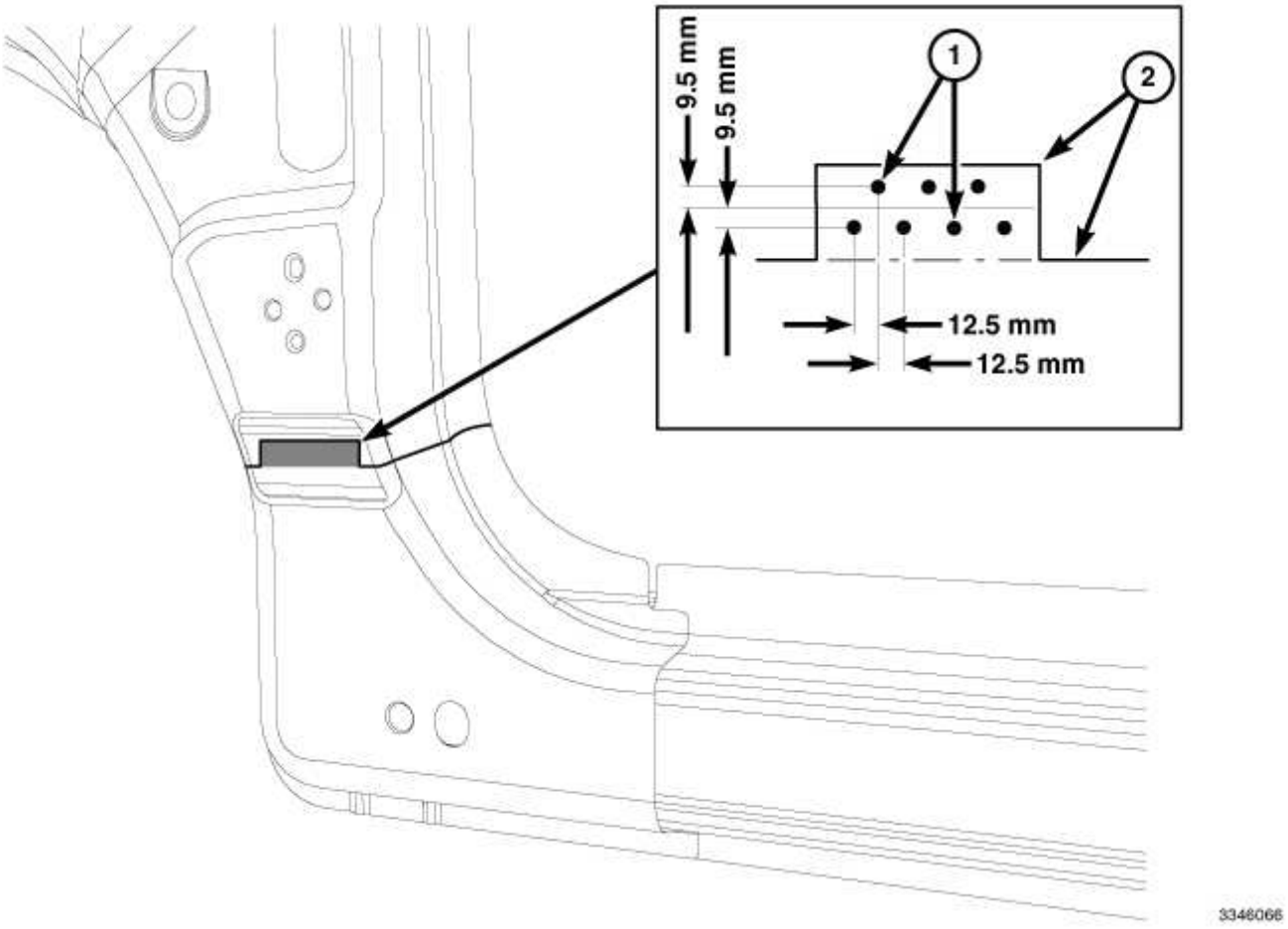
NOTE: Parts shown for example purposes only. Emphasis is on joint design and proper plug weld placement.

The repair joint is a combination lap-joint (1) and butt-joints (2) – the panels are lapped in the flat areas and butted in contoured locations and at weld flanges. The graphic better illustrates this process.



Modified Lap Joint

1 - LAP-JOINT WELDS
2 - BUTT-JOINT WELDS



Plug Weld Layout

1 - MIG PLUG WELDS
2 - MIG SEAM WELD

The MIG plug welds, or "puddle welds" should be made after drilling 8 mm (5/16 in) holes and should be staggered 12.5 mm (0.5 in) apart following the centerline of the lap and should be alternating above and below the centerline 9.5 mm (3/8 in.).

In the lap-jointed area, staggered MIG plug welds (1) are used to augment the joint and **all edges** of the lapped panel seam (2) should be **completely** welded.

Types of Welding

Squeeze Type Resistant Spot Welding (STRSW)

- STRSW relies on the resistance of the material being welded to create heat as a current is passed through. The materials being welded are squeezed together, and as current passes through, resistance causes heat buildup. The force of the tips and the heat from the current allow the materials to fuse together. The current is removed and the force from the welding tips is held during a cool down cycle. When the cool down cycle is complete, the pressure is released and the next weld is positioned.
- Learning how to create weld coupons, refer to Test Weld Coupon and then performing a destructive test using these coupons, is the key to successfully using STRSW. FCA US LLC requires a physical test using test coupons and the methods outlined in this document to test welds prior to making repairs.
- Tip condition is very important for producing proper welds. Inspect tips often and either dress or change per equipment manufacturer recommendations.
- High-quality welding equipment must be used or welds may be inadequate. Also, the equipment must be able to produce repeatable welds from the beginning of the repair to the end.

Gas Metal Arc Welding (GMAW) or "MIG"

- GMAW is an arc welding process where the electrode wire is fed through a weld gun and is surrounded by a shielding gas. The term MIG comes from early uses on aluminum where argon was used as shielding gas and

the process was referred to as Metal Inert Gas welding. The GMAW process is currently the most common in the uni-body repair environment.

Flux Core Arc Welding (FCAW)

- FCAW is an arc welding process where electrode wire is fed through a weld gun and is not surrounded by a shielding gas.
- The welding zone is protected by the use of flux that is located in the center of electrode wire.
- The surface of the completed will have slag left behind from the flux that will need to be removed prior to any refinishing process.

Metal Inert Gas (MIG) Brazing

- MIG brazing, is a brazing process where the electrode wire is fed through a weld gun and is surrounded by argon as shielding gas.
- The application of the process is similar to GMAW. However, it utilizes a different electrode and shielding gas and does not melt the base material.
- Due to the lower melting point of the electrode, it produces a much smaller heat affected zone than GMAW.

Weld Bonding

- A method of joining metals using STRSW in conjunction/combination with a structural adhesive.
- Weld bonding provides the customer with a superior repair as compared to the traditional plug/puddle welding process using GMAW. Structural adhesive should not be used in a joint that did not originally contain it.
- The repair joint or seam should duplicate the OE build as closely as possible, unless otherwise stated in the collision information.

NOTE: FCA US LLC DOES NOT approve or endorse the use of structural adhesives alone in the replacement of body panels.

Weld Processes

Squeeze Type Resistance Spot Welding (STRSW)

Applications

- With advancements in equipment technologies, such as computer program controlled and inverters, STRSW is not restricted to light gauge sheet metal any longer. Heavier gauges of high strength and coated steel, currently used in vehicle structures, can now be welded in the field, providing destructive testing is performed on each combination. This is to ensure quality welds are being maintained.

Equipment Requirements

- Equipment must produce two sided welds
- Equipment must have been tested to SAE J2667 with satisfactory results obtained
- Equipment must have the capability to create welds that comply with the Minimum Weld Nugget Requirement Chart
- Technician must have the appropriate sheet metal measuring equipment to ensure their welds meet the minimum weld nugget size for the actual panels being welded

Gas Metal Arc Welding (GMAW) or ″MIG″

Applications

- Sheet metal repairs where STRSW is not available or practical, and truck frame repairs.
- The most common usage of GMAW on uncoated or galvanneal coated steel will utilize a 75% Argon - 25% CO2 shielding gas mix, and AWS specification ER70S6 wire. When welding galvanized material, Flux Core Arc Welding (FCAW) using AWS specification E71T-GS wire should be used to avoid weld porosity from the zinc in the galvanizing.

Weld Process

COMPONENT PARTS	TRUCK FRAME		BODYSHELL EXTERIOR & UNDERBODY PANELS			
	Zinc and Zinc Iron Alloy coated sheet steels					
WELDING PROCESS	GAS METAL ARC (Note: 1)	FLUX CORED ARC	GAS METAL ARC (Note: 1)	MIG BRAZE (Note: 2)	GAS METAL ARC (Note: 1)	FLUX CORED ARC
Material Type	High Strength and Structural Quality Steels which includes HSLA, Martensitic, and Dual Phase materials					

COMPONENT PARTS	TRUCK FRAME		BODYSHELL EXTERIOR & UNDERBODY PANELS			
Material Thickness Range	2 mm - 4 mm		0.6 mm - 1.02 mm		>1.02 mm - 3.0 mm	
ELECTRODE TYPE (AWS SPEC. A5.18)	AWS CLASS. ER70S-6	AWS CLASS. E71T-11	AWS CLASS. ER70S-6	AWS CLASS. ERCuAl-A2	AWS CLASS. ER70S-6	AWS CLASS. E71T-11
ELECTRODE SIZE	0.035	0.045	0.023 - 0.025	0.035	0.035	0.045
ELECTRODE MAKER	Lincoln®	Lincoln® NR-211-MP	Lincoln®		Lincoln®	Lincoln® NR-211-MP
WIRE FEED SPEED (in/min)	245-250 Vertical Down 70-90 Flat & Horizontal	110 Vertical Down 70-90 Flat & Horizontal	95-115 All Welds	150-155 Flat & Horizontal	245-250 Vertical Down 70-90 Flat & Horizontal	110 Vertical Down 70-90 Flat & Horizontal
TRAVEL SPEED (in/min)			10			
VOLTAGE	19-20	15-18	16-19	18-19	19-20	15-18
POLARITY	DCEP	DCEN	DCEP	DCEP	DCEP	DCEN
GAS FLOW (cfh)	25-35	N/A	25-35	25-35	25-35	N/A
ELECTRICAL STICKOUT (in)	1/2 - 5/8	3/8 - 1/2	1/2 - 5/8	5/8 - 3/4	1/2- 5/8	3/8 - 1/2
GAS TYPE	75% Ar 25% CO2	N/A	75% Ar 25% CO2	100% Ar	75% Ar 25% CO2	N/A
TYPE OF ARC TRANSFER	Short Circuit		Short Circuit	Pulse	Short Circuit	

These Procedure Specifications are appropriate as of this publication. Procedures may be superseded with new spec's at a later date.

Always process to the Thinner Material Thickness (TMT)

All persons performing welding must be qualified to weld in all positions.

NOTE:

1. Must remove Zinc Coating on both sides of metal at the weld zone.
2. MIG Braze welding process requires use of Pulse Arc® or STT® welding machine.

Equipment Requirements

- The preferred GMAW welder will be a 220V. unit with minimum output capacity of 150 amps (250 amps suggested to avoid equipment limitations).

Limitations

- Welds must be "dressed", or ground down before applying topcoats.
- GMAW cannot weld through paints, sealers, or adhesives. Additionally, the zinc used in coated steels can lead to reduced weld strength due to porosity. This porosity problem on materials with heavy coatings can be dealt with by using FCAW.
- Due to the heat affected zone, structural adhesives cannot be applied within 25mm. (1in.) of GMAW welds.

Testing

- Weld coupons identical to the repair situation need to be created to help set up the welding equipment and weld process. These coupons then should be destructively tested to ensure proper quality welds are being made.

Post Weld Procedures

- When welding has been completed, welds in cosmetic locations must be dressed.
- Welds will need to be smoothed down to the height of the surrounding panel without any thinning of the sheet metal. This can be accomplished using one of many sanding or grinding products available in the aftermarket.
- Slag must always be removed prior to refinishing to restore corrosion protection and appearance.

- Corrosion inhibiting materials must be applied to seal the weld zone from future corrosion.

Metal Inert Gas (MIG) Brazing

Applications

- Is the recommended method for attaching steel that is greater than 600 MPa when accessibility to perform STRSW or weld bonding is not possible.
- It has a reduced heat affected zone as compared to GMAW.
- The lower heat involved will not affect the strength properties of the metal being welded

Flux Core Arc Welding (FCAW)

Applications

- Thicker gauge coated steels where the thickness of the metal is between 1.02 mm and 4 mm and tensile strength is below 600 MPa, such as truck frames.
- This type of welding is recommended for galvanized or zinc coated steels, due to porosity issues caused when welding with GMAW.
- AWS specification E71T-GS wire is recommended.

Minimum Weld Nugget Requirement Chart

*Governing Metal Thickness (GMT)	**Minimum Weld Nugget Diameter
0.64 mm. - 0.79 mm.	3.5 mm.
0.8 mm. - 0.99 mm.	4.0 mm.
1.0 mm. - 1.29 mm.	4.5 mm.
1.3 mm. - 1.59 mm.	5.0 mm.
1.6 mm. - 1.89 mm.	5.5 mm.
1.9 mm. - 2.29 mm.	6.0 mm.
2.3 mm. - 2.69 mm.	6.5 mm.
2.7 mm. - 3.04 mm.	7.0 mm.

*Governing Metal Thickness (GMT) = The minimum weld nugget for two thickness welds shall be based on the thinner of the two sheets being welded. The minimum weld nugget diameter for three thickness welds shall be based on the middle gauge of the three panels being welded (not necessarily the middle panel).

**Minimum nugget diameter should be measured with a vernier caliper. If the weld is not round, measure the major and minor diameter and average.

Equipment Limitations

- Each brand/model is limited to material capacity that can be welded.
- The facility power supply will impact equipment performance.

Access Limitations

- Due to the existing structure of the vehicle being repaired, each weld must be evaluated for feasibility. Due to power limitations of the equipment, tongs that are long and deep enough for certain welds may not be available, and the weld will need to be made by another method.

CAUTION: All NVH foam must be removed from the repair area of the vehicle, as material is flammable.

Preparation

- Prior to making repairs with STRSW, weld coupons must be created for testing. The test joint must be an exact duplicate of the original joint, including layering and adhesive application. The testing is required to ensure the repair restores the vehicle to its originally produced condition using the minimum weld nugget requirement chart.
- To correctly identify the material being welded or tested, the technician must posses an accurate material thickness gauge.
- No "improvements" to the vehicle design are allowed as this could have a negative impact on the vehicle as a whole. The repair should mirror what was used on the vehicle at the assembly plant.
- Note, the weld is affected by more than just the thickness or number of panels being welded, but also material coatings. Zinc based anti-corrosion coatings (i.e., galvannealing, galvanizing), sealers, adhesives, and E-coat will affect welder performance.
- When preparing an E-coated panel for STRSW the E-coat must be removed from both of the mating flanges

within 25 mm. (1 in.) of any flange. Corrosion protection is required anytime you remove E-coat. A scuffing disc should be used to remove the E-coat without damaging other sheet metal coatings
- With advancements in technology some STRSW welders now have computer controlled programs. These technologically advanced welders are capable of measuring the thickness and resistance of the panels being welded including multiple tiers and types of metal. The computer program is able to process the information to provide the proper spot weld consistently.
- If the panel originally had structural adhesives it should be reapplied prior to welding. The adhesive should have a corrosion inhibitor and cover all bare metal.
- Prior to creating weld coupons and the final body repairs, all coatings and dirt/road debris must be removed.

Testing

- Weld coupons identical to the repair situation need to be made prior to performing any repair. These coupons must be tested (peel test) to determine if the weld nugget meets the minimum size outlined above in the Minimum Weld Nugget Requirement Chart. Keep in mind that different material coatings, coating thickness, material thickness, and joint configurations have a direct impact on nugget size.

Weld Bonding

NOTE: Structural adhesive manufacturers will vary on time allowed for completion of STRSW in weld bond zones. Check and follow adhesive manufacturer recommendations.

Application

- Weld bonding is the STRSW welding process utilizing structural adhesive between the panels that are resistance welded together. The adhesive creates a very stiff structure, while the welding eliminates concerns of the adhesives' peel strength.
- Additionally, the adhesive acts as a sealer and provides a high level of corrosion protection.

Sealers and Adhesives

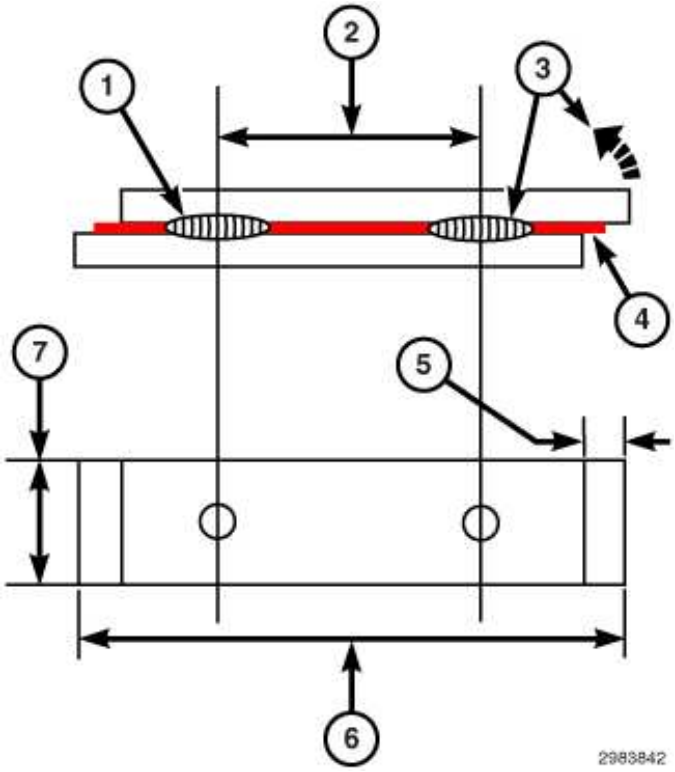
- Sealers are materials placed on top of a seam to control water and air intrusion.
- Adhesives, providing structural improvements, are found between panels welded together. Adhesives also provide the qualities of sealers when applied correctly.
- The FCA US LLC recommendation is to replace any suspected adhesive with a two-component, corrosion inhibiting structural adhesive when any repairs are made, providing the STRSW process is applicable.

Test Weld Coupon

NOTE: Periodically check the electrodes tips to determine wether the faces have been contaminated, damaged or increased in size. If any of these conditions have occurred, replace or re-face the electrode tips per equipment manufacturer recommendations.

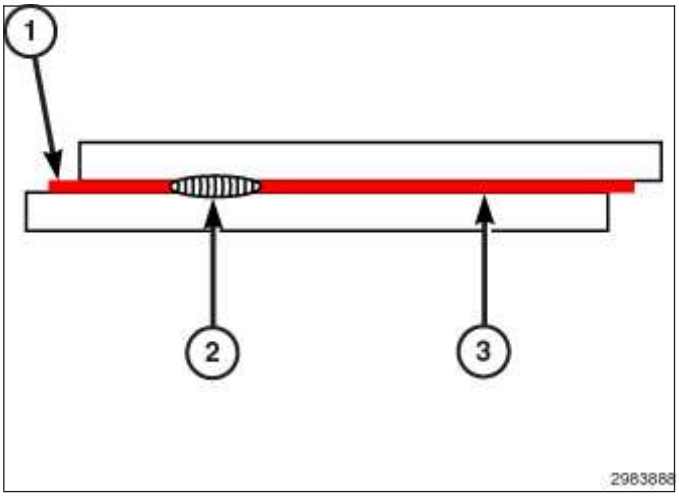
Weld Examples

Current Level Low for Both Welds



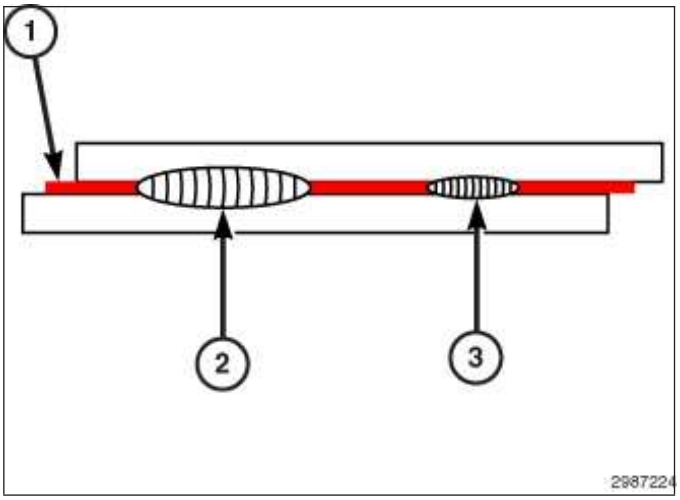
Weld Coupon

1 - FIRST WELD TOWARD END OF COUPON, AT LEAST 12.5 mm. (0.5 in.) FROM ANY EDGE
2 - DISTANCE MUST EQUAL THE SPACING FROM THE REPAIR WELD TO THE CLOSEST EXISTING WELD ON THE VEHICLE
3 - TEST THE SECOND WELD BY PEELING APART IN DIRECTION SHOWN (USING PLIERS OR EQUIVALENT
4 - STRUCTURAL ADHESIVE
5 - APPROXIMATELY 13 mm. (0.5 in.)
6 - APPROXIMATELY 100 mm. (4 in.)
7 - APPROXIMATELY 25 mm. (1 in.)



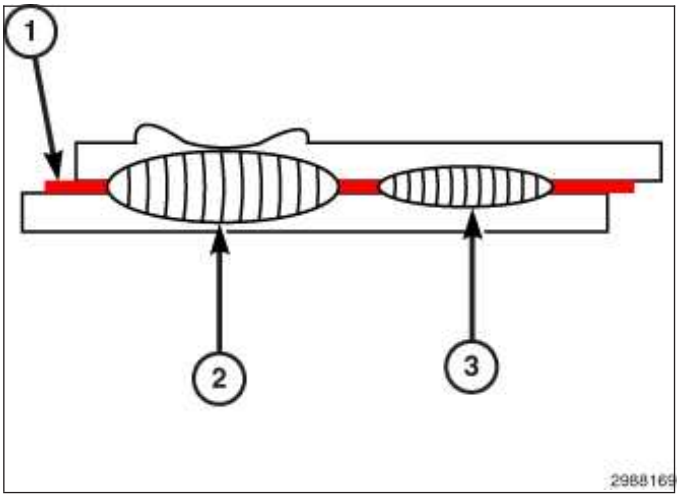
1 - STRUCTURAL ADHESIVE
2 - WELD TOO SMALL
3 - WELD NON-EXISTENT

Current Level Medium for Both Welds



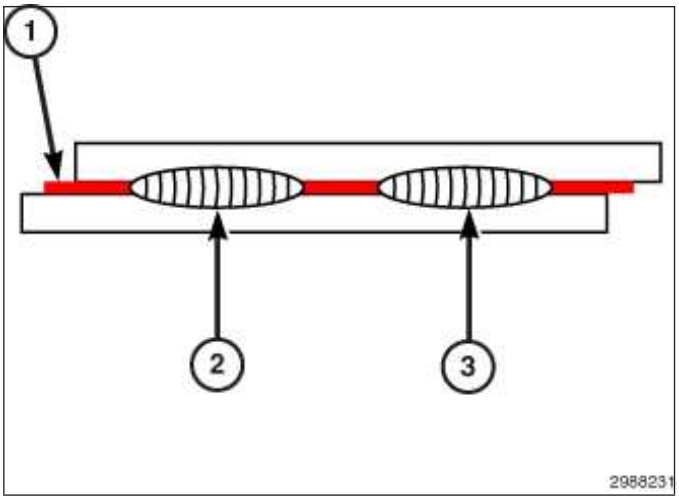
1 - STRUCTURAL ADHESIVE
2 - WELD CORRECT SIZE
3 - WELD TOO SMALL

Current Level High for Both Welds



1 - STRUCTURAL ADHESIVE
2 - WELD HAS HEAVY EXPULSION OF METAL AND SURFACE MARKINGS
3 - WELD CORRECT SIZE

Current Level Adjusted to Provide Acceptable Welds



1 - STRUCTURAL ADHESIVE
2 - WELD CORRECT SIZE
3 - WELD CORRECT SIZE

1. Select the proper spot welding tong/arm which provides the best access to the areas of the vehicles where the spot welds are to be made.
2. Obtain metal of the same thickness and coating (i.e., bare, galvanneal, or galvanized) to be welded. This metal will be used for spot welder set up. Damaged sheet metal taken from the vehicle being repaired may be used if it is from the area from which the work is to take place. The sheet metal must be flat, free of cracks, wrinkles and scored metal.
3. Using the procedure outlined in Test Weld Coupon, prepare the test coupons.
4. Clean and prepare both mating coupons. If using adhesives, verify the recommendations of the adhesive manufacturer. All contaminates such as rust scale, dirt, paint, and existing sealers and adhesives must be removed. Remove any E-coat within 25 mm. (1 in.) of where the welds are to be placed.
5. If the panel joint originally contained structural adhesive, it should be applied to the coupon at this time.
6. Install the equipment manufacturers recommended electrode tips.
7. Adjust the welding electrode tip force, and clamp time per manufacturer recommendations.

   NOTE: Galvanneal and galvanized coated steel will require more force
8. As shown in Test Weld Coupon, place first weld at a position at least 12.5 mm. (0.5 in.) away from end weld coupons. Then make the second weld. The weld spacing should be the same distance as the original welds or the closest existing weld, whichever is the least on the vehicle being repaired.
9. Destructively test the **second** weld to determine the size of the resistance spot weld produced (see examples in Test Weld Coupon. If the weld is insufficient, adjust the welder per the welder manufacturer recommendations and repeat steps 7, 8 and 9 until the proper weld size is achieved.

NOTE: If the first weld becomes too ″hot″ before the second weld reaches the correct size, reduce the current settings for the first weld and continue increasing the current setting for the second weld until the proper size for the second has been reached.

Final Weld Preparation

CAUTION: All NVH foam must be removed from the repair area of the vehicle, as material is flammable.

1. Visually verify that mating flanges are free of scale, rust, dirt, paint and cured adhesives/sealers, as well as wrinkles. If cracked, wrinkled or scored metal exists the condition needs to be corrected at this time.
2. E-coat within 25 mm. (1 in.) needs to be removed for STRSW. If Weld Bonding, E-coat should be ground off completely along seam.

   NOTE: Corrosion resistance coating (i.e., galvanneal, galvanized) should not be removed during cleanup of components.
3. Verify that the welder control settings are the same required to produce the second weld on the test coupons.
4. If adhesive is to be used, apply it at this time. Clamp the component to the vehicle.

   NOTE: Insulated clamps should be used, as not to shunt the weld current.

   NOTE: During the welding of the component it will be necessary to visually verify that the weld being made is not placed directly over an existing weld.

5. Perform the welds on the vehicle.

   NOTE: Structural adhesive manufacturers will vary on time allowed for completion of weld bond zones. Check and follow adhesive manufacturer recommendations. Reference the time temperature chart (Refer to Non-Structural Sheet Metal Repair/Types of Structural Adhesives).

6. If adhesive was used, clean up any excessive squeezeout prior to adhesive curing.

Training and Qualification

Training

As with any equipment, proper training is required, and in the case of welding equipment this is no exception. The goal of automobile facilities and technicians is to restore the vehicle to its OEM condition.

Training must be considered a two-fold process:

- The technician must be well versed in how the equipment operates, how adjustments are made and what effects those adjustments have on the weld. The technician must also clearly understand the maintenance of the equipment and the impact of poor maintenance on welds and equipment longevity.
- The second and most important, aspect of the training, is weld quality confirmation. Destructive testing of weld coupons must be performed to ensure the minimum weld size is created. Physical appearance of the weld is not enough to determine the quality of the weld. Additionally, poor welds may also reduce the durability, or quality , of the repaired vehicle in time.

It is required that technicians have received training regardless of the welding equipment or method they utilize. Both training in the specific field of welding, and the particular equipment, are necessary to ensure safe, durable, quality welds are obtained.

Qualification

To demonstrate welding skill, it is highly important that technicians obtain certification from an organization such as the American Welding Society (AWS) or a certificate from the Inter-Industry Conference on Auto Collision Repair (ICAR).

SECTIONING LOCATIONS AND PROCEDURES

WARNING:

- **When Welding or working with Adhesives always wear safety goggles and gloves to prevent contact with chemicals and to prevent weld spatter, sparks, and sharp metal from causing bodily injury.**
- **Wear an approved respirator while welding and during the application of adhesives to prevent inhalation of harmful vapors.**
- **Always remove NVH (Noise Vibration and Harshness) foam from welding repair area, as material is flammable.**

WARNING: Sectioning of components may only be performed in the described areas if damage to component does not extend past sectioning location. Should damage extend past sectioning location entire component replacement is the only acceptable repair

WARNING: FCA US LLC engineering's position on the use of heat during collision repair is as follows:

- **Any body panel or frame component damaged which is to be repaired and reused, must be repaired using the "cold straightening" method. No heat may be used during the straightening process.**
- **During rough straightening prior to panel replacement, damaged panels or frame components may be heated to assist in body/frame realignment. The application of heat must be constrained to the parts which will be replaced and not allowed to affect any other components.**

This "no heat" recommendation is due to the extensive use of advanced high strength steels in FCA US LLC products. High-strength materials can be substantially and negatively affected from heat input which will not be obviously known to the repairer or consumer.

Ignoring these recommendations may lead to serious compromises in the ability to protect occupants in a future collision event, reduce the engineered qualities and attributes, or decrease the durability and reliability of the vehicle.

This statement supersedes any previously released information by the FCA US LLC.

Failure to follow these instructions may result in serious or fatal injury.

CAUTION:

- **All restraint systems should be disabled before beginning repairs.**
- **Electronic modules located within 305 mm (12 in.) of any welding should be isolated.**
- **Protect vehicle from weld spatter damage.**
- **Vehicle service manual should be referenced for guidelines and warnings.**

Service assemblies for body components may be disassembled if utilization of the subcomponents is more appropriate to the repair or to reduce vehicle disruption. The structural and non-structural metal on the Jeep Gladiator Pickup (JT) may be sectioned in several areas providing the prescribed methods below are adhered to.

The joint should whenever possible be performed in as "flat" an area as possible to simplify the repair. While the joint may include "holes" and formations, it is suggested they be avoided but where this is not possible, the technician must ensure that the additional material thickness does not impede installation of fasteners, etc. that the hole exists for.

All dimensions are to be restored to factory specifications prior to full or partial component replacement.

CAUTION: NVH foam should be removed from the weld area, as material may be flammable.

CAUTION: Do not apply any corrosion protection or NVH foam prior to completion of welding, as materials are flammable.

The described sectioning locations only explain joint location and type. All other welds along the sectioned portion of the component must be replaced. Squeeze Type Resistance Spot Welding (STRSW) is the method to be used. If accessibility prevents application of spot welds, MIG plug welds are to be used. Welding of structural panels through 3 or more tiers of panel stack ups will require 9.5 mm. plug welds. Exterior panels should be installed using 8 mm. plug welds. For further information (Refer to Collision Information - Specifications/Standard Procedure/Weld and Weld Bonding).

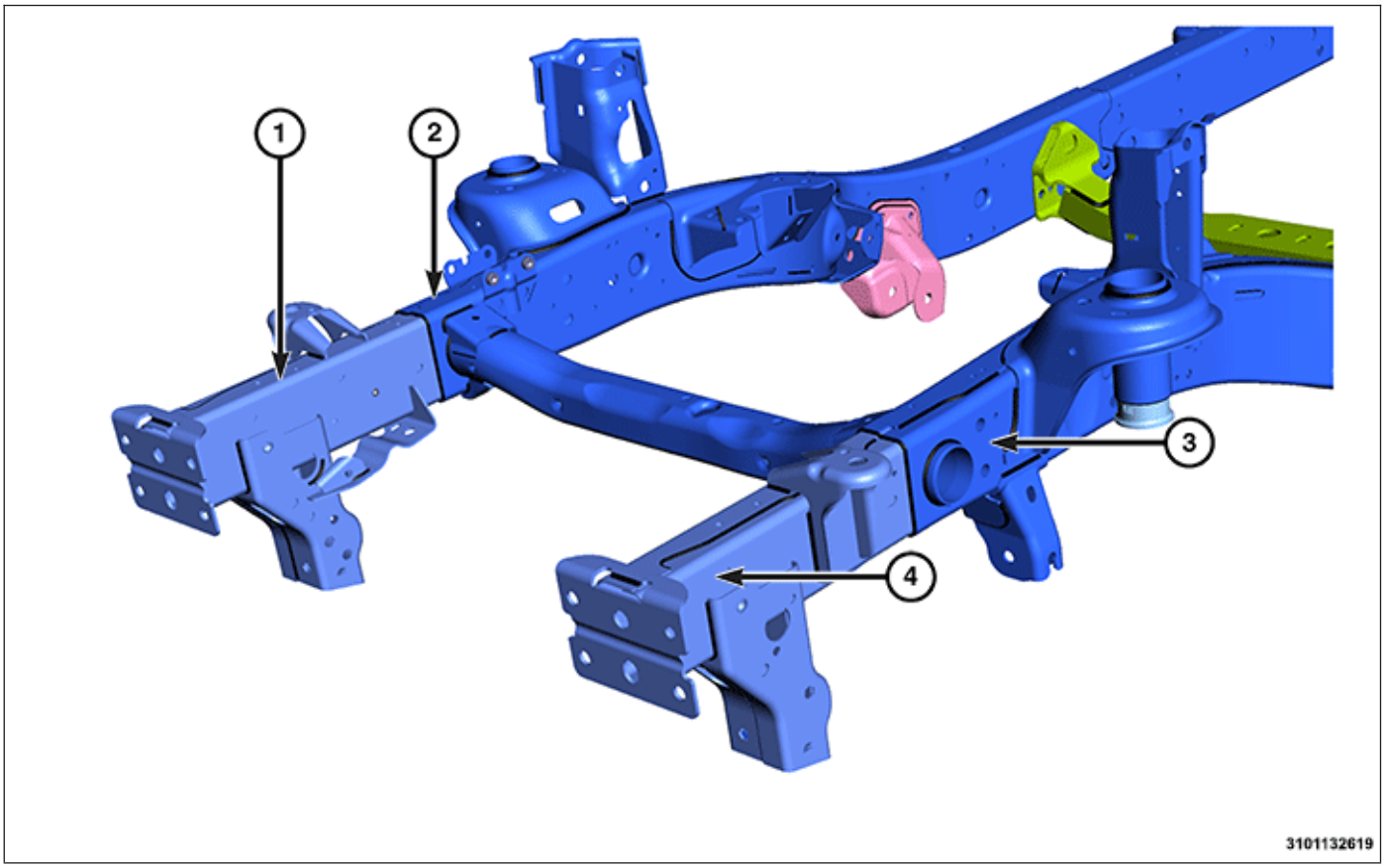
When welding is completed apply inner panel rust proofing, such as Mopar Cavity Wax Kit (part #68042969AA), Mopar Wax Refill (part #68042970AA), or equivalent. Apply to the inner cavity areas in two applications with a 30-minute flash period between the applications. Pay particular attention to areas which have been welded.

Corrosion protection should always be restored to manufacturer specifications. For further information on Corrosion Protection, (Refer to Collision Information - Standard Procedure).

Finish, sealers, adhesives and silencers should be reapplied or replaced to OEM locations and specifications, (Refer to Collision Information - Locations).

DESCRIPTION	FIGURE
FRONT RAIL EXTENSION	Front Rail Extension
UPPER LOAD PATH BEAM	Upper Load Path Beam
REAR BODY SIDE APERTURE	Rear Body Side Aperture
INNER BODY SIDE COMPONENTS **DO NOT SECTION AREAS**	Inner Body Side Components - Do Not Section
A-PILLAR AND UPPER LOAD PATH BEAM COMPOSITE REINFORCEMENTS	A-Pillar And Upper Load Path Beam Composite Reinforcements
WINDSHIELD FRAME AND ROOF CROSSMEMBER COMPOSITE REINFORCEMENTS	Windshield Frame And Roof Crossmember Composite Reinforcements

Front Rail Extension

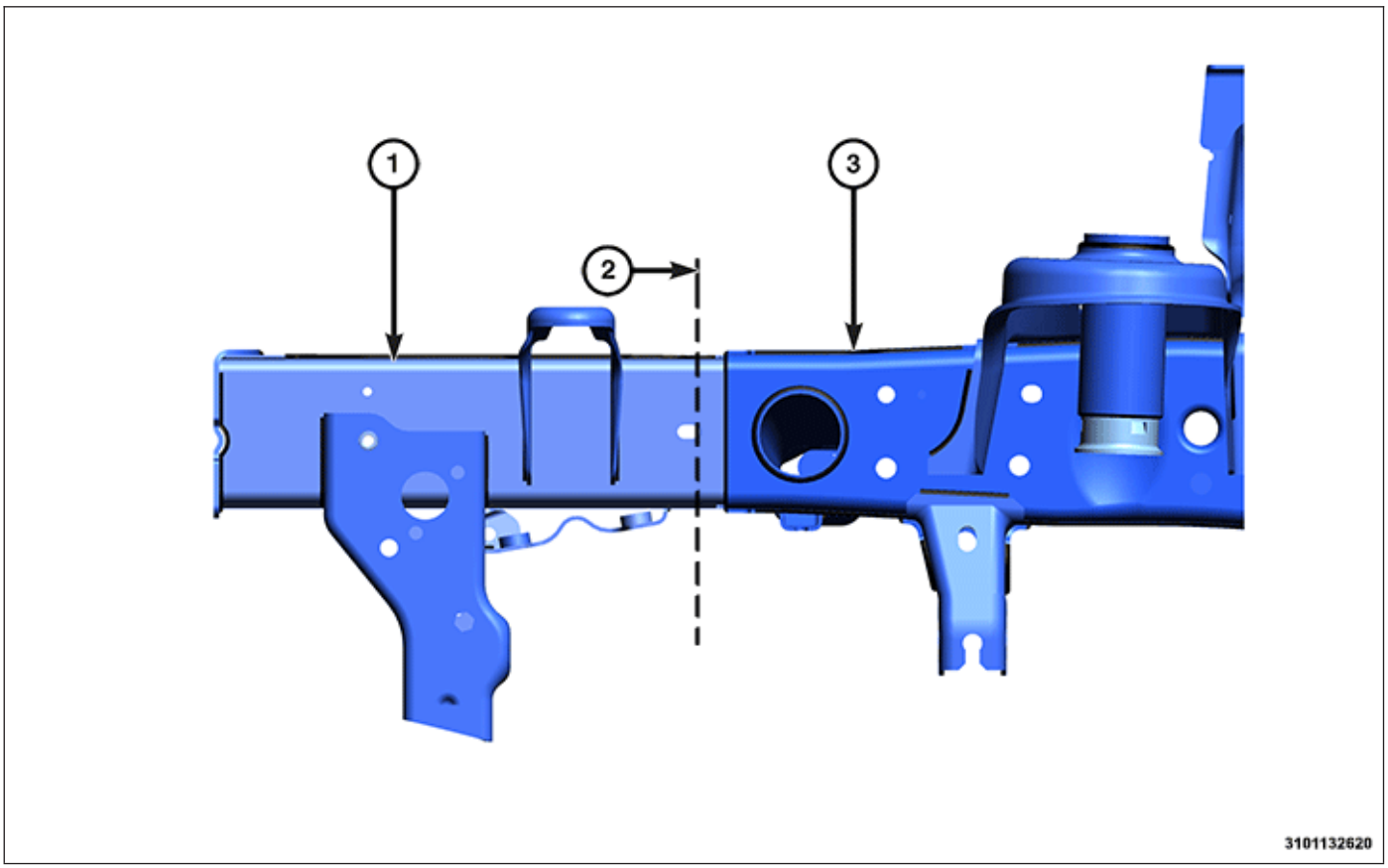


Front Frame Rail Extensions

1 - Right Front Rail Extension (560 MPa)
2 - Right Front Frame Rail (620 MPa)
3 - Left Front Frame Rail (620 MPa)
4 - Left Front Frame Extension (560 MPa)

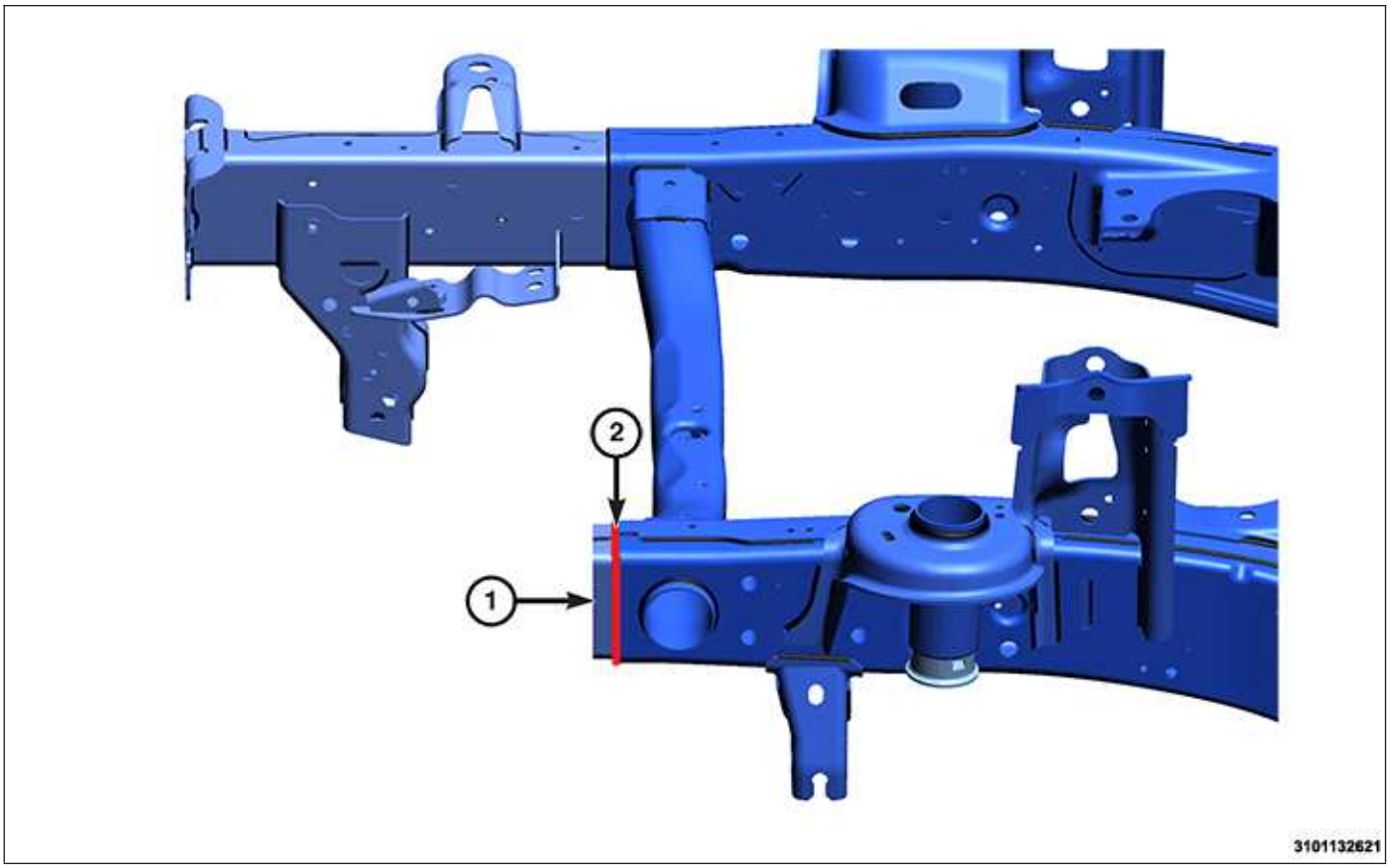
1. Mount the vehicle on an appropriate frame straightening equipment (frame rack).

2. Using a three-dimensional measuring system, measure and straighten the frame to the proper frame specifications (Refer to 31 - Collision Information/Technical Specifications/Frame Dimensions).

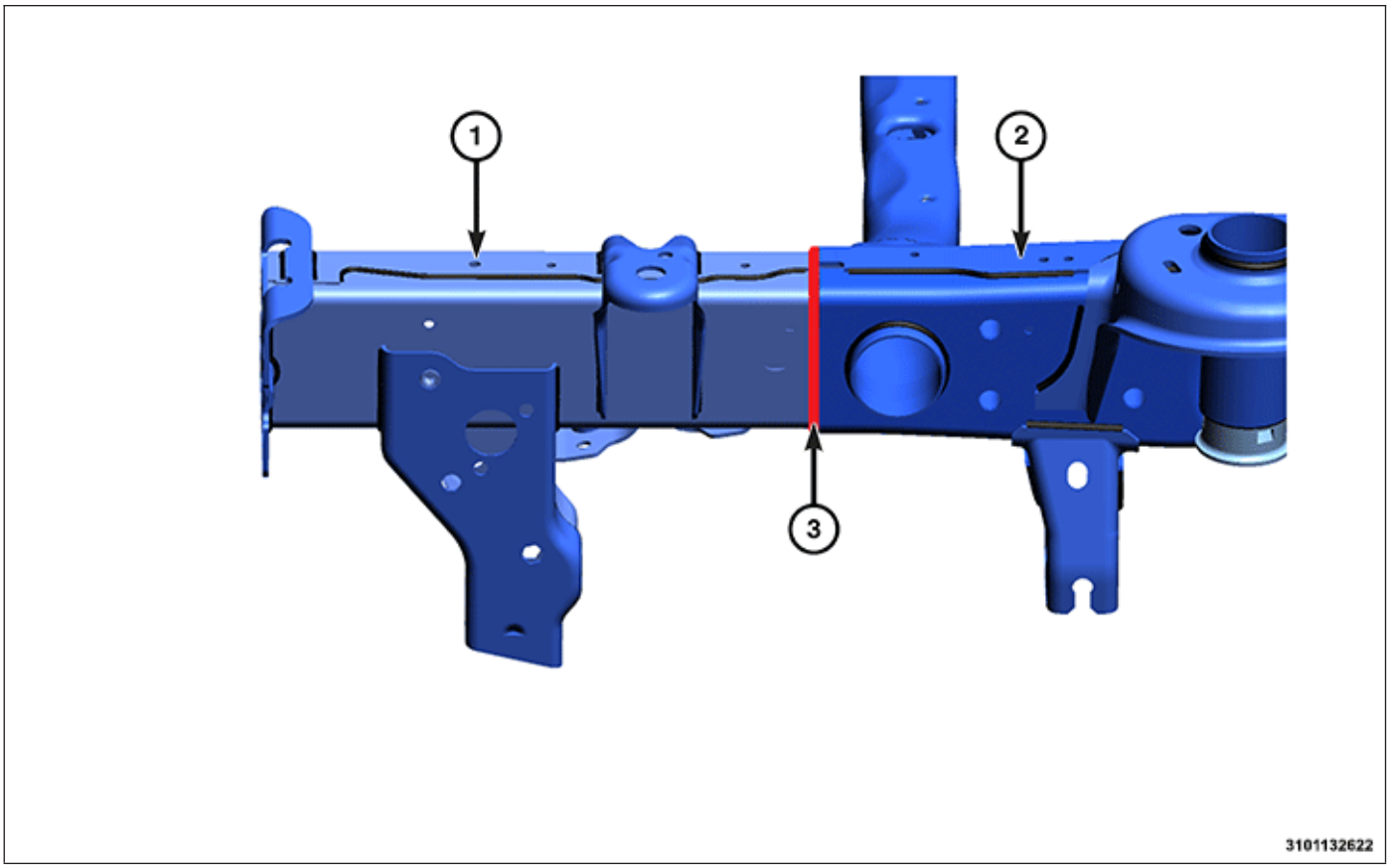


NOTE: Left side shown, right side similar.

3. With the use of a reciprocating saw or equivalent, cut the front rail extension (1) along the cut line (2), using care not to cut the frame rail (3) and surrounding components.



4. With the use of an angle grinder, remove the remaining front rail extension (1) and weldments (2).
5. With the use of a grinder, remove the e-coat and galvanizing within 25 mm (1 in) of the weld zone on the outer and inner area of the front rail extension replacement part and front frame rail.
6. Refer to the welding chart for proper wire and welder settings and use the original front rail extension to adjust the welder and be certain of a proper welding bead. (Refer to 31 - Collision Information/Standard Procedure/Welding and Weld Bonding).



7. Install the replacement front frame extension (1) into the front frame rail (2) and position using three-dimensional measuring equipment.
8. When positioned correctly, apply tack-welds to secure the position.
9. Complete the welds (3) using a skip-stitch method-
   - Welding in a 51 mm (2 in) increment
   - Allow the area to cool between welding operations
   - Then welding the opposing side in a 51 mm (2 in) increment
   - Repeat until the weld area completely encompasses the front frame extension (1) and the front frame rail (2)
10. If necessary, cosmetically dress the weld without removing any base metal.
11. Clean the welded area of any burned coatings and weld spatter.
12. Apply refinish materials to the exterior of the front rail extension and front frame rail to restore corrosion protection and appearance

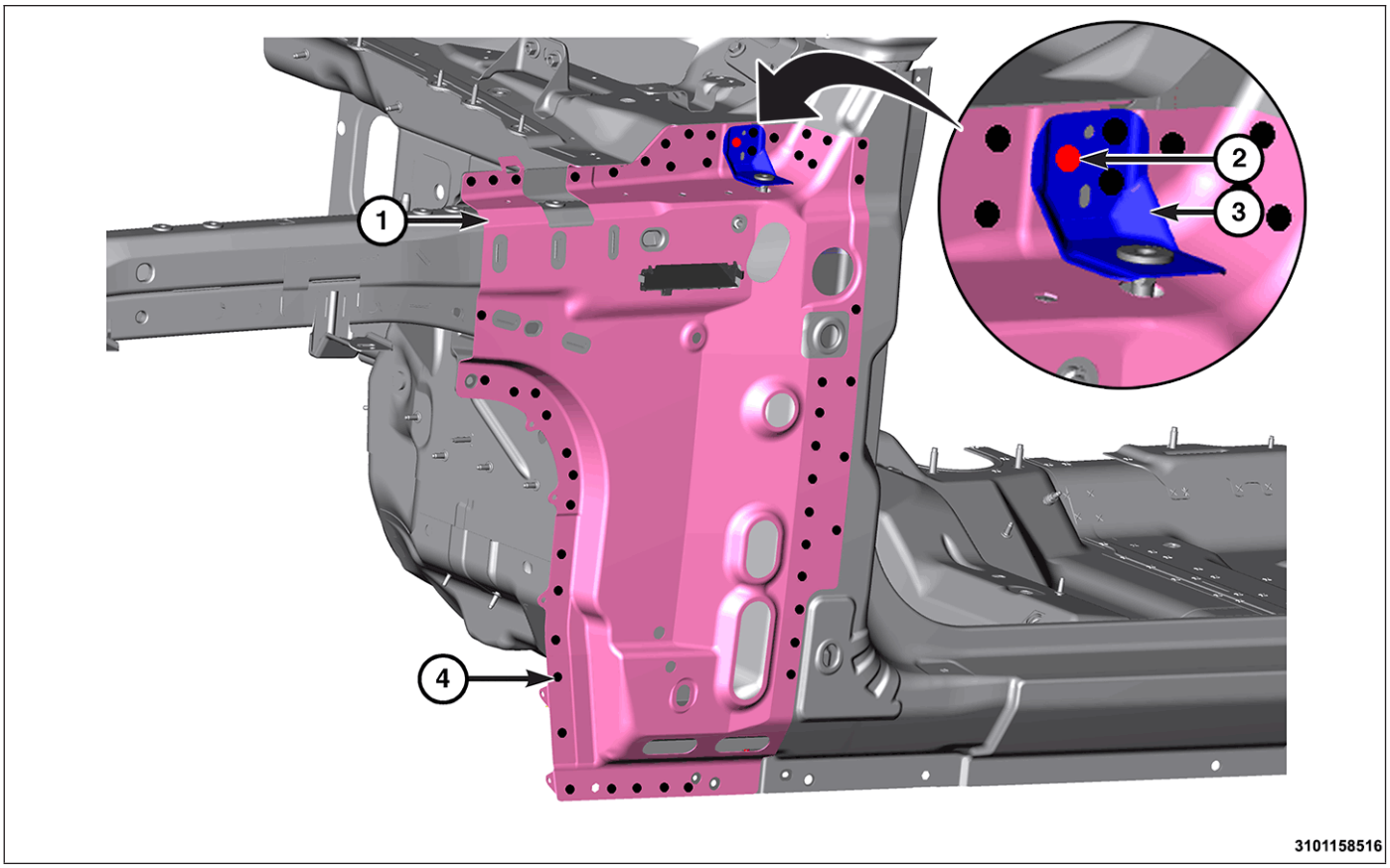
NOTE: When applying the rust proofing be certain to apply generously, to be certain the welded areas are fully covered.

13. Apply a creeping wax type rust proofing material for corrosion protection to the inner cavity of the front rail extension and front frame rail.

Upper Load Path Beam

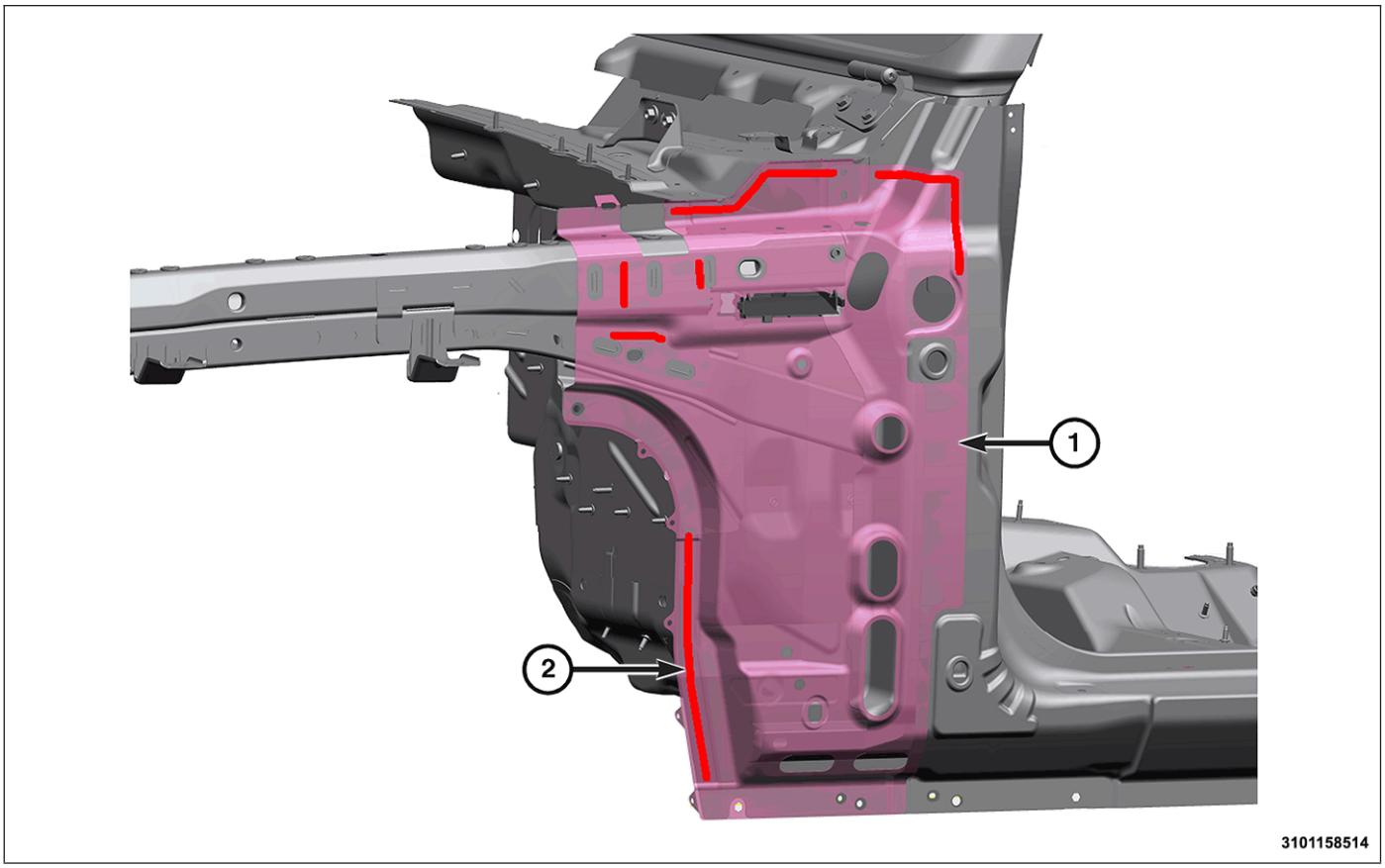
REMOVAL

1. Remove the necessary components to access the hinge pillar panel and upper load path beam, in accordance to the service information.
2. Mount the vehicle on an appropriate frame straightening equipment (frame rack).
3. Using a three-dimensional measuring system, measure and straighten the structure to the proper specifications.



NOTE: Use care to only cut through the hinge pillar panel and not the metal beneath.

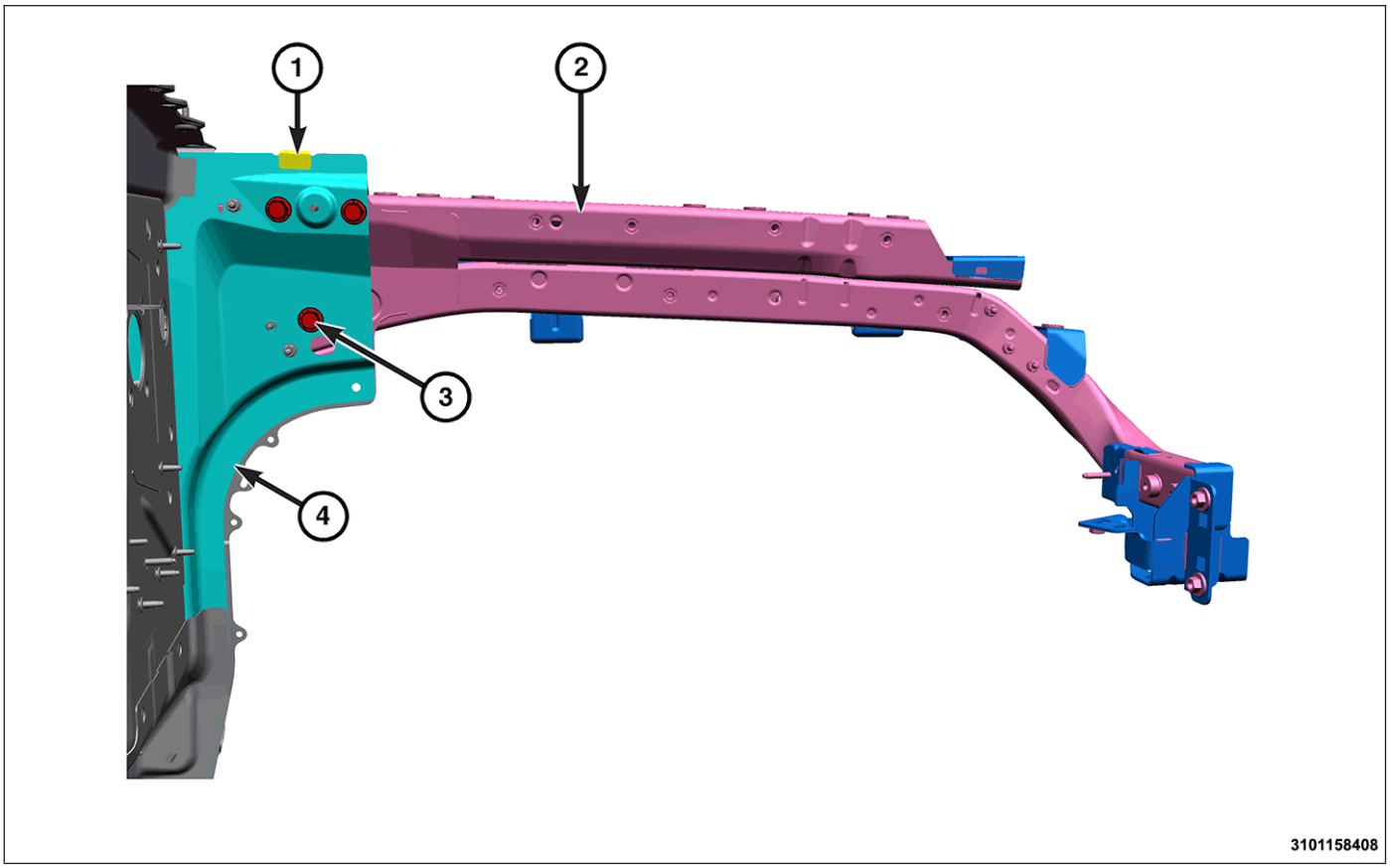
4. With the use of a spot weld cutting tool or equivalent, release hinge pillar panel (1) spot welds (4) . Use care to only cut the hinge pillar panel and not the panels located beneath.
5. With the use of a spot weld cutting tool or equivalent, release the spot weld securing the bracket (3).
6. With the use of a an air chisel equipped with a flat blade or equivalent, remove the bracket (3).
7. With the use of a spot weld cutting tool or equivalent, release the front spot weld (2) through the hinge pillar panel only.
8. Note the weld locations for the panel for reference during installation.



NOTE: Hinge pillar panel (1) transparent for clarity.

NOTE: The hinge pillar panel (1) perimeter at the top and sides utilize structural adhesive (2) in the areas shown in red.

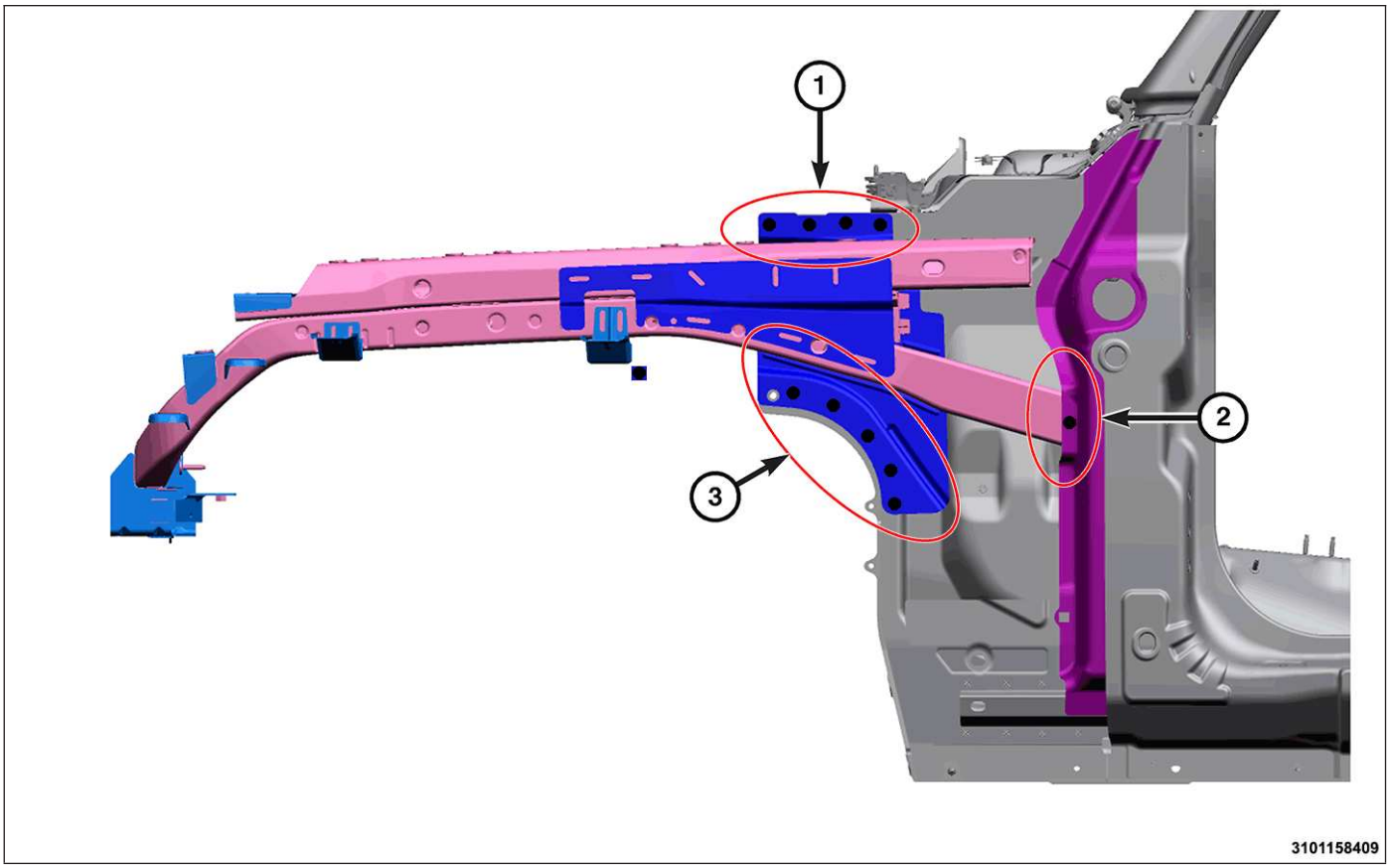
9. If necessary, use a heat gun or inductor to apply heat up to 204° C.(400° F) to aid with loosening the structural adhesive (2) bond. Use care as not to apply heat to surrounding components that could be damaged.
10. With the use of a an air chisel equipped with a flat blade or equivalent, remove the hinge pillar panel (1) from the vehicle.



11. Remove the three bolts (3) securing the load path beam (2) to the inner cowl side panel (4).

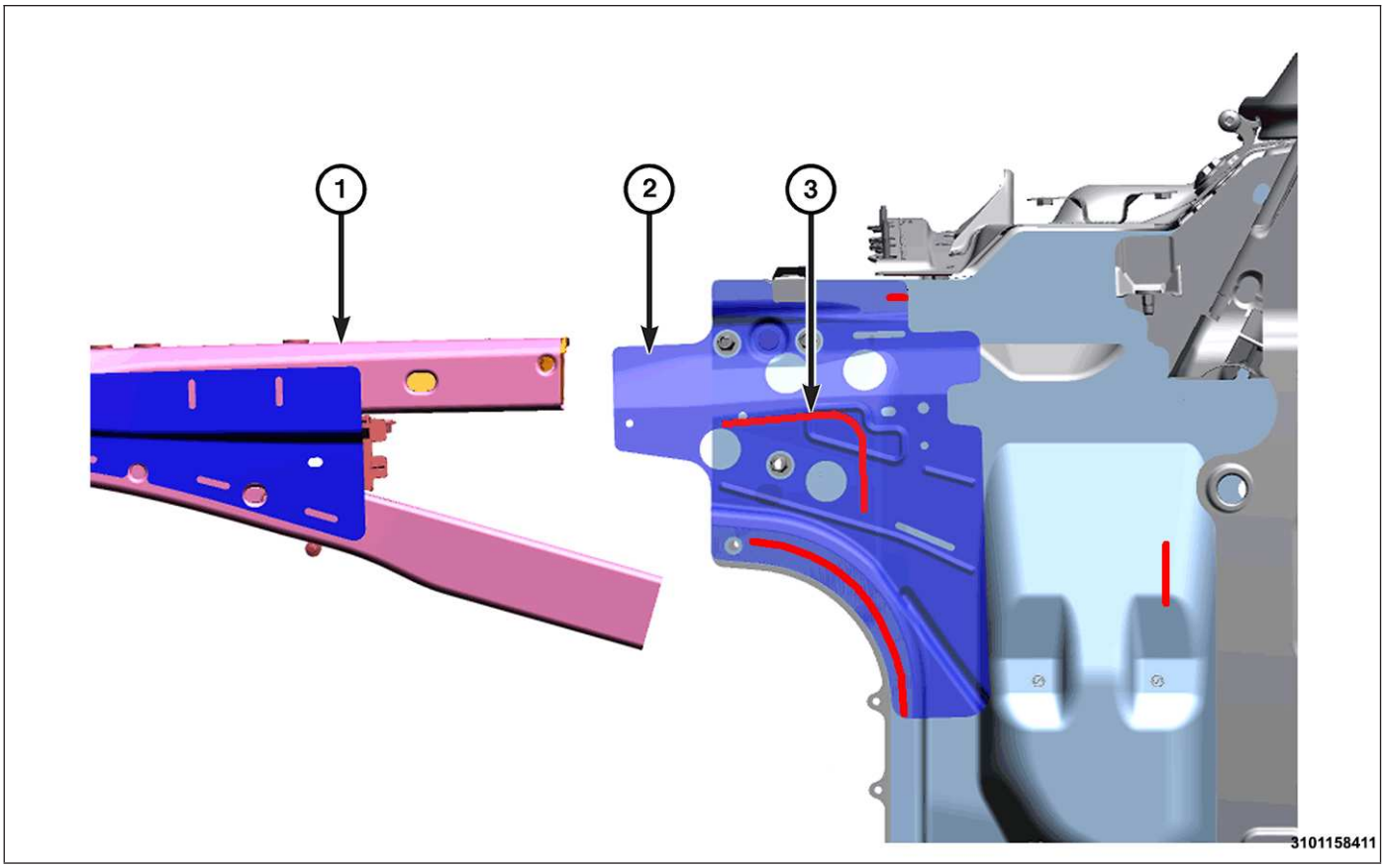
NOTE: The metal tab (1) is used for assembly plant build process and is not a serviceable item.

12. With the use of a grinding wheel or equivalent, grind the top edge of the metal tab (1) until separated then discard.



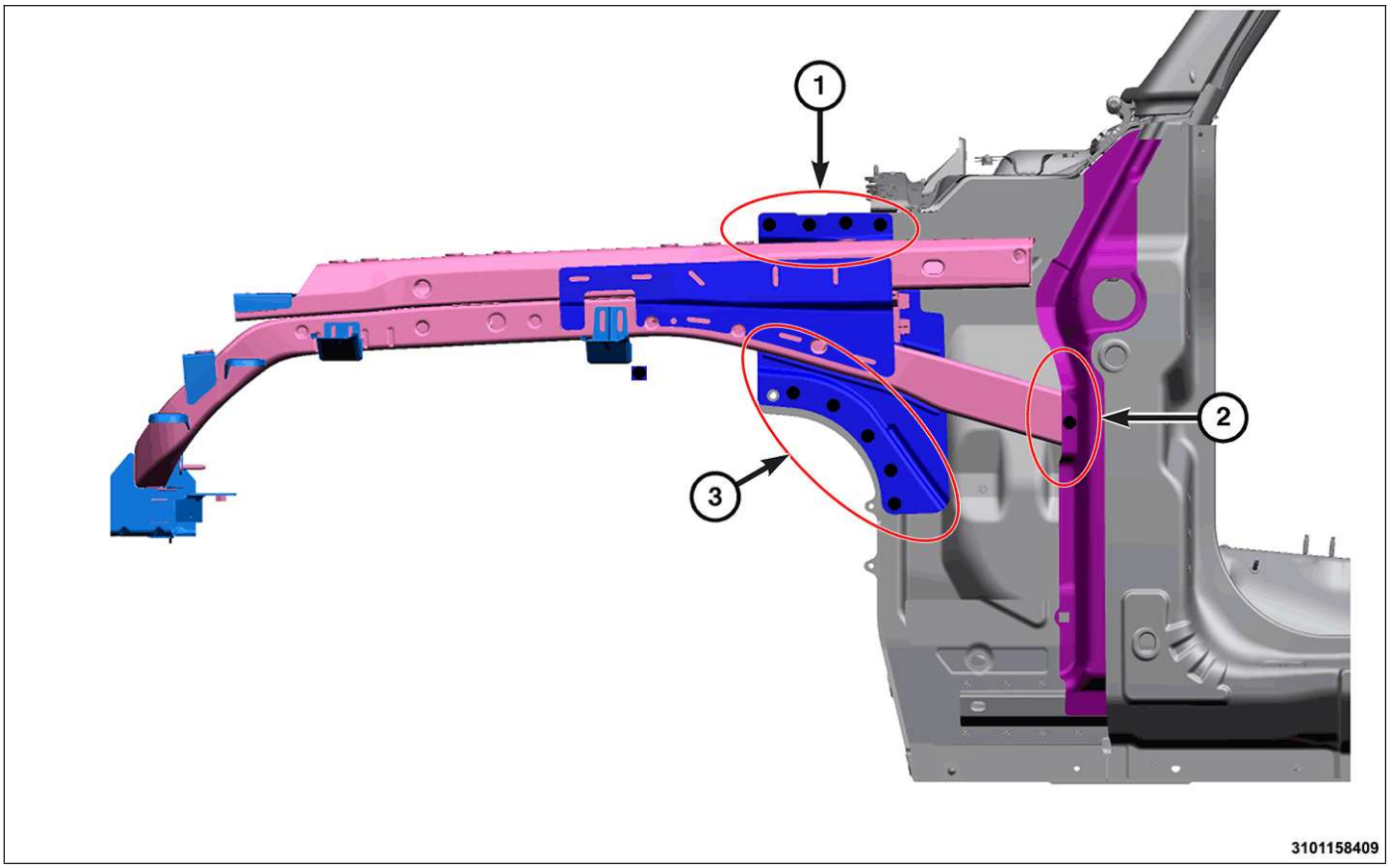
NOTE: Use care to only cut through the load path beam and not the metal beneath.

13. With the use of a spot weld cutting tool or equivalent, release the welds securing the upper load path beam to the inner cowl panel within the front outlined areas (1 and 3).
14. With the use of a spot weld cutting tool or equivalent, release the weld securing the upper load path beam to the hinge pillar reinforcement within the rear outlined area (2).
15. Note the weld locations for the upper load path beam for reference during installation.



Load path beam (1) moved forward and load path beam bracket (2) transparent for clarity.

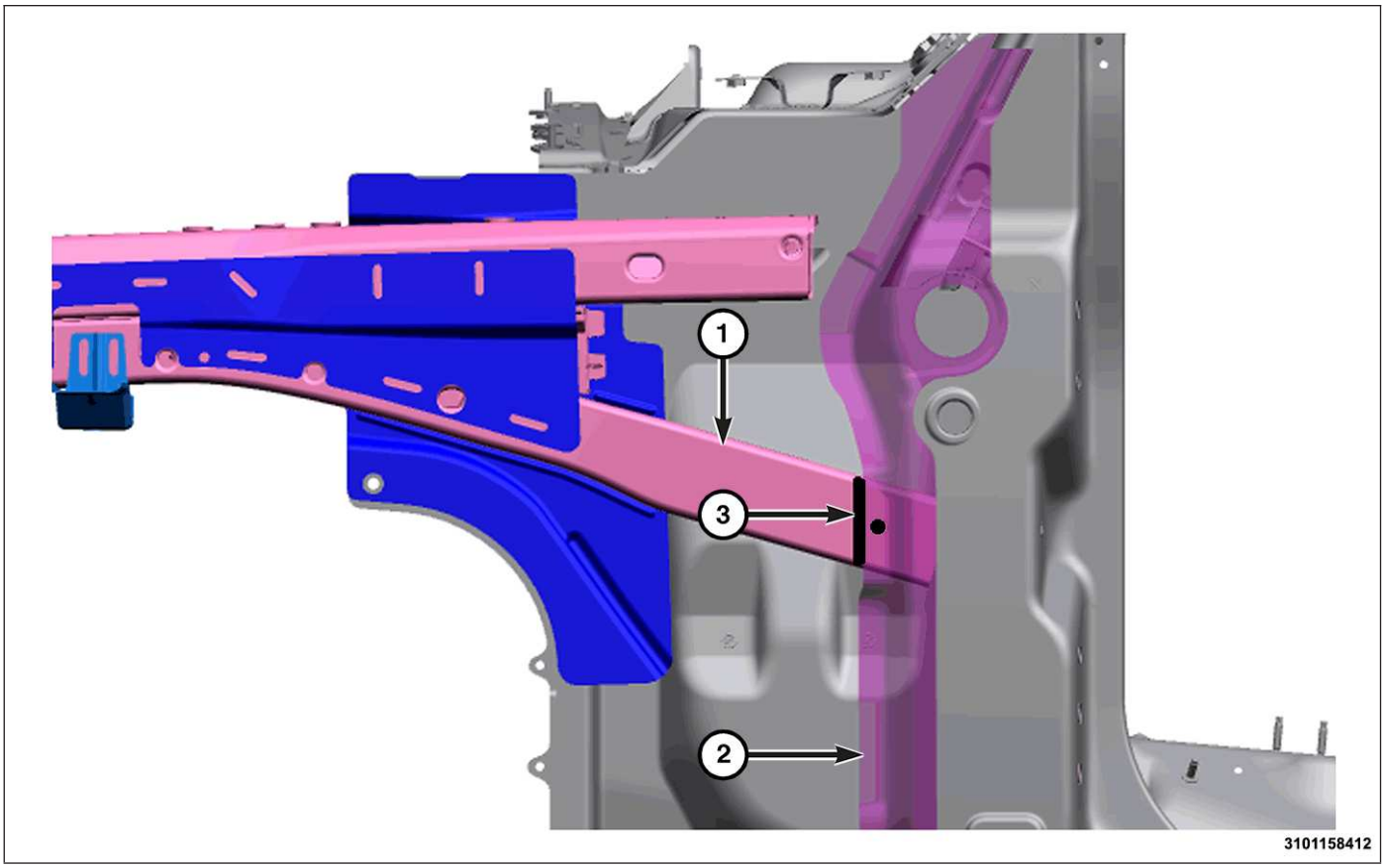
16. If necessary, use a heat gun or inductor to apply heat up to 204° C.(400° F) to aid with loosening the structural adhesive (3) bond. Use care as not to apply heat to surrounding components that could be damaged.



17. With the use of a hammer and a thin blade chisel, release the weld and adhesive securing the load path beam to the hinge pillar reinforcement in the rear area (2).
18. With the use of a an air chisel equipped with a flat blade or equivalent, release the spot welds on the top area (1) and front area (3).
19. Remove the load path beam from the vehicle.
20. Note location of all adhesive securing the upper load path beam to the inner cowl side panel.
21. With the use of a grinder, remove any contaminates and coatings from the mating surface of the upper load path beam to the inner cowl panel. The metal should appear shiny in appearance. If the metal appears pewter in color, all of the galvanized coating has not been removed.

INSTALLATION

1. Position the new upper load path beam and position using three-dimensional measuring equipment, secure with self locking clamps.



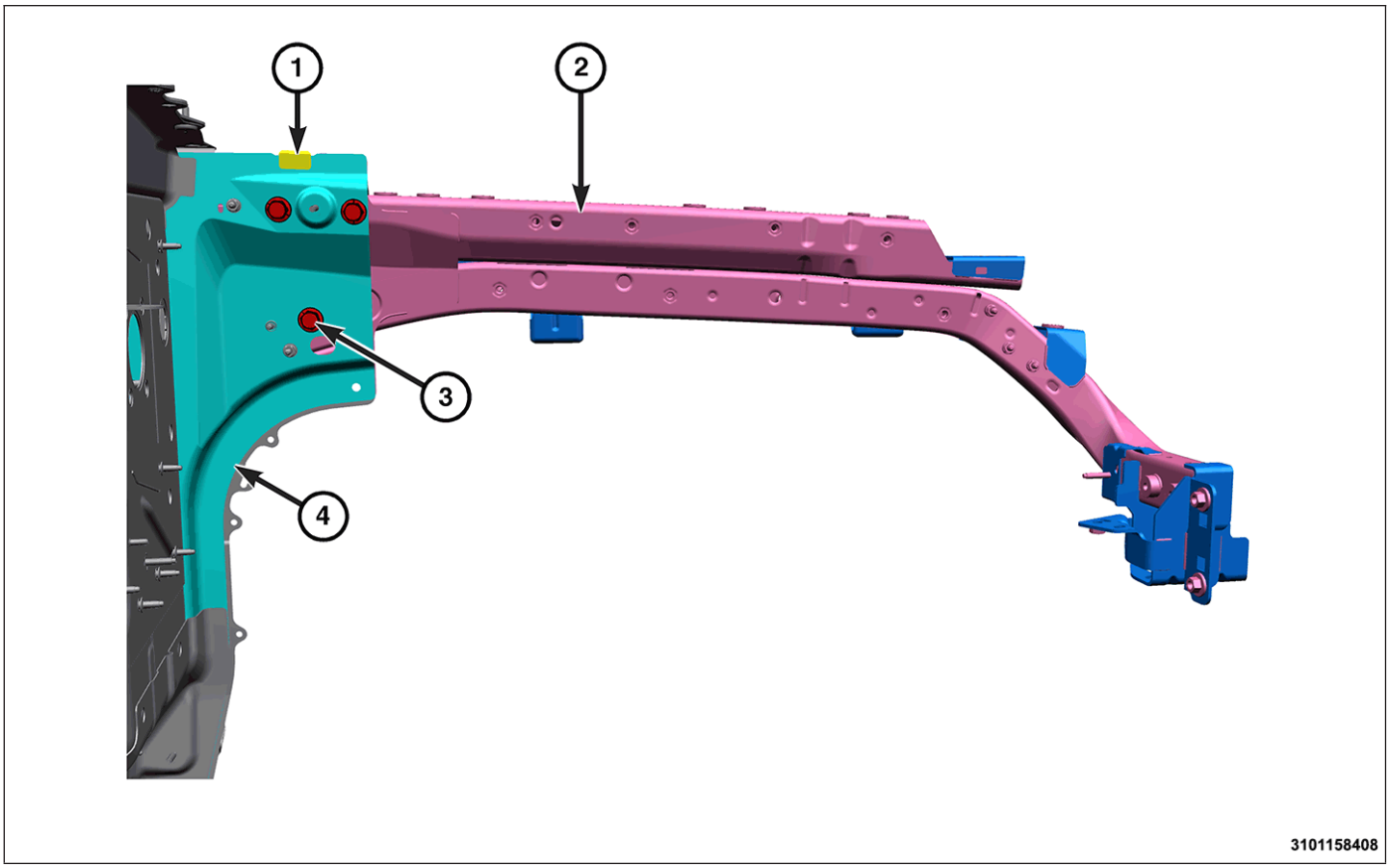
NOTE: Hinge pillar reinforcement (2) transparent for clarity.

NOTE: This area will have an additional weld added and will not have structural adhesive previously applied.

2. Where the lower portion of the load path beam (1) intersects the front edge of the hinge pillar reinforcement (2) mark a line (3) also mark the location of the previous spot weld.
3. Remove the load path beam.

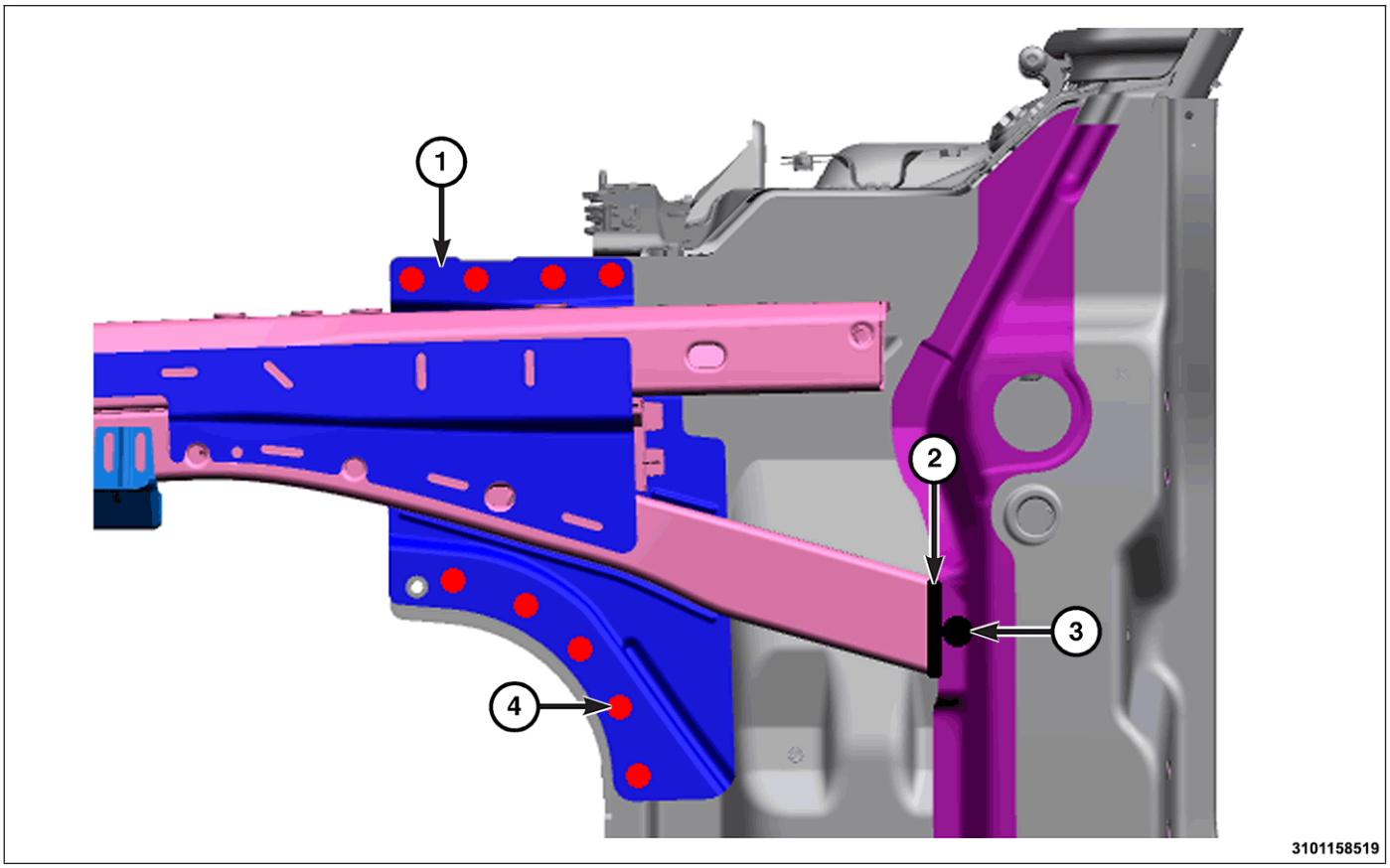
NOTE: It may be difficult to abrade the backside of the hinge pillar reinforcement and may need to be done by hand.

4. Grind the areas marked on the lower portion or load path beam and the inner and outer mating area on the hinge pillar reinforcement.
5. Where the load path beam attaches to the cowl side inner panel, grind the inner and outer mating surfaces where welds will be placed and the inner surfaces where structural adhesives will be placed. (use references made during removal).
6. Apply a 5 mm (0.2 in) width bead of LORD Fusor 2098 structural adhesive, in accordance to the manufacturer directions, to the inner cowl side panel areas where adhesive was previously applied.

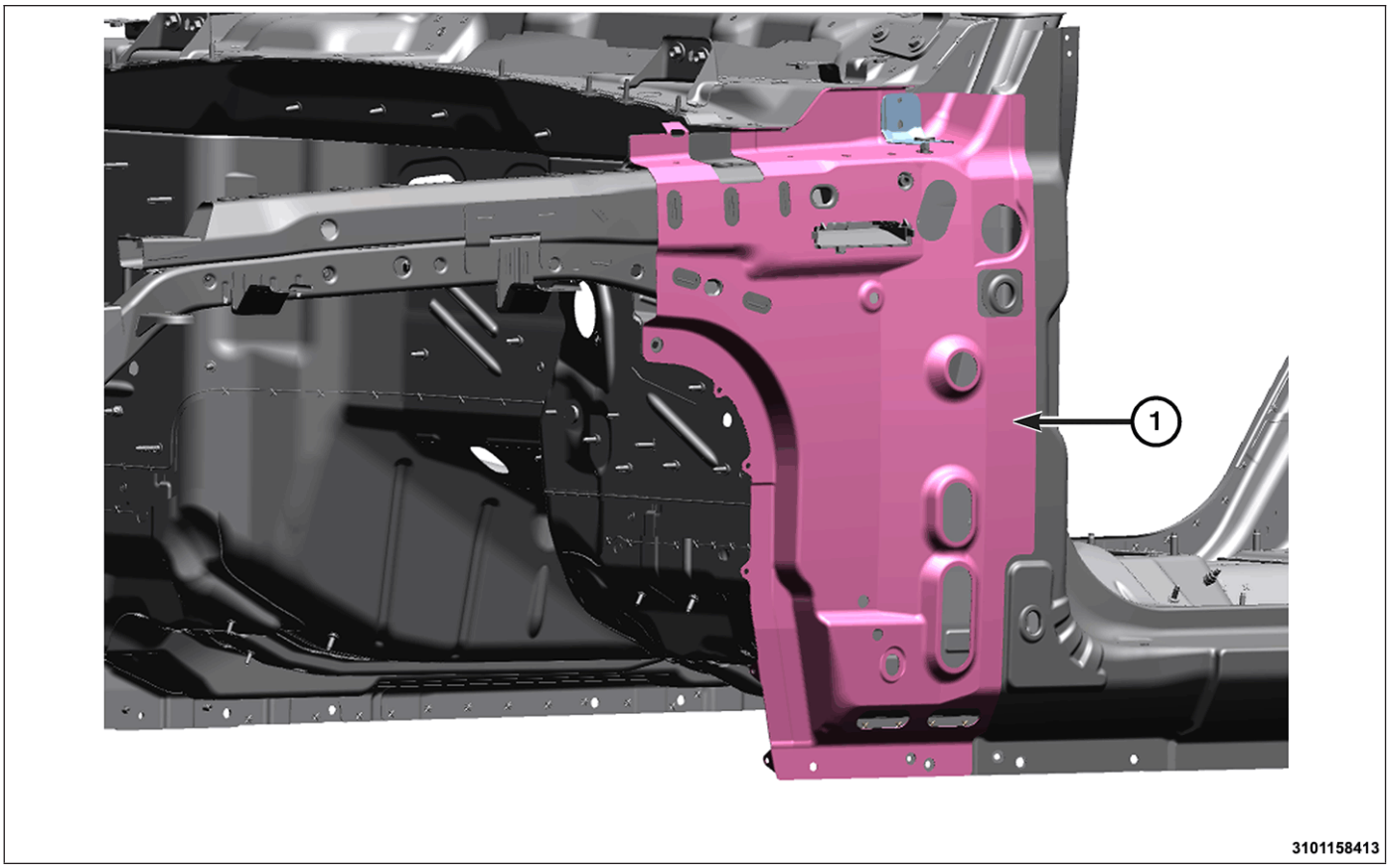


NOTE:

7. Tab (1), discarded during removal, is not a serviceable part and does not get replaced.
8. Position the load path beam (2) using three-dimensional measuring equipment and secure with self locking clamps
9. Install the three inner bolts (3) and tighten to 25 Nm (18 ft lbs).



10. Apply spot welds (4), in the locations previously noted, where the load path beam (1) joins the inner cowl side panel.
11. With the use of a MIG weld, apply the plug weld (3).
12. With the use of MIG weld, apply a stitch weld to the edge (2) along the load path beam and hinge pillar reinforcement.
13. If necessary, cosmetically dress the weld without removing any base metal.
14. Clean the welded area of any burned coating and weld spatter.

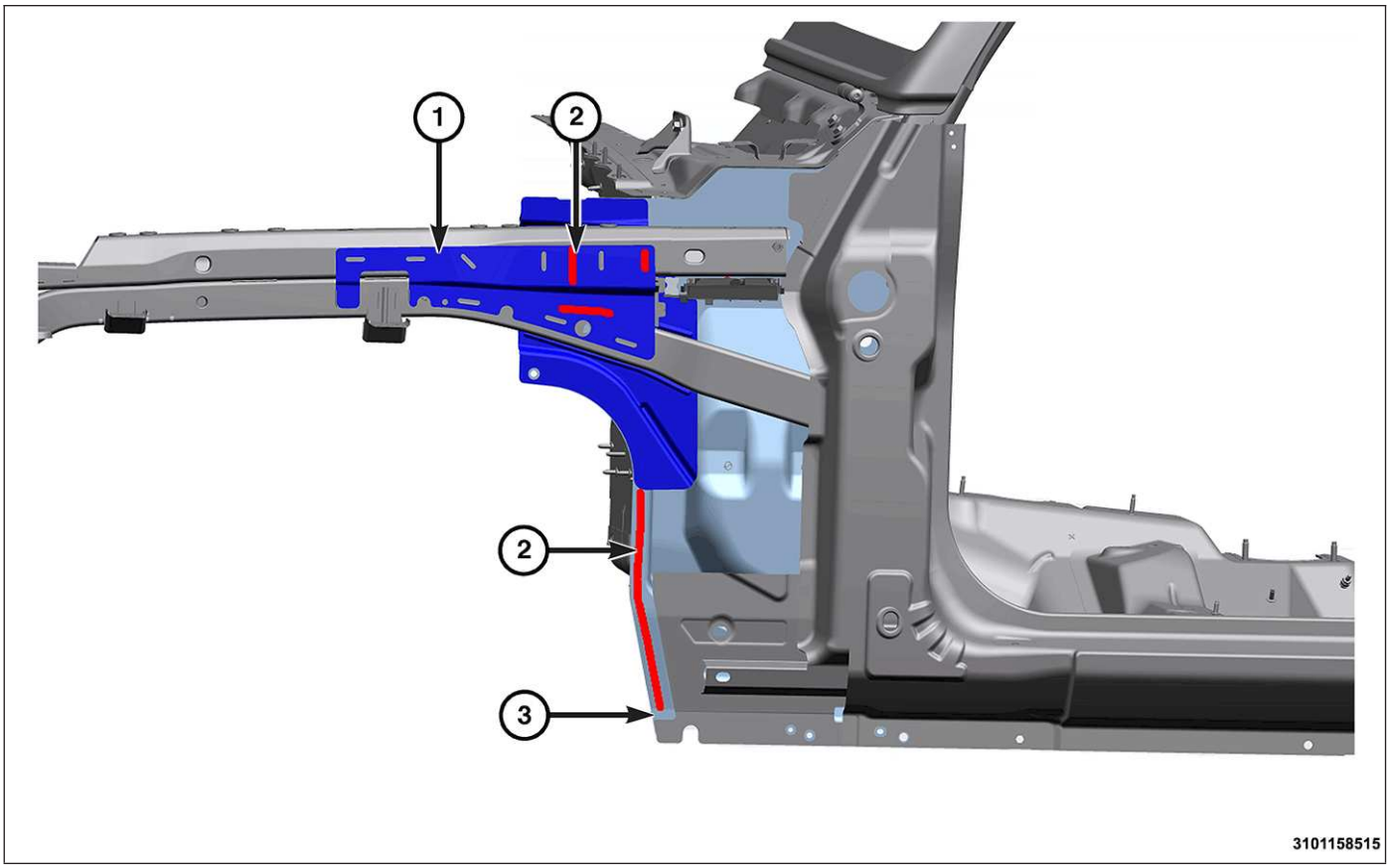


15. Position the new hinge pillar panel (1) using three-dimensional measuring equipment.
16. Using weld locations previously noted, determine which welds are accessible with the spot welder and mark the locations of the welds that are not accessible.

17. Remove the hinge pillar panel and drill 8 mm (5/16 in) holes in the areas marked where plug welds (5) will be placed.

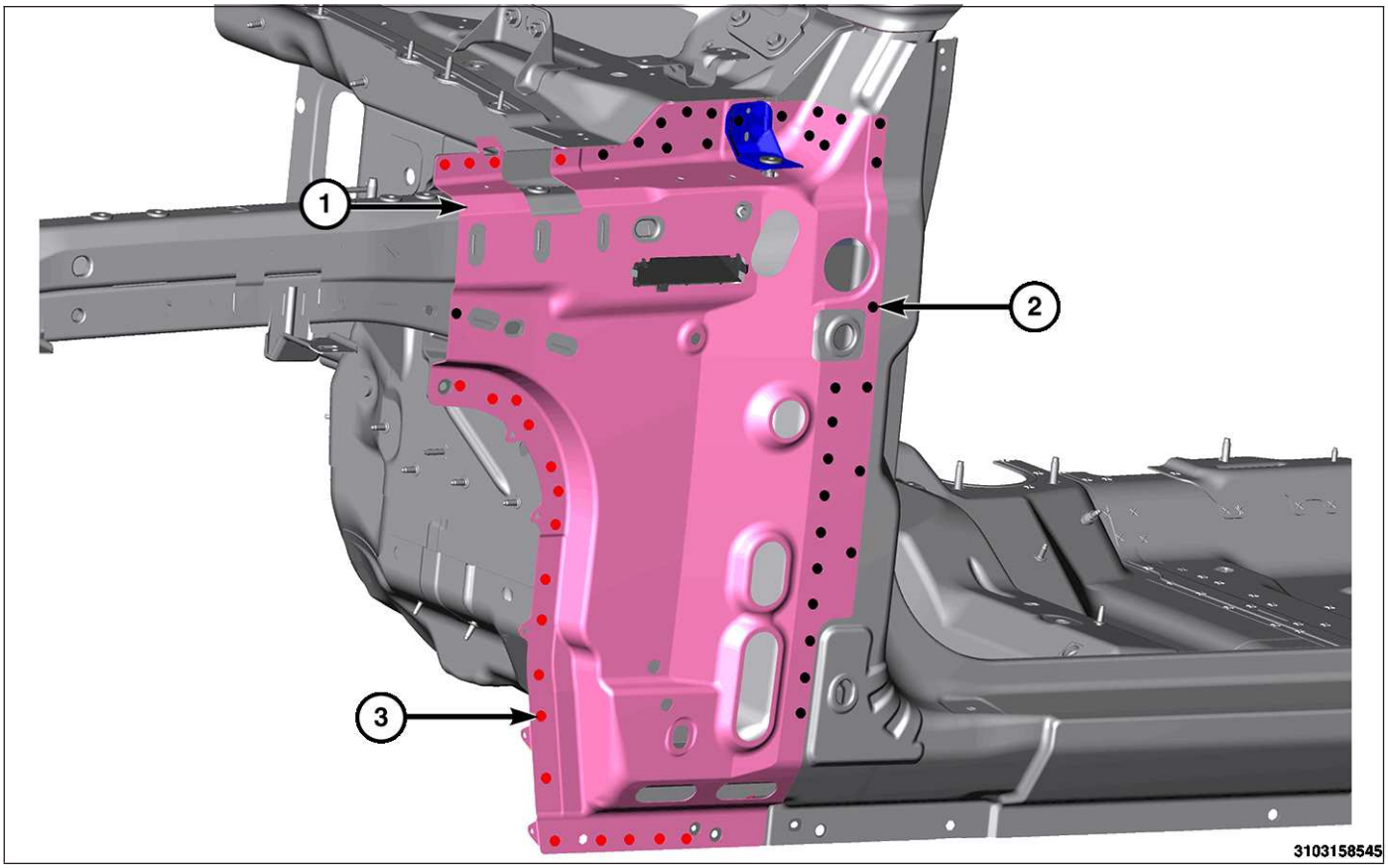
NOTE: The fender bracket (2) should be drilled through the hinge pillar panel in the plug weld location (4) but do not remove the other existing spot welds (3).

18. Grind the inner and outer mating surfaces on the hinge pillar panel and the mating surfaces of the vehicle where plug welds (5) welds will be applied including the bracket plug weld (4).
19. Grind the inner and outer mating surfaces on the hinge pillar panel and the mating surfaces of the vehicle where the spot welds (6) will be placed.



NOTE: Structural adhesive must not be applied within 25 mm (1 in) of where a plug weld will be placed.

20. Grind the mating surfaces of the hinge pillar panel, to the load path beam (1) and inner cowl side panel (3) where structural adhesive (2) will be applied.
21. Apply a 5 mm (0.2 in) width bead of LORD Fusor 2098 structural adhesive (2), in accordance to the manufacturer directions, to the inner cowl panel area (3) and load path beam (1).

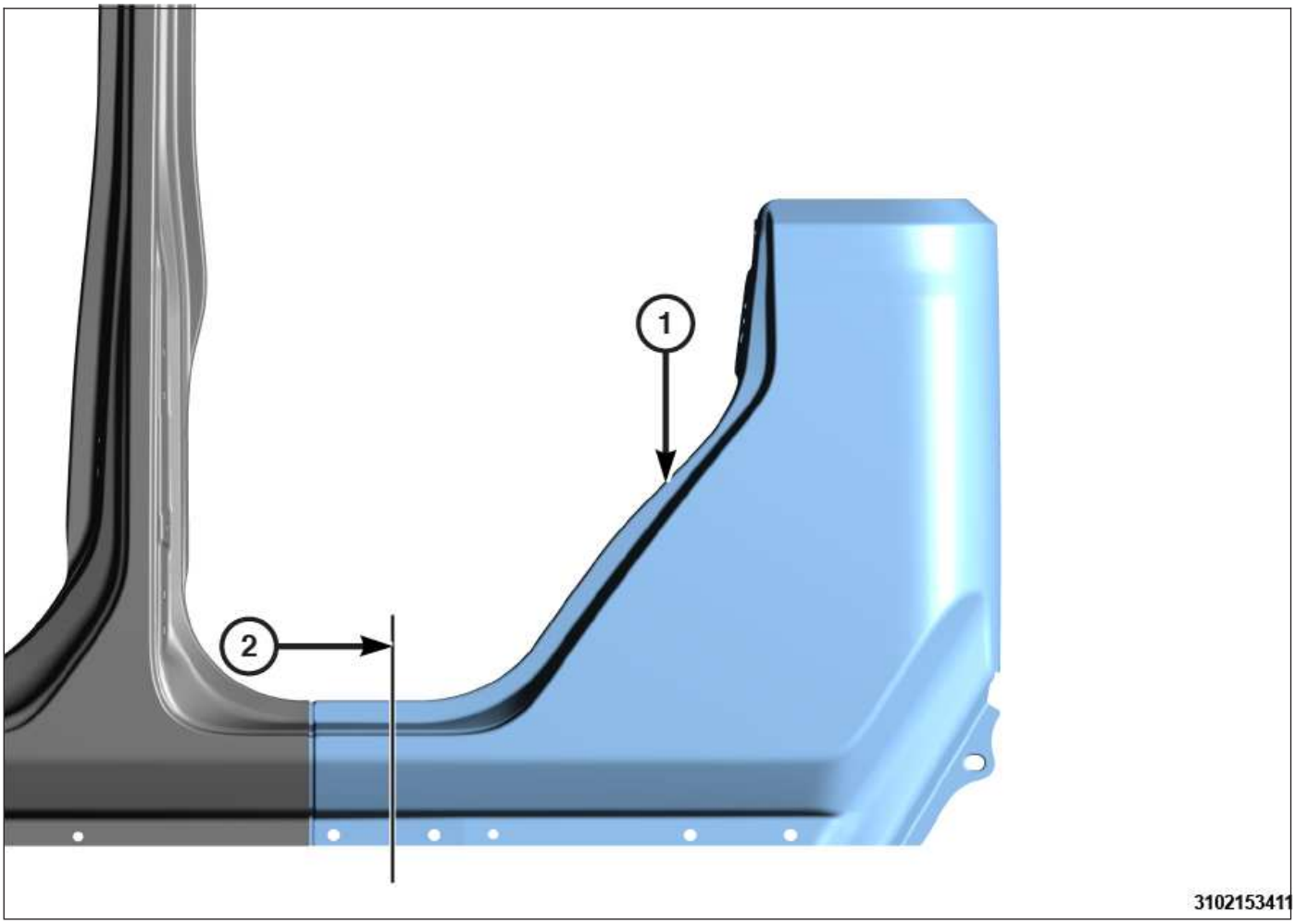


22. Position the hinge pillar panel (1) using three-dimensional measuring equipment and secure with self locking clamps.
23. Apply spot welds (3), as previously determined.
24. With the use of MIG weld, apply plug welds (2) in the previously determined locations.
25. If necessary, cosmetically dress the welds without removing any base metal.
26. Clean the welded area of any burned coating and weld spatter.

NOTE: When applying rust proofing apply generously to be certain all areas are fully covered.

27. Apply Mopar Cavity Wax (kit part #68042969AA - refill part #68042970AA) or equivalent, to the load beam, cowl inner panel, hinge pillar panel and hinge pillar reinforcement, inner cavities. A double application should be applied. Allow a minimum of 30 minutes flash time between the first and second coats.
28. Follow paint manufacturer instructions and refinish accordingly.

Rear Body Side Aperture



Outer Body Side Aperture Rear Panel

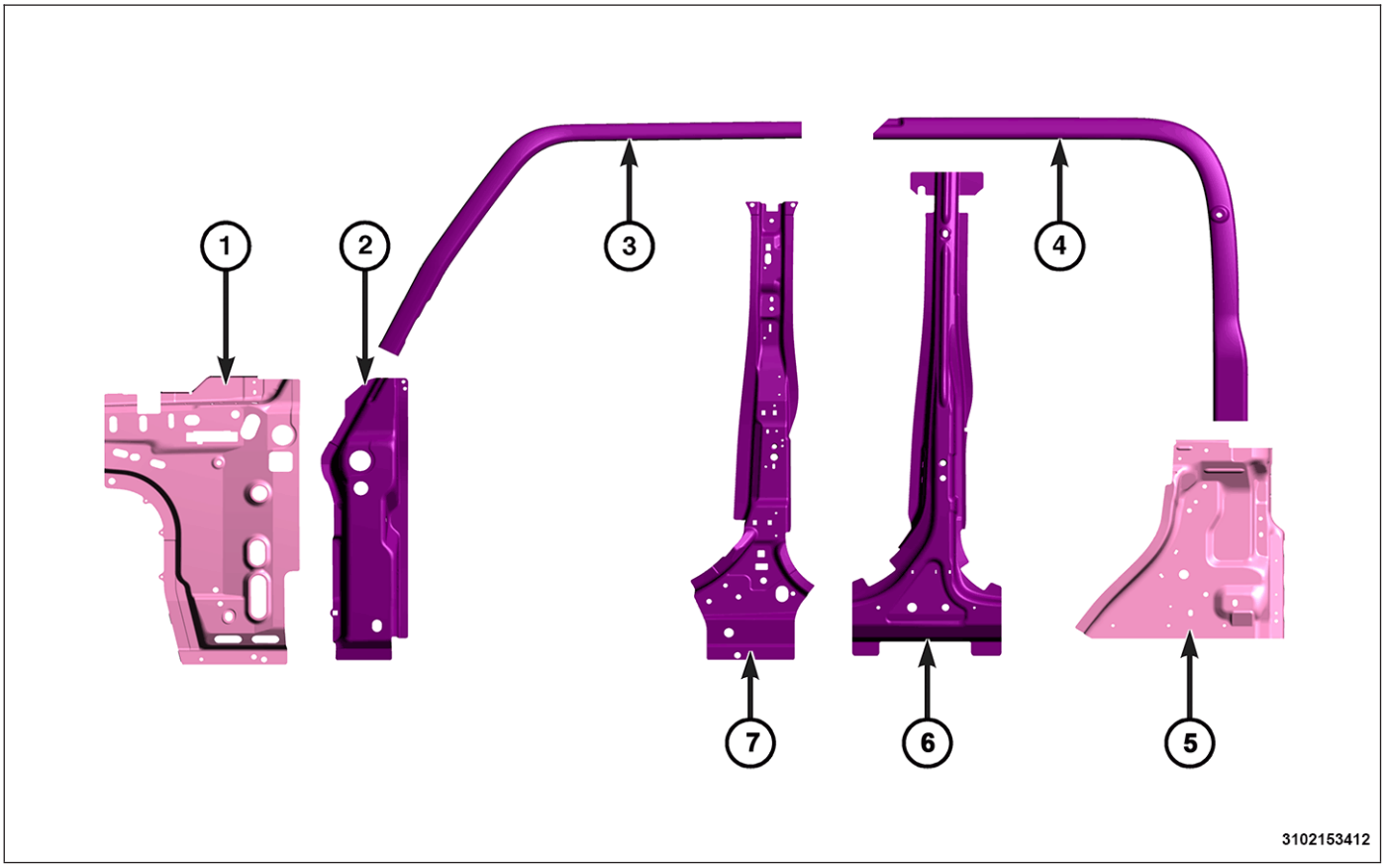
1 - Rear Body Side Aperture (270 MPa)
2 - Sectioning Location

The Rear Body Side Aperture (1) may be sectioned at the cut line (2).

A Butt-joint with a 13 mm (0.5 in.) welded backer panel is to be used in the sectioning area of the rear body side aperture.

For additional information on sectioning the rear body side aperture panel (Refer to 31-Collision Information/ Standard Procedure/Non-Structural Sheet Metal Repair/Body Side Panel).

Inner Body Side Components - Do Not Section

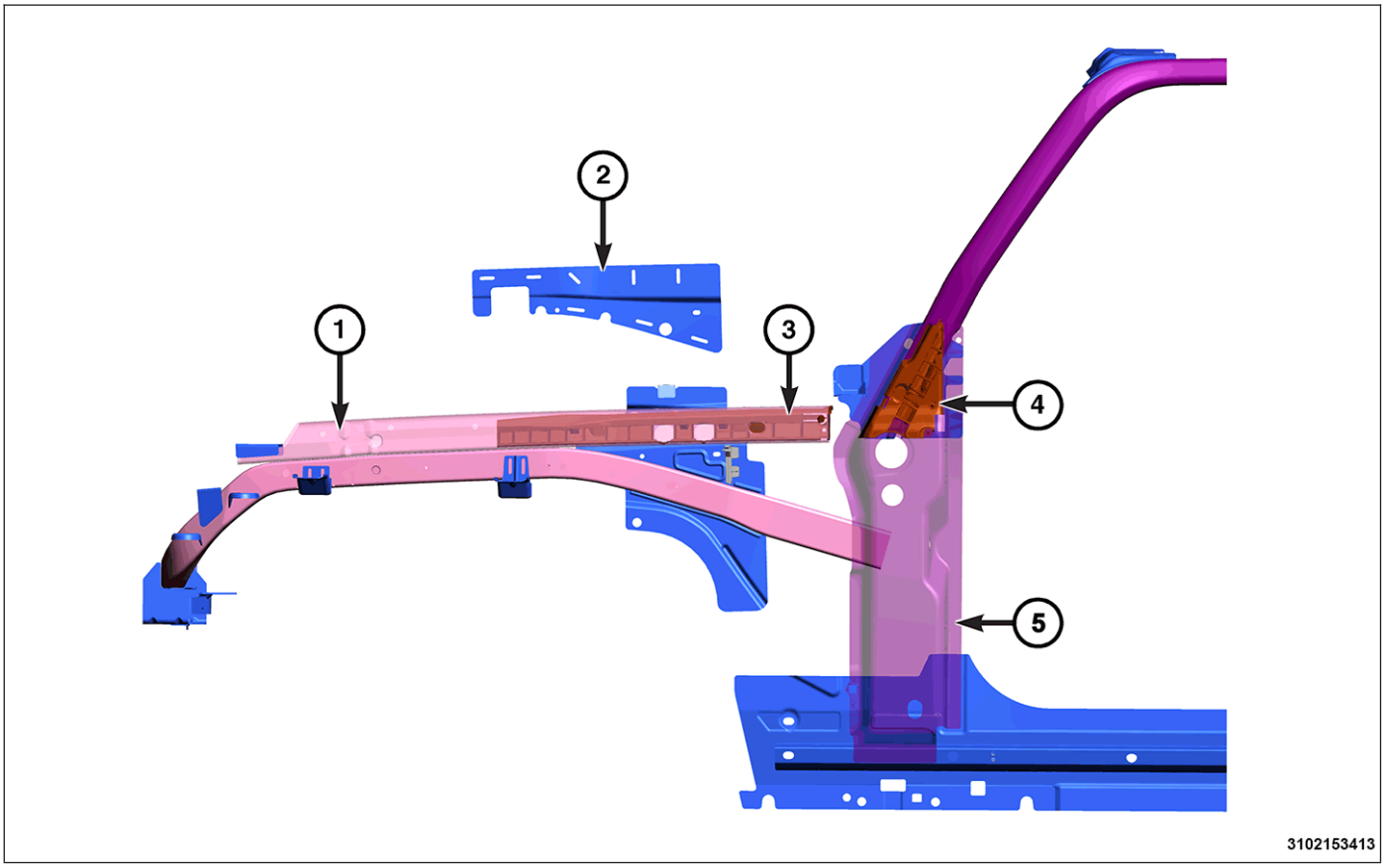


Do Not Section

NOTE: Left side shown, right side similar.

BODY SIDE REINFORCEMENTS AND PANELS - DO NOT SECTION
1 - Cowl Side Panel (780 MPa)
2 - Hinge Pillar Reinforcement (1300 MPa)
3 - Sport Bar - Front (1300 MPa)
4 - Sport Bar - Rear (1300 MPa)
5 - Inner Quarter Panel (690 MPa)
6 - B-pillar Outer Reinforcement (1300 MPa)
7- B-pillar Inner Panel (690 MPa)

A-Pillar And Upper Load Path Beam Composite Reinforcements



Upper Load Path Beam And A-pillar Composite Reinforcements

NOTE: Left side shown, right side similar.

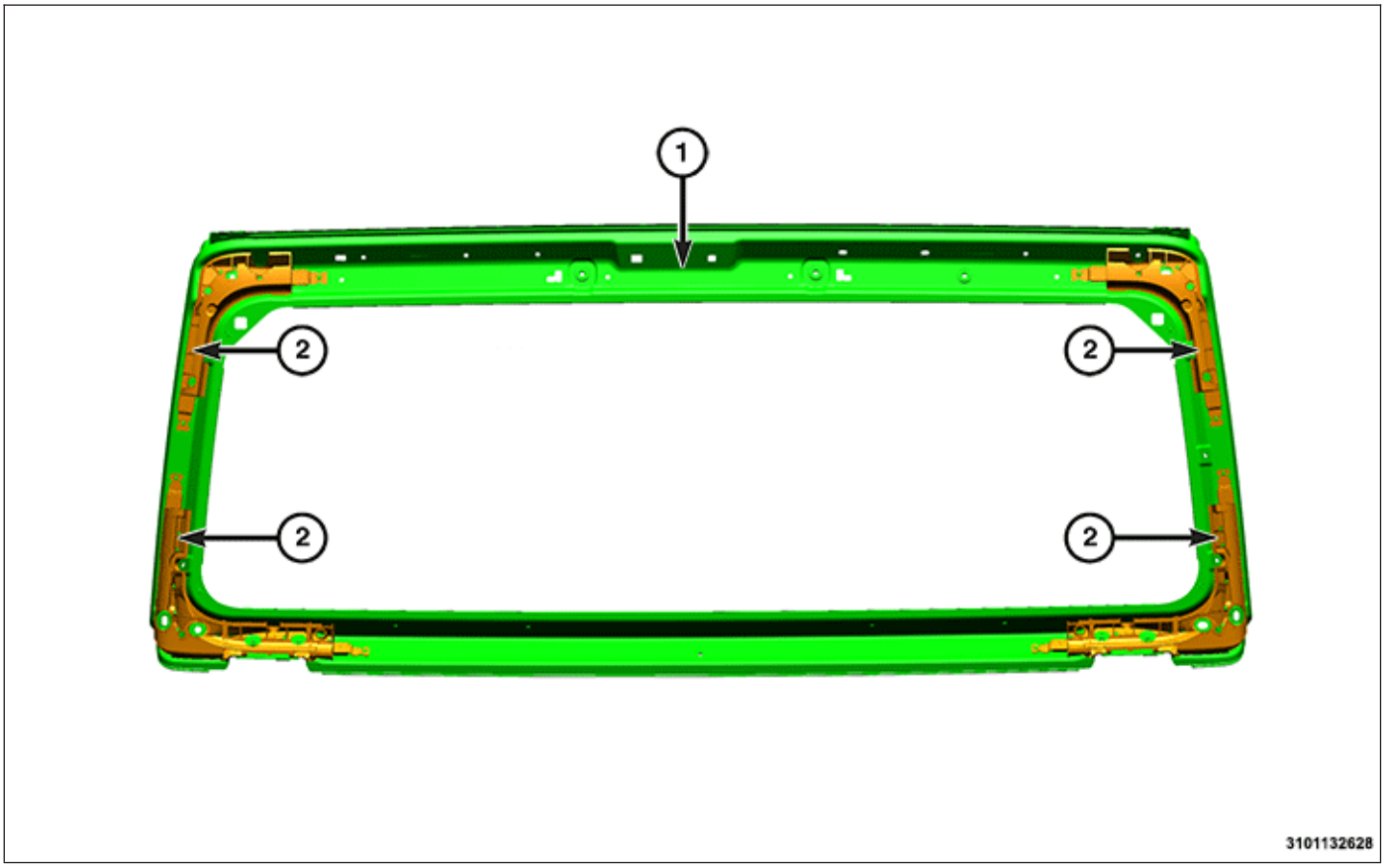
1 - Upper Load Path Beam (610 MPa) - Transparent for clarity
2 - Load Beam Upper Outer Panel (610 MPa) - Removed for clarity
3 - Upper Load Path Beam Composite Reinforcement
4 - A-pillar Composite Reinforcement
5 - Hinge Pillar Reinforcement (1300 MPa) - Transparent for clarity

WARNING: Composite Reinforcements must be installed to maintain component strength standards.

WARNING: Failure to follow these directions may result in serious or fatal injury

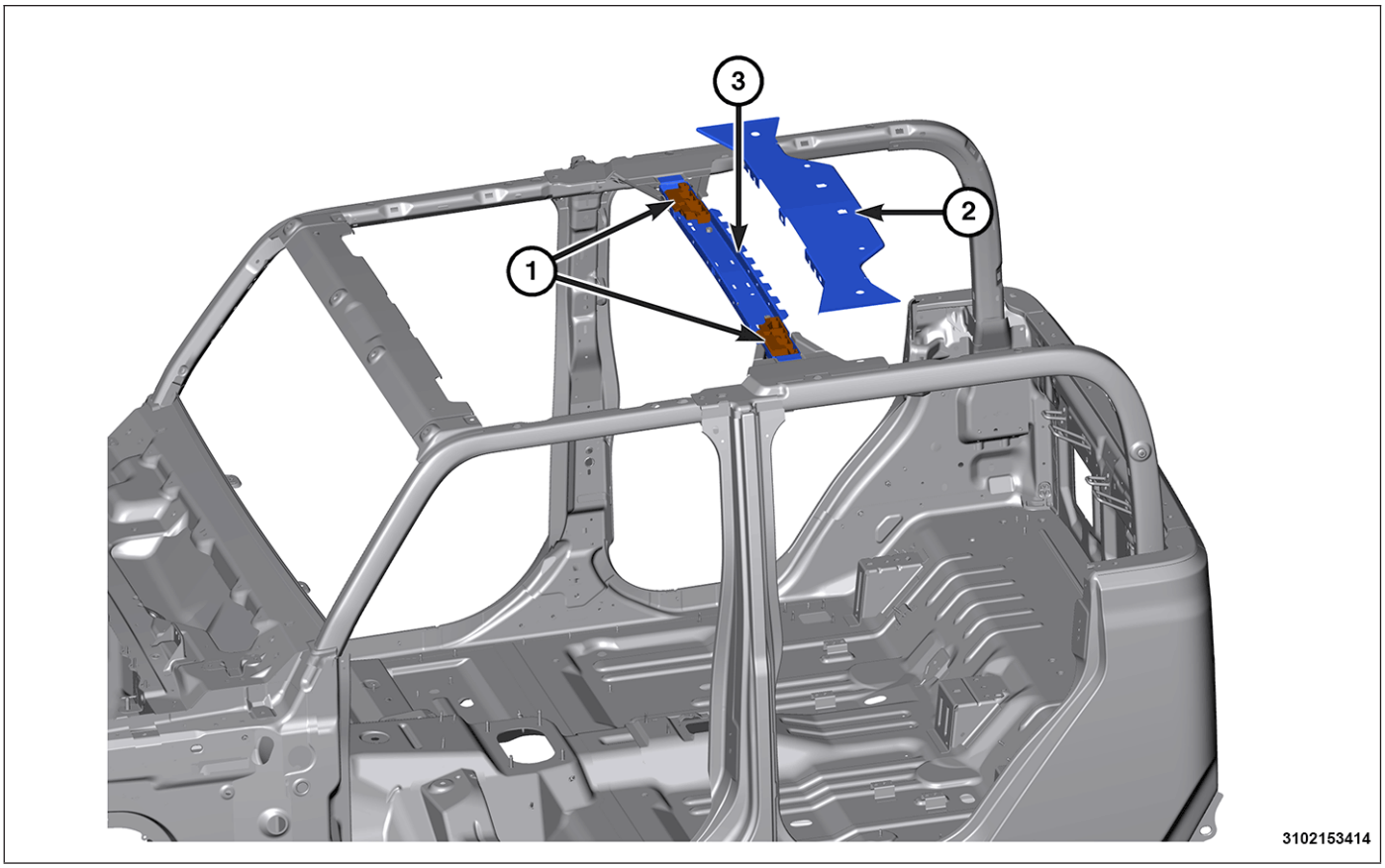
Replace the new or the re-used undamaged composite reinforcement with structural adhesive during the repair process. Approved structural adhesive include LORD Fusor 112B and 3M 08116. When mounting the composite reinforcement align the alignment tabs with the corresponding holes in the mating components.

Windshield And Roof Cross smember Composite Reinforcements



Windshield Frame

1 - Windshield Frame (Aluminum)
2 - Composite Reinforcements



Roof Croosmember

1 - Composite Reinforcements

2 - Lower Roof Crossmember (620 MPa)

2 - Upper Roof Crossmember (620 MPa)

WARNING: Composite Reinforcements must be installed to maintain roof strength standards

WARNING: Failure to follow these directions may result in serious or fatal injury

If the windshield frame or roof crossmember is replaced, it must be replaced with a Mopar® genuine replacement part, as should all replacement parts, but is especially important because of the **Composite Reinforcements which must be included** to be certain that structural integrity standards are adhered to.

HOISTING AND JACKING

WARNING: The hoisting and jack lifting points provided are for a complete vehicle. When a chassis or drivetrain component is removed from a vehicle, the center of gravity is altered making some hoisting conditions unstable. Properly support or secure vehicle to hoisting device when these conditions exist.

Refer to the Owner's Manual for emergency vehicle lifting procedures.

When properly positioned, a floor jack can be used to lift a Jeep vehicle. Support the vehicle in the raised position with jack stands at the front and rear ends of the frame rails.

CAUTION: Do not attempt to lift a Jeep vehicle with a floor jack positioned under:

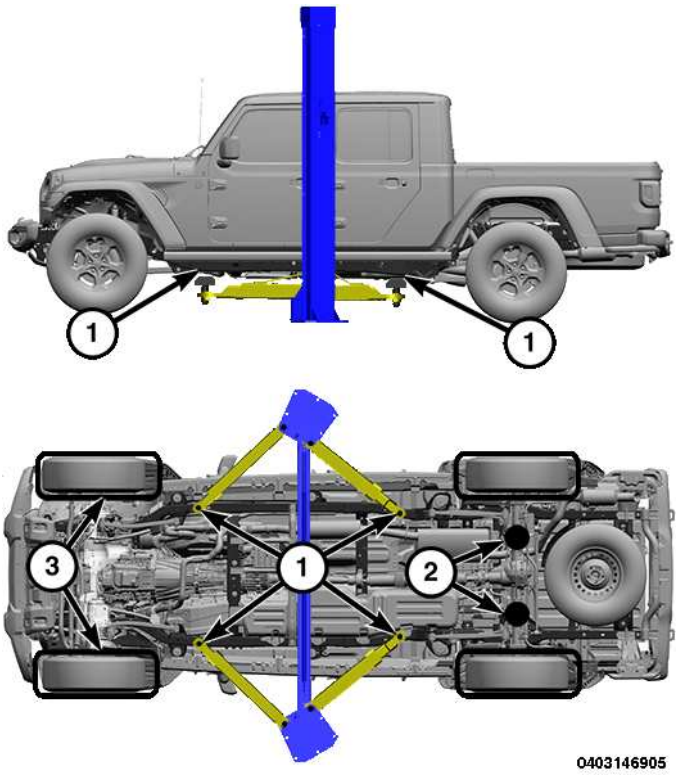
- A body side sill.
- A steering linkage component.
- A drive shaft.
- The engine or transmission oil pan.
- The fuel tank.
- A front suspension arm.
- Transfer case.

NOTE: Use the correct sub-frame rail or frame rail lifting locations only.

A vehicle can be lifted with:

- A single-post, frame-contact hoist.
- A twin-post, chassis hoist.
- A ramp-type, drive-on hoist.

NOTE: When a frame-contact type hoist is used, verify that the lifting pads are positioned properly.



LIFTING POINTS

1 - FRAME CONTACT LIFT (SINGLE POST)
1 - CHASSIS LIFT (DUAL LIFT)
1 - OUTBOARD LIFT (DUAL LIFT)
2 - ALTERNATE LIFTING LOCATIONS
2 - FLOOR JACK
3 - DRIVE ON HOIST

STATIONARY GLASS

WARNING: **Do not operate the vehicle within 24 hours of windshield installation. It takes at least 24 hours for urethane adhesive to cure. If it is not cured, the windshield may not perform properly in an accident.**

- **Urethane adhesives are applied as a system. Use glass cleaner, glass prep solvent, glass primer, PVC (vinyl) primer and pinch weld (fence) primer provided by the adhesive manufacturer. If not, structural integrity could be compromised.**
- **FCA US LLC does not recommend glass adhesive by brand. Technicians should review product labels and technical data sheets, and use only adhesives that their manufactures warrant will restore a vehicle to the requirements of FMVSS 212. Technicians should also insure that primers and cleaners are compatible with the particular adhesive used.**
- **Be sure to refer to the urethane manufacturer's directions for curing time specifications, and do not use adhesive after its expiration date.**
- **Vapors that are emitted from the urethane adhesive or primer could cause personal injury. Use them in a well-ventilated area.**
- **Skin contact with urethane adhesive should be avoided. Personal injury may result.**
- **Always wear eye and hand protection when working with glass.**

CAUTION: **Protect all painted and trimmed surfaces from coming in contact with urethane or primers.**

Be careful not to damage painted surfaces when removing moldings or cutting urethane around windshield.

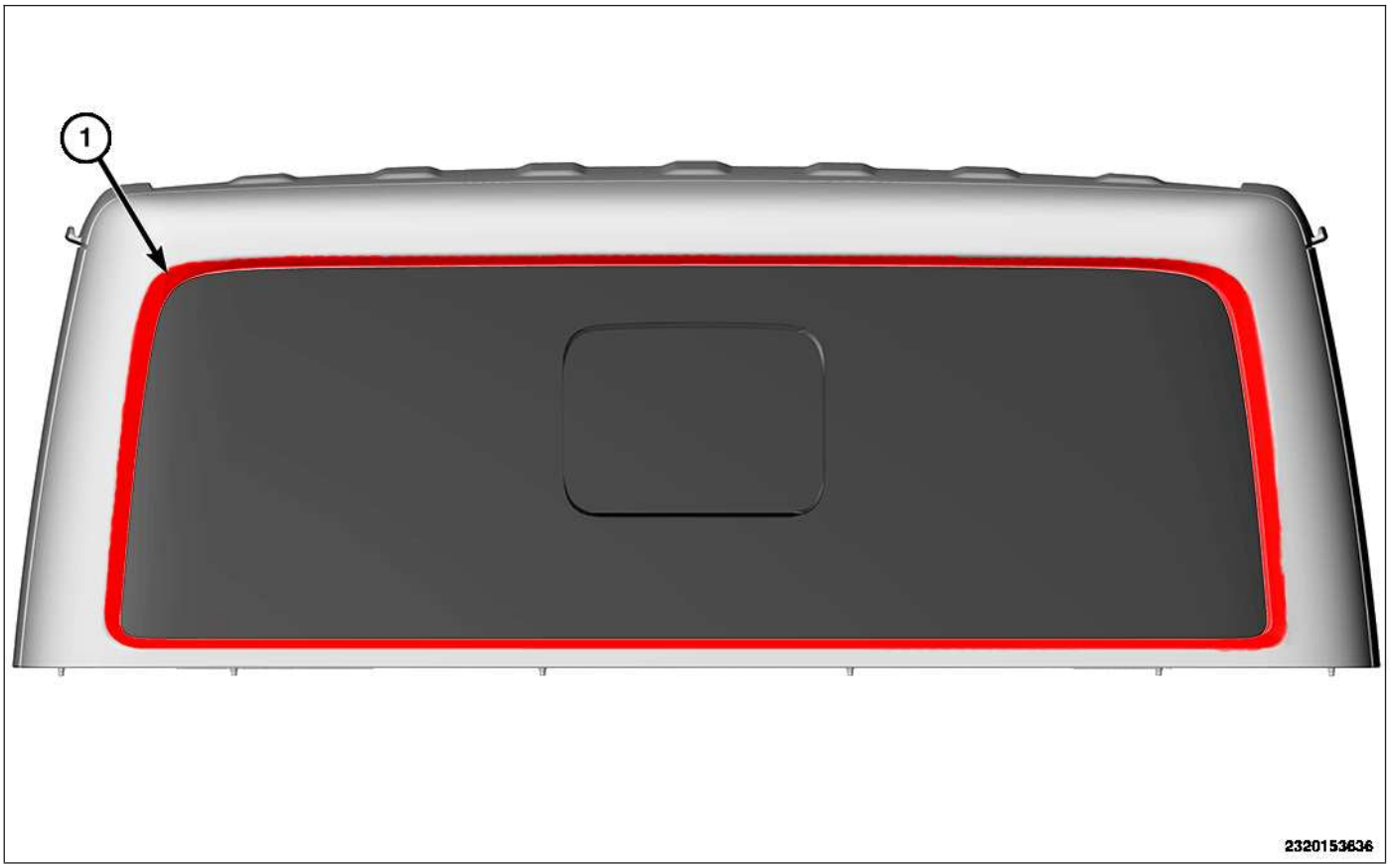
Common glass tools needed to remove Stationary Glass

- 1 – Extractor® Express™ or equivalent, equipped with flat blade
- 2 – Rotating wire removal system
- 3 – Two handled wire type removal system
- 4 – Cold knife equipped with an 25 mm (1 in) blade
- 5 – Long knife

DESCRIPTION	Procedure
Backlite Glass	Backlite Glass
Sliding Backlite Glass	Sliding Backlite Glass
Windshield	Windshield
Windshield Frame	Windshield Frame

BACKLITE GLASS

REMOVAL AND INSTALLATION

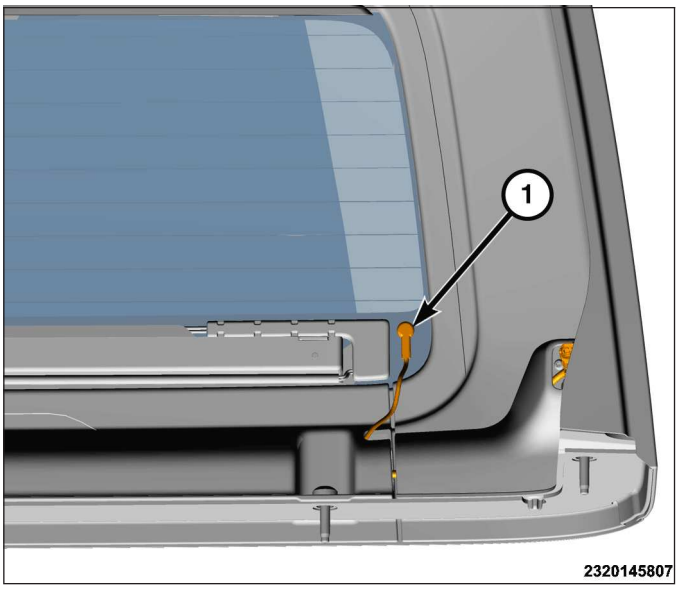


CAUTION: **It is difficult to salvage the backlite during the removal operation. The urethane bonding used to secure the glass to the fence is difficult to cut or clean from any surface. Since the molding is set in urethane, it is unlikely it would be salvaged. Before removing the backlite, check the availability from the parts supplier.**

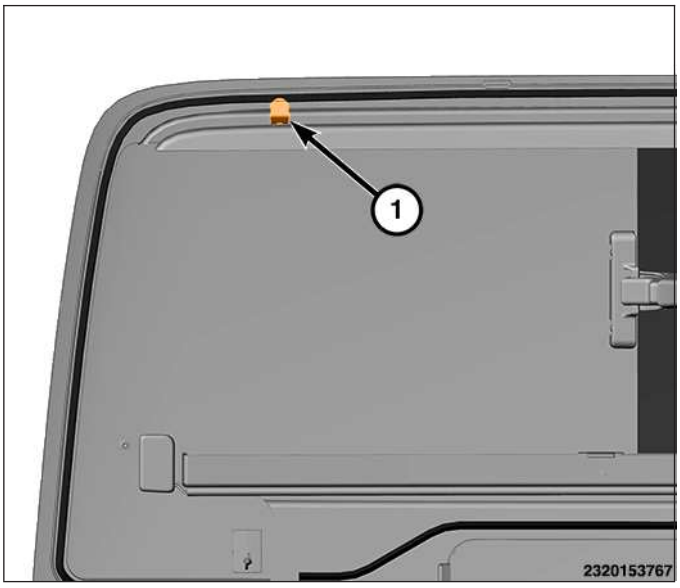
CAUTION: **Take care using any tools to avoid top damage in the location indicated by the illustration.**

NOTE: **The backlite is attached to the window frame with urethane adhesive. The urethane adhesive is applied cold and seals the surface area between the window opening and the glass. The primer adheres the urethane adhesive to the backlite.**

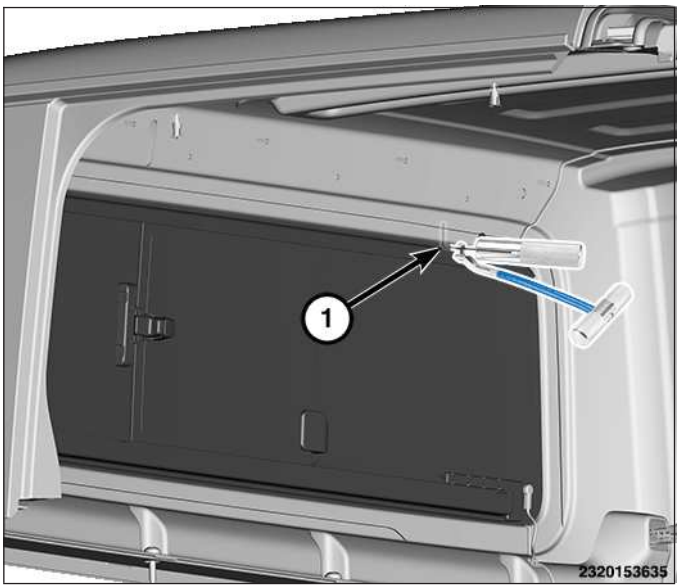
1. Disconnect and isolate the negative battery cable(s), in accordance to the service information.
2. Remove the rear header panel, in accordance to the service information.
3. Disconnect the electronic backlite grid connectors (1) from both sides of the glass, if equipped.

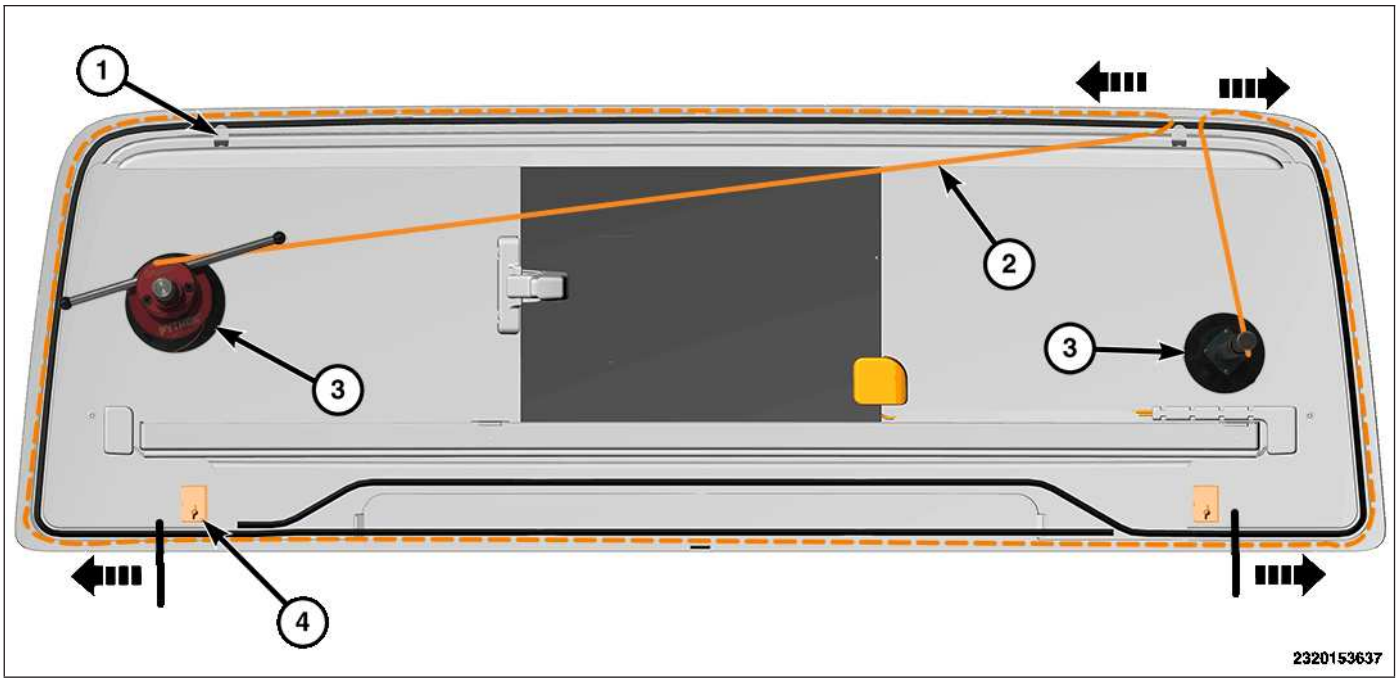


4. Bend the top tabs (1) down out of the way.

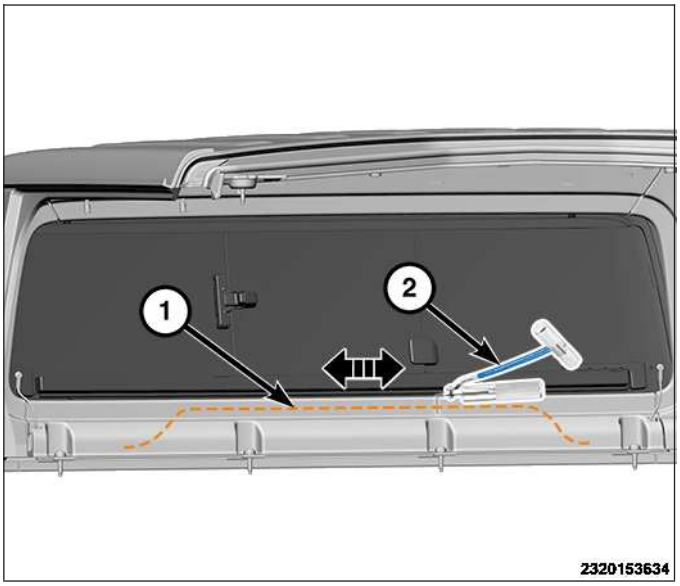


5. From inside the vehicle, separate the top adhesive using a pull knife (1) or equivalent, to aid installation of the wire removal tool.

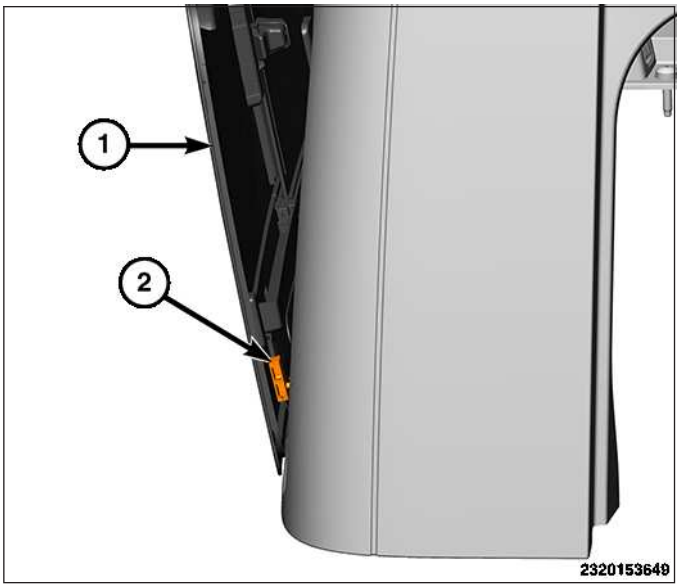


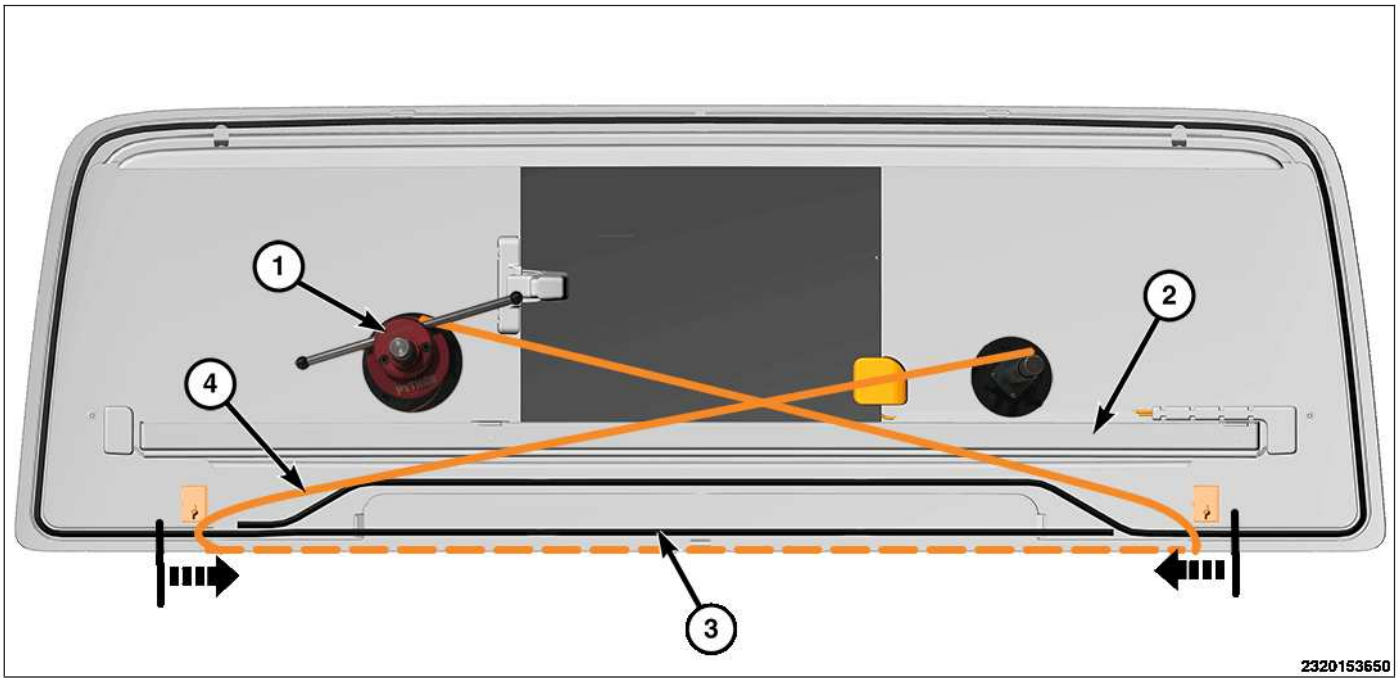


6. Install the nylon cable (2) out through the opening in the adhesive made previously and position around the perimeter of the glass as indicated.
7. Using an assistant and a windshield Rotating Wire Removal System tool (3), cut and separate the urethane adhesive securing the glass to the fence and stopping at the support pins (4). Use a trim stick or equivalent to aid in guiding the nylon cable around the glass channels as needed.
8. From inside the vehicle, separate the lower adhesive (1) using a pull knife (2) or equivalent. This will aid in gaining access to the lower support pins.



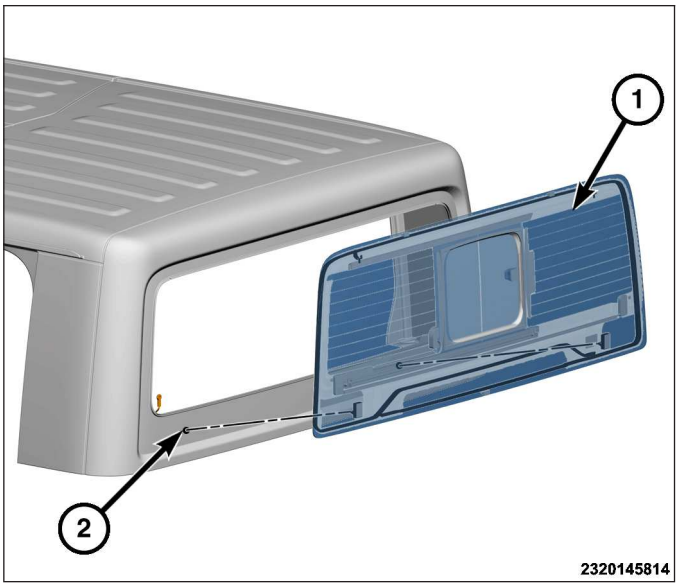
9. Position the glass (1) back to expose the support pins (2) at the bottom.
10. Using a small flat bladed tool or equivalent, separate the two sided tape securing the support pins (2) to the glass.





11. Reposition the nylon cable (4) through the glass opening to cut the remaining adhesive at the bottom (3) of the glass as indicated.
12. Using an assistant and a windshield Rotating Wire Removal System tool (1), cut and separate the remaining urethane adhesive (3) securing the bottom of the glass to the fence and remove the glass. Use a trim stick or equivalent to aid in guiding the nylon cable around the glass channels (2) as needed.

13. Separate glass (1) from vehicle.



WARNING: **Do not operate the vehicle within 24 hours of windshield installation. It takes at least 24 hours for urethane adhesive to cure. If it is not cured, the windshield may not perform properly if the vehicle is in an accident.**

CAUTION: **To help prevent water leaks, partially roll down the left and right door glass before installing the windshield. This avoids pressurizing the passenger compartment if a door is slammed before the urethane is cured.**

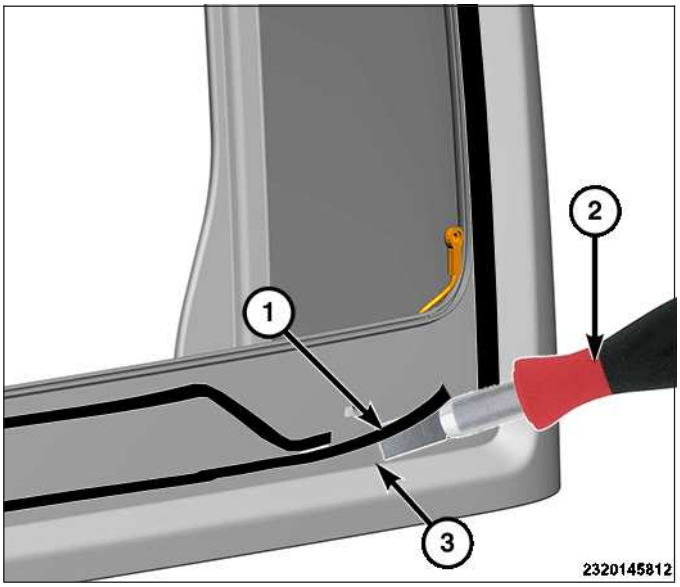
CAUTION: **Protect all painted and trimmed surfaces from coming in contact with urethane or primers.**

NOTE: **The glass fence should be cleaned of most of its old urethane adhesive. A small amount of old urethane, approximately 1 mm in height should remain on the fence. Do not completely remove all old urethane from the fence, the paint finish and bonding strength will be adversely affected.**

CAUTION: **Do not use solvent based glass cleaners to clean the backlite before applying glass prep and primer or poor glass adhesion may result.**

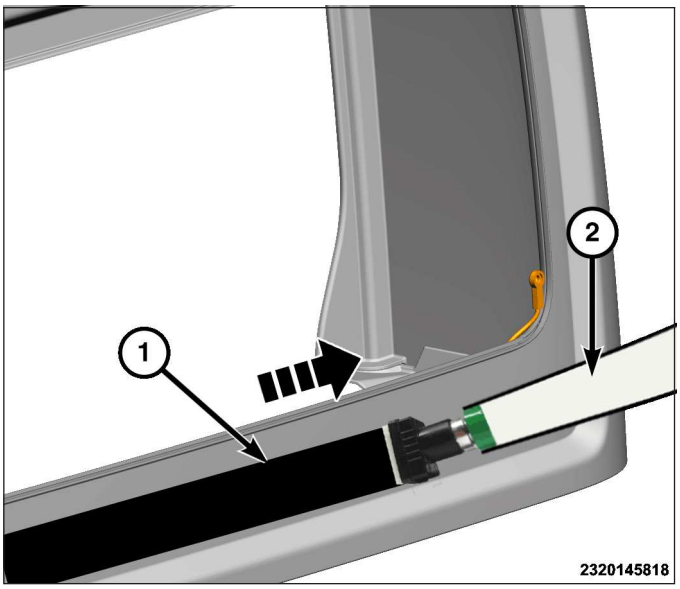
INSTALLATION

1. With a sharp flat bladed tool (2) equipped with an appropriate width blade, trim the remaining bead of adhesive (1) down to approximately 1 mm (0.04 in). Use care not to damage the edge of the top (3). Do not completely remove all old urethane from the frame, the paint finish and bonding strength will be adversely affected.
2. Clean the inside of the glass with an ammonia based glass cleaner and a lint-free cloth.
3. Apply glass prep adhesion promoter 25 mm (1 in.) wide around the perimeter of the glass and 5 mm (0.2 in.) from the edge of the glass and let air dry without wiping.
4. Apply glass primer 25 mm (1 in.) wide around the perimeter of the glass and 5 mm (0.2 in.) from the edge of the glass. Allow at least three minutes drying time.

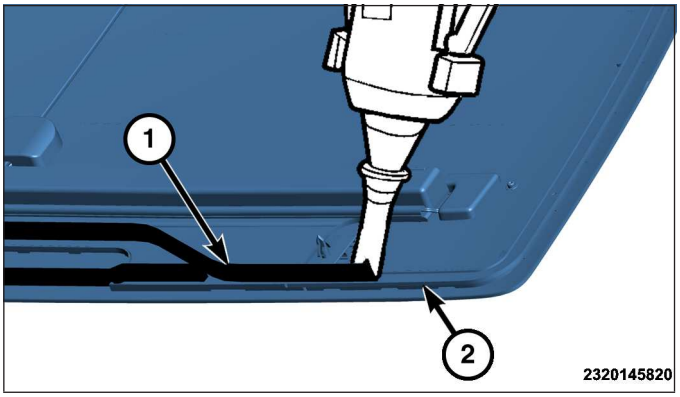


5. Using a flashlight, verify that the primer is completely and evenly installed along the perimeter of the glass.
6. Re-prime any area that is not fully and evenly primed.

7. Clean the glass fence with an ammonia based glass cleaner and a lint-free cloth.
8. With the use of the applicator (2), apply pinch weld primer 25 mm (1 in.) wide (1) around the glass fence. Allow at least three minutes drying time.
9. Using a flashlight, verify that the primer is completely and evenly installed along the glass fence.
10. Re-prime any area that is not fully and evenly primed.



CAUTION: **Always apply bead of adhesive to the backlite. Always install the backlite within 5 minutes after applying adhesive.**



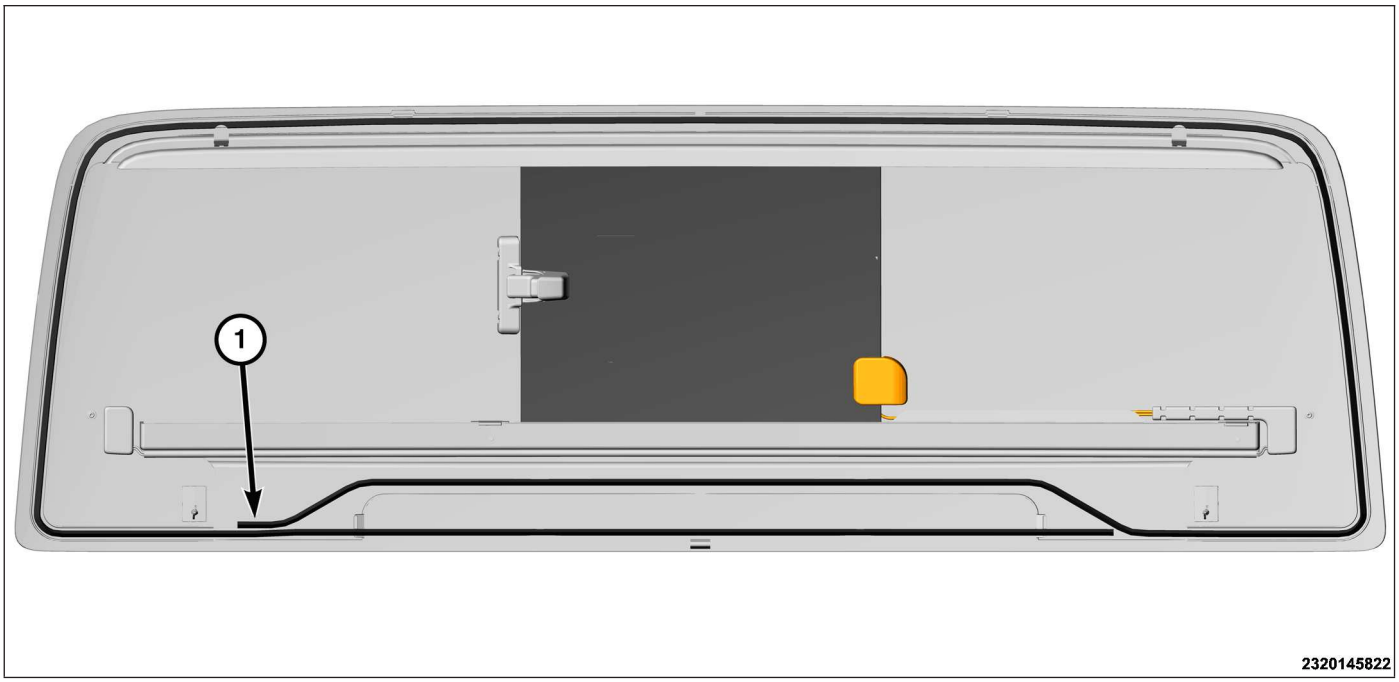
ADHESIVE WIDTH 7 mm (0.275 in)
ADHESIVE HEIGHT 13 mm (0.50 in)

NOTE: **If the original urethane adhesive has been exposed for more than 12 hours, the entire adhesive area will need to be re-primed prior to installing new adhesive.**

Apply bead of adhesive (1) with a triangular nozzle directly on the glass.

11. Apply approximately a 7 mm (0.3 in.) wide and 13 mm (0.5 in.) tall bead of adhesive (1) with a triangular nozzle approximately 6 mm (0.230 in.) from the edge of the glass (2) starting at the bottom center of the glass.

NOTE: **Make sure the bead of adhesive is placed on the primer fully.**



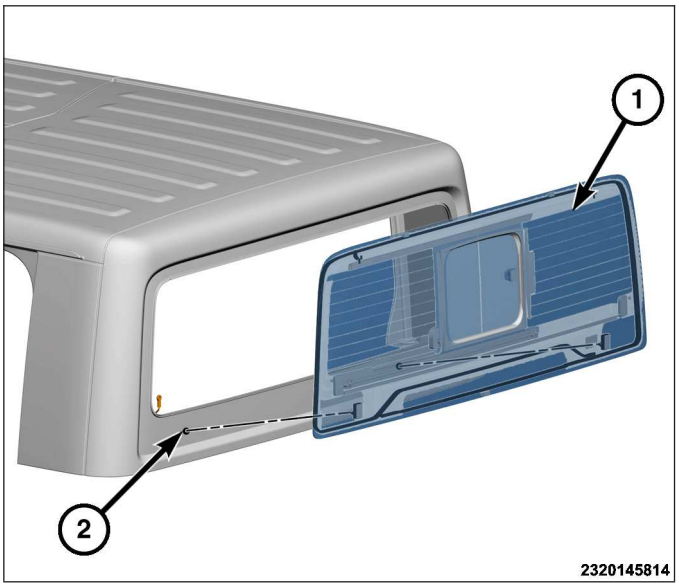
12. Run the end of the adhesive bead (1) on the glass parallel to the start of the bead and smooth the ends flush.

NOTE: Make sure there are no gaps present in the adhesive bead and ends.

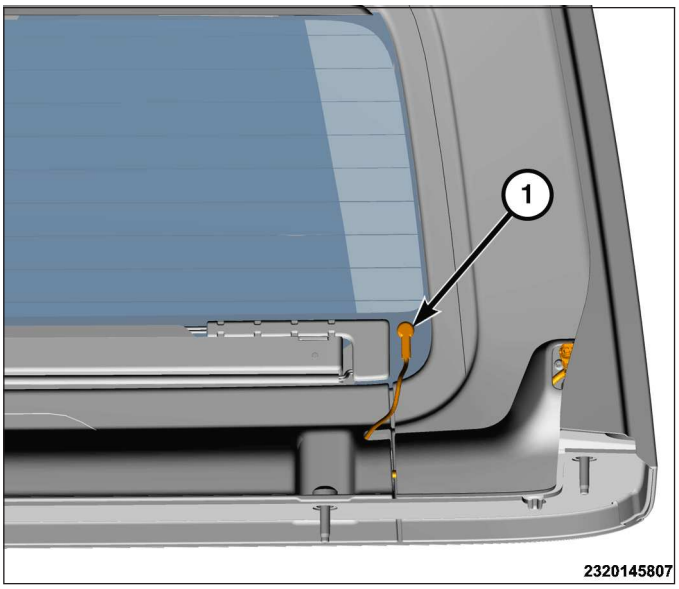
WARNING: Allow the urethane at least 24 hours to cure before returning the vehicle to use.

NOTE: Roll down the left and right front door glass before installing backlite. This is to avoid pressurizing the passenger compartment if a door is slammed before the urethane is cured. The potential for water leaks can result.

13. Locate the glass assembly (1) to the backlight opening. Align the pins on the glass assembly with the holes (2) in the bottom corners of the backlight opening.
14. Apply hand pressure to the outside glass surface, around the entire periphery, to assure proper seating of the glass to the backlight opening. The glass must be seated to the rest blocks.



15. Connect the electronic backlite grid connectors (1) to both sides, if equipped.
16. Install the rear cab header panel, in accordance to the service information.
17. Connect the negative battery cable(s), in accordance to the service information.

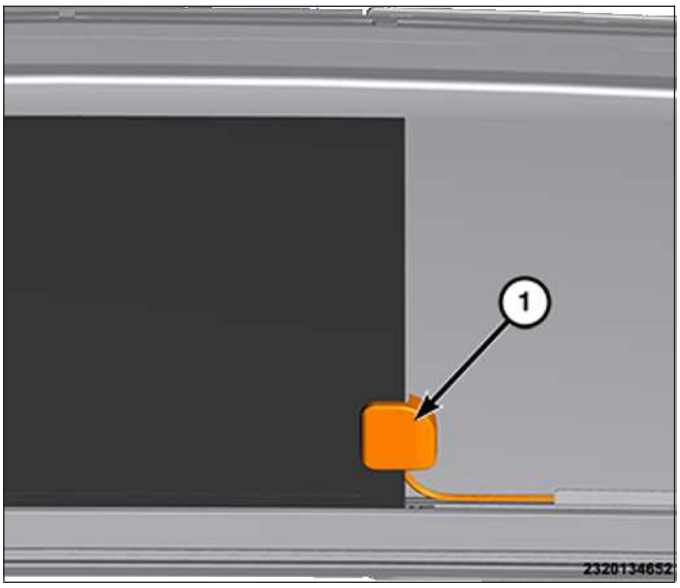


SLIDING BACKLITE GLASS

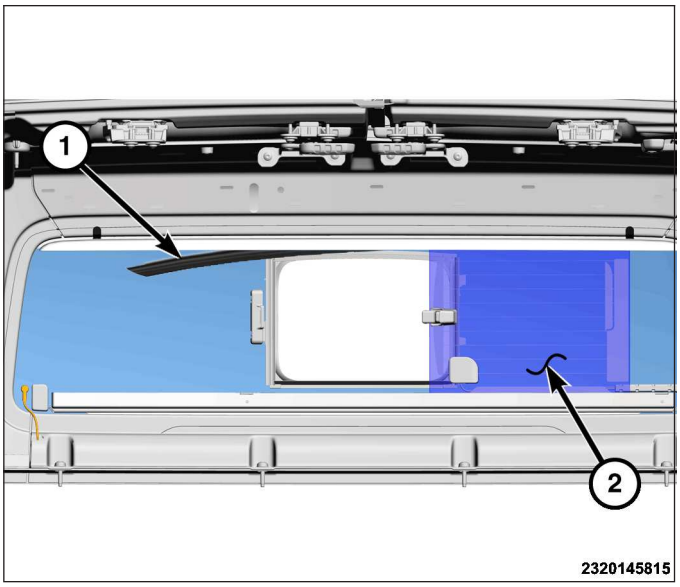
REMOVAL AND INSTALLATION

REMOVAL

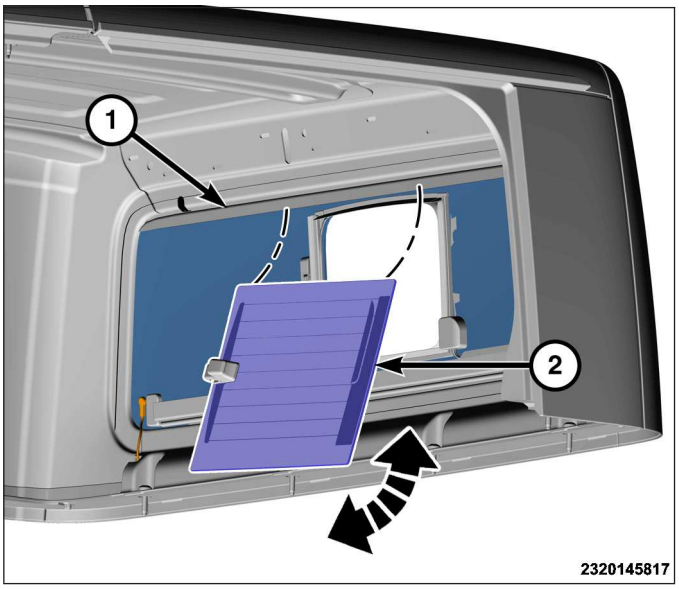
1. Open the center glass approximately 8 cm (3 in).
2. Disconnect and isolate the negative battery cable(s), in accordance to the service information (Refer to 08 - Electrical/Battery System/Standard Procedure).
3. Disconnect the heated glass wire harness connector (1).



4. Using a hook tool, pull the upper window channel down on the outboard end (1) and slide it out of the window frame.

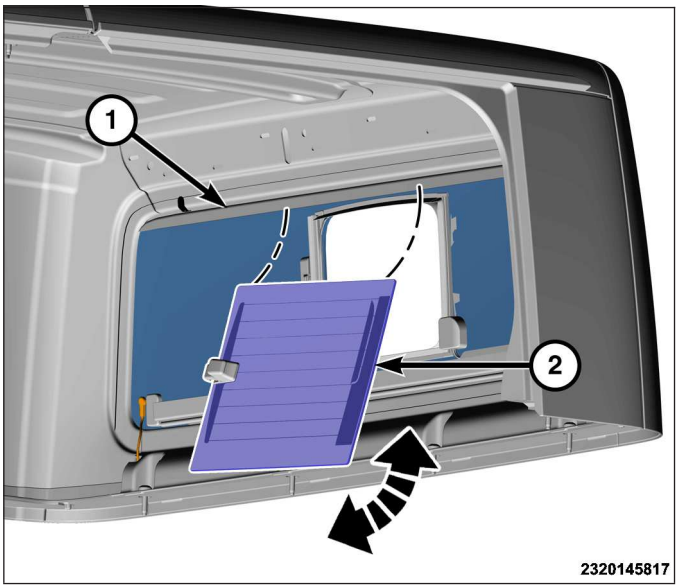


5. Lift the sliding glass (2) upward and pull the bottom out of the lower channel.
6. Remove the sliding glass (2) out of the window frame (1).

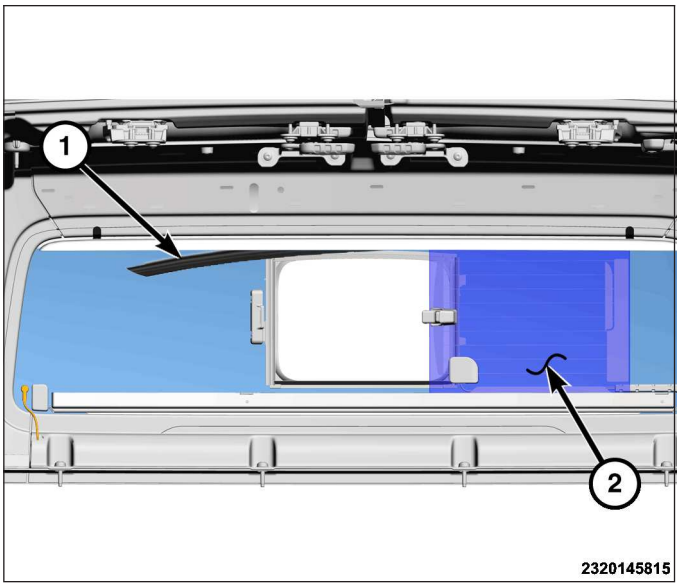


INSTALLATION

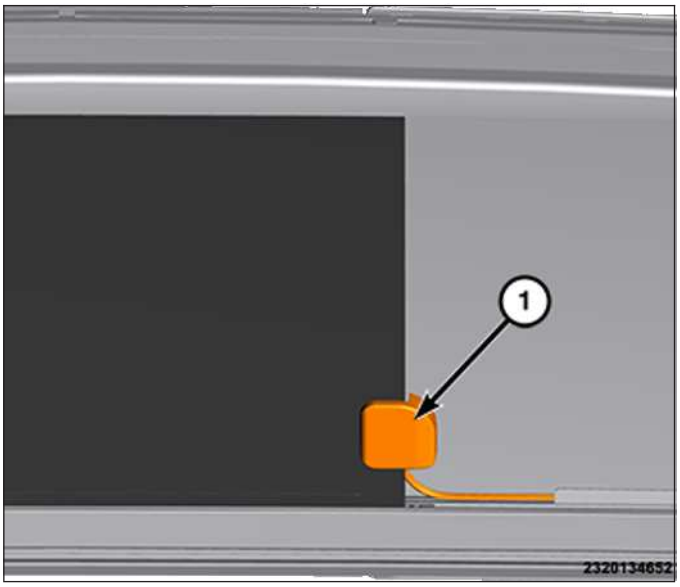
1. Install the sliding glass (2) into the upper window frame (1) and rotate the lower edge into the lower channel.



2. Position the upper run channel (1) into the window frame and slide it into place.



3. Connect the heated glass wire harness connector (1).
4. Connect the negative battery cable(s), in accordance to the service information.
5. Verify proper operation of the glass.



WINDSHIELD

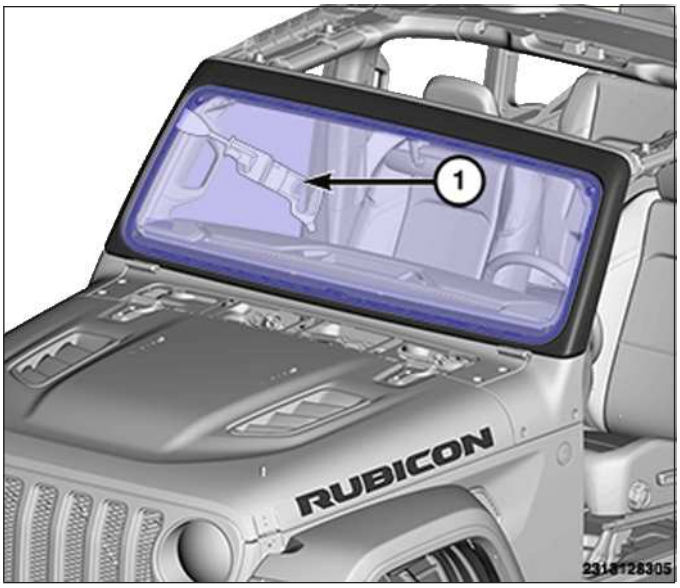
REMOVAL AND INSTALLATION

CAUTION: Be careful not to damage painted surfaces when removing moldings or cutting urethane around the windshield.

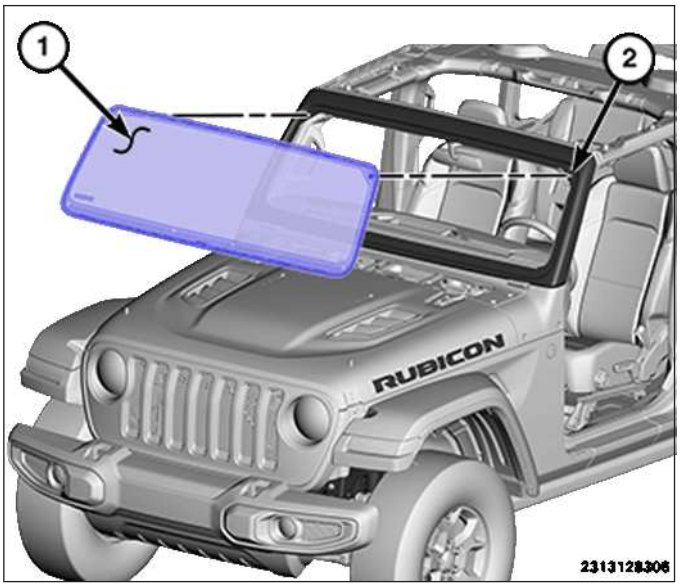
REMOVAL

1. Remove the wiper arms, in accordance to the service information.

2. Using an assistant and a windshield cut-out tool (1), cut and separate the urethane adhesive securing the windshield to the windshield frame.



3. Carefully remove the windshield (1) from the vehicle.



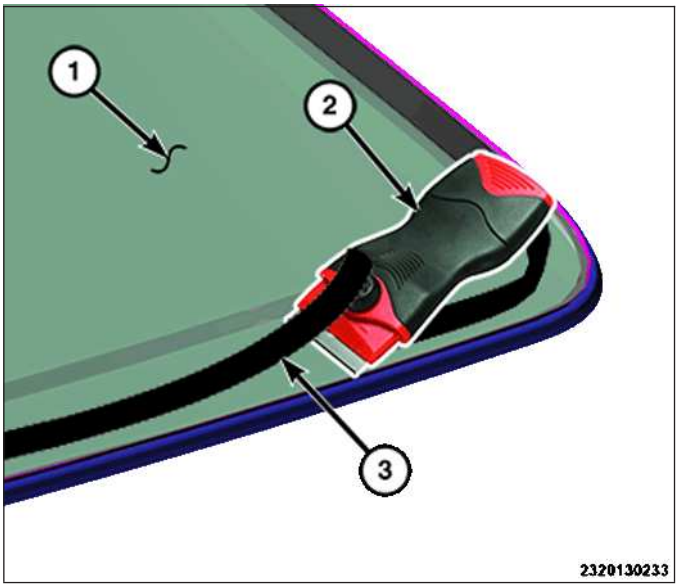
WARNING: **Do not operate the vehicle within 24 hours of windshield installation. It takes at least 24 hours for urethane adhesive to cure. If it is not cured, the windshield may not perform properly if the vehicle is in an accident.**

CAUTION: **To help prevent water leaks, partially roll down the left and right door glass before installing the windshield. This avoids pressurizing the passenger compartment if a door is slammed before the urethane is cured.**

CAUTION: **Protect all painted and trimmed surfaces from coming in contact with urethane or primers.**

INSTALLATION

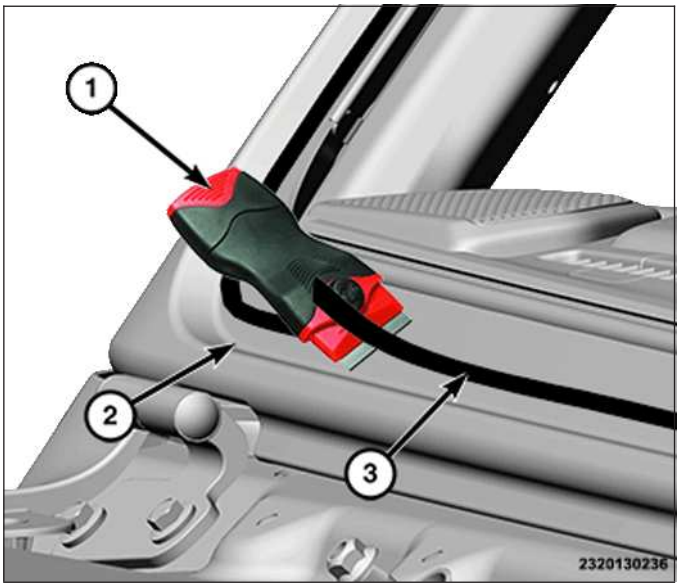
1. If the windshield (1) is being reused, remove as much original urethane (3) as possible from the glass surface using a razor knife (2).



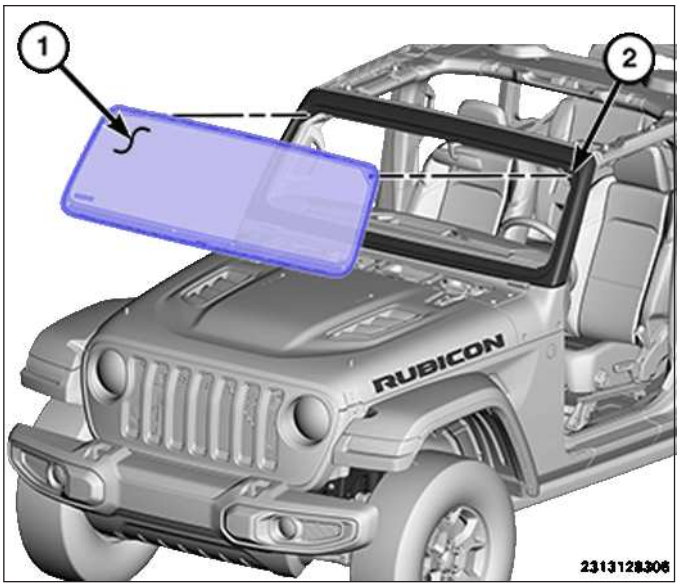
NOTE: **To prevent corrosion, do not damage paint on windshield frame when removing original urethane.**

NOTE: **The windshield frame should be cleaned of most of its old urethane adhesive. A small amount of old urethane, approximately 1 mm in height should remain on the frame. Do not completely remove all old urethane from the frame, the paint finish and bonding strength will be adversely affected.**

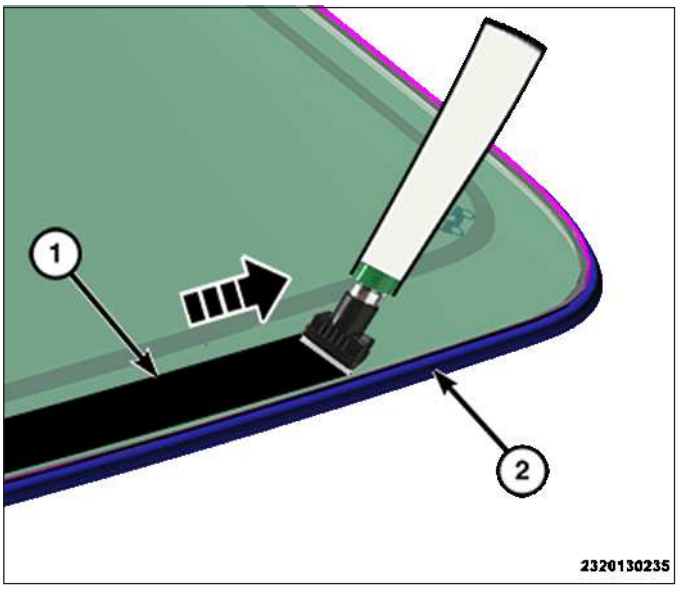
2. Using a razor knife (1), level the original bead of urethane (3) on the windshield frame (2) to a thickness of approximately 1 mm (0.04 in.) and remove the loose adhesive.



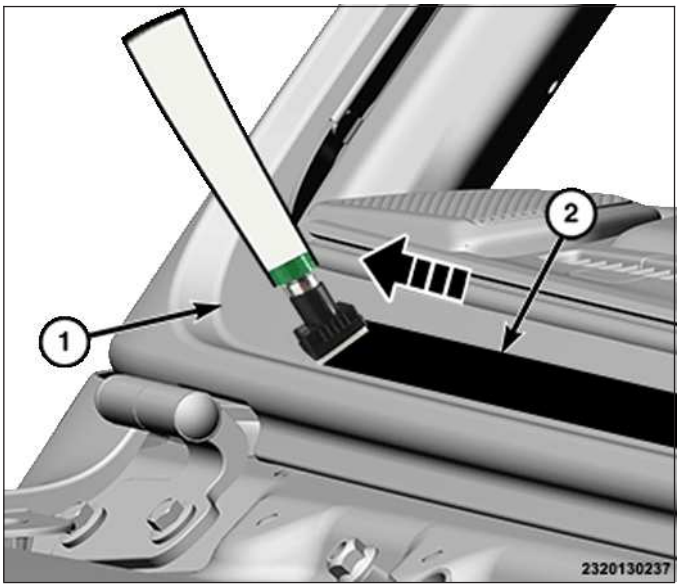
3. Using an assistant, position the windshield (1) into the windshield opening and against the windshield frame (2).
4. Verify the windshield lays evenly against the frame at the top, bottom and sides of the opening. If not, the frame must be formed to the shape of the windshield.
5. Mark the windshield and the windshield frame with pieces of masking tape to use as a reference for installation.
6. Using an assistant, remove the windshield from the windshield opening and place it on a suitable padded work surface.



7. Clean the inside of the windshield with an ammonia based glass cleaner and a lint-free cloth.
8. Apply glass prep adhesion promoter 25 mm (1 in.) wide (1) around the perimeter of the windshield (2) and 5 mm (0.2 in.) from the edge of the glass and wipe dry with a clean lint-free cloth until no streaks are visible.
9. Apply glass primer 25 mm (1 in.) wide (1) around the perimeter of the windshield (2) and 5 mm (0.2 in.) from the edge of the glass. Allow at least three minutes drying time.
10. Using a flashlight, verify that the primer is completely and evenly installed along the perimeter of the windshield.
11. Re-prime any area that is not fully and evenly primed.



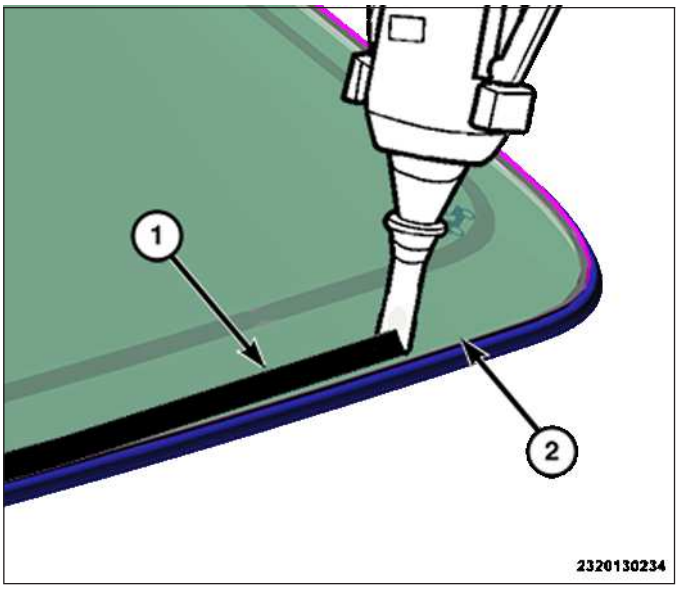
12. Clean the windshield frame with an ammonia based glass cleaner and a lint-free cloth.
13. Apply pinch weld primer 25 mm (1 in.) wide (2) around the windshield frame (1). Allow at least three minutes drying time.
14. Using a flashlight, verify that the primer is completely and evenly installed along the windshield frame.
15. Re-prime any area that is not fully and evenly primed.



CAUTION: Always apply the bead of adhesive to the windshield. Always install the windshield within 5 minutes after applying the adhesive.

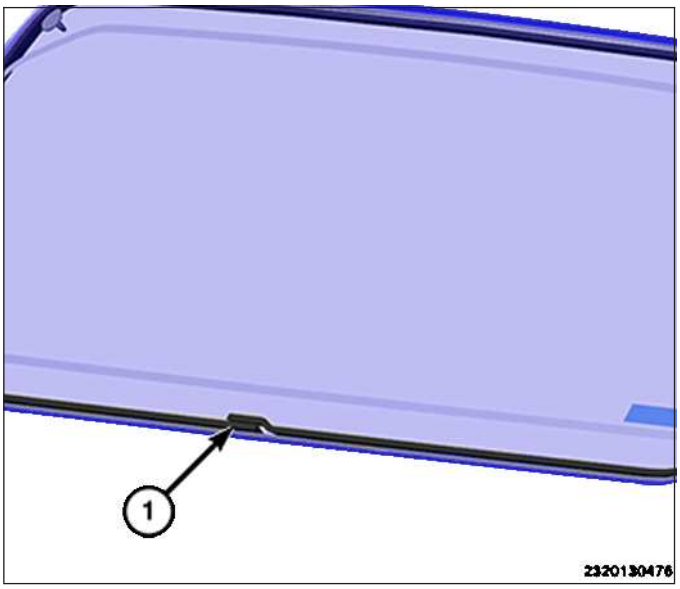
NOTE: If the original urethane adhesive has been exposed for more than 12 hours, the entire adhesive area will need to be re-primed prior to installing new adhesive.

16. Apply approximately a 7 mm (0.3 in.) wide and 13 mm (0.5 in.) tall bead of adhesive (1) with a triangular nozzle approximately 6 mm (0.230 in.) from the edge of the glass (2) starting at the bottom center of the windshield.



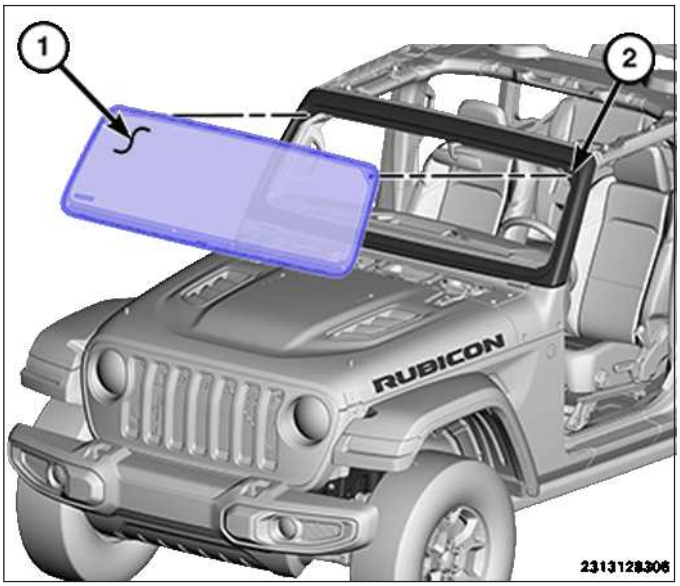
NOTE: Make sure the bead of adhesive is placed on the primer fully.

17. Run the end of the adhesive bead (1) on the windshield parallel to the start of the bead and smooth the ends flush.

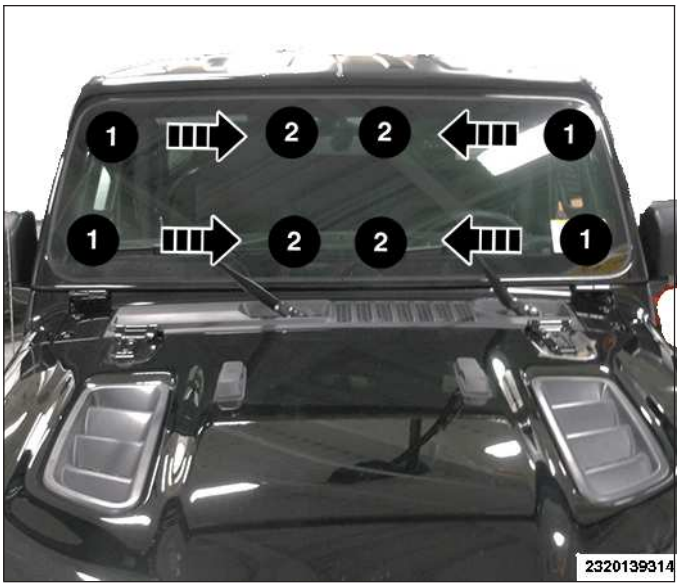


NOTE: Make sure there are no gaps present in the adhesive bead and ends.

18. Using an assistant, position the windshield (1) over the windshield opening.
19. Using the tape as reference points, align the windshield to the opening.
20. Carefully lower the windshield onto the windshield frame. Guide the windshield into its proper location.
21. Push the windshield inward until the windshield comes into contact with the location pins located on each side of the upper windshield frame (2).



22. Seat the windshield glass firmly starting at the top and the bottom A-pillars (1) and working inward to the center on the top and bottom until the standoff bottom out onto the frame. Hold in position until the glass feels solid and make sure glass is underflush around the entire frame.
23. Slowly add pressure inboard and press the center of the glass (2) underflush as far as possible.
24. Make sure the glass is in the center of the frame opening and that the lips of the lace molding are not gapping and seated equally around the perimeter of the glass.
25. Install the wiper arms, in accordance to the service information.

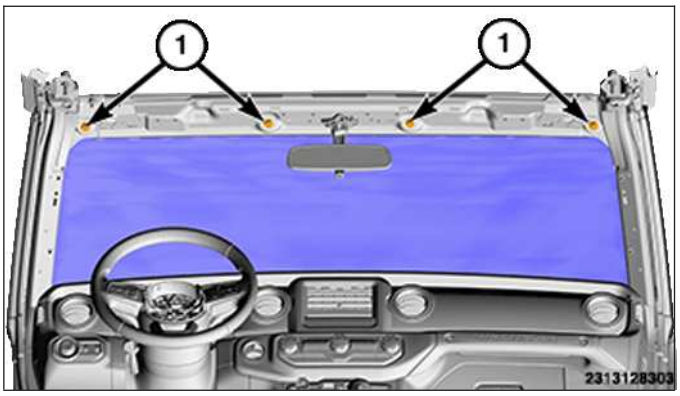


WINDSHIELD FRAME

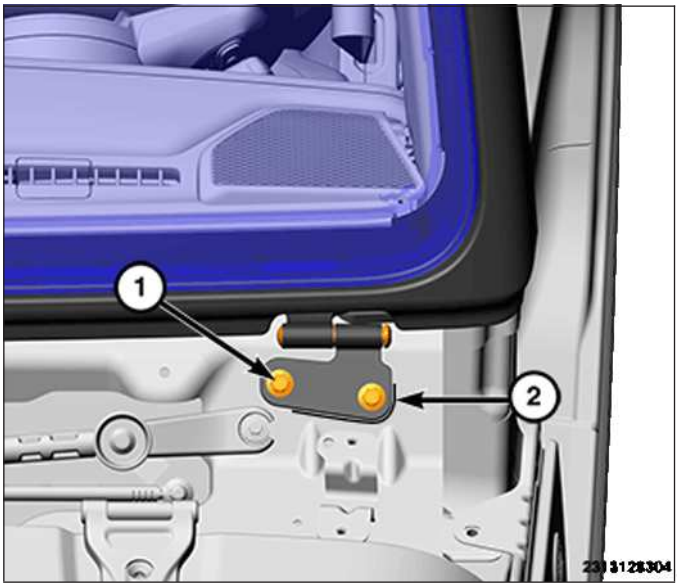
REMOVAL AND INSTALLATION

REMOVAL

1. Remove the Freedom Tops, if equipped.
2. Open the soft top, if equipped.
3. Remove the wiper arms, in accordance to the service information.
4. Remove the bolts (1) securing the upper windshield frame to the header.

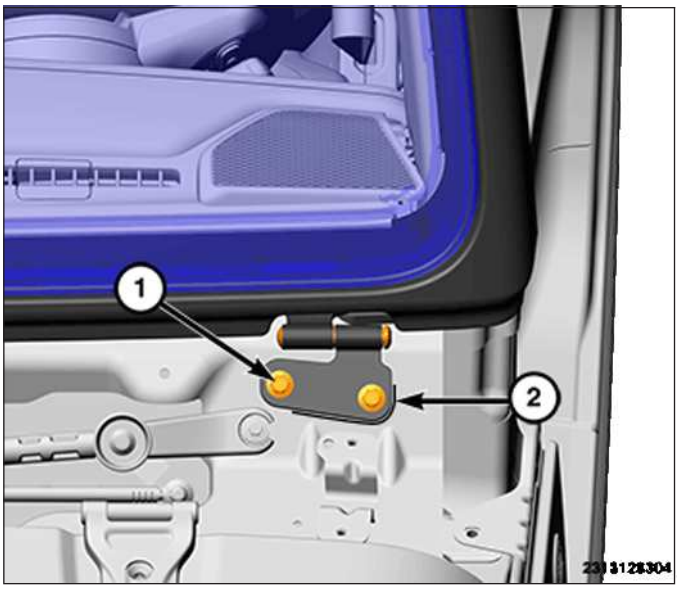


5. Remove the cowl trim, in accordance to the service information.
6. Using a suitable marking device, mark the position of the of the hinges on the body (2) to aid installation.
7. Remove the bolts (1) and with the aid of a helper, remove the windshield frame assembly.

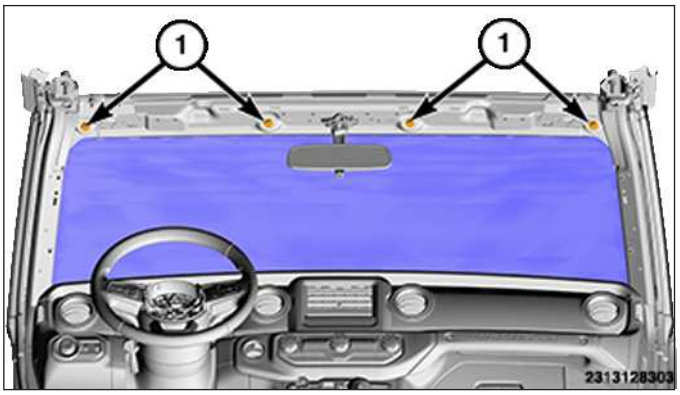


INSTALLATION

1. A suitable body sealant should be applied when removing or moving the hinges.
2. Align the hinges to the reference marks (2) made previously and tighten the hinge bolts (1) to 30 N·m (22 ft lbs).
3. Install the cowl trim, in accordance to the service information.



4. Seat the windshield frame on the header fully and install the bolts (1).
5. Tighten the bolts (1) to 17 N·m (12 ft lbs).
6. Install the wiper arms, in accordance to the service information.



CORROSION PROTECTION

Corrosion Protection Restoration

"Corrosion protection" encompasses all the materials and coatings which protect a vehicle from corrosion and include:

- Coated steels
- E-coat primer on the complete body
- Body sealing to eliminate water and air intrusion where panels join
- Structural adhesives in some joints
- Chip resistant primer applications on the entire body
- Paint application
- Underbody corrosion protection
- Inner panel corrosion protection added to repair areas

Corrosion protection must be restored during a repair anytime it may have been compromised. All areas that have been subjected to structural pulls, clamping, straightening, welding, or any other any other operation that may have imparted damage to the corrosion protection system will need to be addressed.

In the repair process corrosion protection is addressed in three phases: pre-refinish, refinish and post-refinish.

Pre-refinish

In the pre-finish phase, structural adhesives, seam sealers and other applied coatings are installed. Sheet metal seams are sealed to prevent water intrusion into the "dry" areas of the vehicle, such as passenger compartment, and also to prevent intrusions of contaminates, such as water and road salt, into seams causing corrosion. Lap joints, hem flanges, and any panel mating locations need to be addressed during the repair and treated to duplicate the original vehicle build.

All bare metal should be epoxy primed prior to applying seam sealer, following the refinish material provider's instructions for doing so, unless the manufacture of the sealer specifically states otherwise.

When working around pinch weld flanges, seam sealer should be installed to duplicate the original appearance and function. If it is unclear whether the original sealing material **between** the flanges is strictly a sealer or structural adhesive, always default to a structural adhesive such as LORD Fusor 2098, LORD Fusor 112B, or 3M 08116. For additional information related to weld-bonding and welding around adhesives and sealers, (Refer to 31 - Collision Information - Standard Procedure).

Roof and closure panels will require the use of anti-flutter foam. Where inner panel supports meet external panels, the proper replacement materials in these areas are Mopar part No. 04864015AB, or equivalent, or LORD Fusor 121, or 3M 04274 Noise Vibration Harshness (NVH) dampening material.

Any disturbed or removed NVH foam needs to be replaced. Use Mopar part No. 05142864AA, LORD Fusor 130, or 3M 8463.

All hem flanges on closure panels should be sealed whether sealer is apparent or not. This includes those disturbed during the repair, and those on new replacement panels. Either duplicate the existing bead in shape or size, or where one is not obvious, seal the hem flange in a discrete fashion. Hem flanges should be sealed using Mopar part No.04318026, LORD Fusor 129, or 3M 08308.

Lap joints, such as in floor pans, should be sealed to duplicate the sealer visible, but also addressed on any exterior surface by sealing the lap wether visible or not.

NOTE: FCA US LLC does not recommend the use of any type of ″weld-thru″ primer during repairs. Weld-bonding with corrosion protecting adhesives or sealers, along with final application of inner panel corrosion protection is the proper method.

Refinish

All painted surfaces should be coated using a FCA US LLC approved refinish material. The refinish process includes application of undercoats, primers (filler & sealer), basecoats and clearcoat. These approved materials have been tested to the same material standards as the production materials.

Post-refinish

All new panels, and repair areas, must have inner panel corrosion protection applied after the painting operation is complete, but before all the trim is reinstalled. Mopar Cavity Wax No. 68042970AA, or 3M Rustfighter

#08891 should be applied to all interior cavities, weld flanges, hem flanges as well as any are affected by the repair especially where any type of welding was performed. Inner panel corrosion protection should be applied using "pressure pot" equipment with wands which provide 360-degree material coverage for closed cavities, and directional spray wands for visible coverage (Mopar kit #04271235). Additionally, the corrosion protecting material must be applied in two coats with a minimum 30-minute flash time between applications.

Wheel wells and underbody panels which have been involved in the repair process should also have a final undercoating applied. Use Mopar No. 05093417AA, or equivalent, and apply with "pressure pot" style application equipment.

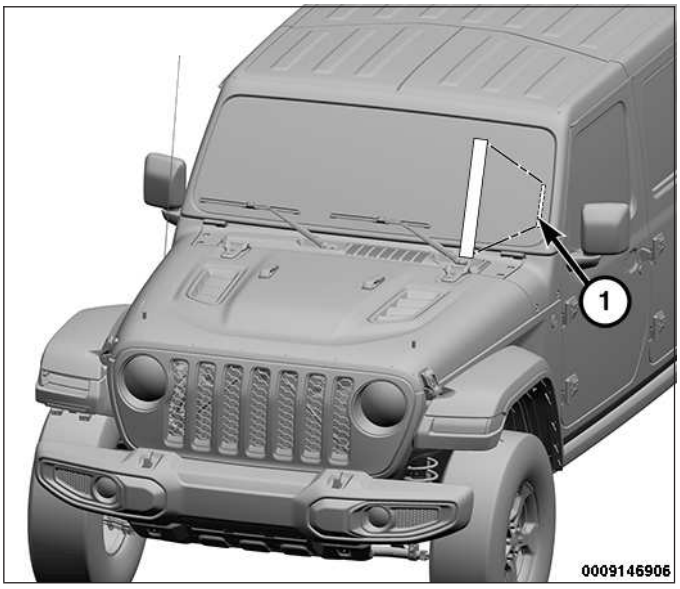
Following this arrangement, choice of materials, and proper application, the repaired vehicle should be as well protected against corrosion as it was prior to the repair.

Technical Specifications

VEHICLE IDENTIFICATION NUMBER

The Vehicle Identification Number (VIN) plate is located on the lower left A-pillar (1) and attached with rivets. The VIN contains 17 characters that provide data concerning the vehicle. Refer to the VIN decoding chart to determine the identification of a vehicle.

To protect the consumer from theft and possible fraud the manufacturer is required to include a check digit at the ninth position of the VIN. The check digit is used by the manufacturer and government agencies to verify the authenticity of the vehicle and official documentation. The formula to use the check digit is not released to the general public.



POSITIONS 1 - 3: WORLD MANUFACTURER IDENTIFIER

1	2	3	Manufacturer	Vehicle Type
1	C	6	FCA US LLC	Truck

POSITION 4: BRAKE SYSTEM & GVWR

Brake System	GVWR Range		Active Belts, Air Bags	Active Belts, Air Bags, Side Bags-Front Row	Active Belts, Air Bags, Side Bags-All Rows	Active Belts, No Air Bags	Active Belts, GVWR > 10, 000 lbs.
	Pounds	Kilograms					
Hydraulic	5001-6000#	(2268 - 2721 KG)	—	H	—	—	—
Hydraulic	6001-7000#	(2722 - 3175 KG)	—	J	—	—	—

Positions 5 - 7:

Define the following: brand, marketing name, drive wheels, cab/body type, drive position, and price series.

4WD			Cab Type	Position	Series
J	T	A	Crew Cab	Left Hand Drive	Sport
J	T	F			Overland
J	T	B			Rubicon

POSITION 8: ENGINE

Engine Code	G
Displacement	3.6 Liter
Cylinders	V6
Fuel	Gasoline
Manufacturer	FCA
Jeep Gladiatior	285

NOTE: Values in chart are horsepower

POSITION 9: CHECK DIGIT

0 through 9 or X

POSITION 10: MODEL YEAR

L = 2020

POSITION 11: ASSEMBLY PLANT

Position 11: Assembly Plant

CODE	PLANT	CITY	STATE	COUNTRY
W	Toledo North Assembly	Toledo	OH	USA

POSITION 12 - 17: PLANT SEQUENCE NUMBER

A six digit number assigned by assembly plant.

STANDARDIZED MATERIAL IDENTIFICATION

In an effort to reduce confusion over the large number of steel grades in use, and the repairability and weldability concerns involved with each, FCA US LLC has instituted new nomenclature which is applicable to material call-outs and Body In White (BIW) views released for use in the repair industry.

All materials listed in the key may not be used on a given model, nor may every panel be identified in the graphic (ex: some groups do not show fascias).

WARNING: FCA US LLC engineering's position on the use of heat during collision repair is as follows:

- **Any body panel or frame component damaged which is to be repaired and reused, must be repaired using the "cold straightening" method. No heat may be used during the straightening process.**
- **During rough straightening prior to panel replacement, damaged panels or frame components may be heated to assist in body/frame realignment. The application of heat must be constrained to the parts which will be replaced and not allowed to affect any other components.**

This "no heat" recommendation is due to the extensive use of advanced high strength steels in FCA US LLC products. High-strength materials can be substantially and negatively affected from heat input which will not be obviously known to the repairer or consumer.

Ignoring these recommendations may lead to serious compromises in the ability to protect occupants in a future collision event, reduce the engineered qualities and attributes, or decrease the durability and reliability of the vehicle.

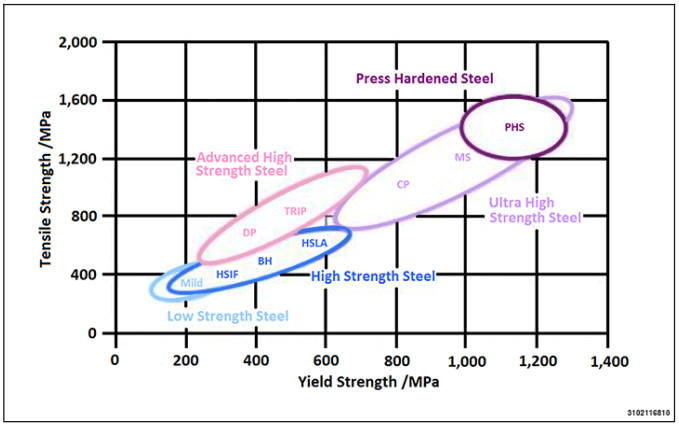
This statement supersedes any previously released information by the FCA US LLC.

Failure to follow these instructions may result in serious or fatal injury.

Information on sectioning of components will be identified in **Non-Structural Sheet Metal Repair, Sectioning Locations and Procedures and Welding and Weld Bonding** , (Refer to 31- Collision Information /Standard Procedure).

NOTE: Corrosion protection must be restored after repair.

Steels



- **Low Strength Steels (LS)** - Include Mild Steels. Good repairability and weldability (least sensitive to heat). May be attached using the preferred Squeeze Type Resistance Spot Welding (STRSW) process, weld bonding where appropriate, or MIG welding.
- **High Strength Steels (HSS)** - Includes High Strength Interstitial-Free (HSIF), Baked Hardened (BH) and High Strength Low Allow (HSLA) steels. Some repairability and good weldability (the higher the strength of the steel, the greater the sensitivity to heat). May be attached using STRSW, weld bonding, and MIG welding unless otherwise noted in Sectioning Locations and Procedures (Refer to 31- Collision/Standard Procedure/Sectioning Locations and Procedures.
- **Advanced High Strength Steels (AHSS)** - Includes Dual Phase (DP) and Transformation Induced Plasticity (TRIP) steels. Very limited repairability and weldability (very sensitive to heat). Attach only at OE defined locations. Specialized cutters are required with many materials in this group. May be attached using STRSW, weld bonding and Metal Active Gas (MAG) brazing, to minimize heat affected zone, unless otherwise noted in Sectioning Locations and Procedures (Refer to 31- Collision/Standard Procedure/Sectioning Locations and Procedures.
- **Ultra High Strength Steels (UHSS)** - Includes Complex Phase (CP) and Martinistic Steels (MS). Very limited repairability and weldability (very sensitive to heat). Attach only at OE defined locations using OE defined procedures. Specialized cutters are required with many materials in this group. May be attached using STRSW, weld bonding and Metal Active Gas (MAG) brazing to minimize heat affected zone.
- **Press Hardened Steels (PHS)** - Includes hot-stamped boron materials which are also termed "press hardened". No repairability and limited weldability (very sensitive to heat). Attach only at OE defined locations. Specialized cutters are required with many materials in this group. May be attached using STRSW, weld bonding and Metal Active Gas (MAG) brazing to minimize heat affected zone.

Magnesium

- **Magnesium** No repairability, replacement of components only. Special care must be used when working around magnesium parts due to combustibility.

Aluminum

- **Aluminum Sheets** - Including 5000, 6000 and 7000 series aluminum sheets. Stamped aluminum sheet metal panels may be repairable with specialized tools and techniques.
- **Aluminum Extrusion Profiles** - Also known as extruded aluminum. Extruded aluminum sheet may be repairable with specialized tools and techniques but never when used in structural usage such as impact bars, engine cradles, suspension components.
- **Cast Aluminum**- Cast Aluminum is non-repairable and must be replaced.

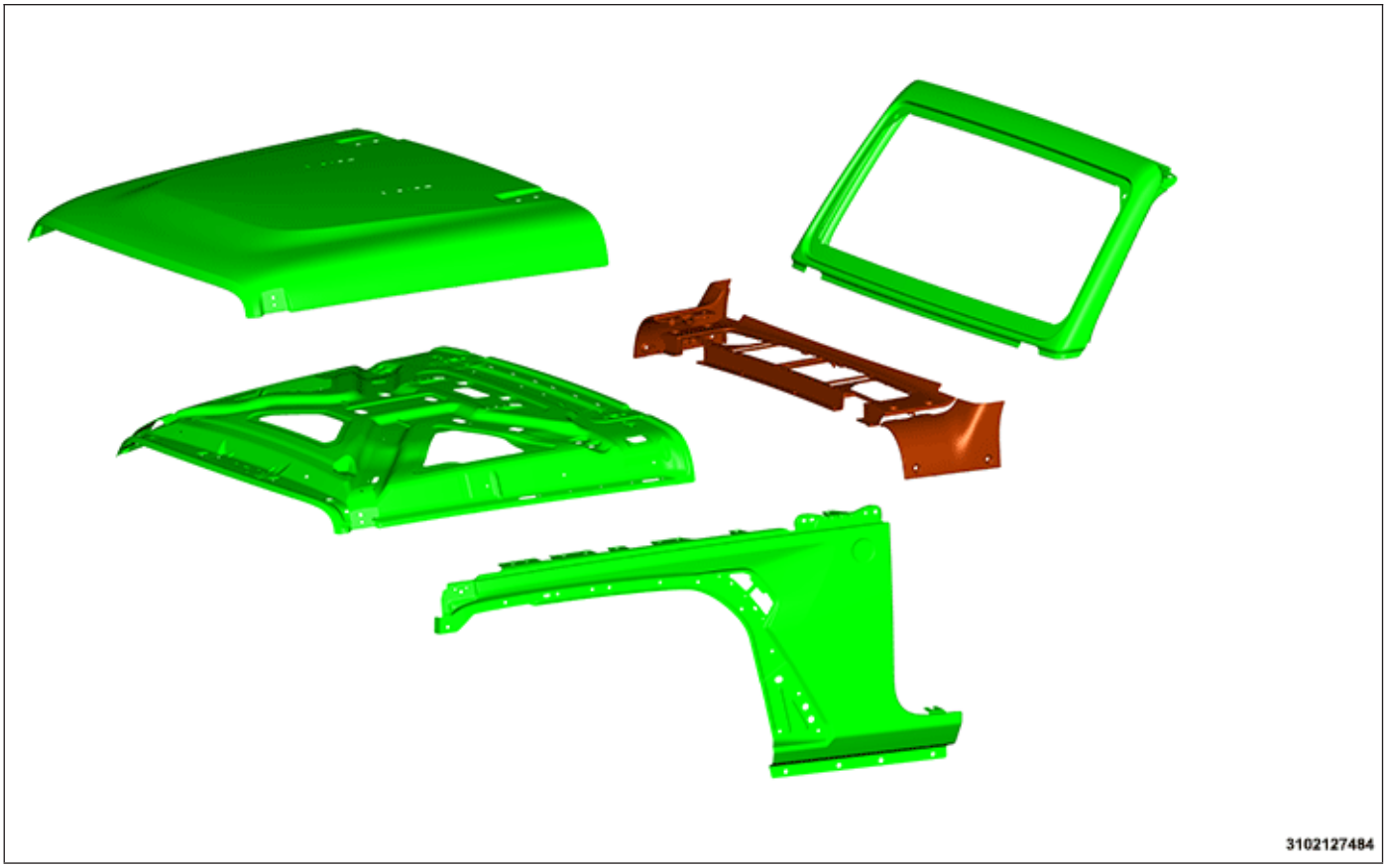
Plastics

- **Fiber Reinforced Plastics** - Composite materials may be fiber reinforced (example Kevlar) or co-molded assemblies of steel and plastic. Any of these require specialized repair materials and processes.
- **Duroplastics** - Including Sheet Molded Compound (SMC). Some repairability depending upon the type of plastic involved, the degree of damage, and the component function. Cosmetic components such as fascias have a higher degree of repair allowed than those components which can carry components and loads. Where SMC components are bonded to steel structure, FCA US LLC will identify the proper adhesive to attach the replacement panel. Repair materials for duroplastics are commonly available in the collision repair market.
- **Thermoplastics** - Some repairability depending upon the type of plastic involved, the degree of damage, and the component function. Cosmetic components such as fascias have a higher degree of repair allowed than those components which can carry components and loads. Repair materials for thermoplastics are commonly available in the collision repair market.

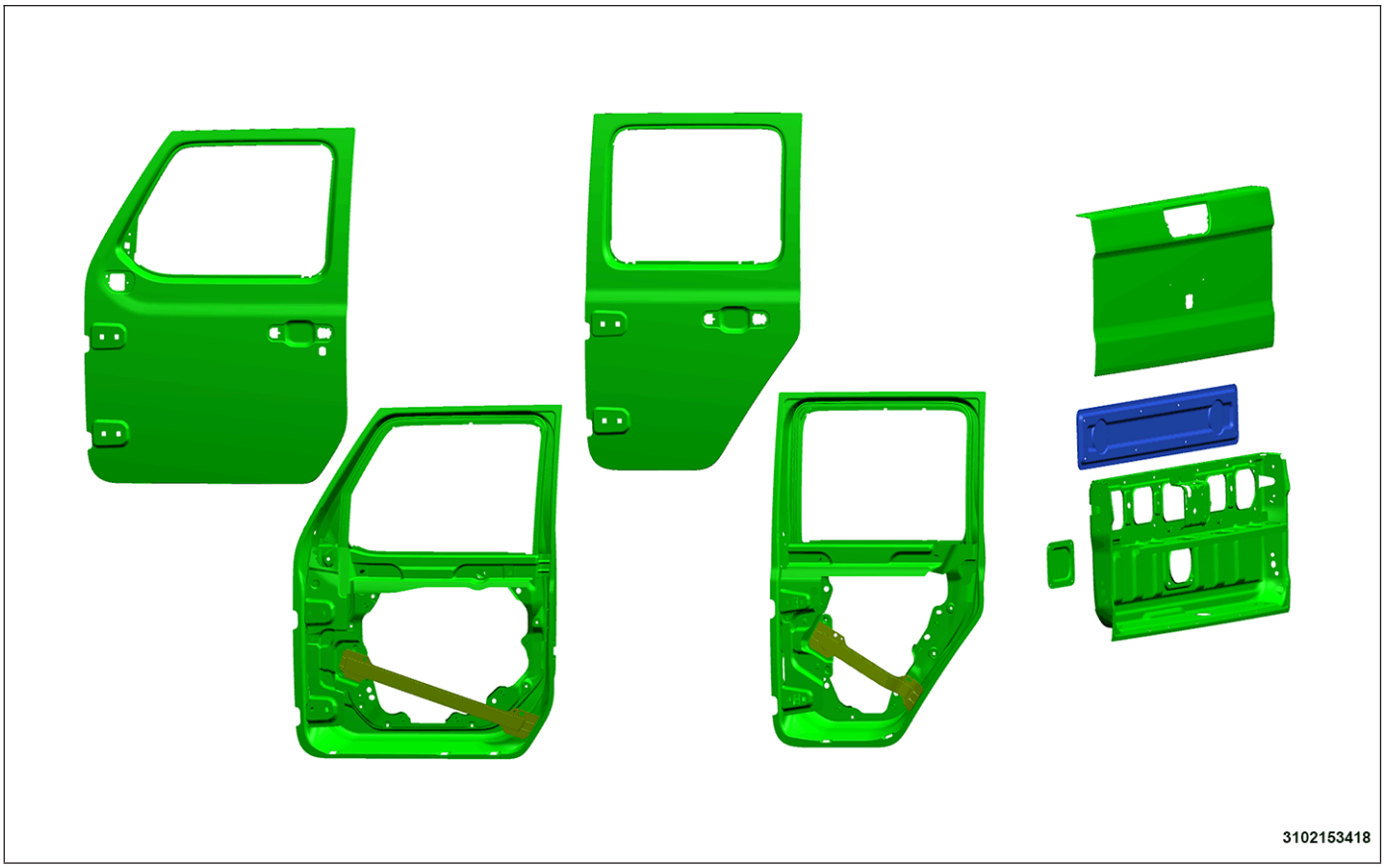
Materials: corresponding metallurgical classes		Color code
Steels	Low Strength Steels: Mild steels	
	High Strength Steels (HSS): High Strength Interstitial-free Steels (HSIF), Bake Hardening Steels (BH), High Strength Low Alloy Steels (HSLA)	
	Advanced High Strength Steels (AHSS): Dual Phase Steels (DP), Transformation Induced Plasticity Steels (TRIP)	
	Stainless Steels: Austenitic stainless steels	
	Ultra High Strength Steels (AHSS): Complex Phase Steels (CP), Martensitic Steels (MS)	
	Press Hardened Steels (PHS)	
Aluminum	Aluminum sheets: 7xxx series	
	Aluminum sheets: 6xxx series Aluminum extrusion profiles 7xxx	
	Aluminum sheets: 5xxx series	
	Aluminum extrusion profiles 6xxx	
	Aluminum extrusion profiles 7xxx	
	Cast aluminum	
	Magnesium	
Plastics	Fibre reinforced plastics	
	Duroplastics, including Sheet Molding Compounds (SMC)	
	Thermoplastics	
Other materials: Material identified in the graphic shown		

DESCRIPTION	FIGURE
Hood, Fender, Cowl and Windshield Frame	Figure 1

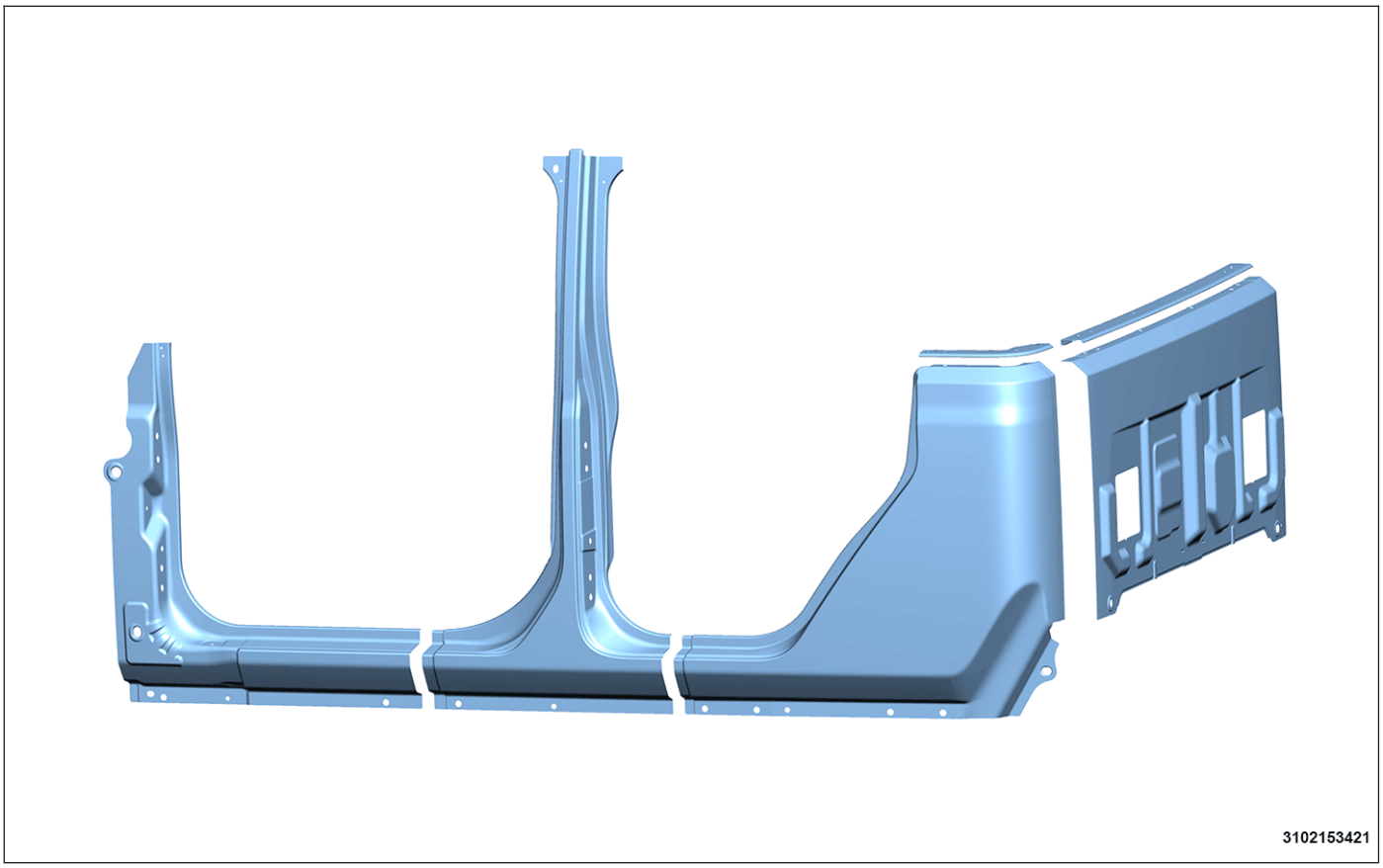
DESCRIPTION	FIGURE
Doors and Tailgate	Figure 2
Body Side Apertures, B-pillar Panel and Cab Back Panel	Figure 3
Body In White (Top view front)	Figure 4
Body In White (Top view rear)	Figure 5
Body In White (Bottom view front)	Figure 6
Body In White (Bottom view rear)	Figure 7
Body In White (Left side view)	Figure 8
Body In White (Right side view)	Figure 9
Pickup Box (Top views)	Figure 10
Pickup Box (Bottom views)	Figure 11
Frame (Top view front)	Figure 12
Frame (Bottom view rear)	Figure 13



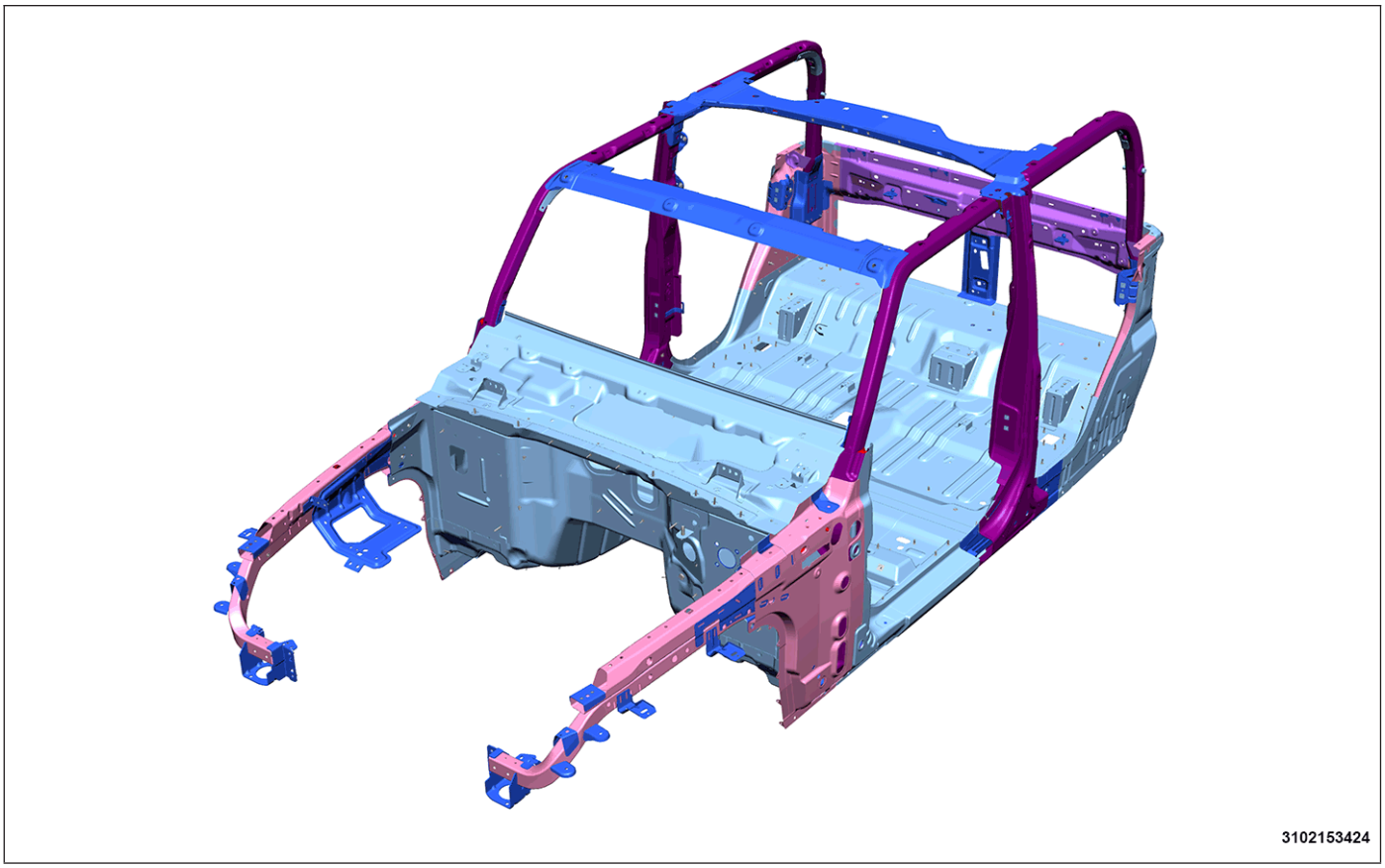
Hood, Fender, Cowl and Windshield Frame



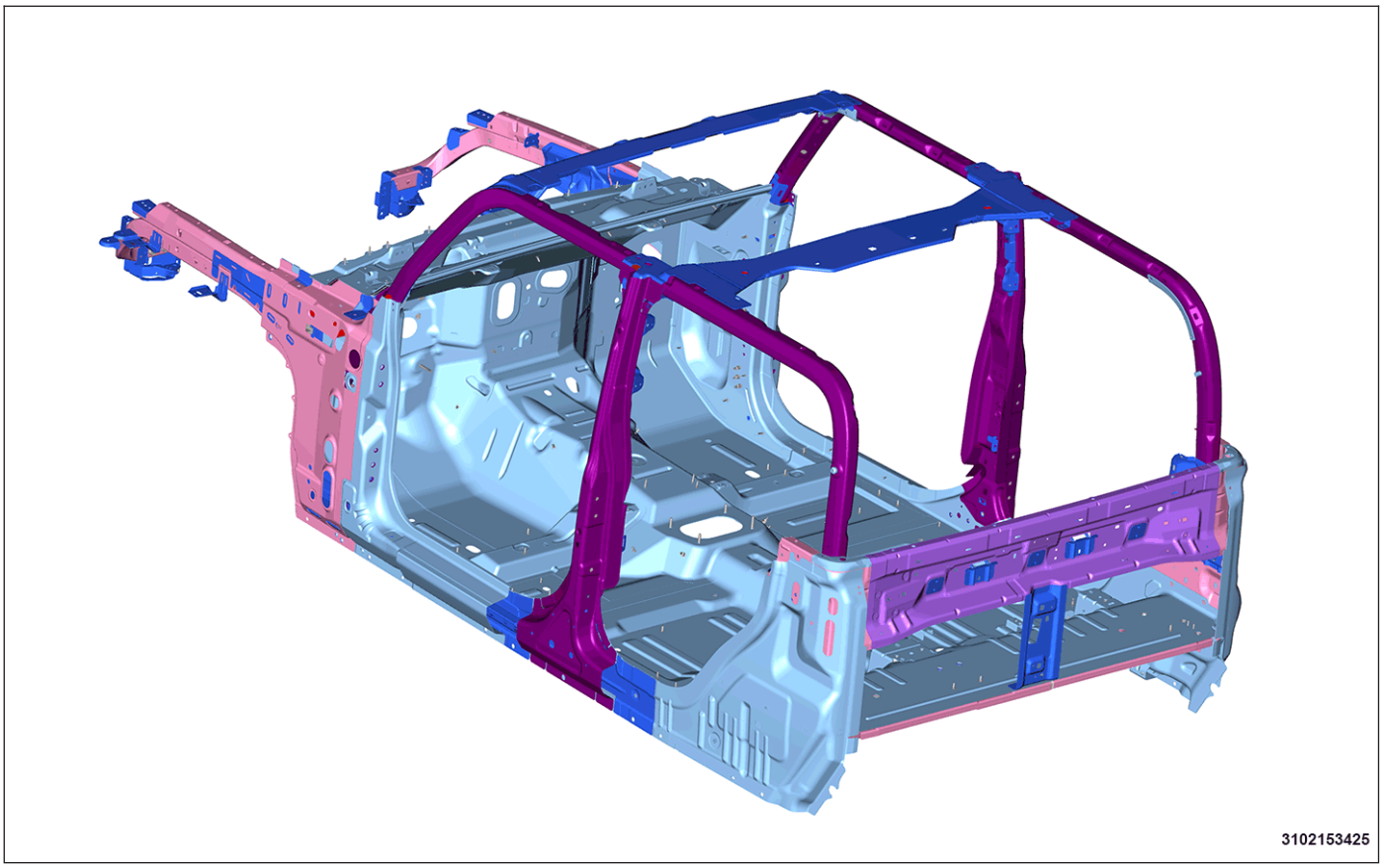
Doors and Tailgate



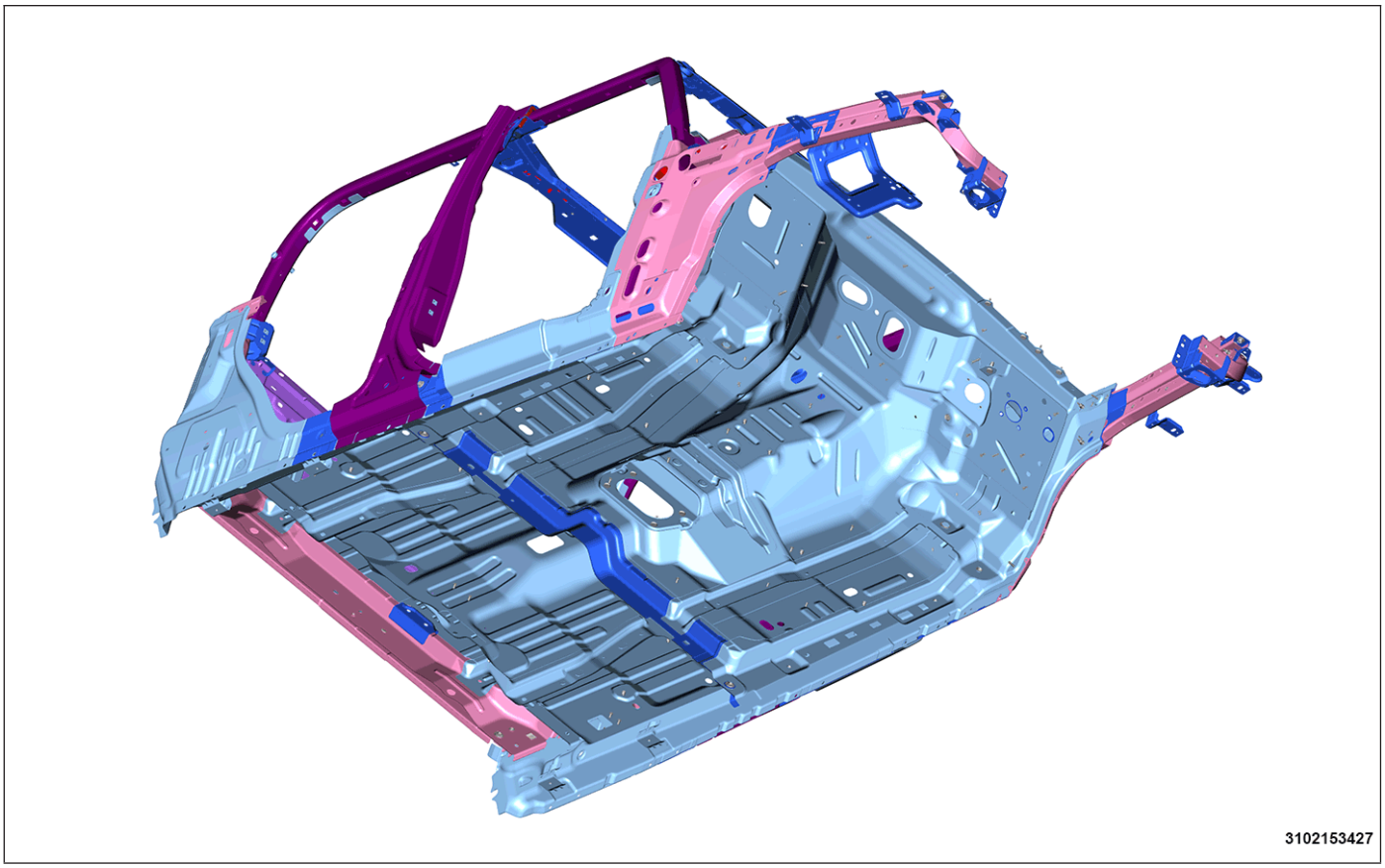
Body Side Apertures, B-pillar Panel and Cab Back Panel



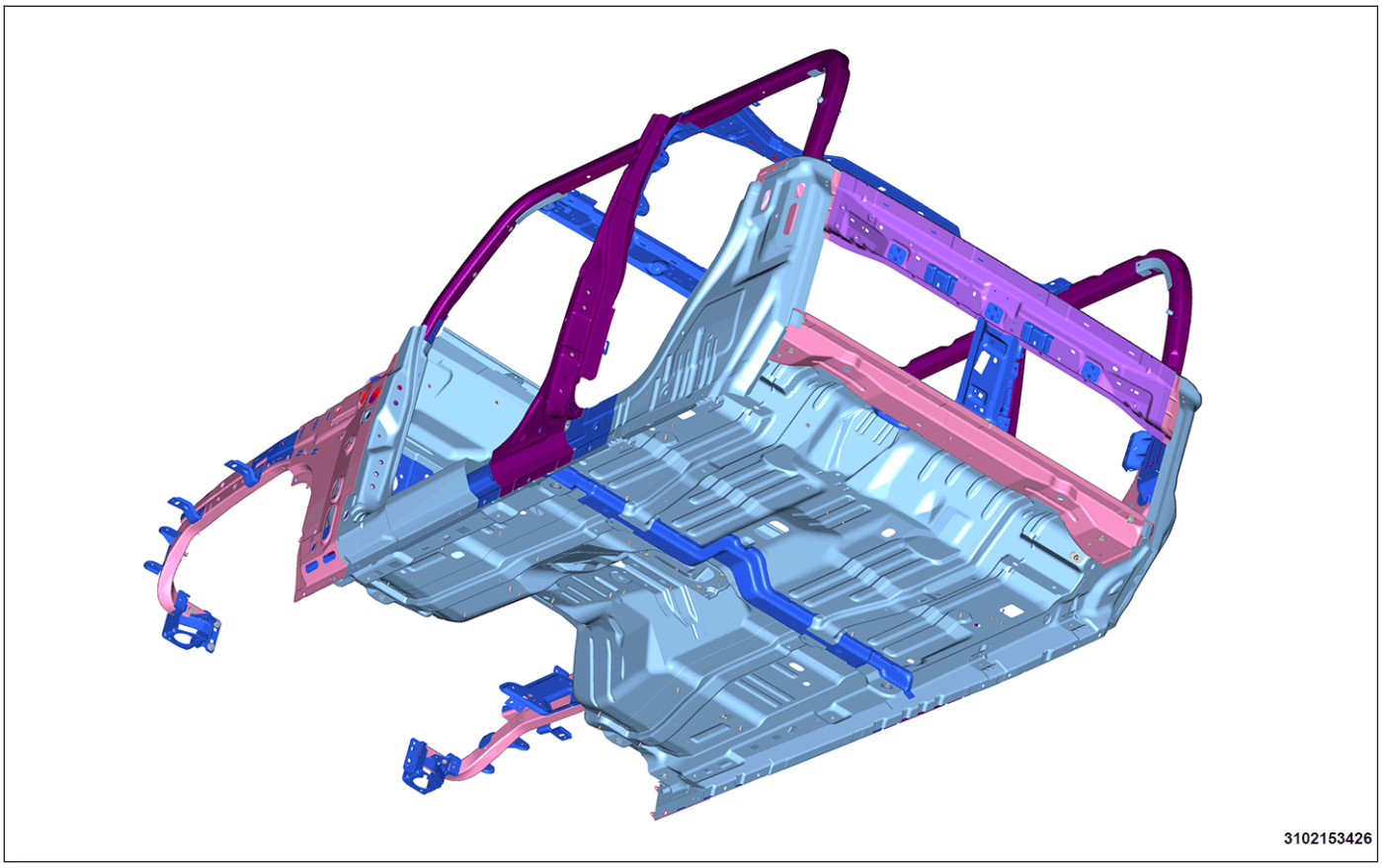
Body In White (Top view front)



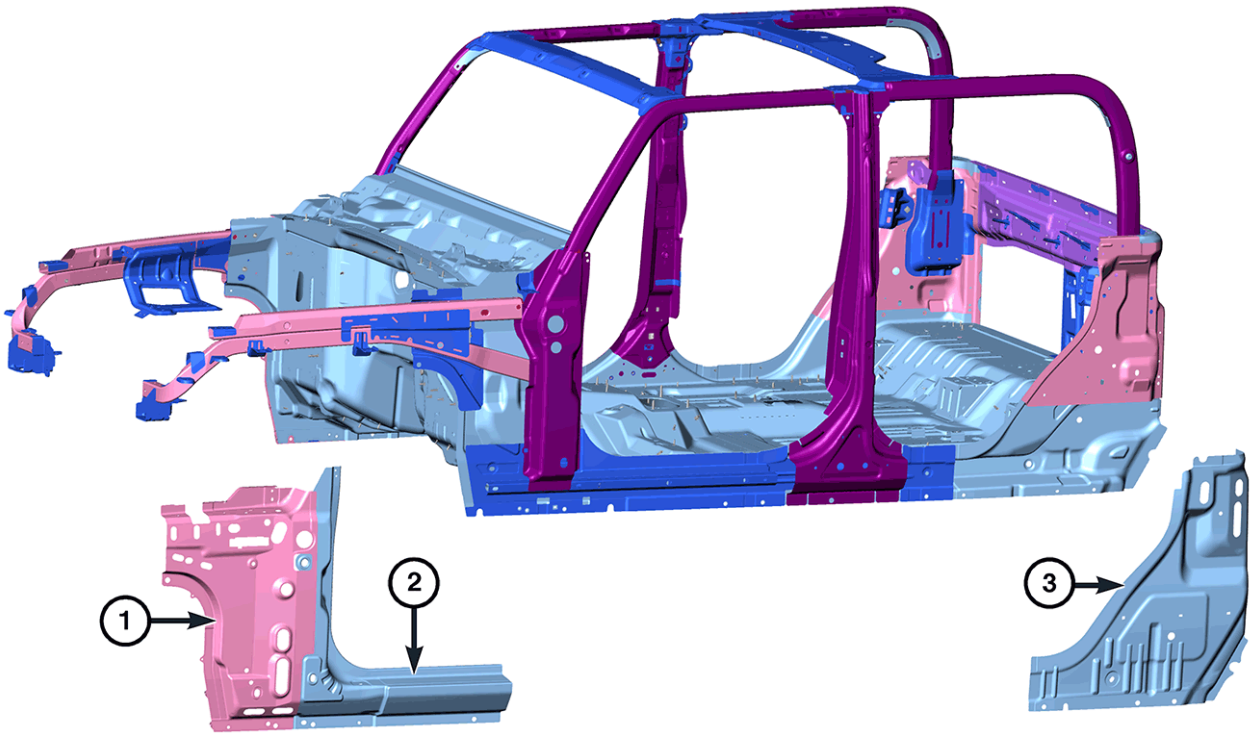
Body In White (Top view rear)



Body In White (Bottom view front)



Body In White (Bottom view rear)



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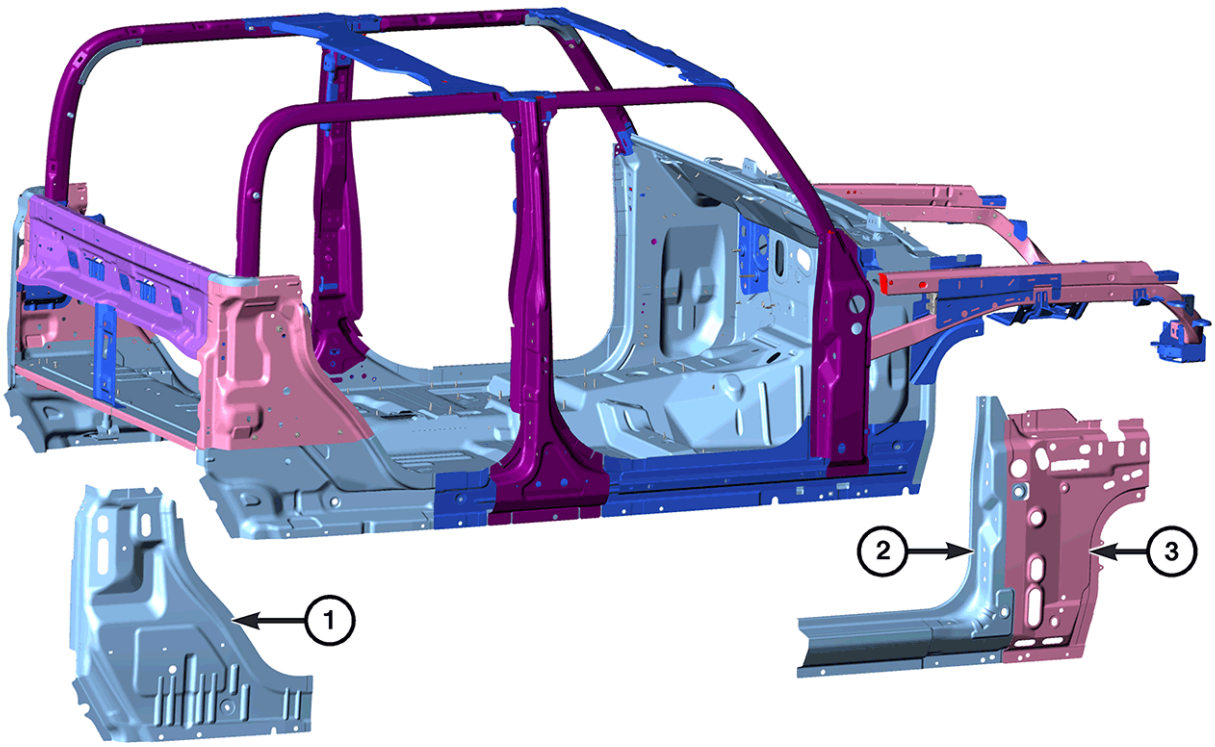
Body In White (Left side view)

The following parts are removed for clarity of underlying components-
1- Cowl Side Panel
2- Body Side Aperture Front Panel
3- C-pillar Reinforcement



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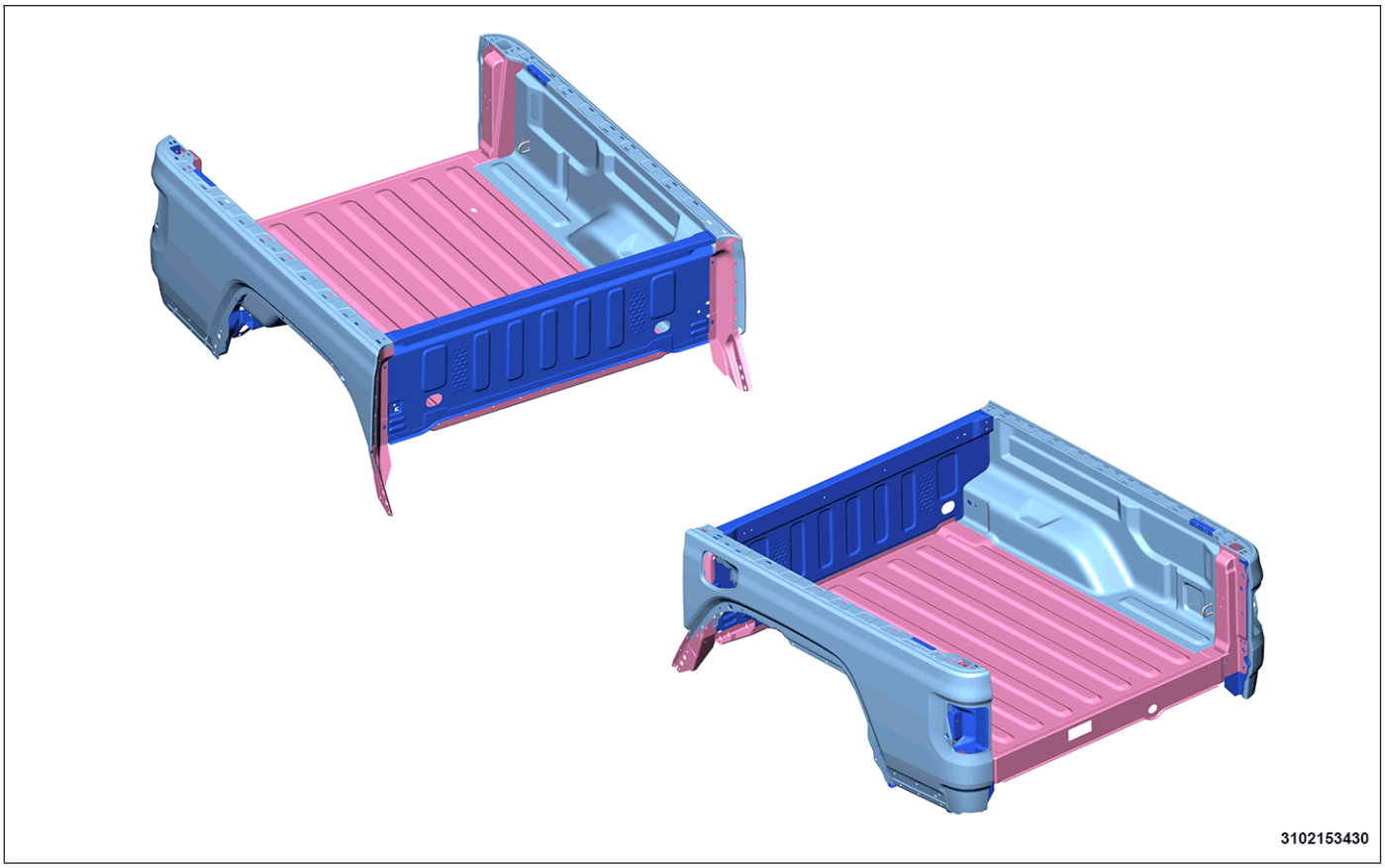
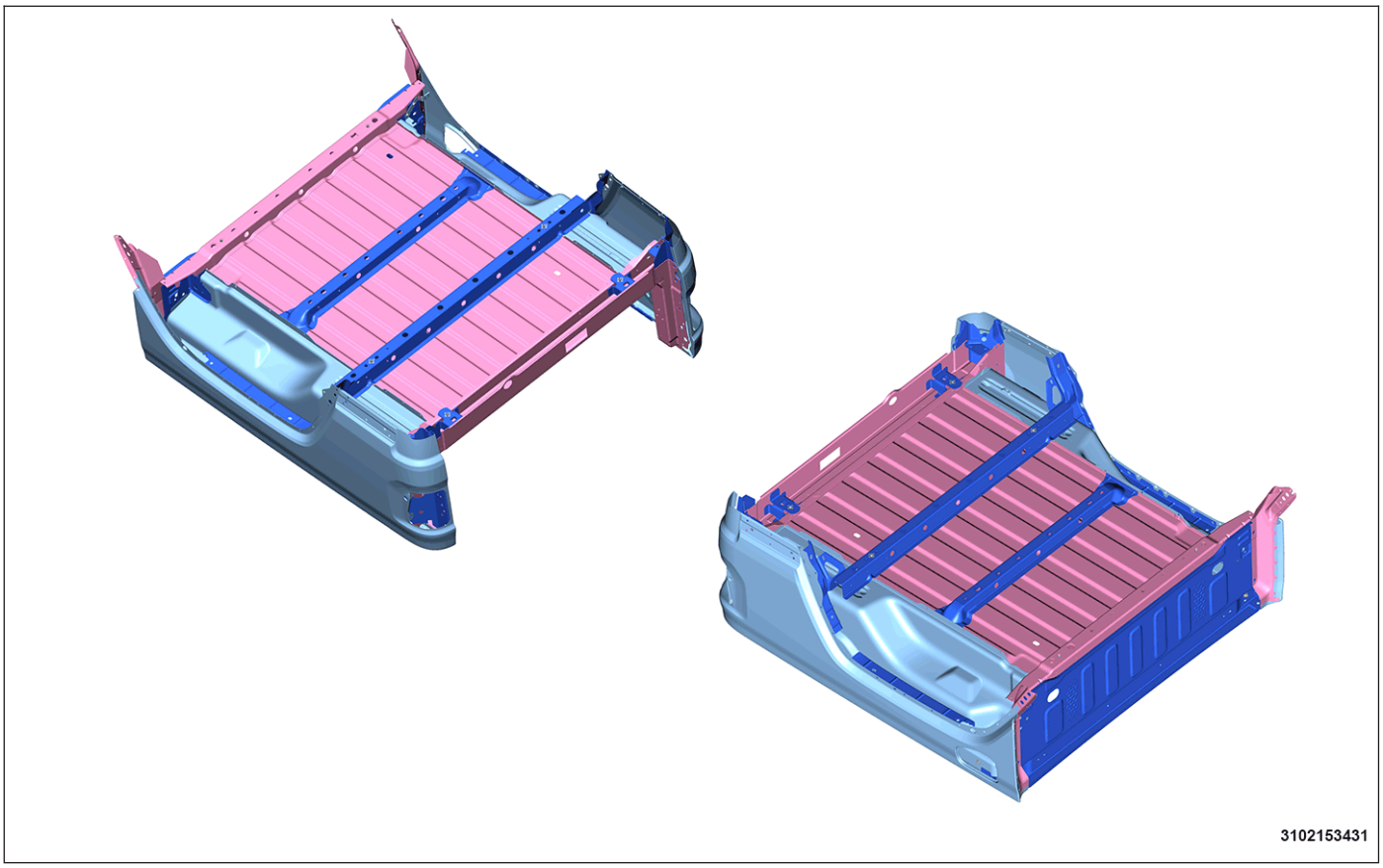
Body In White (Right side view)

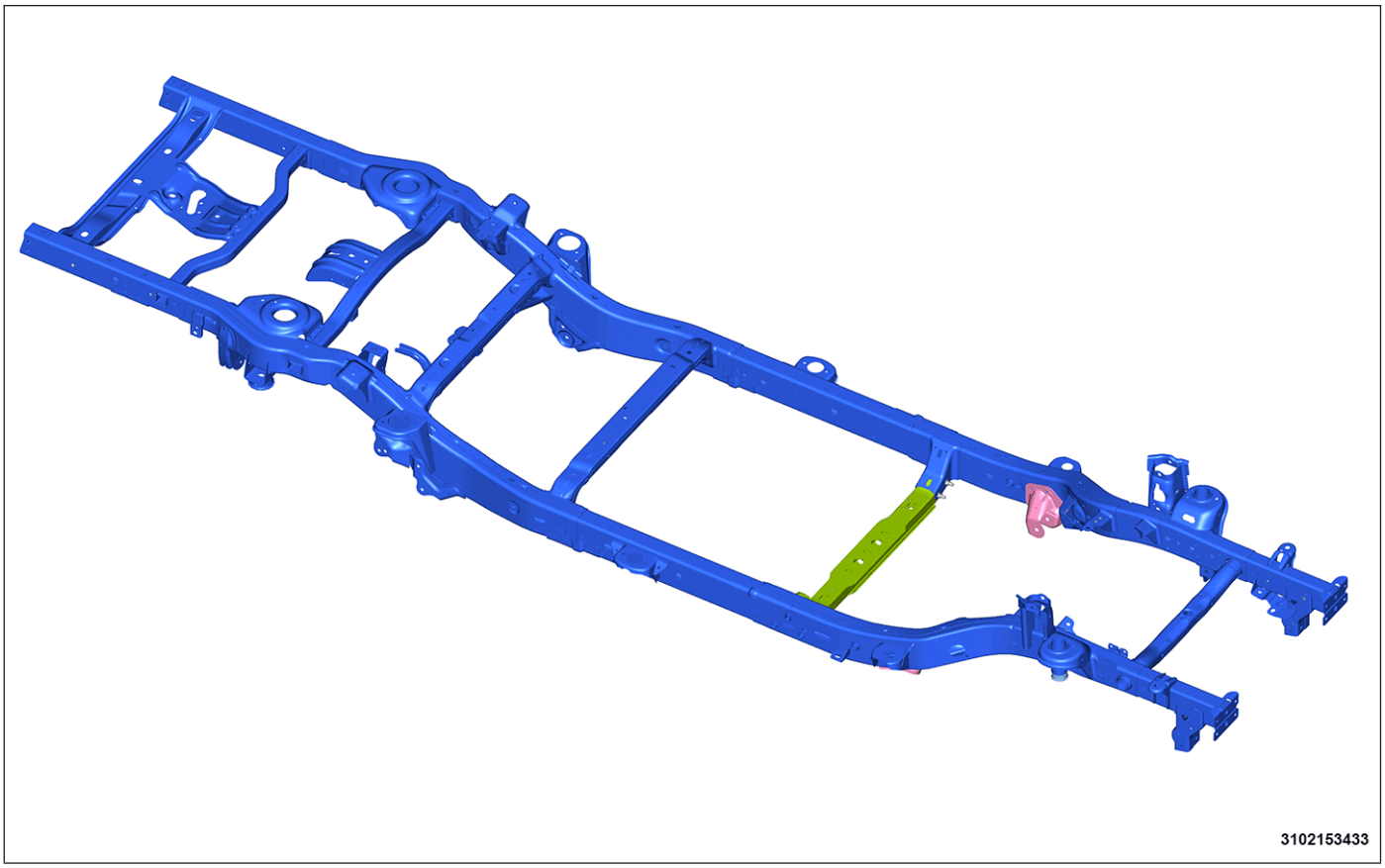
The following parts are removed for clarity of underlying components-
1- C-pillar Reinforcement
2- Body Side Aperture Front Panel
3- Cowl Side Panel



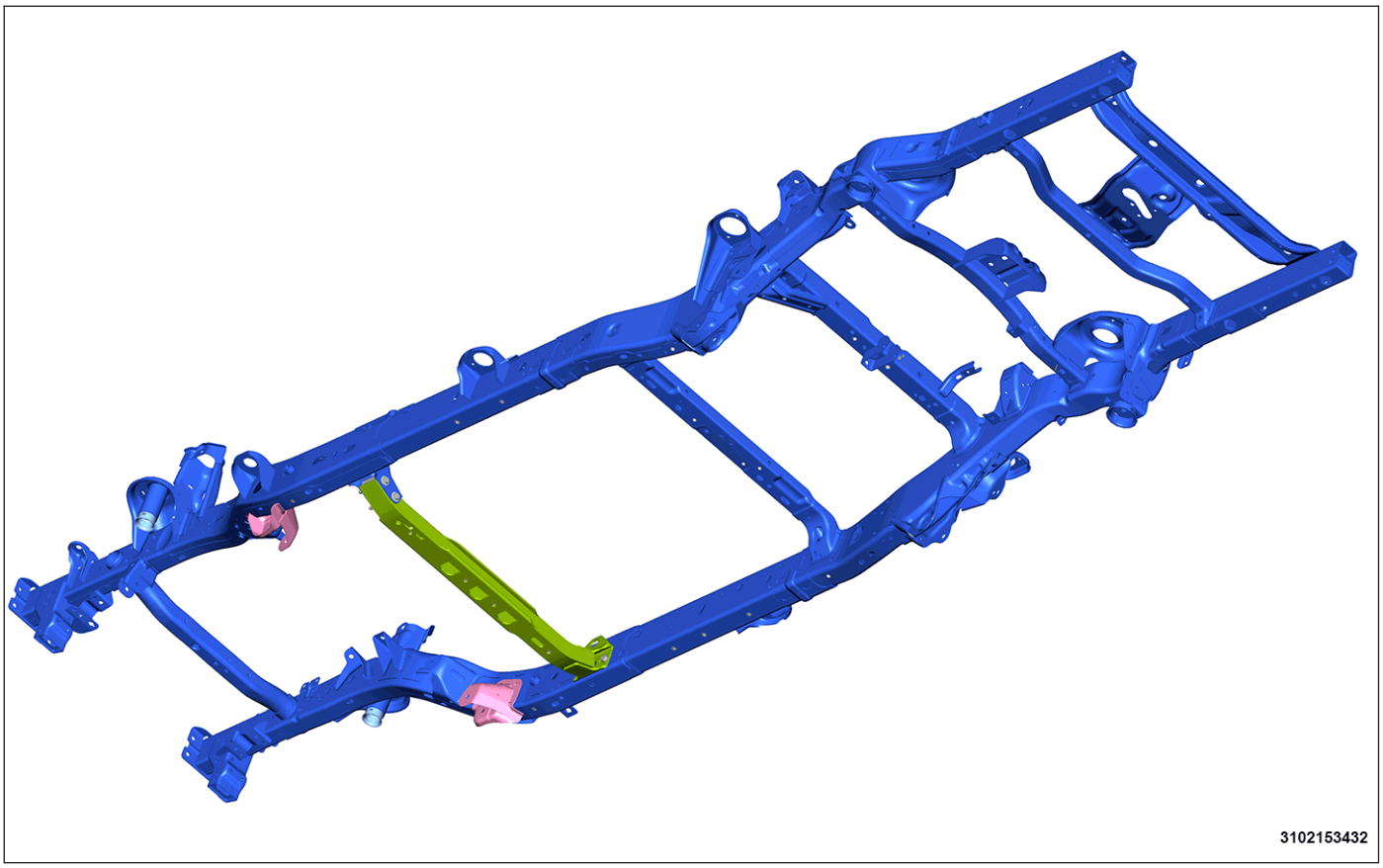
Pickup Box (Top views)



Pickup Box (Bottom views)



Frame (Top view front)



Frame (Bottom view rear)

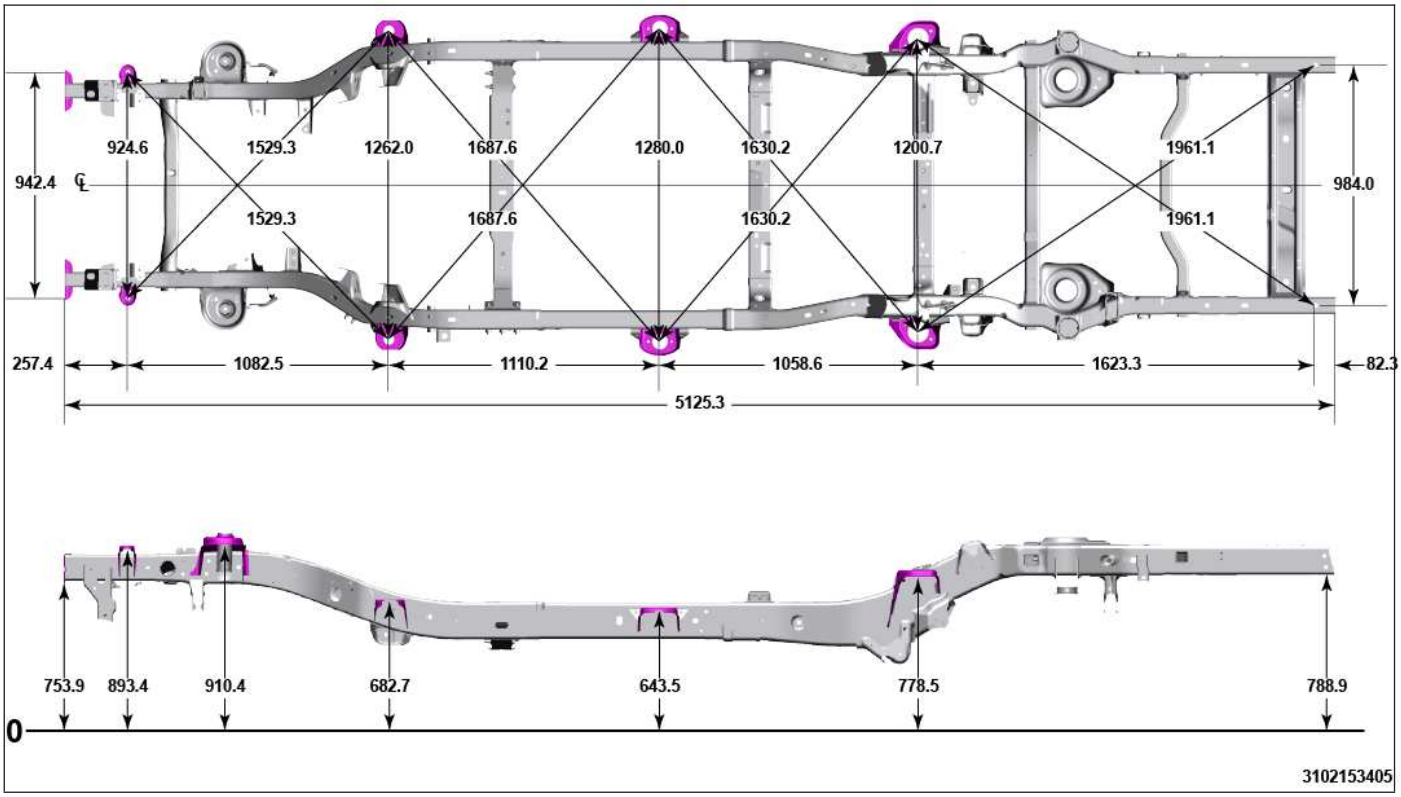
FRAME DIMENSIONS

NOTE: Frame dimensions are listed in metric scale millimeter (mm). All dimensions are from center to center of Principal Locating Point (PLP), or from center to center of PLP and fastener location.

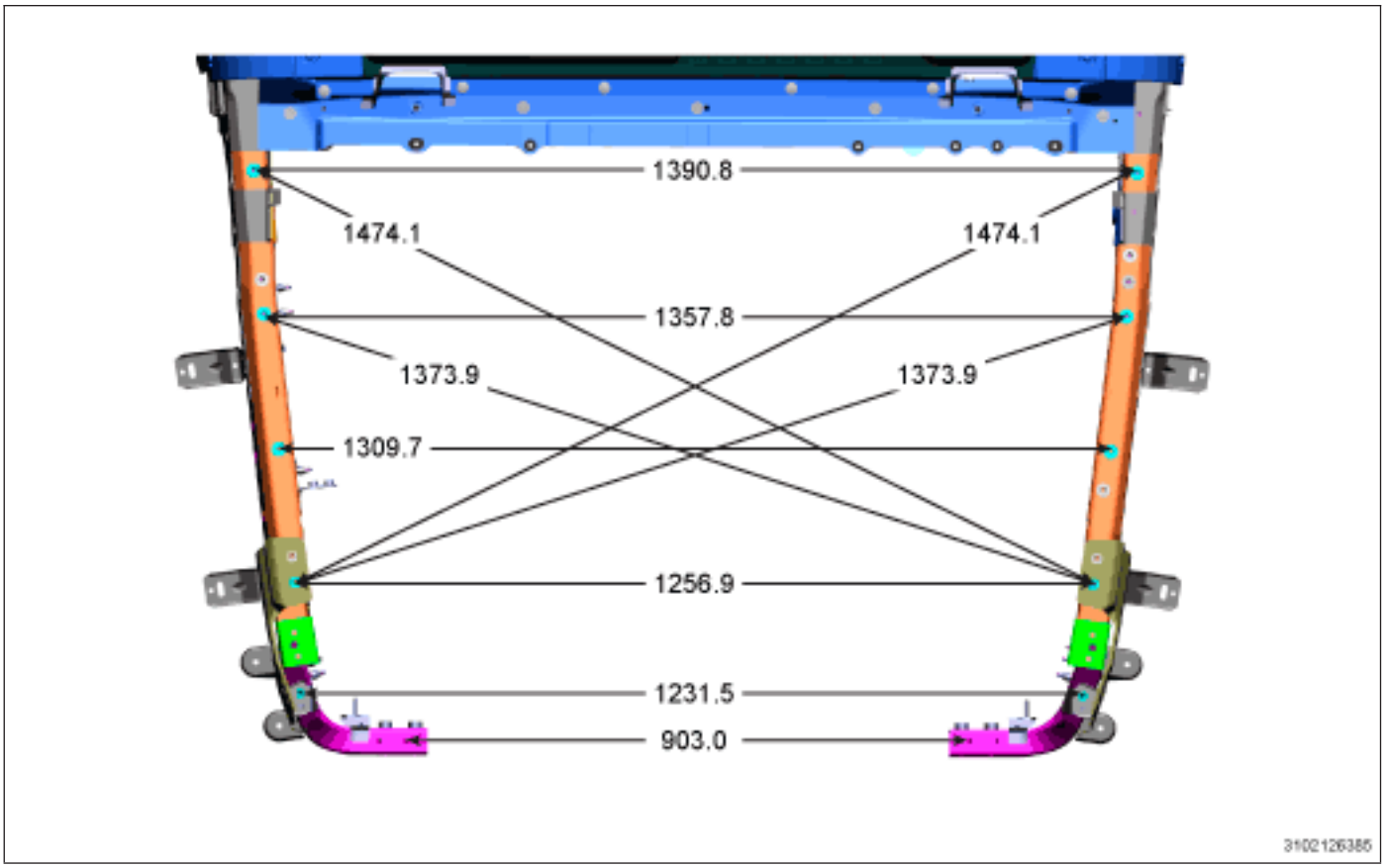
VEHICLE PREPARATION-

Position the vehicle on a level work surface. Using screw or bottle jacks, adjust the vehicle PLP heights to the specified dimension above a level work surface. Vertical dimensions can be taken from the work surface to the locations indicated were applicable.

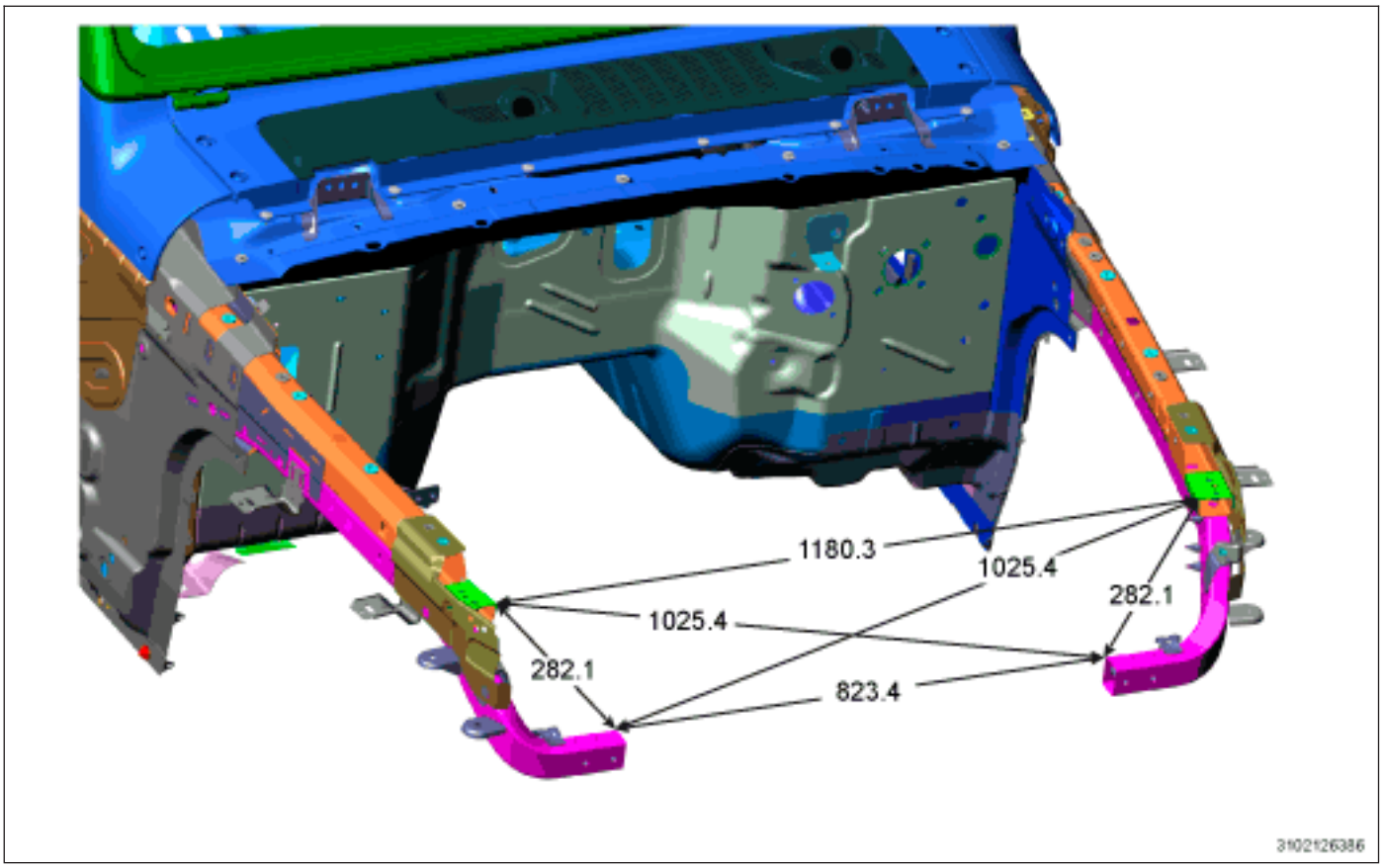
INDEX



Frame Dimensions



Under Hood Dimensions (1 of 2)



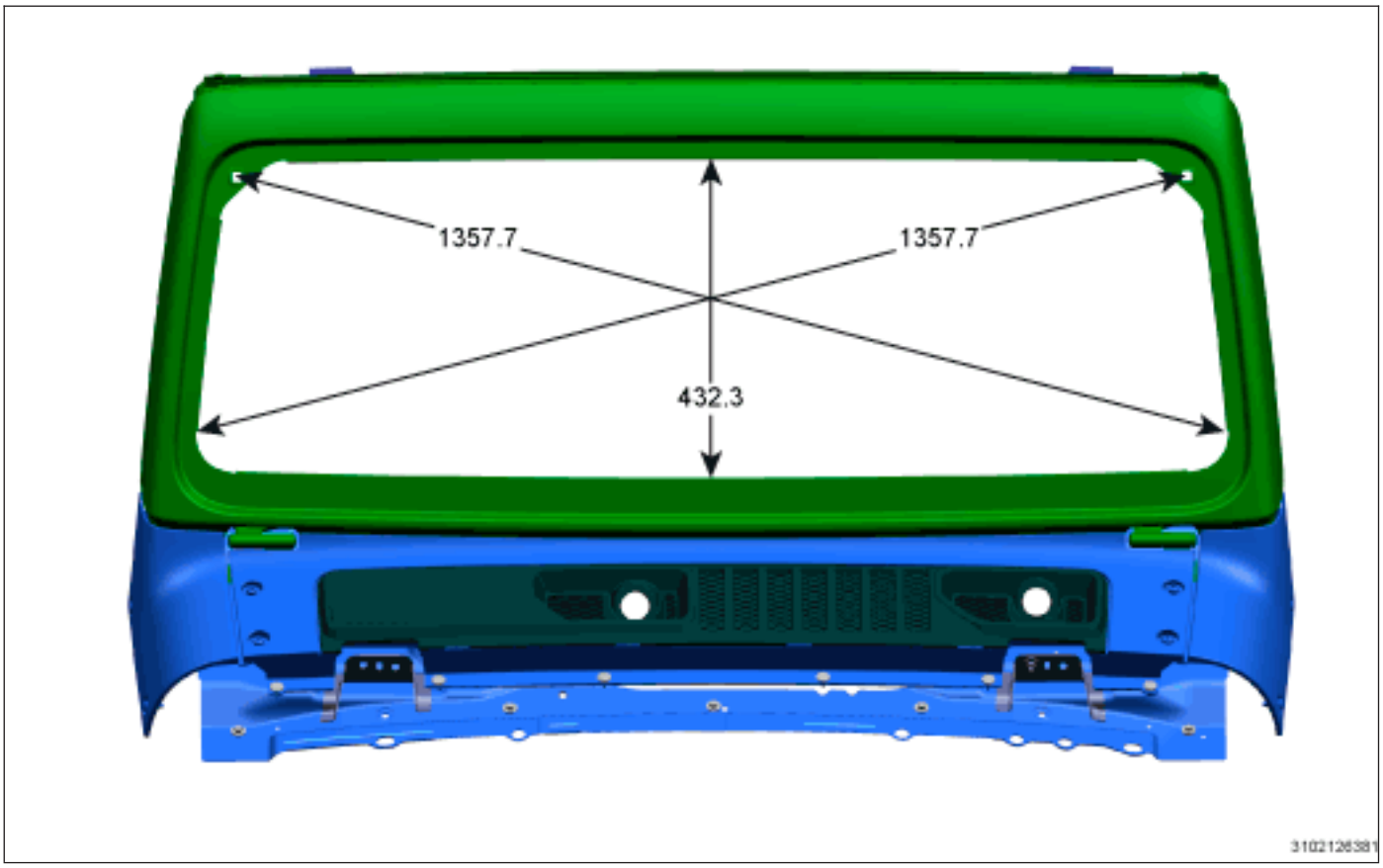
Under Hood Dimensions (2 of 2)

BODY OPENING DIMENSIONS

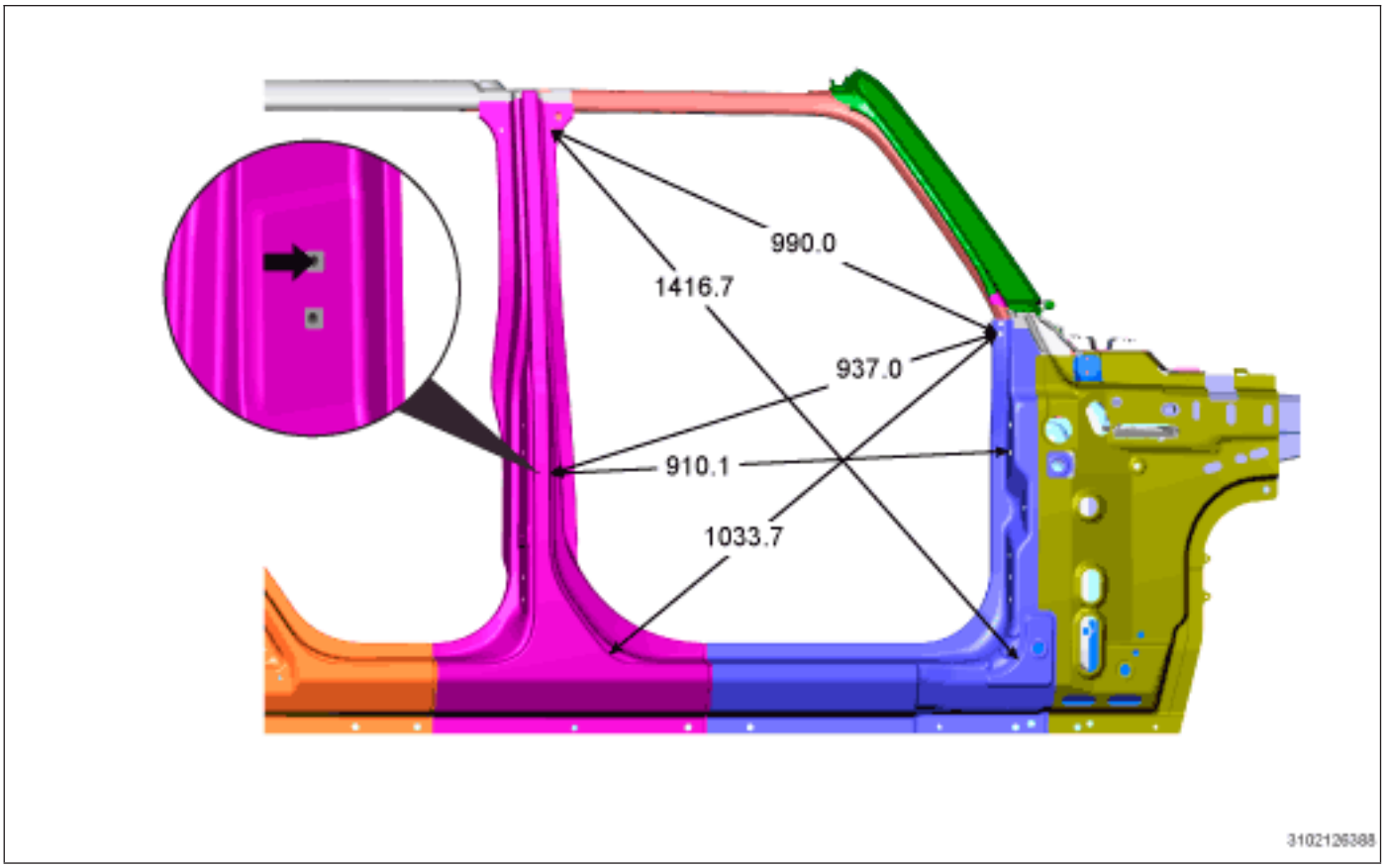
NOTE: Body opening dimensions are listed in metric scale millimeter (mm). Principal Locating Points (PLP), fastener locations, and holes are measured to center, unless noted otherwise.

Position the vehicle on a level work surface. Remove any weatherstrips, door strikers or any other parts that may interfere with the reference point.

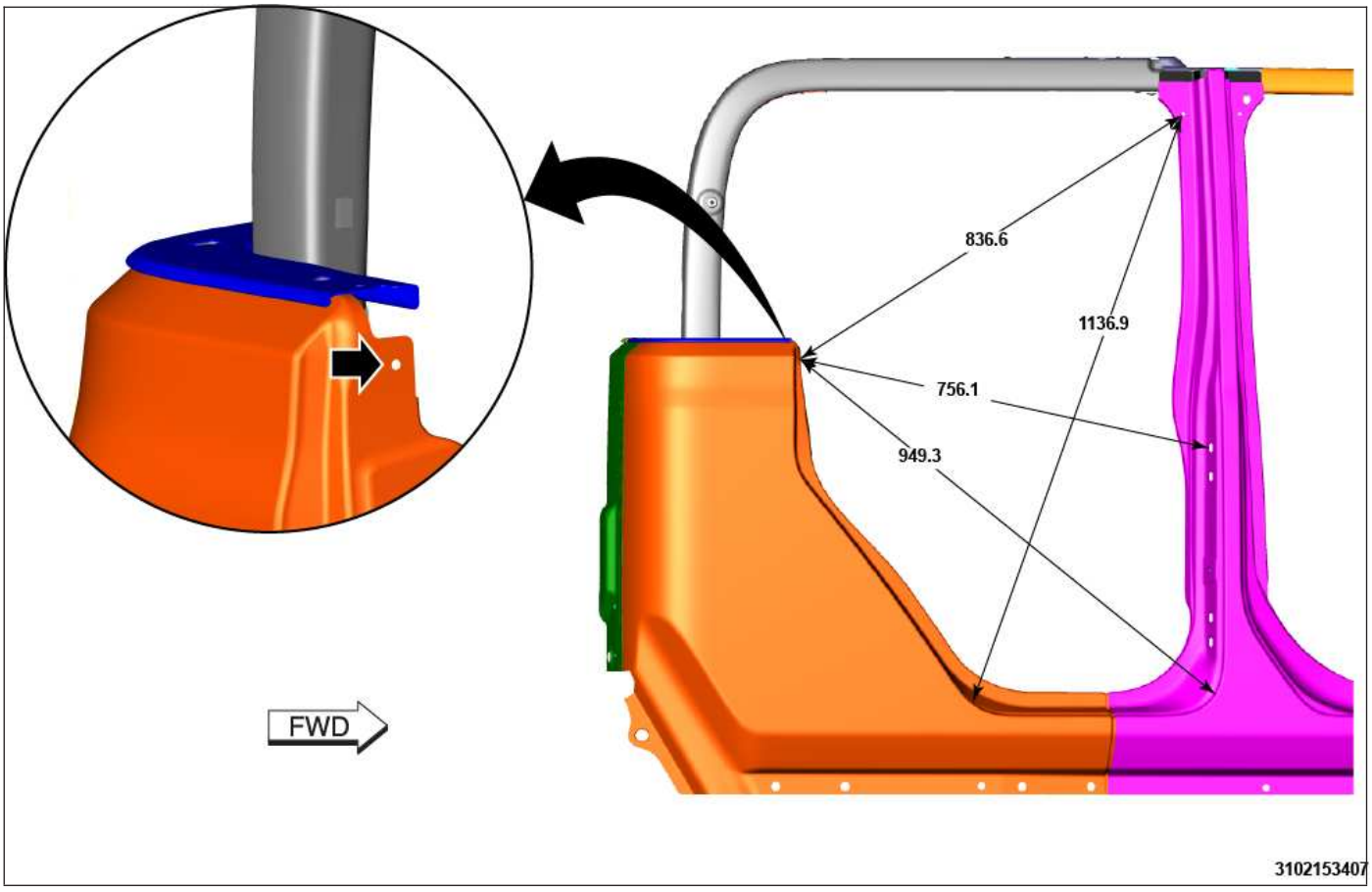
DESCRIPTION	FIGURE
Windshield Opening	Figure 1
Front Door Opening	Figure 2
Rear Door Opening	Figure 3
Upperbody /Sport Bar	Figure 4
Pickup Box	Figure 5
Tailgate Opening	Figure 6



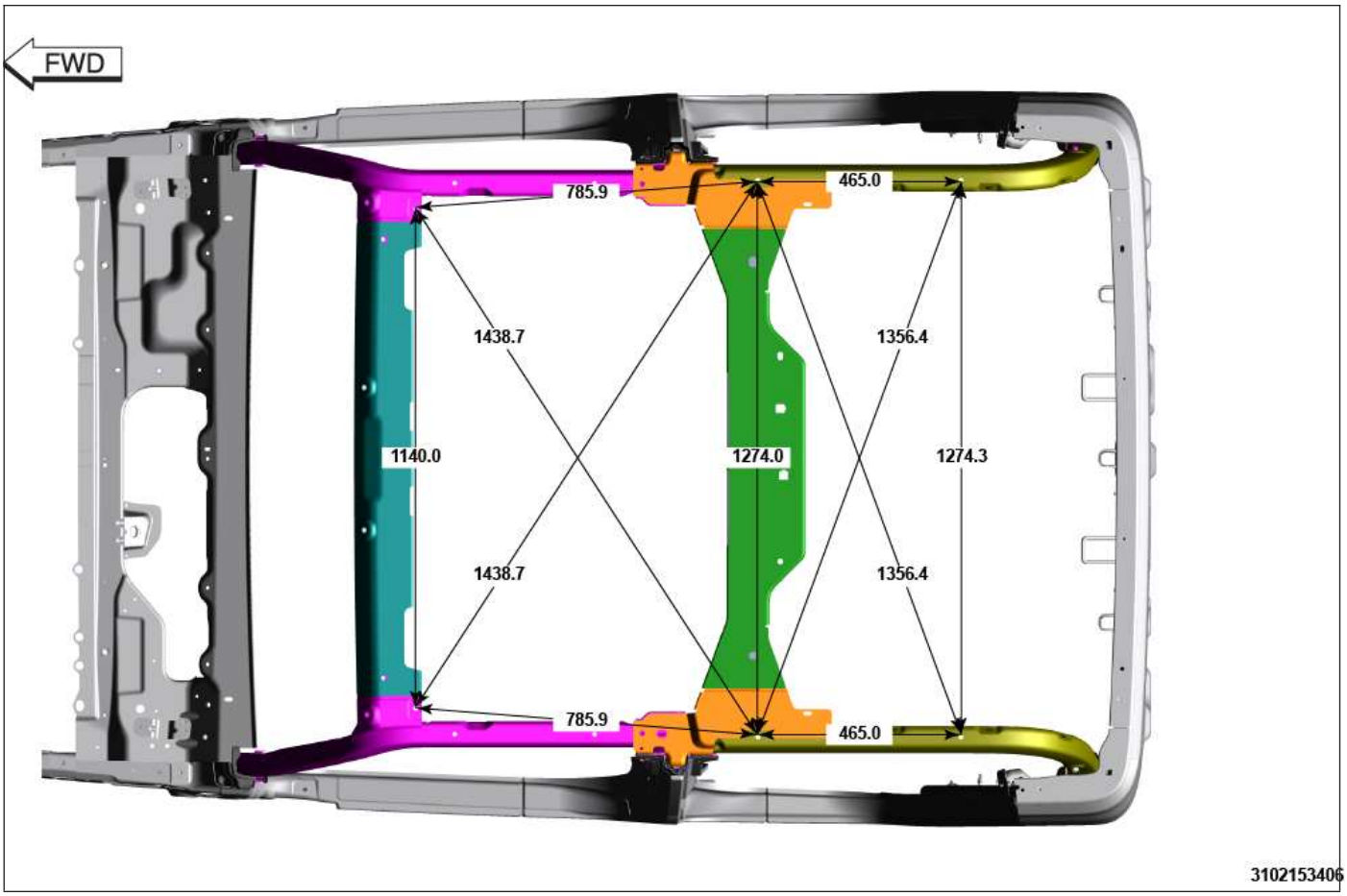
Windshield Opening



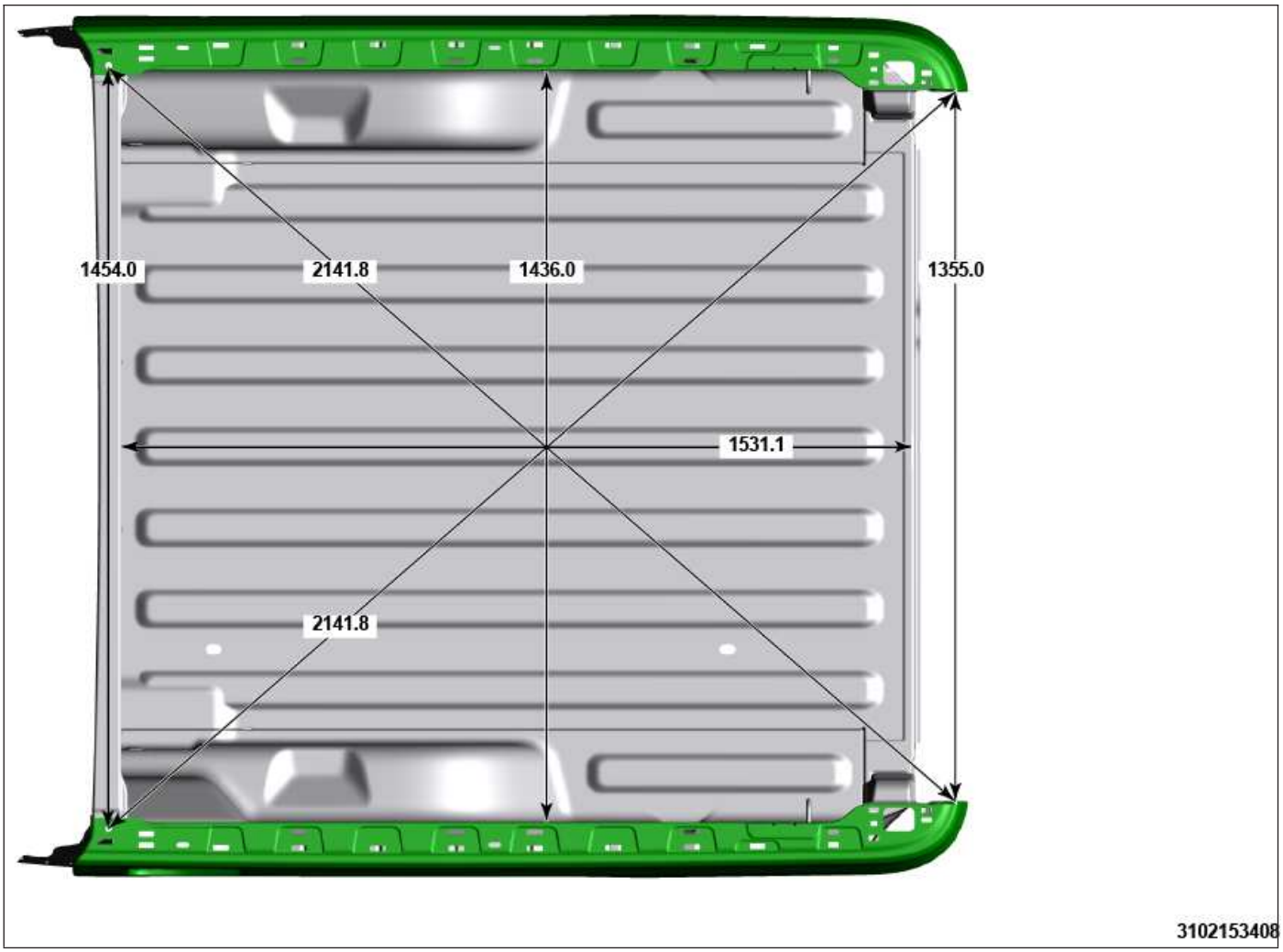
Front Door Opening



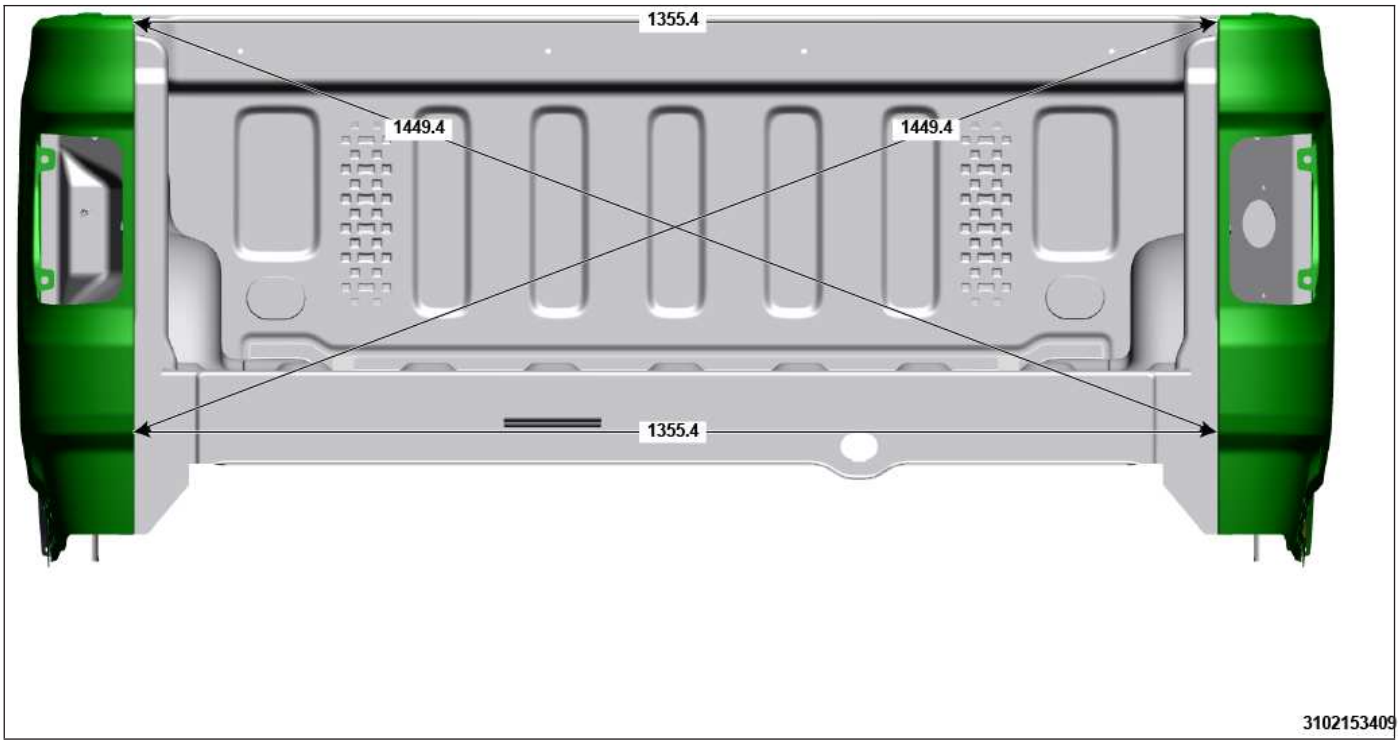
Rear Door Opening



Upperbody/Sport Bar

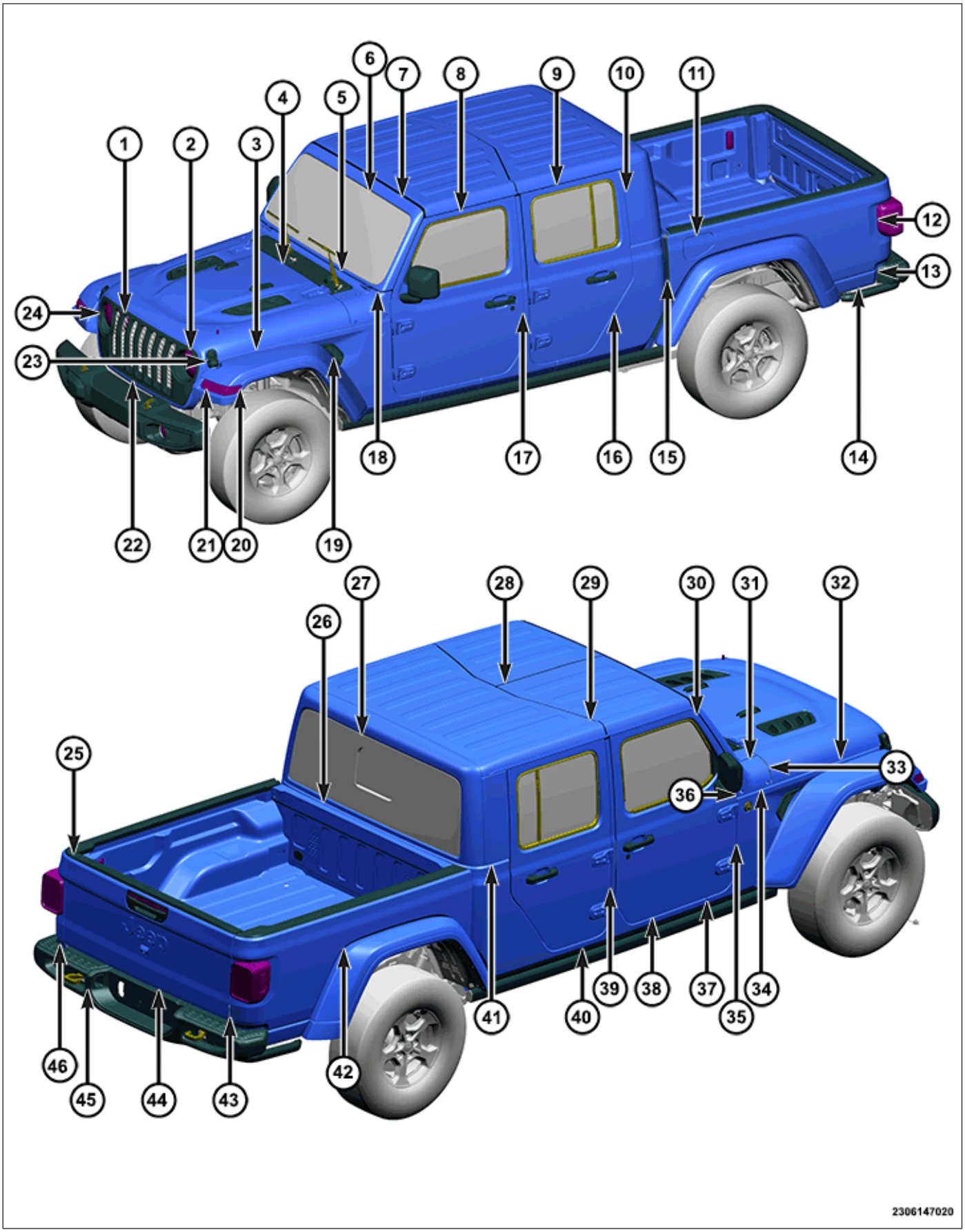


Pickup Box



Tailgate Opening

GAP AND FLUSH DIMENSIONS



NOTE: All dimensions are in millimeters.

- **O/F = Over Flush**
- **U/F = Under Flush**
- **U/D = Up/Down**
- **F/A = Fore/Aft**

DIMENSION	DESCRIPTION	GAP	FLUSH
1 (Base)	Hood to Grill	7.0 at top +/- 1.7 Transition to 5.6 at side +/- 1.7 Parallel within 1.7	Grill U/F 0.2 at center +/- 1.5 Transition to 0.4 at outboard +/- 1.5 Consistent within 1.5
1 (Rubicon)	Hood to Grill	6.5 at top +/- 1.7 Transition to 5.1 at side +/- 1.7 Parallel within 1.7	Grill U/F 0.2 at center +/- 1.5 Transition to 0.4 at outboard +/- 1.5 Consistent within 1.5
1 (BUX)	Hood to Grill	7.0 at top +/- 1.7 Transition to 6.0 at side +/- 1.7 Parallel within 1.7	Grill U/F 0.2 at center +/- 1.5 Transition to 0.4 at outboard +/- 1.5 Consistent within 1.5
2	Headlamp to Headlamp Bezel Headlamp to Grille (Sport)	3.9 +/- 1.6 Parallel within 1.6	—
3	Hood to Fender	7.0 +2.5 / - 1.5 Parallel within 1.5	Hood U/F 0.2 at front +2.5 /- 1.5 Transition to 0.1 at rear +2.5 /- 1.5 Side to side within 1.5
4 (Sahara and Sport)	Cowl Grill to Hood	5.0 +/- 1.5 Parallel within 1.5	Cowl U/F at inboard 0.7 +/- 1.6 Transition to O/F 0.1 at outboard +/- 1.6 Consistent within 1.6
4 (Rubicon)	Cowl Grill to Hood	5.0 +/- 1.5 Parallel within 1.5	Cowl O/F 0.5 at inboard +/- 1.6 Transition to 0.0 outboard +/- 1.6 Consistent within 1.6
4 (BUX)	Cowl Grill to Hood	5.0 +/- 1.5 Parallel within 1.5	0.0 +/- 1.6 Consistent within 1.6
5	Cowl Surround to Windshield Frame	5.1 +/- 1.5 Parallel within 1.5	Cowl U/F 1.0 +/- 1.5 Parallel within 1.5
6	Windshield to Windshield Frame	4.8 at top +/- 1.0 4.9 at sides +/- 1.0 5.1 at top corner +/- 1.0 5.3 at bottom corner +/- 1.0 Parallel within 1.0	Frame O/F 3.8 at top +/- 1.7 Transition to 4.2 at upper corner to 2.1 at upper side to 4.8 at lower corner to 4.8 at bottom +/- 1.7 Consistent within 1.7

DIMENSION	DESCRIPTION	GAP	FLUSH
7	Hard Top Front Panel to Windshield Frame	12.2 at center +/- 1.5 Transition to 12.5 at outboard corner to 12.0 at outboard +/- 1.5 Parallel within 1.5	Panel U/F at center 2.0 +/- 1.5 Transition to 3.4 at outboard corner to 1.6 at outboard +/- 1.5 Consistent within 1.5
8	Hard Top Front Panel to Front Door	4.7 +/- 1.5 Parallel within 1.5	Panel O/F 15.7 at front +/- 1.5 Transition to 15.4 at rear Consistent within 1.5
9	Hard Top to Rear Door	4.7 +/- 1.5 Parallel within 1.5	Door U/F 15.9 +/- 1.5 Transition to 15.5 at rear Consistent within 1.5
9	Soft Top to Rear Door	4.7 +/- 1.5 Parallel within 1.5	Door U/F 13.6 +/- 1.5 Transition to 13.2 at rear Consistent within 1.5
10	Hard Top to Rear Door at Side	4.5 +/- 1.5 Parallel within 1.5	0.0 +/- 1.5 Consistent within 1.5
10	Soft Top to Rear Door at Side	4.5 +/- 1.5 Parallel within 1.5	0.0 +/- 1.5 Consistent within 1.5
11	Fuel Door to Box Side Panel	2.5 +/- 0.9	Fuel Door 0.9 +/- 0.9 Consistent within 0.9
12	Taillamp to Box Side Panel	1.0 +/- 1.0 Parallel within 1.0	—
13 (Sport)	Rear Bumper to Box Side Cladding	14.8 at top +/- 2.6 Transition to 16.3 at bottom +/- 2.6 Parallel within 2.6	—
13 (Rubicon)	Rear Bumper to Box Side Cladding	13.7 +/- 2.6 Parallel within 2.6	—
14 (Rubicon)	Guard Rail to Box Side Cladding	24.1 +/- 2.4 At End Cap 14.7 +/- 2.4 Parallel within 2.4	—
15	Body Side Aperture to Box Side	34.8 +/- 4.0 at top Transition to 28.0 +/- 4.0 at bottom Parallel within 3.0	Body Side Aperture O/F 14.9 at top +/- 4.0 Transition to 14.0 to 18.8 at bottom +/- 4.0 Consistent within 3.0
15	Box Seal to Body Side Aperture	11.5 +/- 4.0 Transition to 6.4 to 7.0 at Floor	—
16	Rear Door to Body Side Aperture (Applies to Full and Half Doors)	4.5 +/- 1.0 Parallel within 1.0	Door U/F 0.4 at front +/- 1.0 Transition to 0.0 at top +/- 1.0 Consistent within 1.0
17	Front Door to B-Pillar (Applies to Full and Half Doors)	4.5 +/- 1.0 Parallel within 1.0	Door U/F 0.2 at bottom front +/- 1.0 Transition to 0.0 at rear +/- 1.0 Consistent within 1.0

DIMENSION	DESCRIPTION	GAP	FLUSH
18	Cowl End Cap to Windshield Frame	4.7 at inboard +/- 1.5 Transition to 6.5 to 4.7 at rear +/- 1.5 Parallel within 1.5	End Cap U/F 1.0 at front +/- 1.5 Transition to 1.7 to 0.1 at rear +/- 1.0 Consistent within 1.5
19	Fender Vent Bezel to Wheel Flare	1.4 at top +0.9 /- 0.8 Transition to 3.0 at bottom +0.9 /- 0.8 Parallel within 0.9	—
20 (Sport 32” Flare)	Side Marker Lamp to Fender Flare	1.0 +/- 1.0 Parallel within 1.0	Lamp U/F 5.4 at upper front +/- 1.0 Transition to 4.2 at upper rear +/- 1.0 Consistent within 1.0
20 (BUX 32” Flare)	Side Marker Lamp to Fender Flare	1.3 at upper +/- 1.0 Transition to 1.0 at rear to 1.2 at lower front +/- 1.0 Parallel within 1.0	Lamp U/F 5.4 at upper front +/- 1.0 Transition to 4.2 at upper rear +/- 1.0 Consistent within 1.0
20 (35” Flare)	Side Marker Lamp to Fender Flare	1.0 +/- 1.0 Parallel within 1.0 Transition to 1.4 upper rear	Lamp U/F 3.9 at upper front +/- 1.0 Transition to 5.0 at upper rear +/- 1.0 Consistent within 1.0
21 (32” Flare)	Daytime Running Lamp to Fender Flare	1.0 +/- 1.0 Parallel within 1.0	Lamp U/F 5.0 at inboard upper +/- 1.0 Transition to 5.2 at outboard upper +/- 1.0 12.0 at inboard lower Transition to 5.0 at inboard upper +/- 1.0 Consistent within 1.0
21 (35” Flare)	Daytime Running Lamp to Fender Flare	1.0 +/- 1.0 at upper Transition to 1.2 inboard Parallel within 1.0	Lamp U/F 5.3 at inboard upper +/- 1.0 Transition to 3.9 at outboard upper +/- 1.0 15.2 at inboard lower Transition to 5.8 at inboard upper +/- 1.0 Consistent within 1.0
22	Center Chin Strap to Front Bumper Closeout	22.9 +/- 3.0 Transition to 22.7 outboard Parallel within 3.0	—
23	Outer Chin Strap to Hood	7.0 +/- 1.8 Transition to 7.4 +/- 1.4 at rear Parallel within 1.8 Side to side within 1.8	Chin Strap U/F 0.2 at front +/- 1.7 Transition to 0.4 +/- 1.7 at side Consistent within 1.7
24	Fender to Outer Chin Strap	12.4 at top +/- 1.7 Transition to 13.7 to 12.2 at bottom Parallel within 1.7	Fender O/F 0.5 +/- 1.5

DIMENSION	DESCRIPTION	GAP	FLUSH
25 (Base)	Box Side Cap to Tailgate Deflector	8.8 +/- 2.2 Parallel within 2.2	Box Side Cap U/F 0.3 +/- 2.2 at rear Transition to 0.0 +/- 2.2 at front Consistent within 2.2 side to side
25 (Tonneau)	Box Side Cap to Tailgate Deflector	7.8 +/- 2.2 Parallel within 2.2	Box Side Cap U/F 0.3 +/- 2.2 at rear Transition to 0.0 +/- 2.2 at front Consistent within 2.2 side to side
26	Hard Top to Cab Back Panel	7.3 +/- 2.2 Parallel within 1.5	0.0 +/- 2.2 Consistent within 1.5
27	Hard Top to Backlite Glass	4.0 +/- 1.5 at inside of Glass Parallel within 1.5	—
28	Hard Top Left Panel to Hard Top Right Side Panel	8.0 +/- 1.8 Parallel within 1.8	0.0 +/- 2.0 Consistent within 2.0
29	Hard Top Front Panels to Hard Top	8.0 +/- 1.8 Parallel within 1.8	0.0 +/- 2.0 Consistent within 2.0
30	Windshield Frame to Door	4.5 +/- 1.5 Parallel within 1.5	Windshield Frame O/F 1.0 +/- 1.2 Consistent within 1.2
31	Cowl End Cap to Cowl Surround Panel	5.2 +/- 1.8 Parallel within 1.8	Cowl End Cap U/F 0.2 +/- 1.0
32	Wheel Flare to Front Fender	0.0 + 1.0	—
33	Cowl End Cap to Hood	5.0 +/- 1.5 Parallel within 1.5	0.0 + 2.5 /- 1.5 Consistent within 1.5
33 (BUX)	Cowl End Cap to Hood	5.0 +/- 1.5 Parallel within 1.5	Varies + 2.5 /- 1.5 Consistent within 1.5
34	Cowl End Cap to Fender	5.0 +/- 1.5 Parallel within 1.5	0.0 +/- 1.5 Consistent within 1.5
35	Fender to Front Door (Applies to Full and Half Doors)	4.5 +/- 1.1 Parallel within 1.1	Fender O/F 0.5 +/- 1.1 Consistent within 1.1
36	Cowl End Cap to Front Door	4.5 +/- 1.5 Parallel within 1.5	End Cap O/F 1.0 +/- 1.5 Transition to 0.5 +/- 1.5 at bottom Consistent within 1.5
37	Fender to Front Sill	5.0 +/- 1.0 Parallel within 1.0	0.0 +/- 1.0 Consistent within 1.0
38	Front Sill to B-Pillar	4.0 +/- 1.0 Parallel within 1.0	0.0 +/- 1.0 Consistent within 1.0
39	Rear Door to B-Pillar	4.5 +/- 1.0 Parallel within 1.0	Door U/F 0.5 +/- 1.0 at front Transition to 0.4 +/- 1.0 at bottom Consistent within 1.0

DIMENSION	DESCRIPTION	GAP	FLUSH
40	B-Pillar to Body Side Aperture	4.0 +/- 1.0 Parallel within 1.0	0.0 +/- 1.0 Consistent within 1.0
41	Hard Top to Body Side	Side Panel 6.7 +/- 1.5 Rear Panel 7.3 +/- 1.5 at side Transition to 7.8 +/- 1.5 at rear Parallel within 1.5	Hard Top O/F 0.7 +/- 1.7 at rear Transition to 0.0 +/- 1.7 at side Consistent within 1.5
41	Soft Top to Body Side	1.0 +/- 1.5 at side Transition to 1.5 +/- 1.5 at rear Parallel within 1.5	Soft Top U/F 8.0 +/- 1.5 at front Transition to 6.5 +/- 1.5 across rear Consistent within 1.5
42	Rear wheel Flare to Body Side	23.6 +/- 4.0 at top Transition to 23.1 to 25.2 +/- 4.0 at bottom	—
43	Box Side to Tailgate	4.0 +/- 1.5	Box Side U/F 0.1 +/- 1.4 Consistent within 1.2 Side to Side 1.2
44 (Sport)	Rear Bumper to Tailgate	30.0 +/- 3.5 at inboard Parallel within 3.5	—
44 (Rubicon)	Rear Bumper to Tailgate	30.0 +/- 3.5 at inboard Parallel within 3.5	—
45	Tow Hook to Rear Bumper	43.5 +/- 3.7 Parallel within 4.1	—
46	Rear Bumper to Box	29.5 +/- 3.5 Parallel within 3.5	—

PAINT CODES

Exterior vehicle body color(s) are identified on the Vehicle Certification Label or the Body Code Plate.

The first digit of the paint code listed on the vehicle indicates the sequence of application, i.e.: P = primary coat, Q = secondary coat. The color names provided in the Paint and Trim Code Description chart are the same color names used on most repair product containers.

PAINT COLOR INFORMATION	INFORMATION LOCATION
2020 - Paint Color Chart	2020 PAINT CODES

2020 PAINT CODES

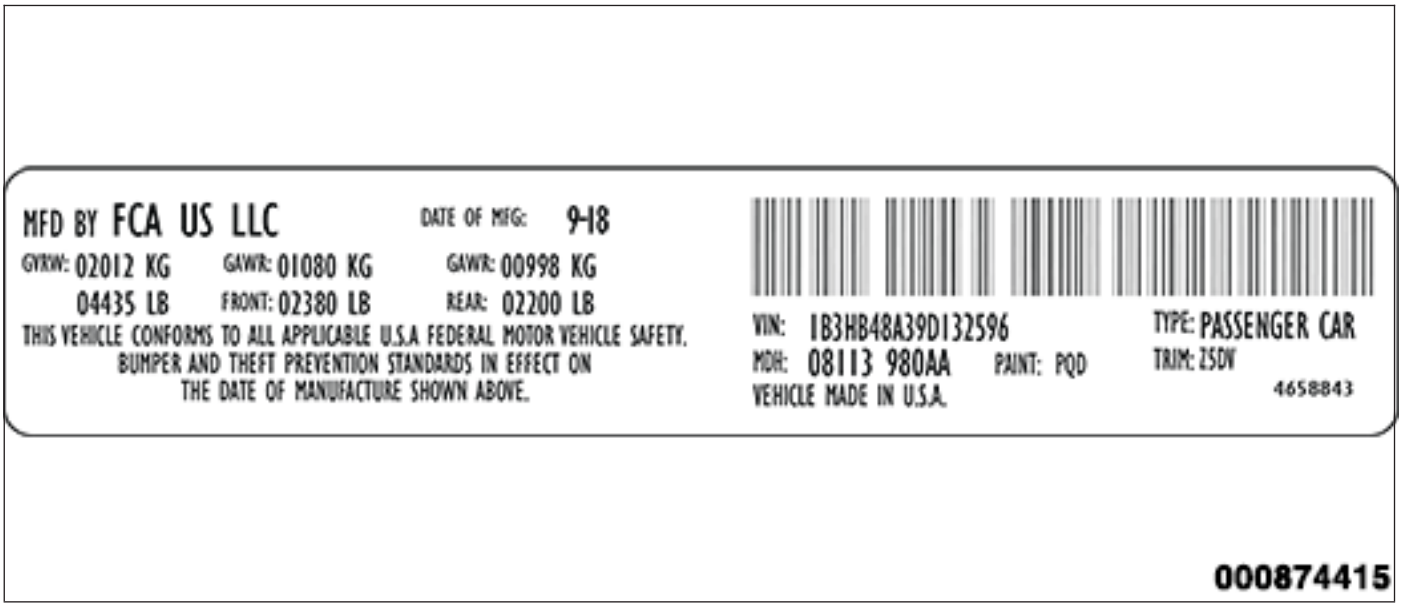
EXTERIOR COLORS

EXTERIOR COLOR	COLOR CODE
Black Clear Coat	DX8
Bright White Clear Coat	GW7
Billet Silver Metallic Clear Coat	JSC
Granite Crystal Metallic Clear Coat	LAU
Hydro / Laser Blue Pearl Coat	MBJ
Firecracker Red / Speed Red Metallic Clear Coat	MRC
Ceramic / Sting Gray	PDN
Gobi Clear Coat	RUA
Punk'n Clear Coat	SE4
Gator Clear Coat	VGV

INTERIOR COLORS

INTERIOR COLOR	OPTION CODE	COLOR CODE
Black	X9	DX9
Global Black / Seal Grey	TA	TX7 / SA5
Black / Dark Saddle	TV	DX9 / VT9
Sandstone	T5	XT5

VEHICLE CERTIFICATION LABEL



NOTE: **Typical example of label shown.**

A vehicle certification label is attached to every FCA US LLC vehicle. The label certifies that the vehicle conforms to all applicable Federal Motor Vehicle Standards. The label also lists:

- Month and year of vehicle manufacture.
- Gross Vehicle Weight Rating (GVWR). Gross Axle Weight Ratings (GAWR) The gross front and rear axle weight ratings are based on a minimum rim size and maximum cold tire inflation pressure.
- Vehicle Identification Number (VIN).
- Type of vehicle.
- Type of rear wheels.
- Bar code.
- Month, Day and Hour (MDH) of final assembly.
- Paint and Trim codes.
- Country of origin.

The label is located on the driver-side door shut-face.

Locations

SEALERS AND SOUND DEADENERS

Terminology

- **Work Time :** The length of time a sealer can continue to be applied or tooled effectively.
- **Set Time :** Time when there is no longer product transfer.
- **Handling Time :** The time when a part can be safely transported and sealer can no longer be tooled or repositioned.
- **Full Cure Time :** Time when a sealer has reached full strength.
- **Paintable Time :** Established time when refinish materials can safely be applied to a sealer.

Sealers

- **Brushable :** Single component sealer applied with a brush.
- **Flowable :** Sealer with low viscosity and self-leveling characteristics.
- **Pumpable :** A two component or one component sealer that seals interior and exterior joints and voids.
- **Resistance Weld-through :** Sealer / adhesive that can be used in conjunction with resistance spot welding.
- **Sealer Tape :** Preformed sealer. Can be welded through.
- **Sprayable :** Sealer applied with a pneumatic dispenser to duplicate original textured appearance.
- **Thumb Grade :** Heavy bodied sealer for sealing large gaps and filling voids. Should remain soft and pliable.

Sound Deadeners

- **Non-Structural Flexible Acoustical :** Flexible foam with sealing and sound deadening properties.
- **Non-Structural Ridged Acoustical :** Ridged foam with sealing and sound deadening properties.
- **Mastic Pads :** Sound deadener pad that is preformed to fit a specific area.
- **Structural Ridged Foam :** Joint reinforcement foam with sound deadening properties.

Identifying Sealers

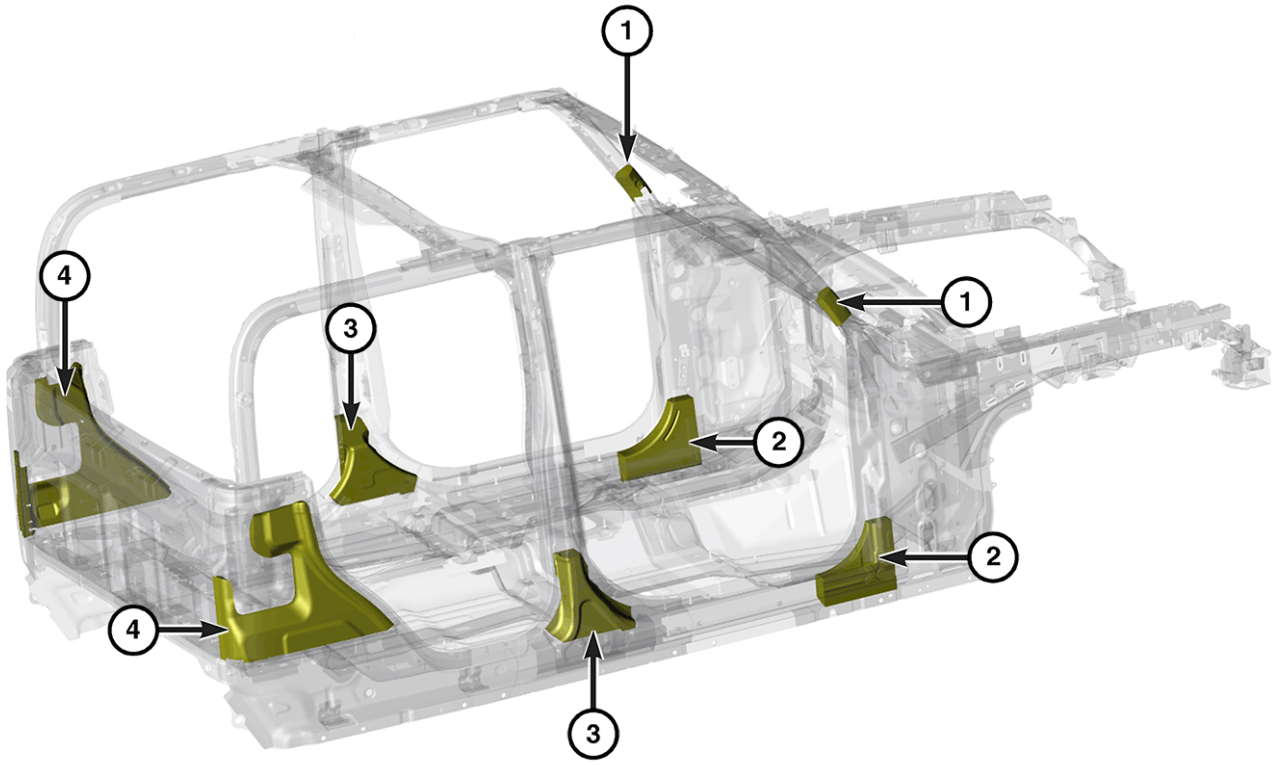
- Several types of sealers and sound deadeners are used during assembly. Therefore, specific applications may not be identified in this publication. General applications and the various types of products for repair will be featured to identify and replace OEM sealers and sound deadeners.

Helpful Sealer Tips

- Check shelf life or expiration date prior to beginning sealer applications.
- Be sure "work time" is appropriate for sealer application.
- Temperature, humidity and thickness of sealer will affect the work, set and paintable times.
- Test fit replacement panels prior to installation to be certain of a tight fit and proper seal.
- Equalize 2K Products according to adhesive manufacturer’s recommendations.
- Always follow manufacturer’s recommendations for storage, usage and application to achieve best performance of the product.

SOUND DEADENER LOCATIONS

DESCRIPTION	FIGURE
PUR Foam Locations	Figure 1
Hood	Figure 2
Dash Panel Outer	Figure 3
Dash Panel Inner (1 of 3)	Figure 4
Dash Panel Inner (2 of 3)	Figure 5
Dash Panel Inner (3 of 3)	Figure 6
Floor Tunnel Exterior	Figure 7
Floor Tunnel Interior	Figure 8
Doors	Figure 9
Floor Pan Interior	Figure 10



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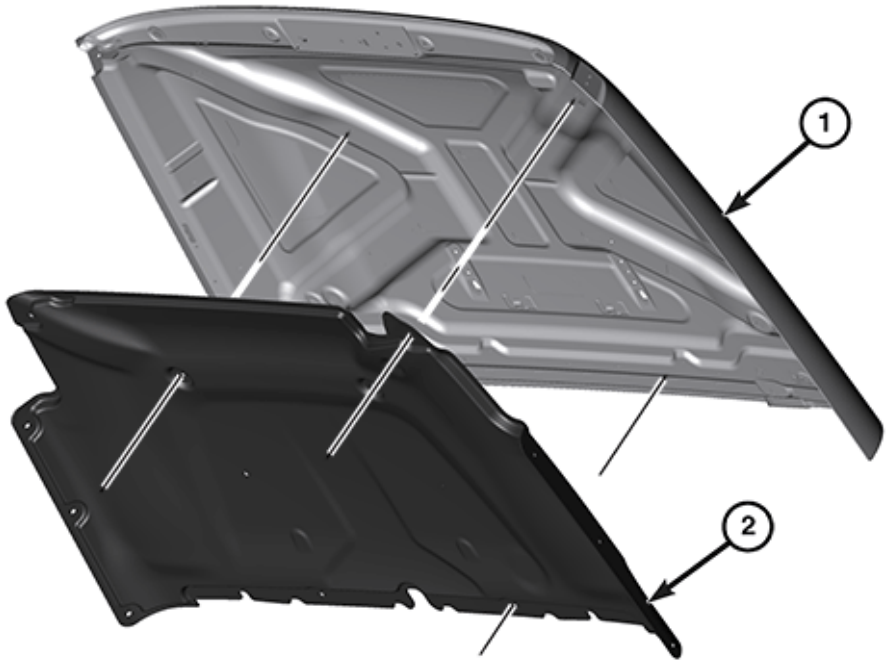
PUR Foam Locations

1- A-pillar
2- Lower Cowl and Sill
3- B-pillar
4- Rear Body Side Aperture



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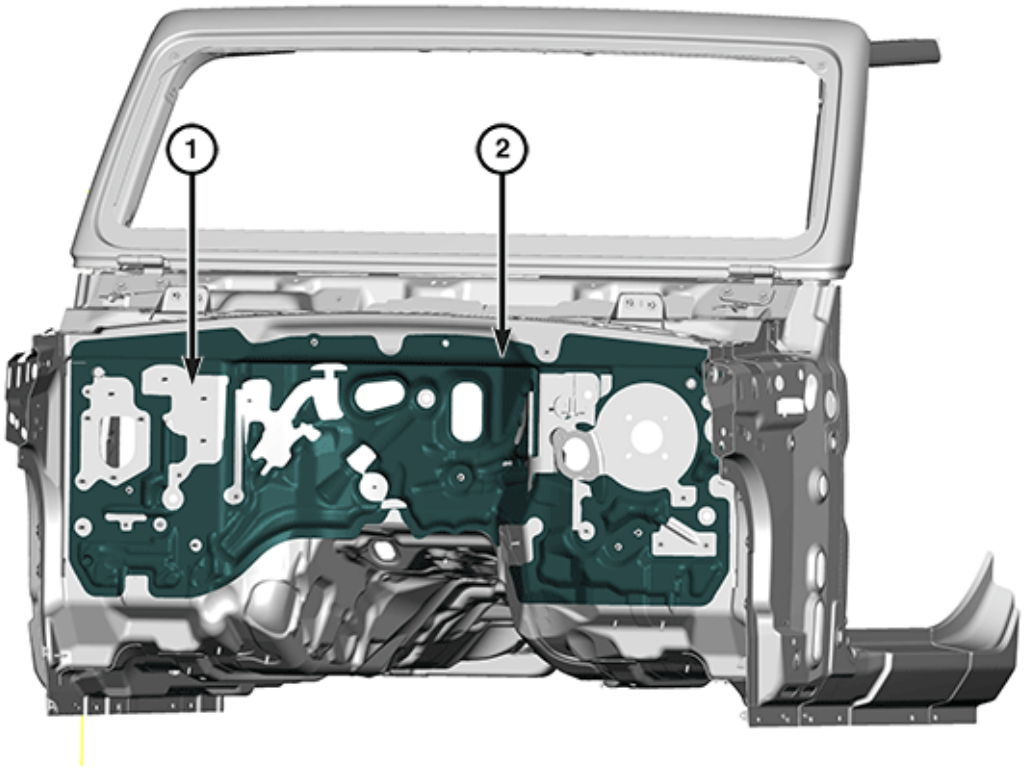
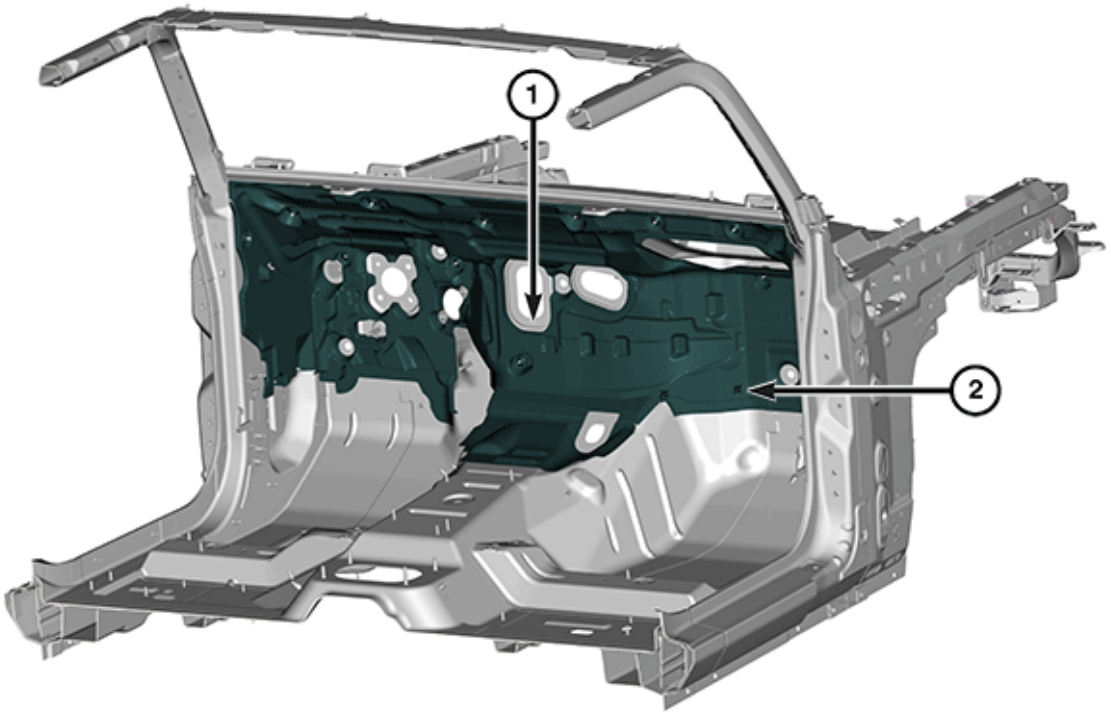
Hood

1- Hood
2- Hood Silencer Pad



Dash Panel Outer

1- Dash Panel
2- Dash Panel Silencer



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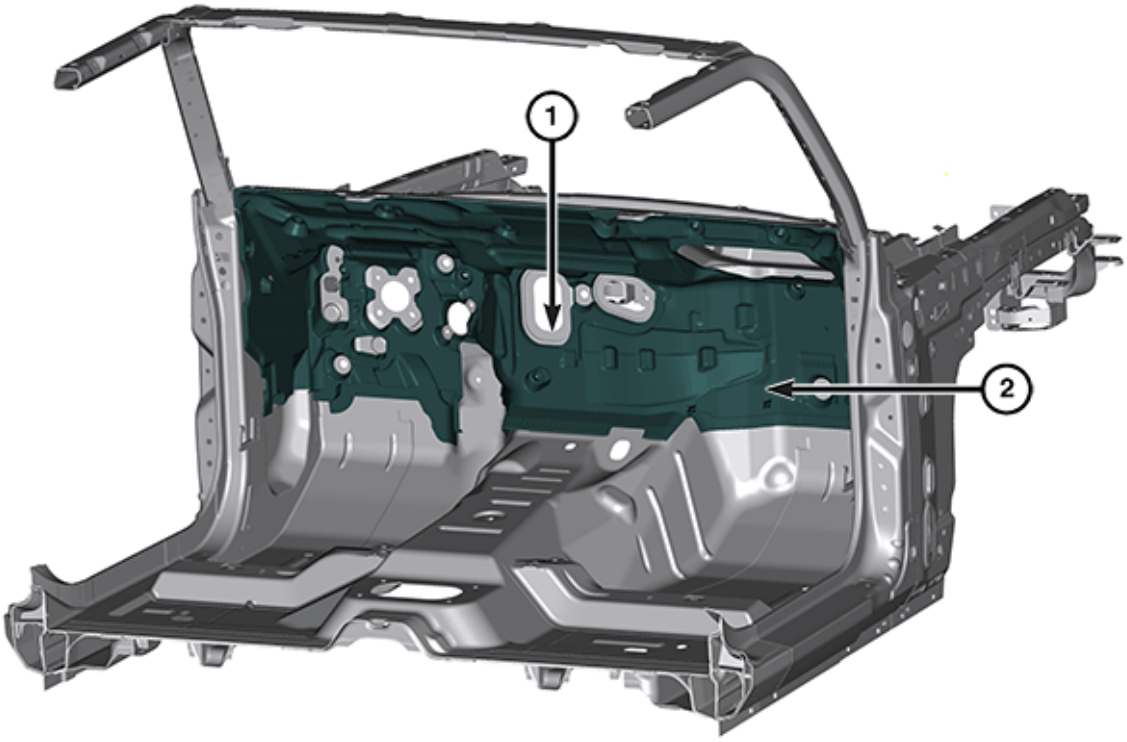
Dash Panel Inner (1 of 3)

NOTE: Models equipped with a diesel engine only.

1- Dash Panel
2- Dash Silencer Pad



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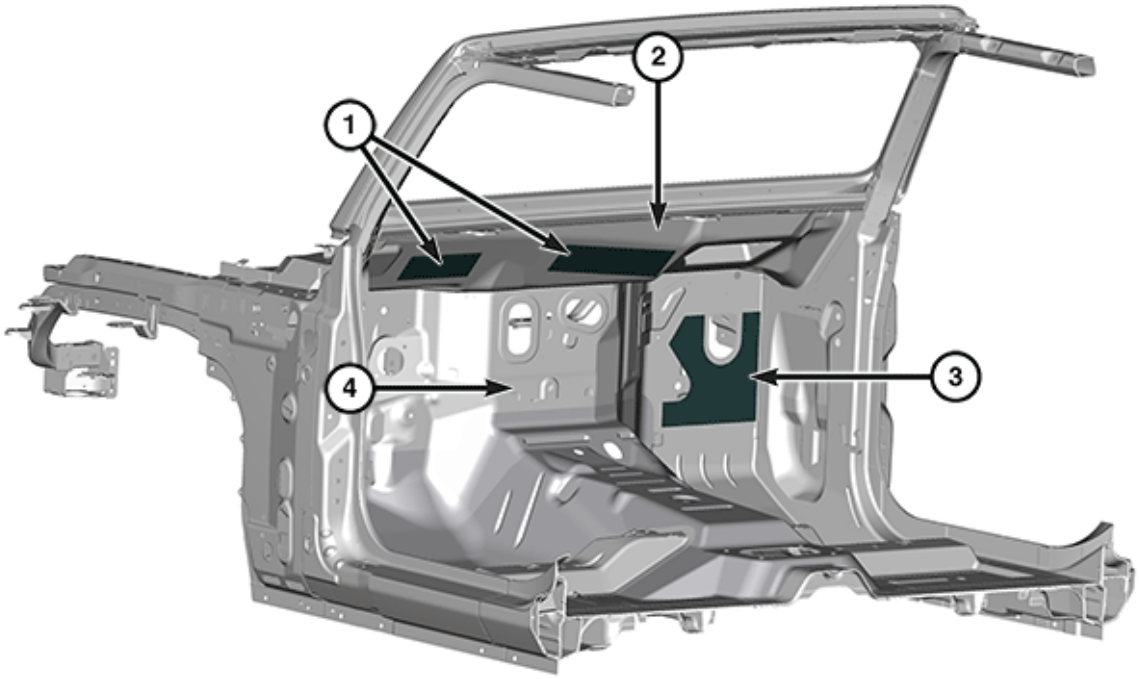
Dash Panel Inner (2 of 3)

NOTE: Models equipped with gasoline engines only.

1- Dash Panel
2- Dash Silencer Pad



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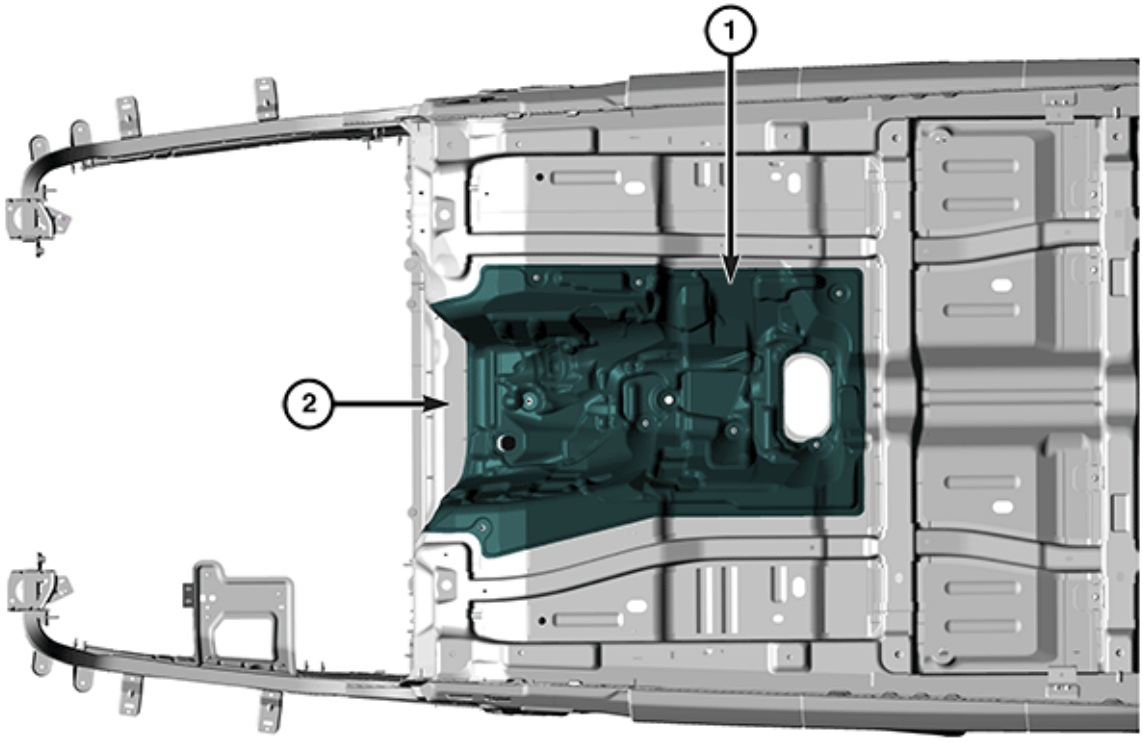
Dash Panel Inner (3 of 3)

1- Plenum Panel Mastic Pads (Models equipped with diesel engine only)
2- Plenum Lower Panel
3- Dash Panel Mastic Pad (All models)
4- Dash Panel



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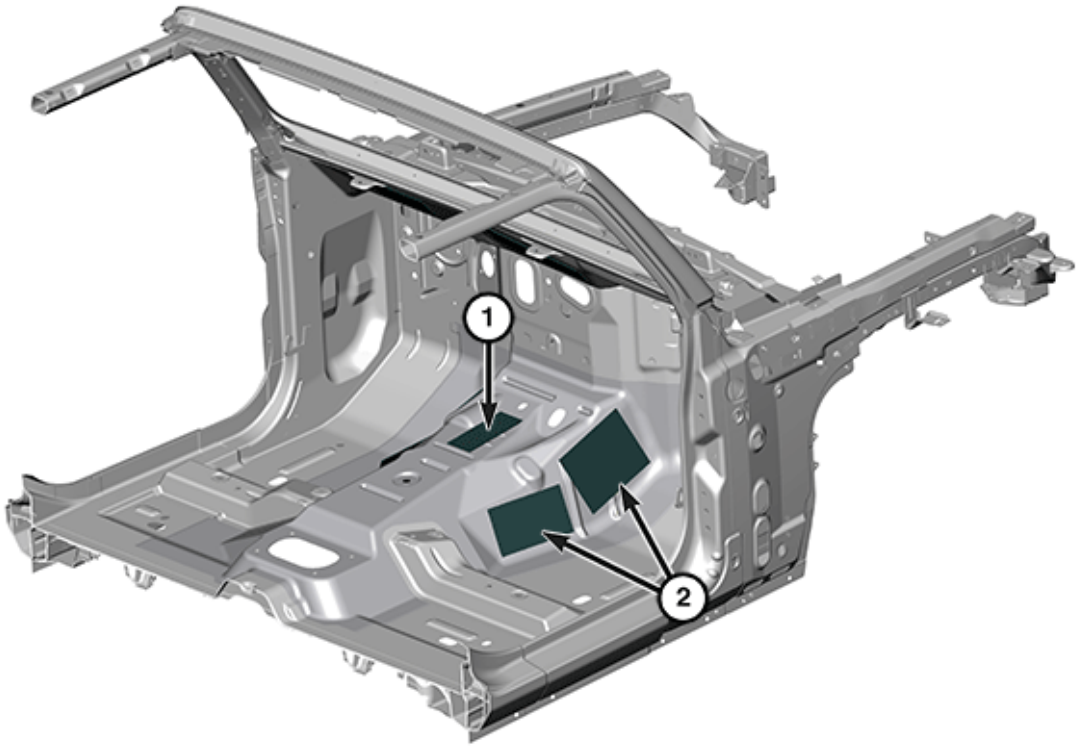
Tunnel Exterior

1- Tunnel Panel Silencer Pad
2- Tunnel Panel



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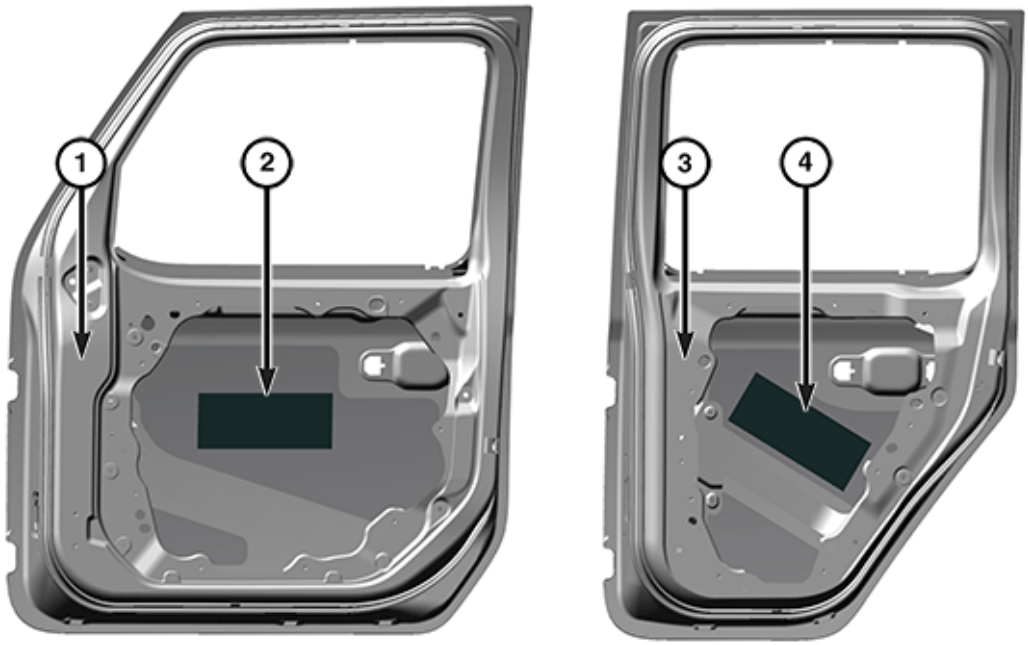
Tunnel Interior

NOTE: Models equipped with diesel engine only.

1- Tunnel Panel Top Mastic Pad
2- Tunnel Panel Side Mastic Pad (Right side shown, left side similar.)



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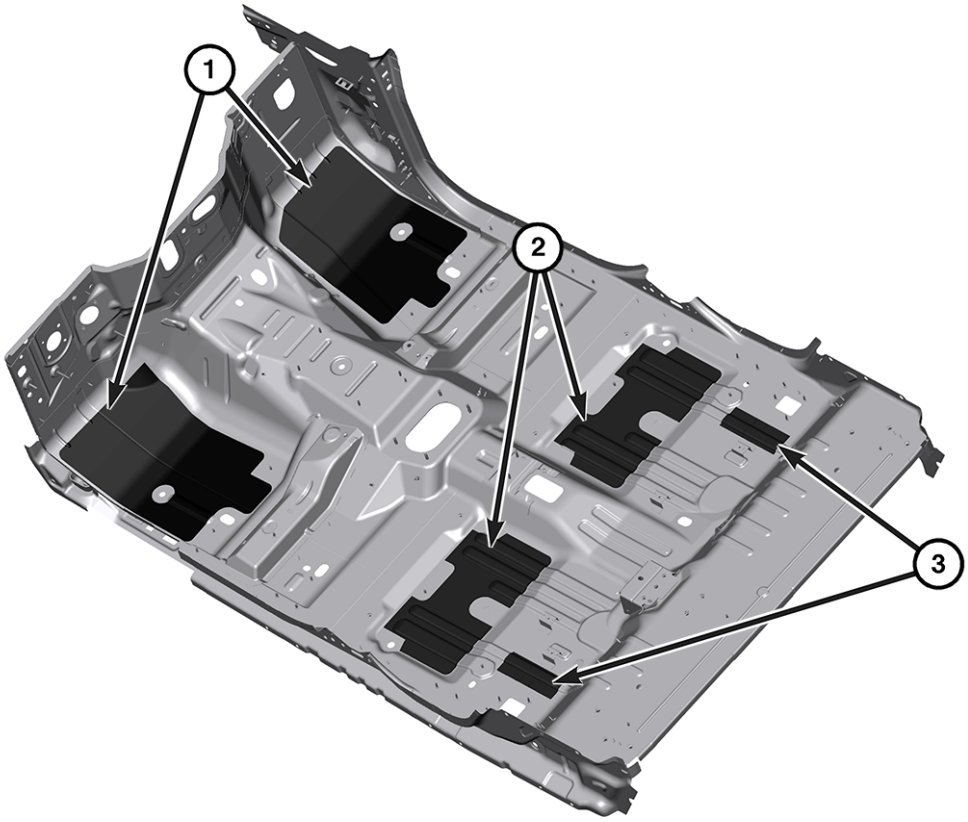
Doors

1- Front Door
2- Front Door Mastic Pad
3- Rear Door
4- Rear Door Mastic Pad



Floor Pan Interior

1- Front Floor Pan Mastic Pads
2- Rear Floor Pan Front Mastic Pads
3- Rear Floor Pan Rear Mastic Pads

STRUCTURAL ADHESIVE, FLEXIBLE ADHESIVES AND SEAM SEALER LOCATIONS

Structural adhesives, flexible adhesives and seam sealers should only be applied by trained technicians. Follow the manufactures instructions for proper applications of products.

Structural adhesive is applied by itself or in conjunction with Squeeze Type Resistance Spot Welds (STRSW) and is to be re-assembled in the same manner as vehicle build. Any situation where it is undetermined weather it is structural adhesives or seam sealer always default to structural adhesive.

Anti- flutter adhesive is applied to areas of the vehicle where adhesive properties with flexibility are required. Typically found on supports and braces throughout the closure panels, roof and body side gas fill areas.

Seam sealers are only to be used topically, never within weld flanges or hem flanges. All sealers being replaced should duplicate the factory style sealer in shape and size.

For additional information on Corrosion Protection, (Refer to Collision Information - Standard Procedure).

For additional information on Sealer and Sound Description, (Refer to Collision Information-Locations).

FCA US LLC approved replacement materials include –

- **Structural Adhesives:** LORD Fusor 2098, LORD Fusor 112B and 3M 08116.
- **Anti-Flutter Adhesives:** LORD Fusor #121 or #124 (Flexible Foam), 3M #8463 Flexible Foam, Crest – CFF Flexi-Foam.
- **Seam Sealer:** Mopar #04318026, Fusor 129, 3M 08308.

MATERIAL TYPE	COLOR
Structural Adhesive	Red
Anti-Flutter Adhesive	Green

MATERIAL TYPE	COLOR
Seam Sealer	Blue

DESCRIPTION	FIGURE
Hood (1 of 2)	Figure 1
Hood (2 of 2)	Figure 2
Windshield Frame	Figure 3
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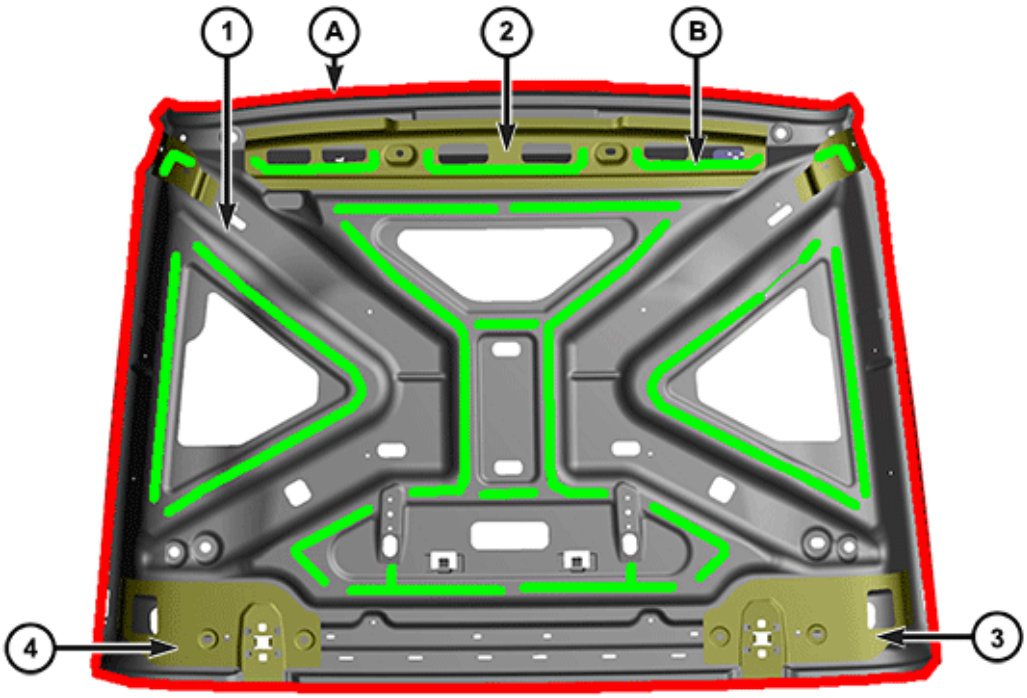
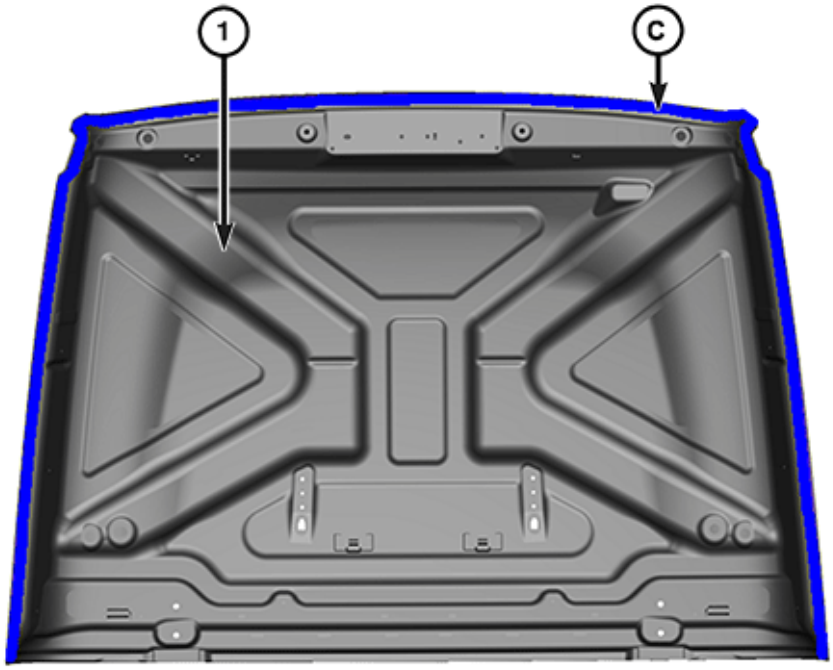


3103131787

Hood (1 of 2)

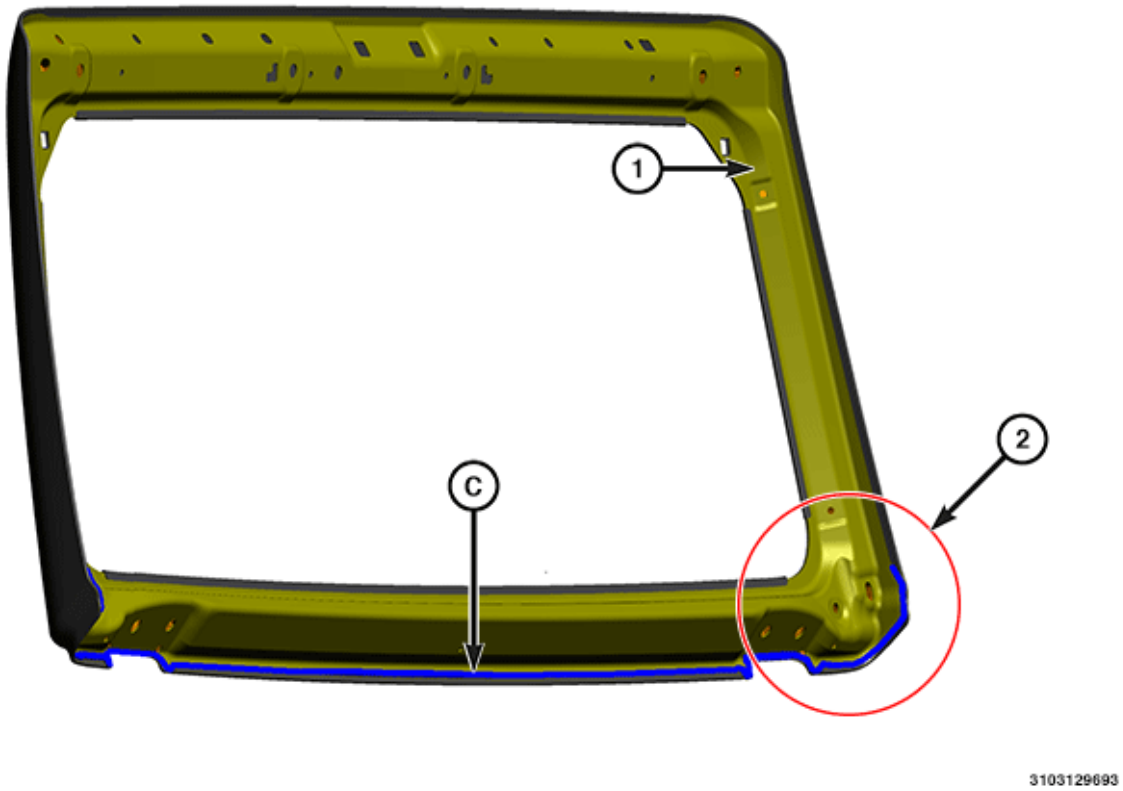
1- Hood Inner Panel
2- Hood Inner Slam Reinforcement
3- Right Hood Hinge Reinforcement
4- Left Hood Hinge Reinforcement
A- Structural Adhesive
B- Anti-Flutter Adhesive



3103131788

Hood (2 of 2)

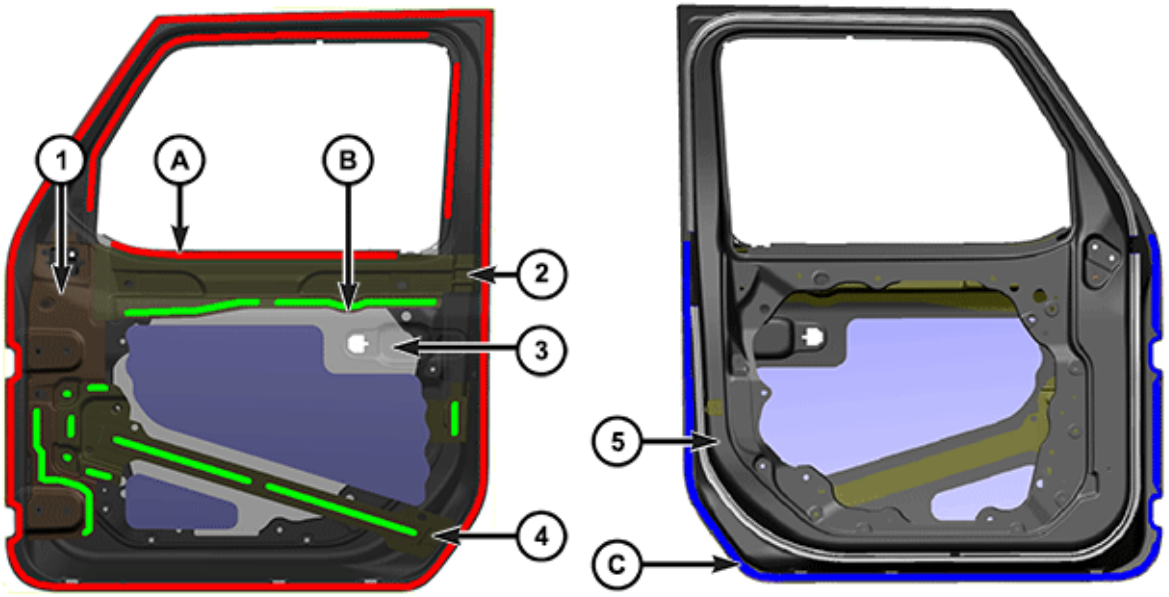
1- Hood Inner Panel
C- Seam Sealer



Windshield Frame

1- Windshield Frame

NOTE: Right corner detail shown, left side similar.
2- Right Corner Detail
C- Seam Sealer

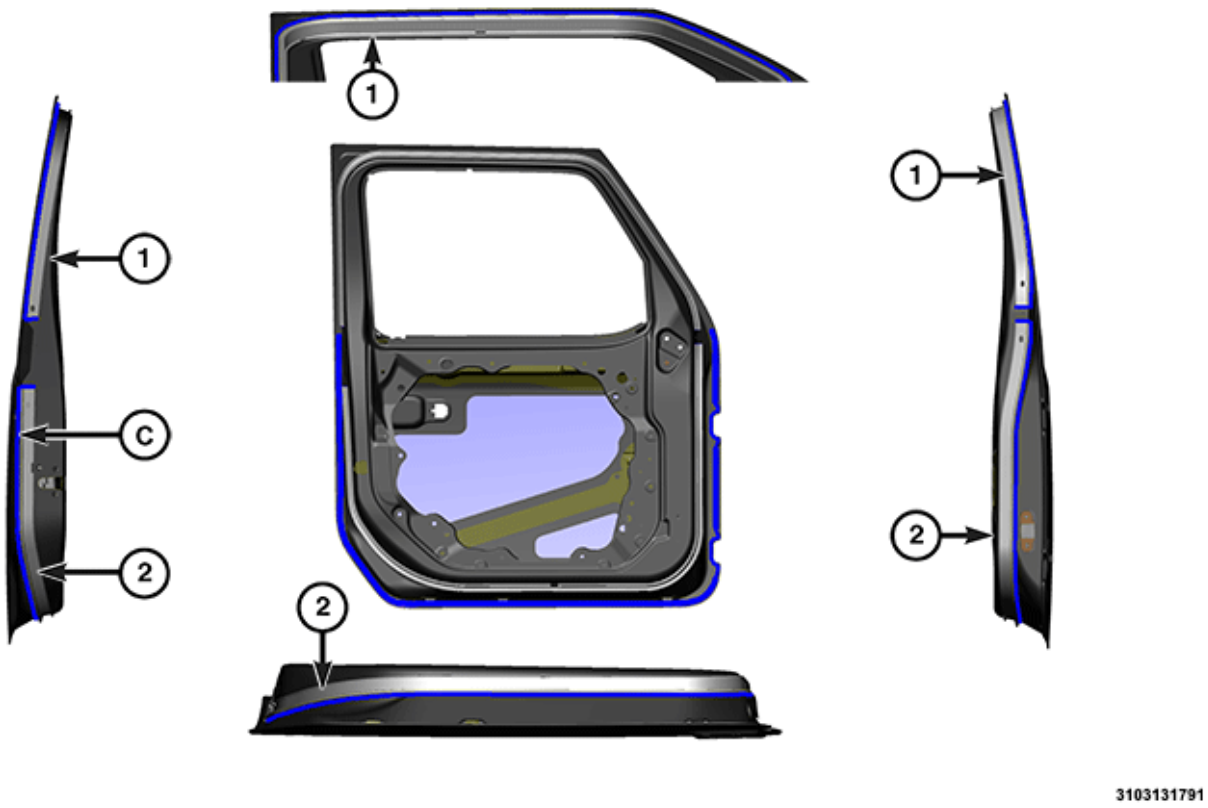


3103131790

Front Door (1 of 2)

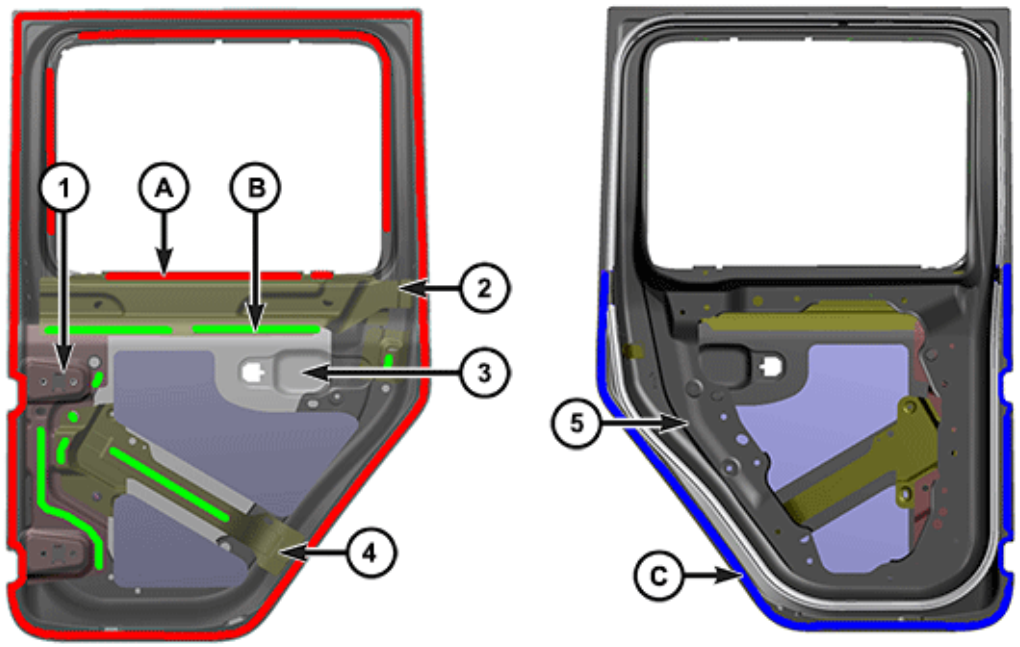
NOTE: Left side shown, right side similar.

1- Hinge Reinforcement
2- Door Belt Reinforcement
3- Outer Door Panel (Transparent for clarity)
4- Lower Reinforcement
5- Inner Door Panel
A- Structural Adhesive
B- Anti-Flutter Adhesive



Front Door (2 of 2)

NOTE: Left side shown, right side similar.
1- Upper Weatherstrip Channel
2- Lower Weatherstrip Channel
C- Seam Sealer

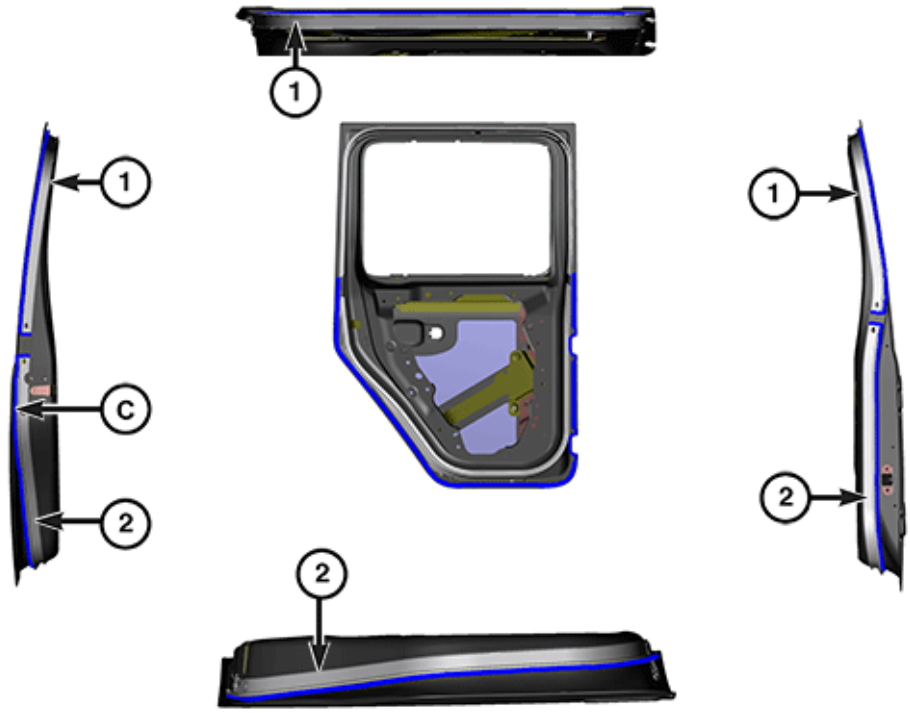


3103131792

Rear Door (1 of 2)

NOTE: Left side shown, right side similar.

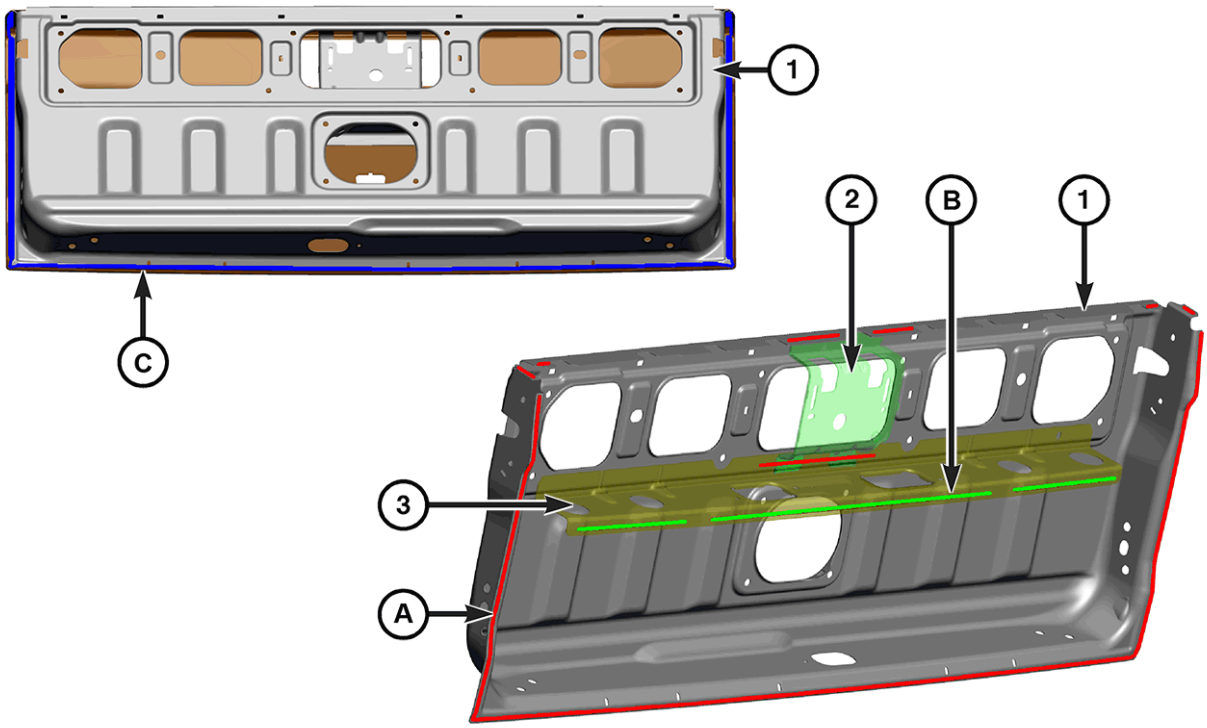
1- Hinge Reinforcement
2- Door Belt Reinforcement
3- Outer Door Panel (Transparent for clarity)
4- Lower Reinforcement
5- Inner Door Panel
A- Structural Adhesive
B- Anti-Flutter Adhesive
C- Seam Sealer



3103131793

Rear Door (2 of 2)

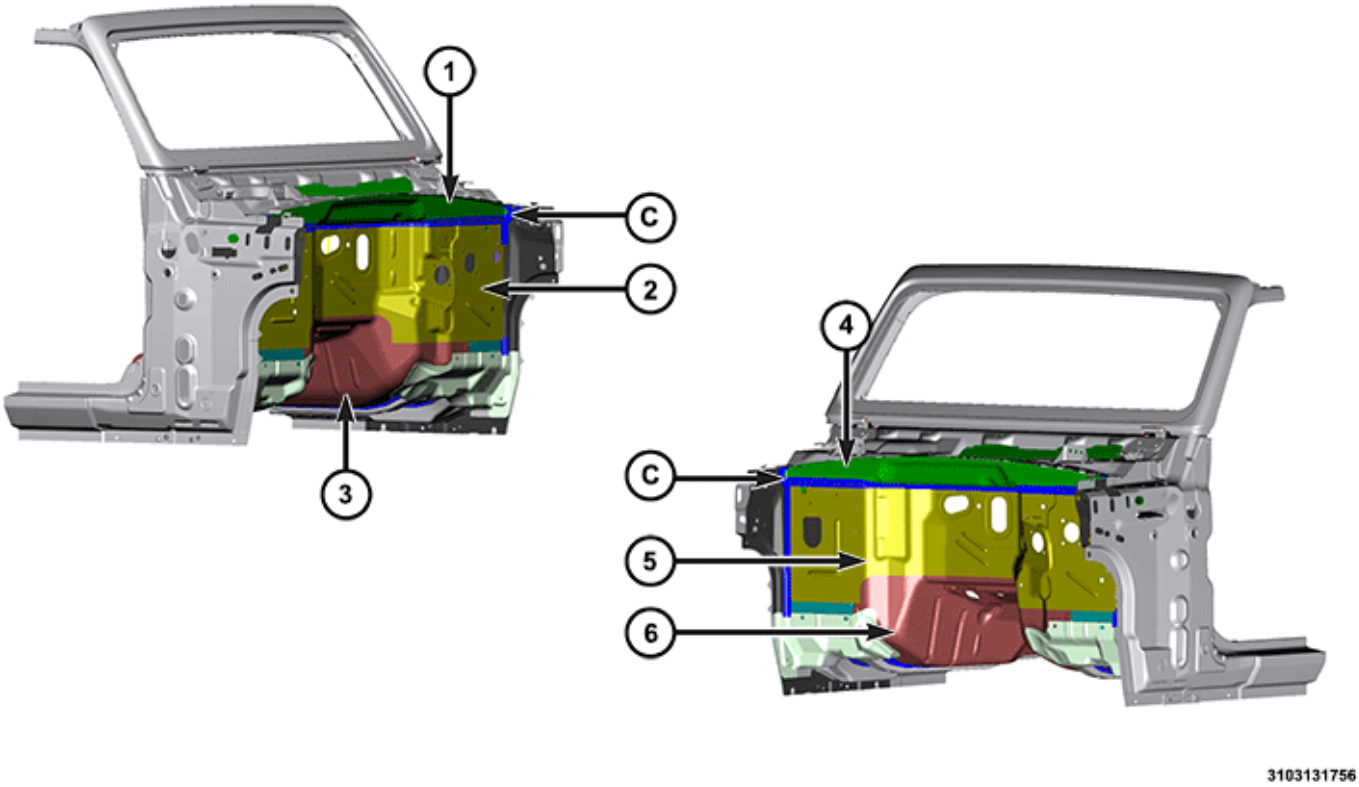
NOTE: Left side shown, right side similar.
1- Upper Weatherstrip Channel
2- Lower Weatherstrip Channel
A- Structural Adhesive
C- Seam Sealer



3103154485

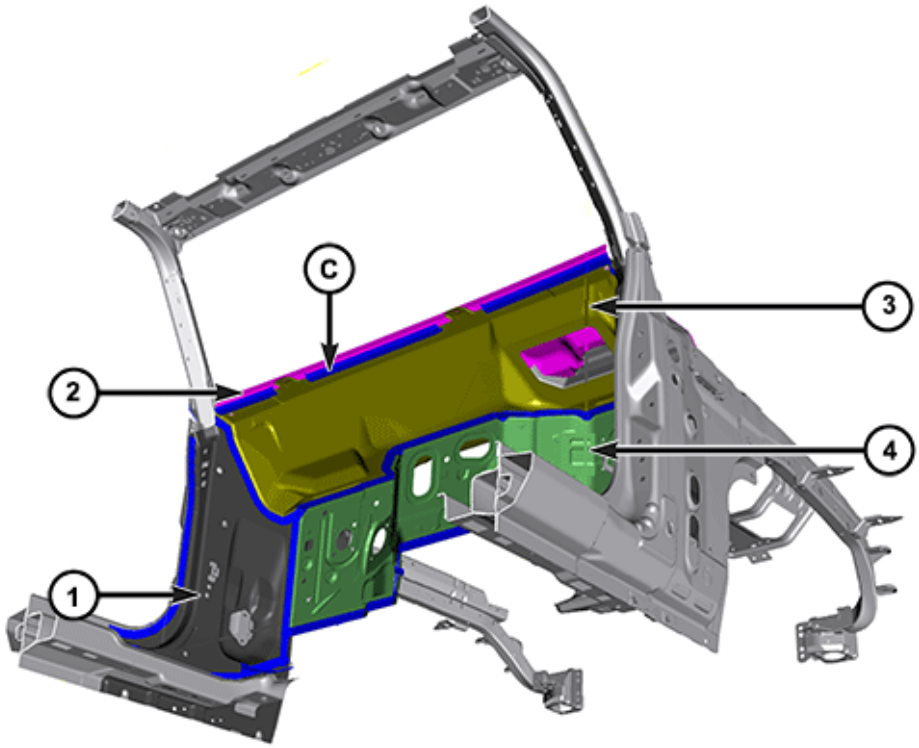
Tailgate

1- Inner Tailgate Panel
2- Handle Reinforcement (Transparent for clarity)
3- Center Reinforcement (Transparent for clarity)
A- Structural Adhesive
B- Anti-Flutter Adhesive
C- Seam Sealer



Dash Panel (Exterior)

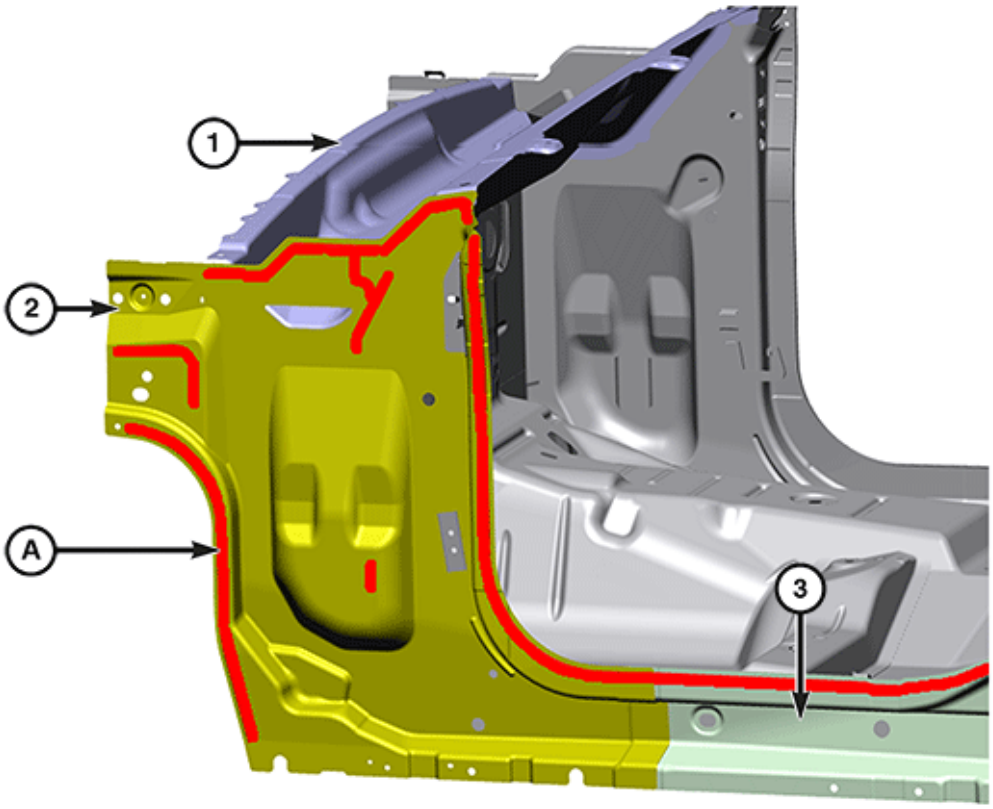
1- Plenum Panel - Left View
2- Dash Panel - Left View
3- Tunnel Panel - Left View
4- Plenum Panel - Right View
5- Dash Panel - Right View
6- Tunnel Panel - Right View
C- Seam sealer



3103131778

Dash Panel (Interior)

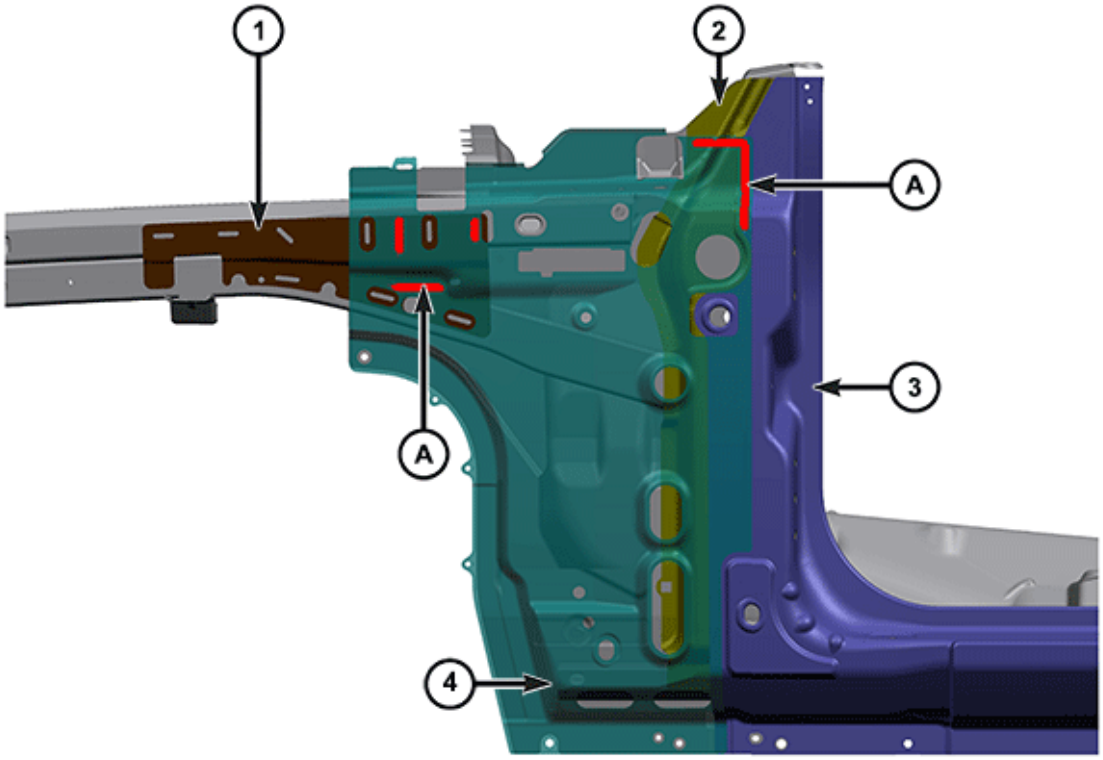
NOTE: Left side shown, right side similar.
1- Cowl Inner Side Panel
2- Cowl Panel
3- Plenum Panel
4- Dash Panel
C- Seam Sealer



3103129694

Cowl Inner Side Panel

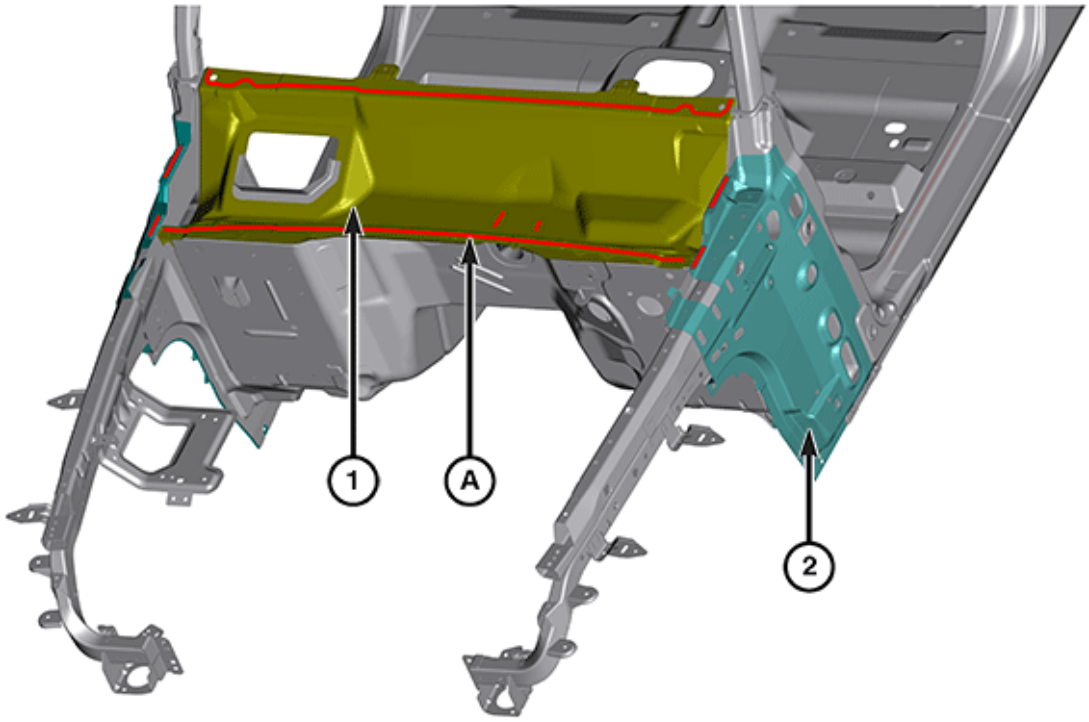
NOTE: Left side shown, right side similar.
1- Plenum Panel
2- Cowl Inner Side Panel
3- Inner Sill Panel
A- Structural Adhesive



3103131051

Hinge Pillar Panel

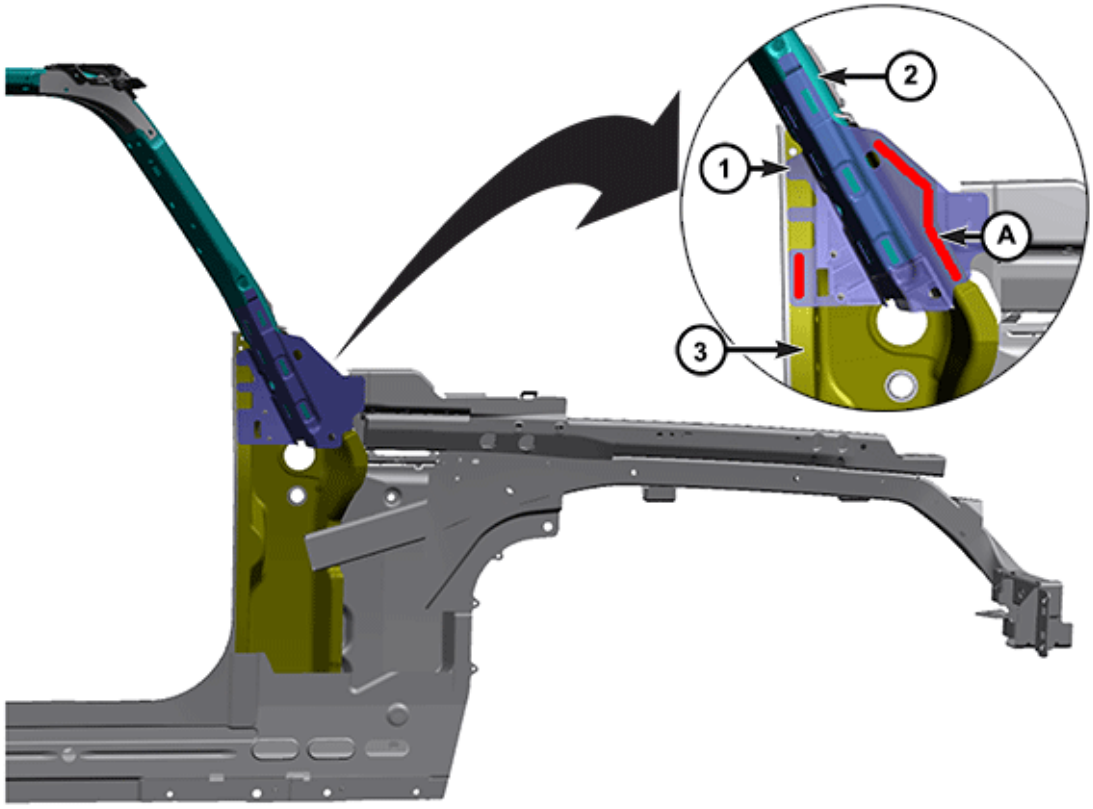
NOTE: Left side shown, right side similar.
1- Upper Outer Load Beam
2- Hinge Pillar Reinforcement
3- Front Body Side Aperture
4- Hinge Pillar Panel (Transparent for Clarity)
A- Structural Adhesive



3103129705

Cowl Top Panel

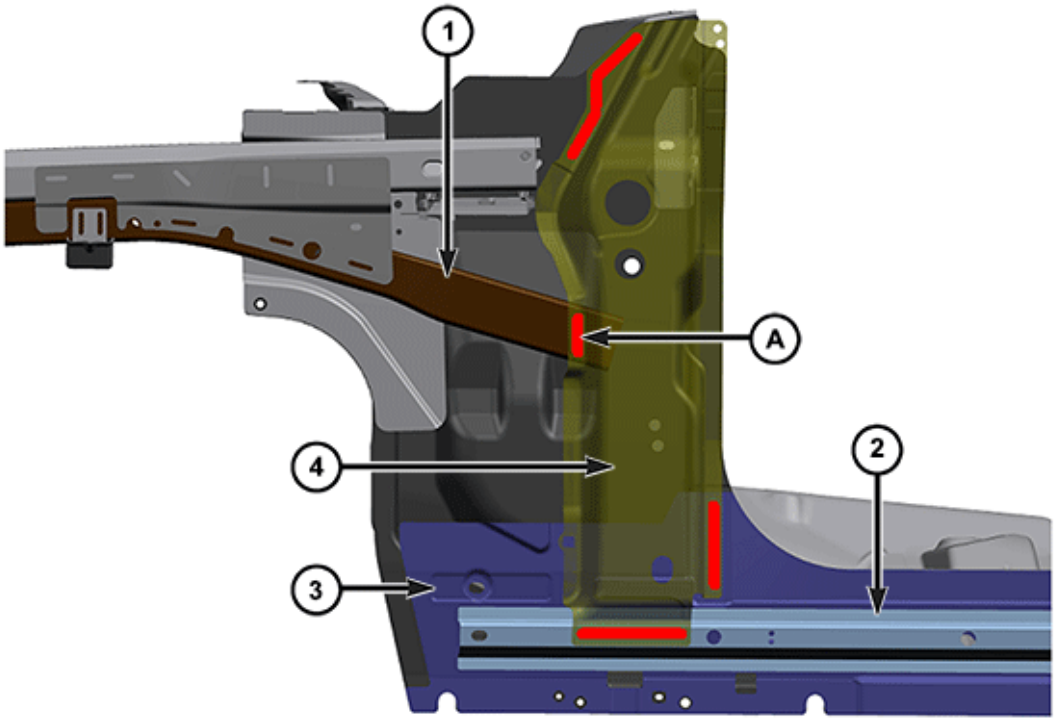
1- Plenum Panel
2- Hinge Pillar Panel
A- Structural Adhesive



3103131076

Sport Bar-Front

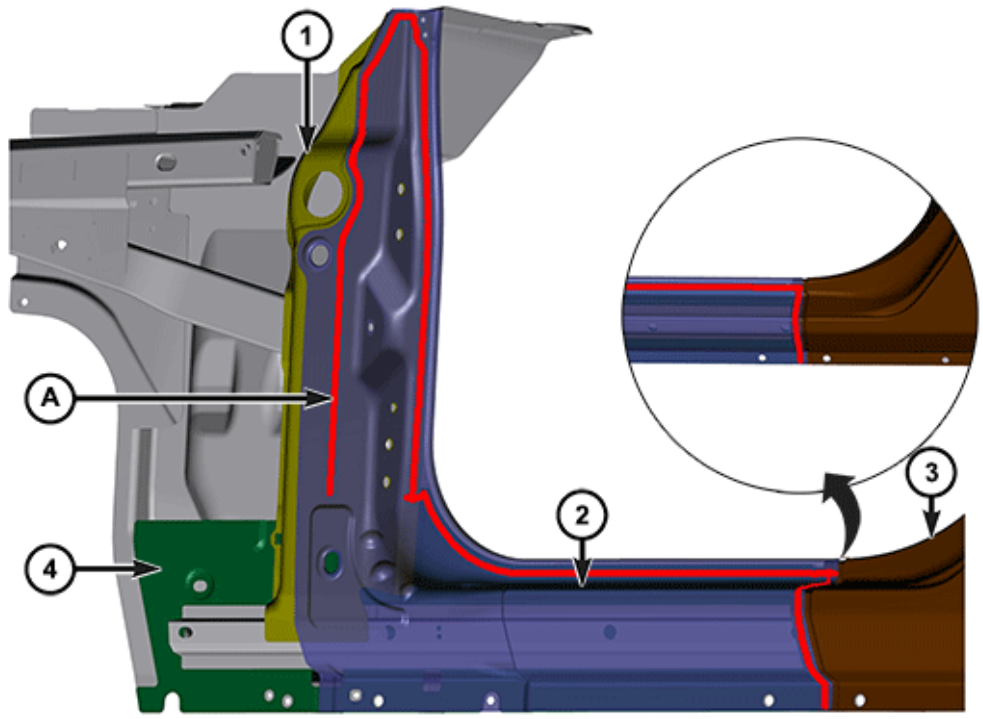
NOTE: Left side shown, right side similar.
1- Sport Bar Front Bracket (Transparent for Clarity)
2- Front Sport Bar
3- Hinge Pillar Reinforcement
A- Structural Adhesive



3103131052

Cowl Side Panel

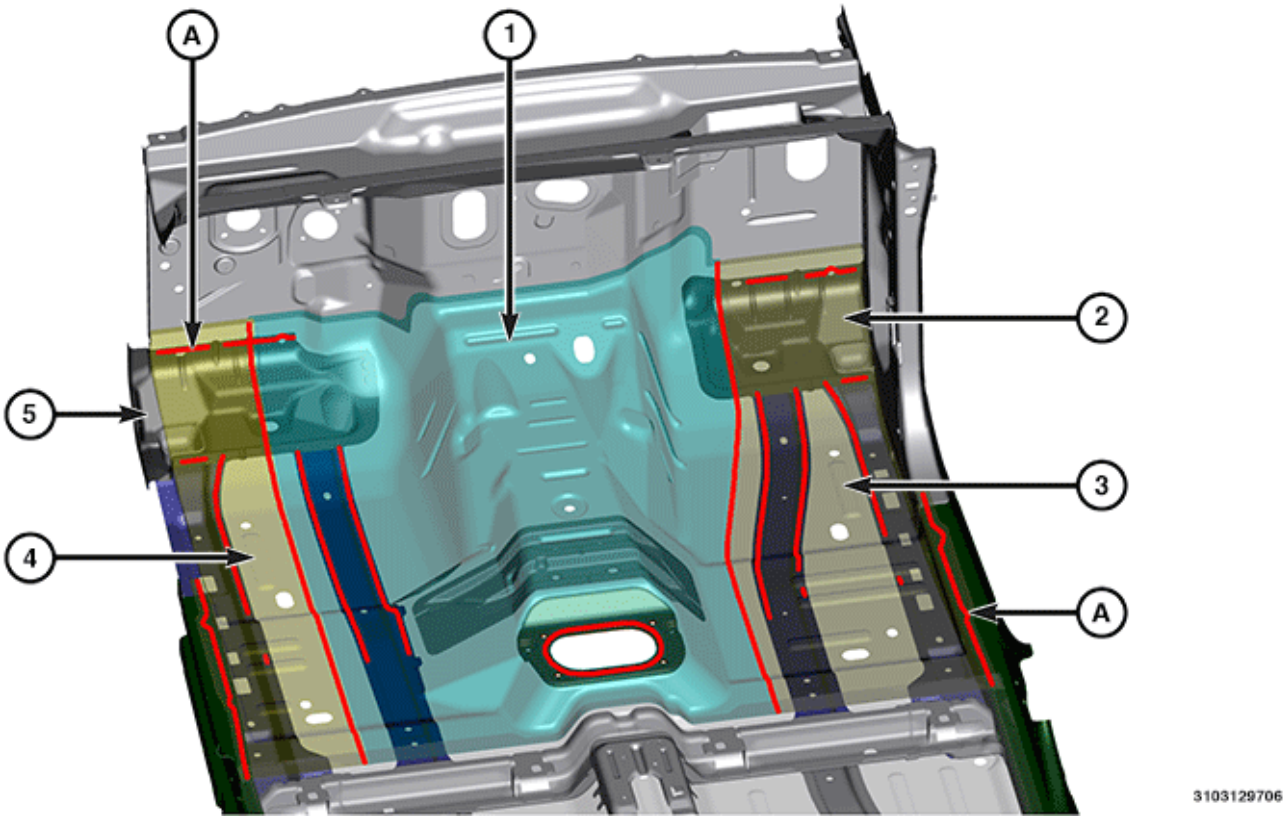
NOTE: Left side shown, right side similar.
1- Lower Load Beam
2- Outer Sill Reinforcement
3- Outer Sill Panel
4- Hinge Pillar Reinforcement (Transparent for Clarity)
A- Structural Adhesive



3103131053

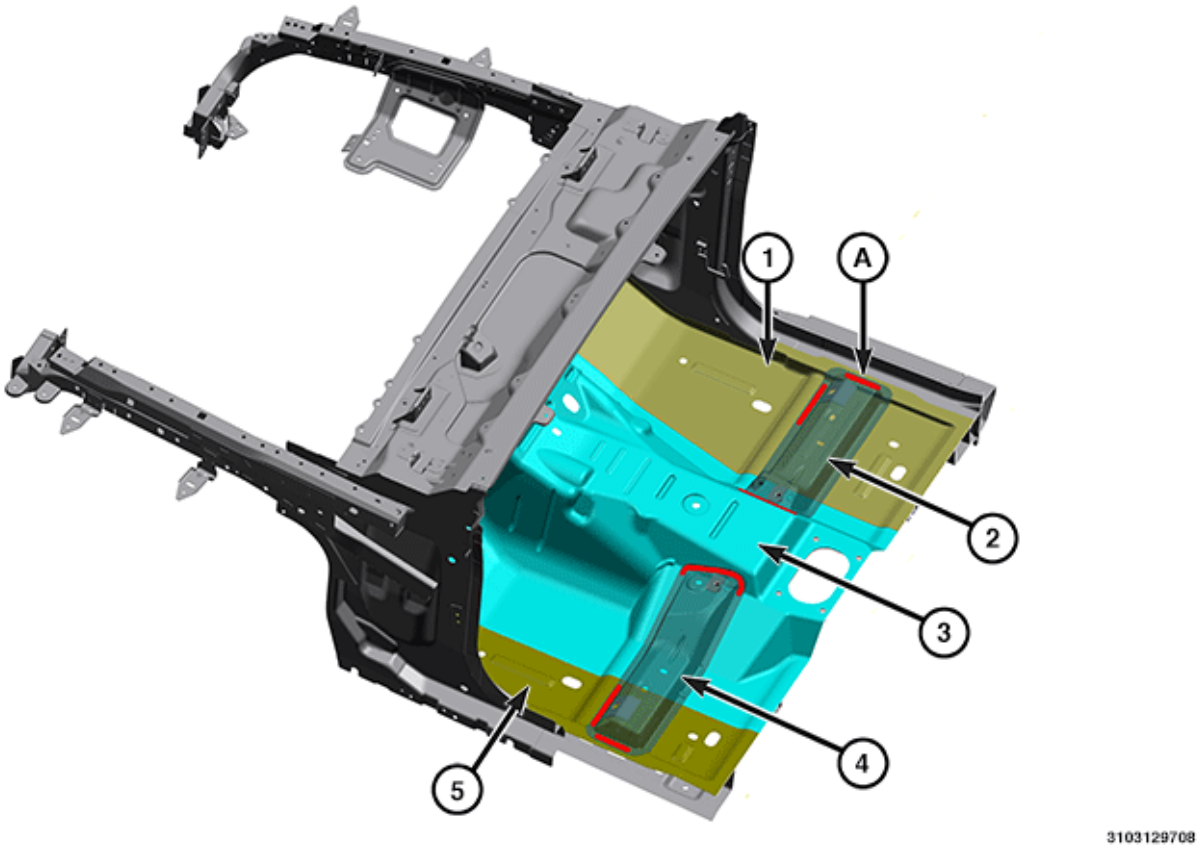
Front Body Side Aperture

NOTE: Left side shown, right side similar.
1- Hinge Pillar Reinforcement
2- Front Body Side Aperture (Transparent for Clarity)
3- B-Pillar Outer Panel
4- Outer Sill Panel
A- Structural Adhesive



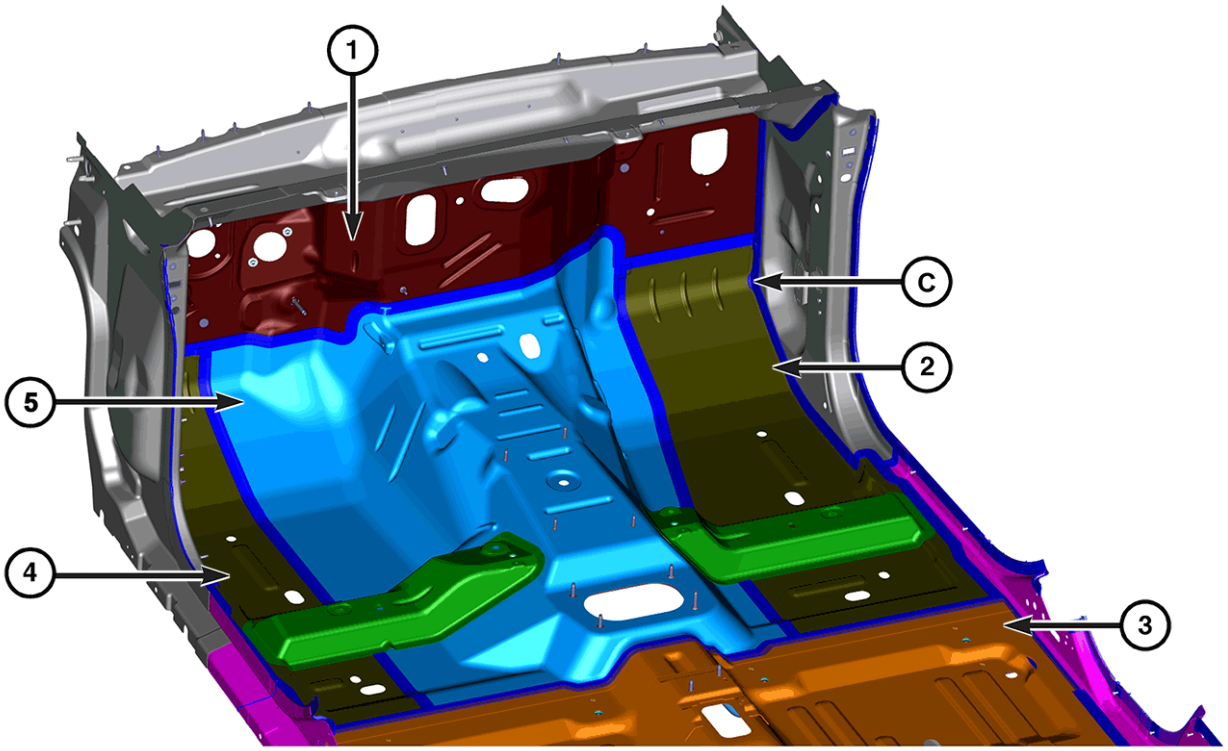
Front Floor and Ladder Assembly

1- Front Floor Tunnel Panel (Transparent for Clarity)
2- Right Underbody Hold Down Panel
3- Right Front Floor Pan Panel (Transparent for Clarity)
4- Left Front Floor Pan Panel (Transparent for Clarity)
5- Right Underbody Hold Down Panel
A- Structural Adhesive



Front Floor

NOTE: Left side view shown, right side similar.
1- Right Front Floor Pan Panel
2- Right Front Floor Crossmember (Transparent for Clarity)
3- Front Floor Tunnel Panel
4- Left Front Floor Crossmember (Transparent for Clarity)
5- Left Front Floor Pan Panel
A- Structural Adhesive

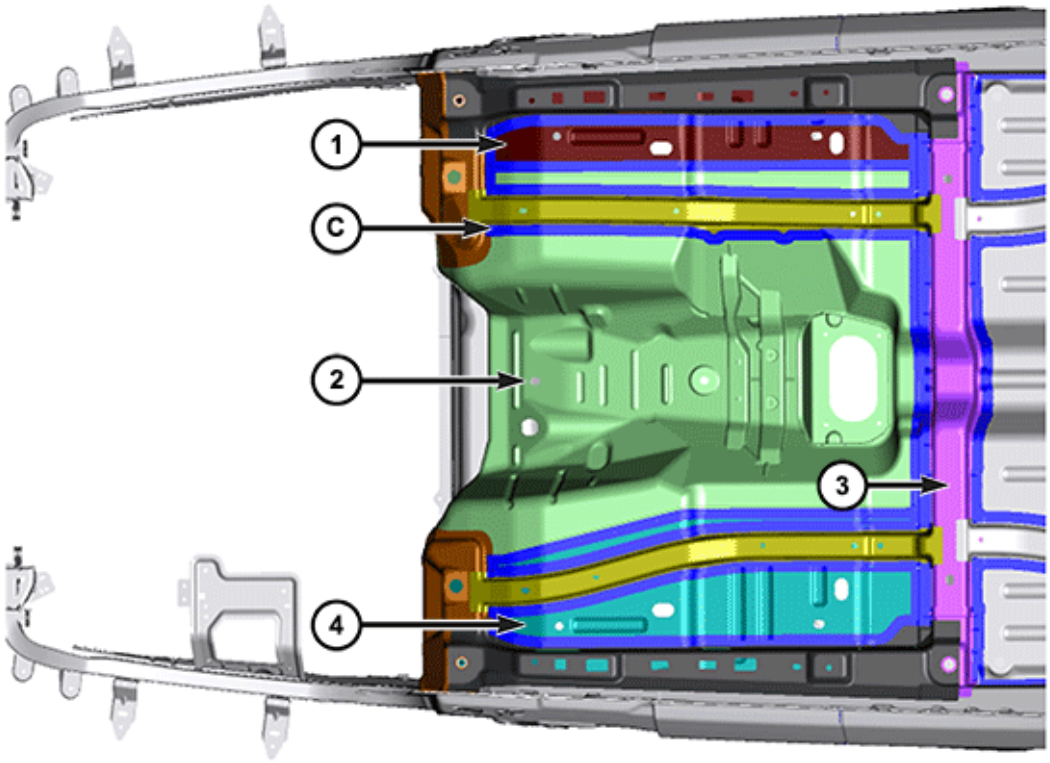


3103154465

Front Floor Interior

NOTE: Left side view shown, right side similar.

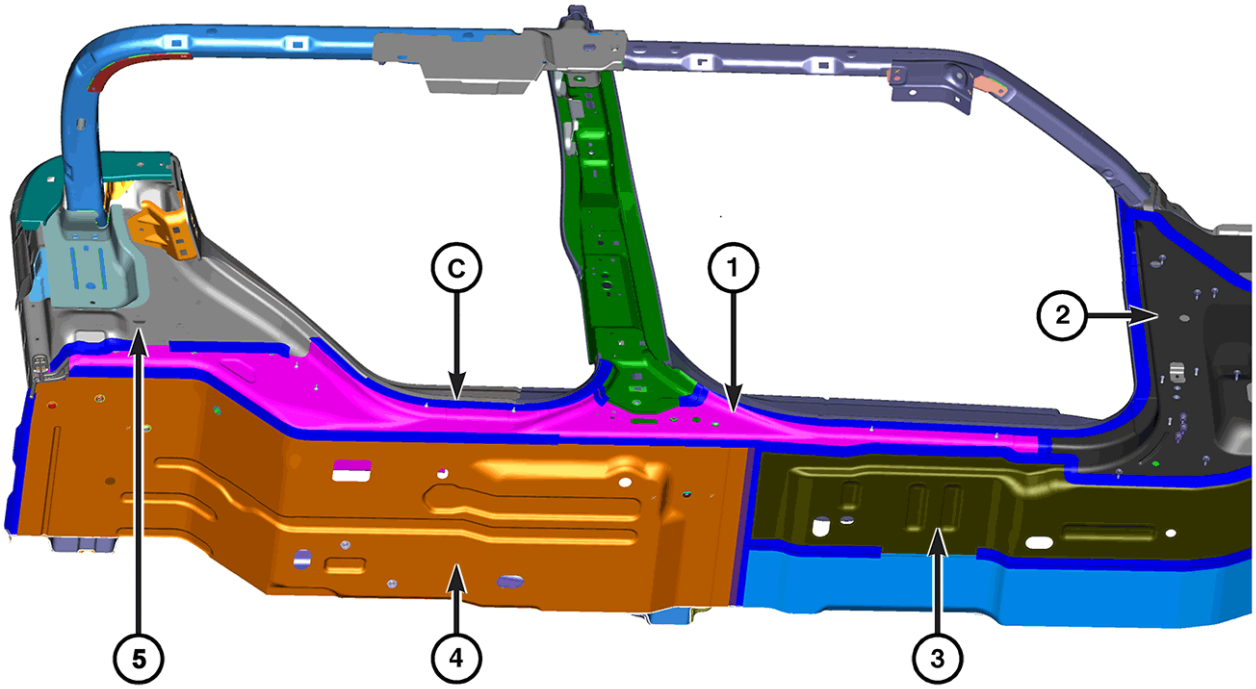
1- Dash Panel
2- Right Front Floor Pan Panel
3- Rear Floor Pan Panel
4- Left Front Floor Pan Panel
5- Front Floor Tunnel Panel
C- Seam Sealer



3103131758

Front Floor Exterior

1- Right Front Floor Pan Panel
2- Front Floor Tunnel Panel
3- Front Seat Mounting Crossmember
4- Left Front Floor Pan Panel
C- Seam Sealer

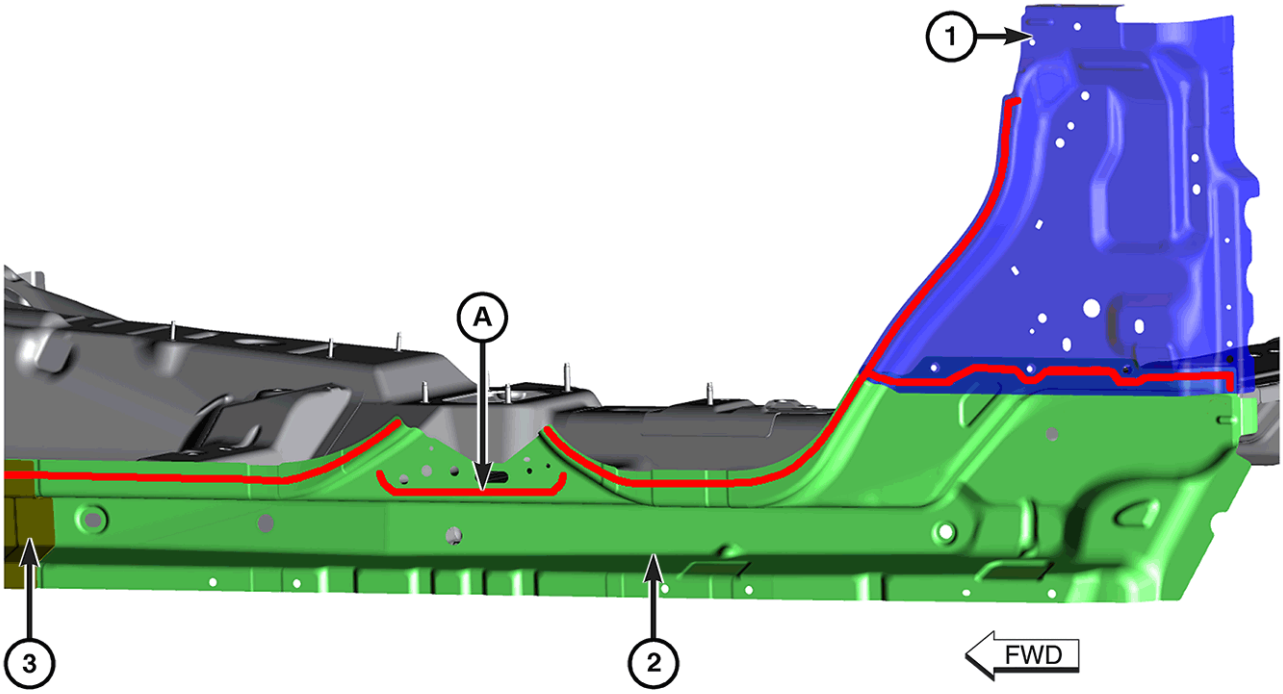


3103154466

Inner Sill and Floor Panels

NOTE: Left side shown, right side similar.

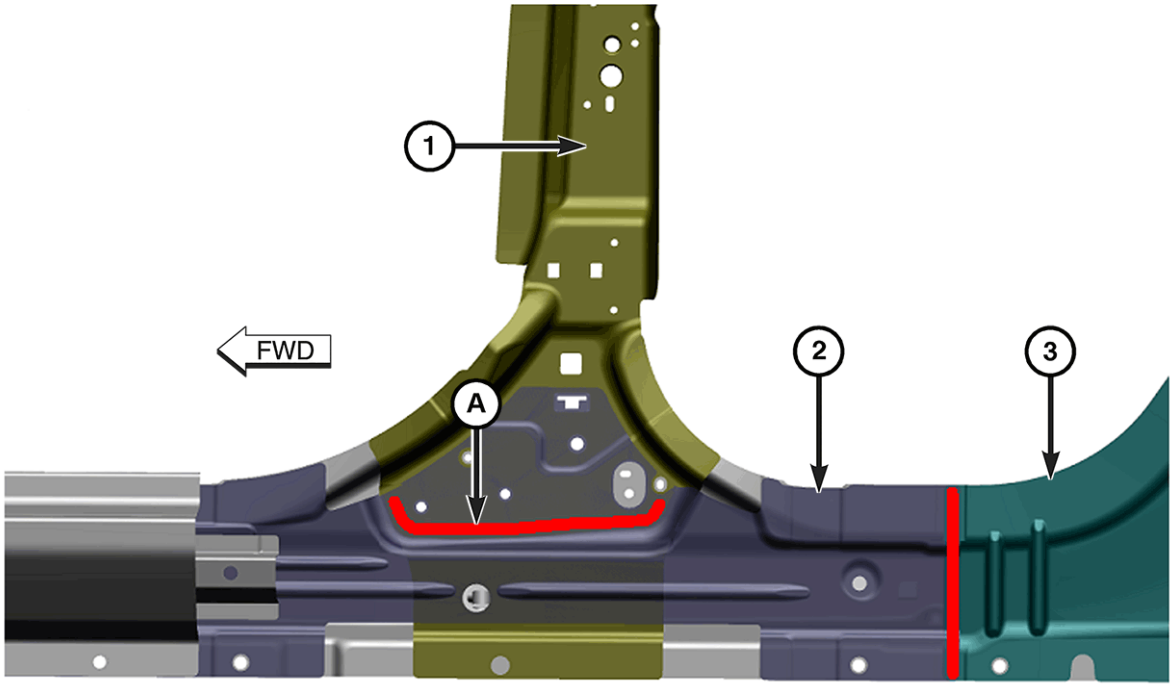
1- Inner Sill Panel
2- Cowl Inner Side Panel
3- Front Floor Pan Panel
4- Rear Floor Pan Panel
5- Inner Quarter Panel
C- Seam Sealer



3103154467

Inner Sill Panel

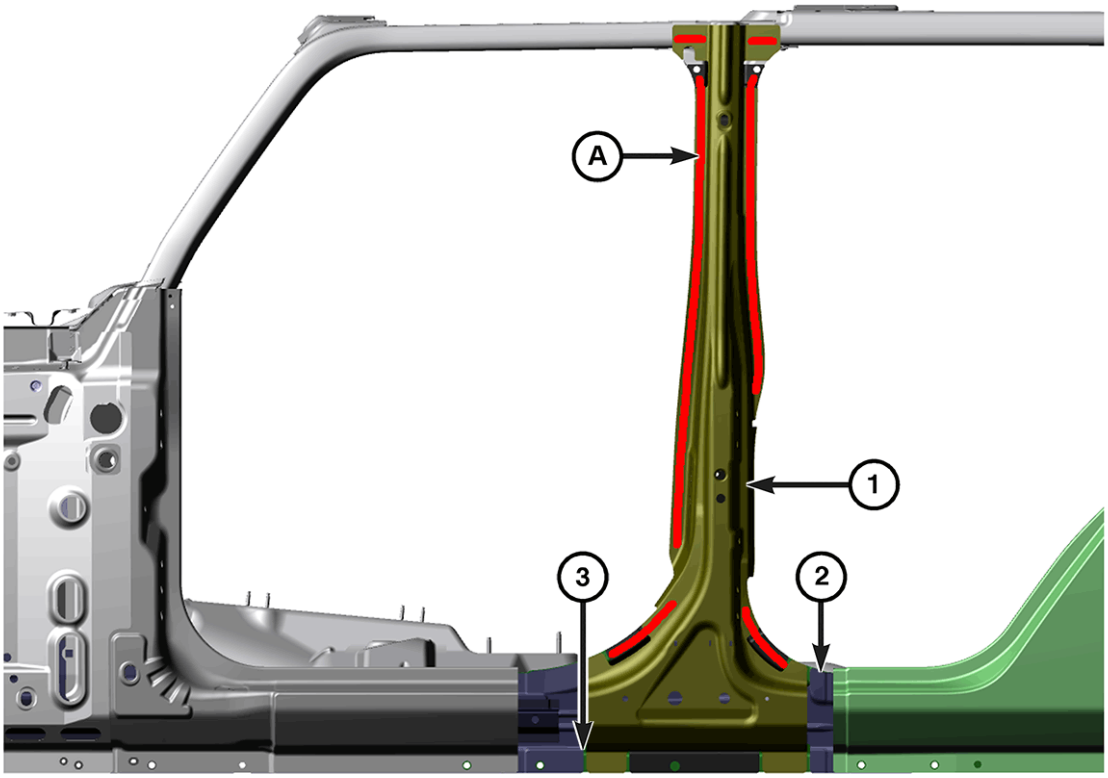
NOTE: Left side shown, right side similar.
1- Inner Quarter Panel
2- Inner Sill Panel
3- Cowl Inner Side Panel
A- Structural Adhesive



3103154468

Inner B-Pillar and Outer Sill Panel

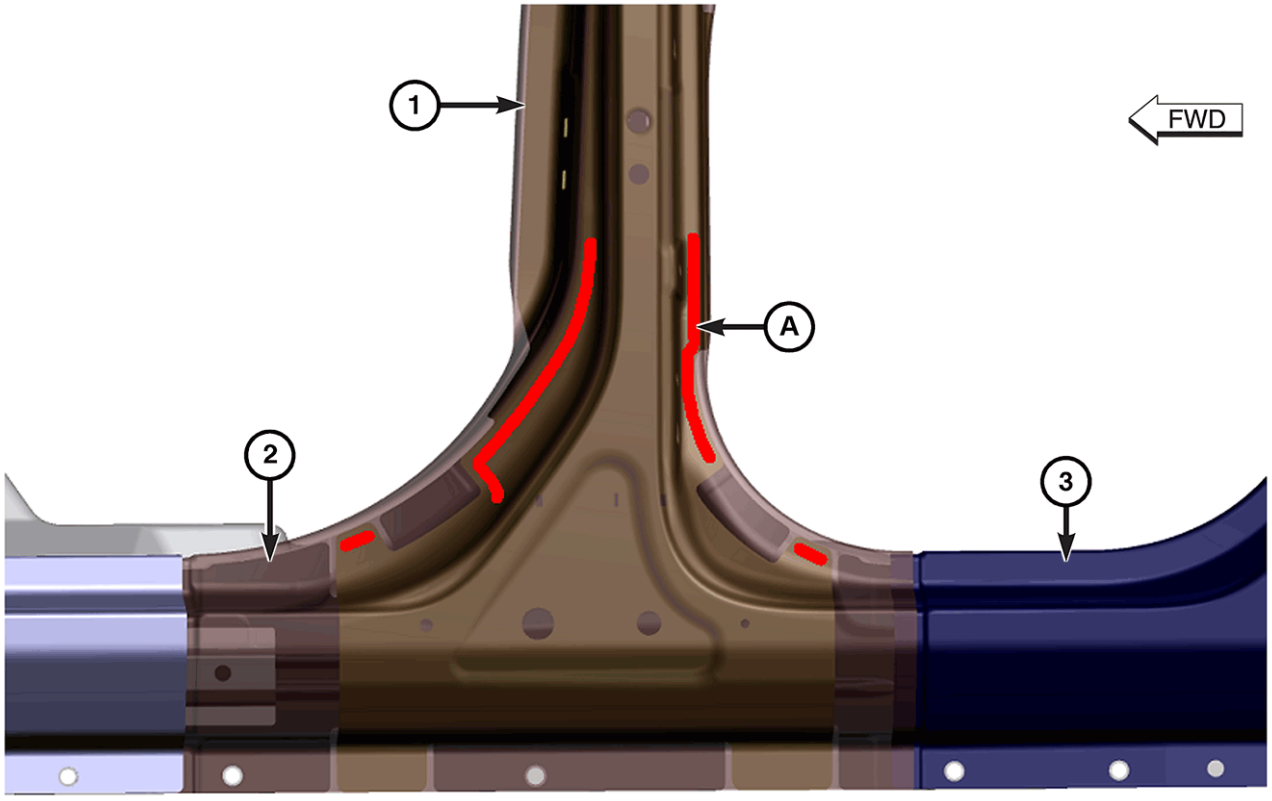
NOTE: Left side shown, right side similar.
1- Inner B-Pillar Panel
2- Inner Sill Panel (Transparent for Clarity)
3- C-Pillar Reinforcement
A- Structural Adhesive



3103154469

B-Pillar Reinforcement and Inner B-Pillar

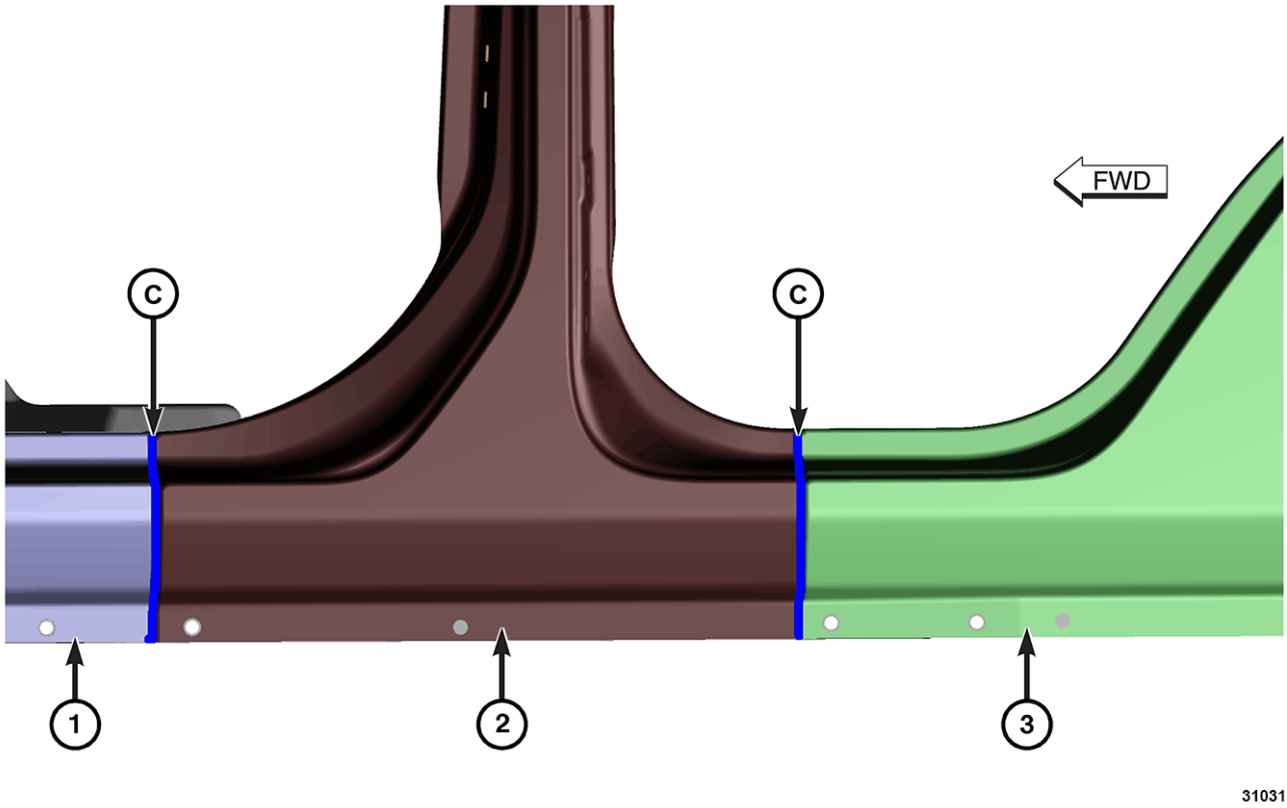
NOTE: Left side shown, right side similar.
1- B-Pillar Reinforcement (Transparent for Clarity)
2- Outer Sill Panel
3- Inner Sill Panel
A- Structural Adhesive



3103154470

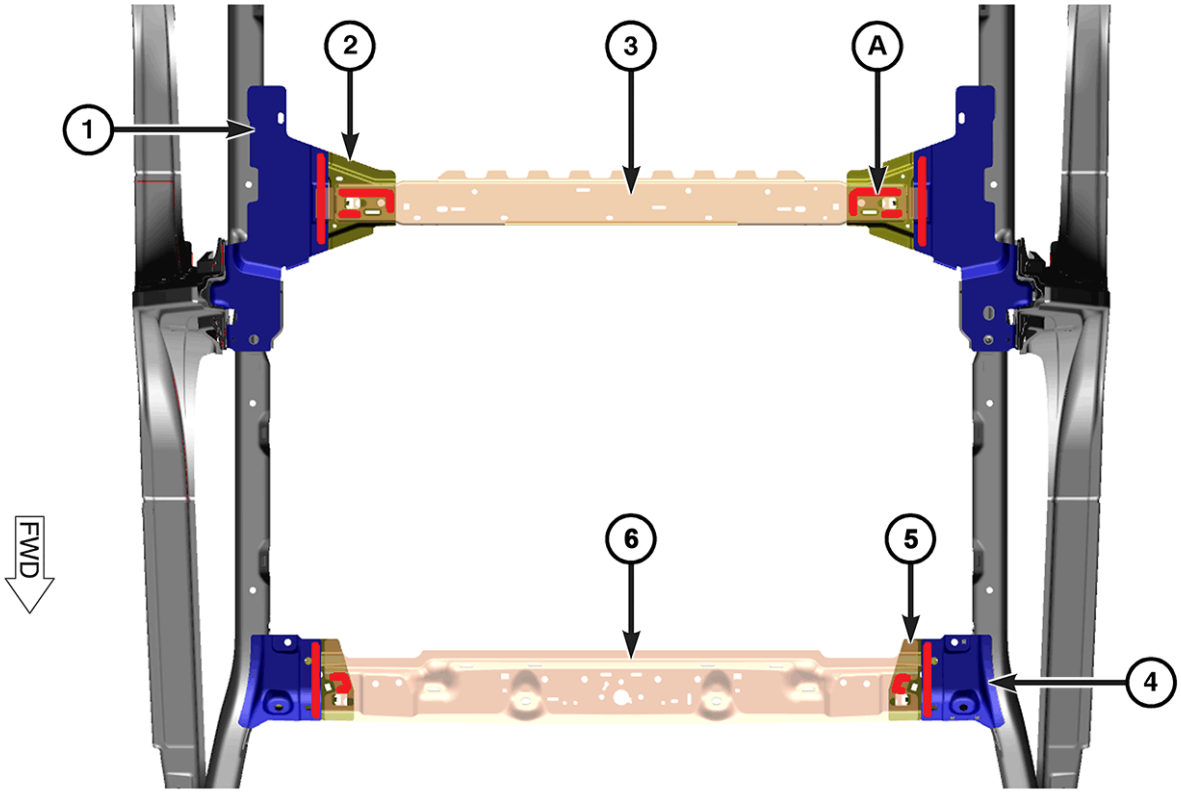
Outer B-Pillar Panel and B-Pillar Reinforcement

NOTE: Left side shown, right side similar.
1- Outer B-Pillar Panel (Transparent for Clarity)
2- Inner Sill Panel
3- Rear Body Side Aperture Panel
A- Structural Adhesive



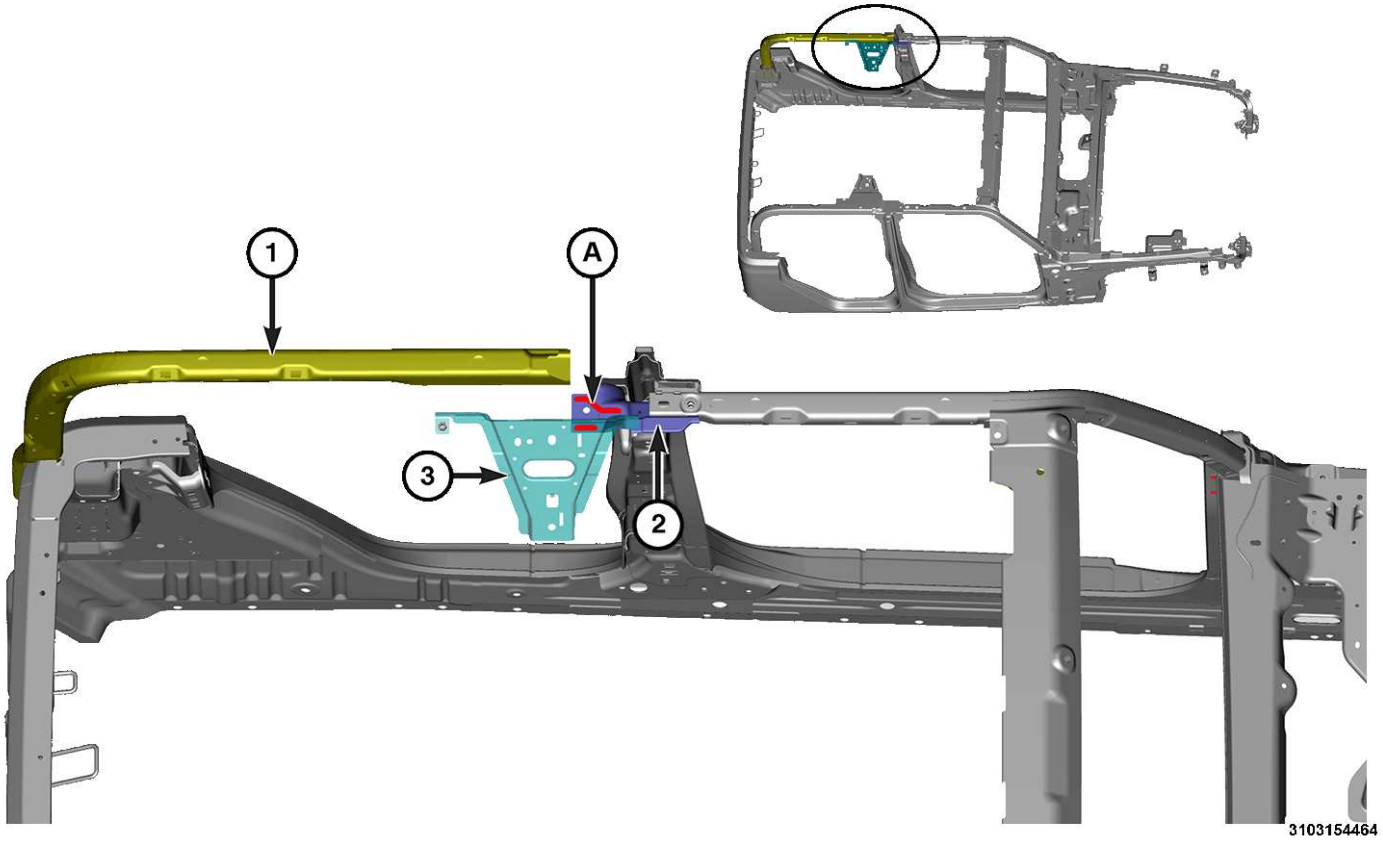
Outer B-Pillar Panel

NOTE: Left side shown, right side similar.
1- Front Body Side Aperture Panel
2- Outer B-Pillar Panel
3- Rear Body Side Aperture Panel
C- Seam Sealer



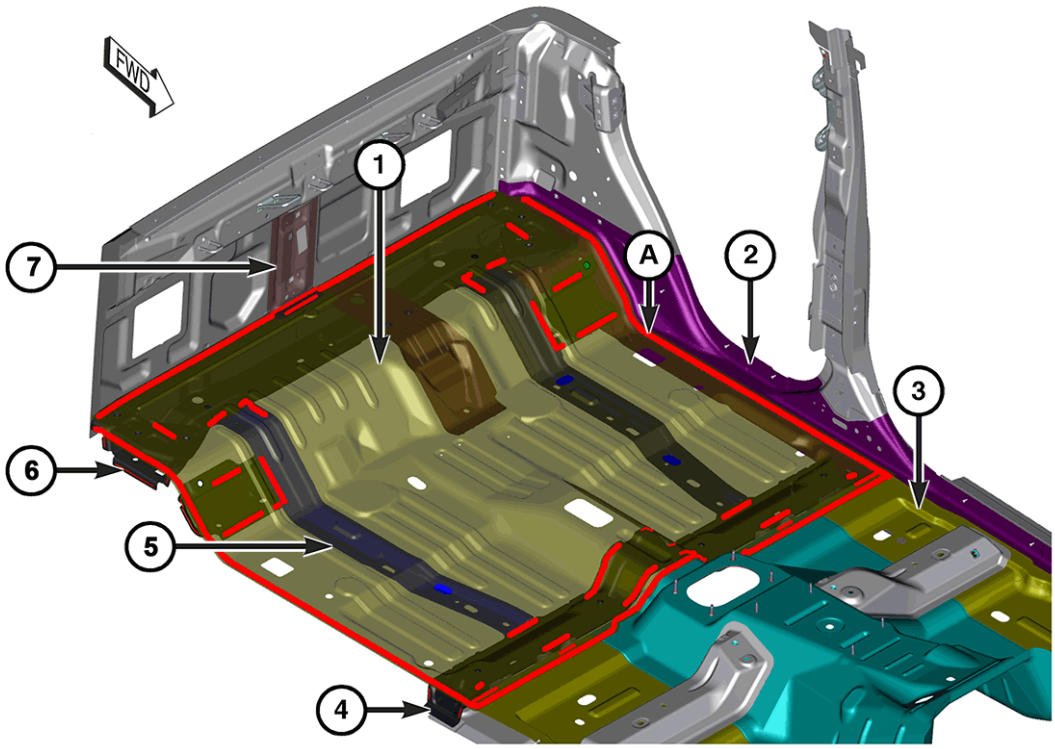
Roof Bows

1- Sport Bar B-Pillar Gusset
2- B-Pillar Upper Gusset
3- B-Pillar Crossmember Lower Reinforcement
4- Front Side Rail Gusset
5- Sport Bar Front Gusset
6- Front Header Lower Reinforcement
A- Structural Adhesive



Sport Bar-Center

NOTE: Left side shown, right side similar.
1- Rear Sport Bar (Moved for Clarity)
2- B-Pillar Upper Bracket
3- B-Pillar Upper Gusset (Transparent for Clarity)
A- Structural Adhesive

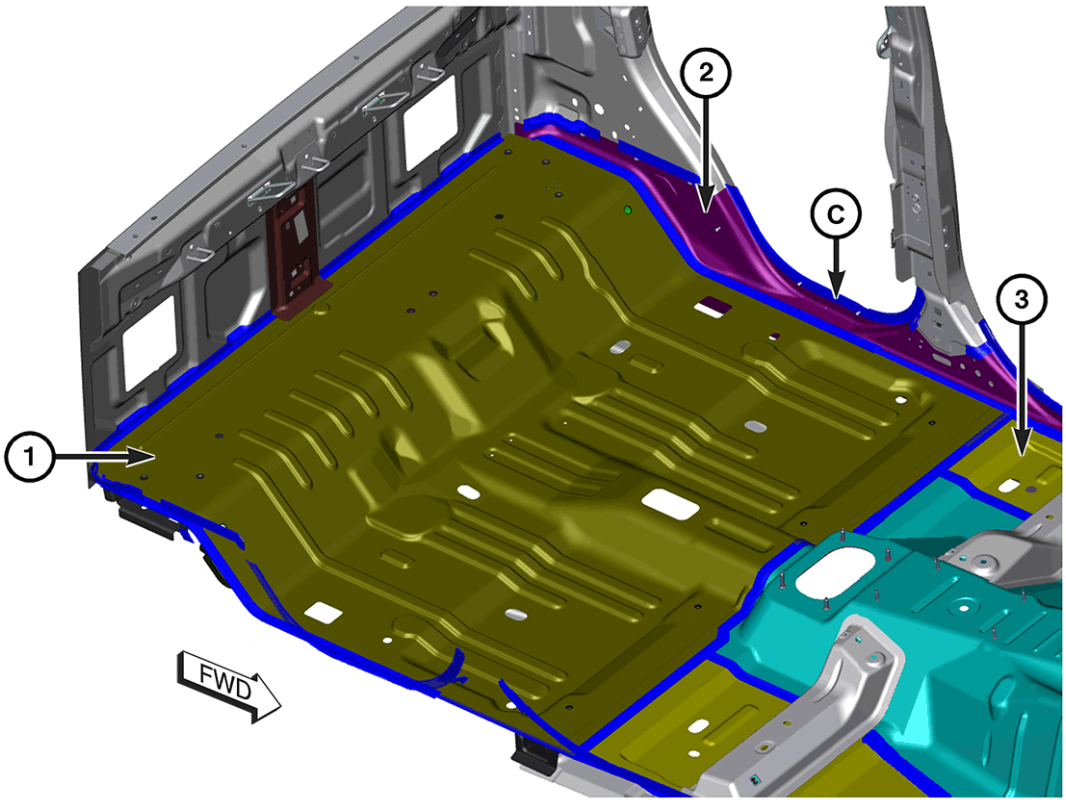


3103154472

Rear Floor Interior (1 of 2)

NOTE: Left side view shown, right side similar.

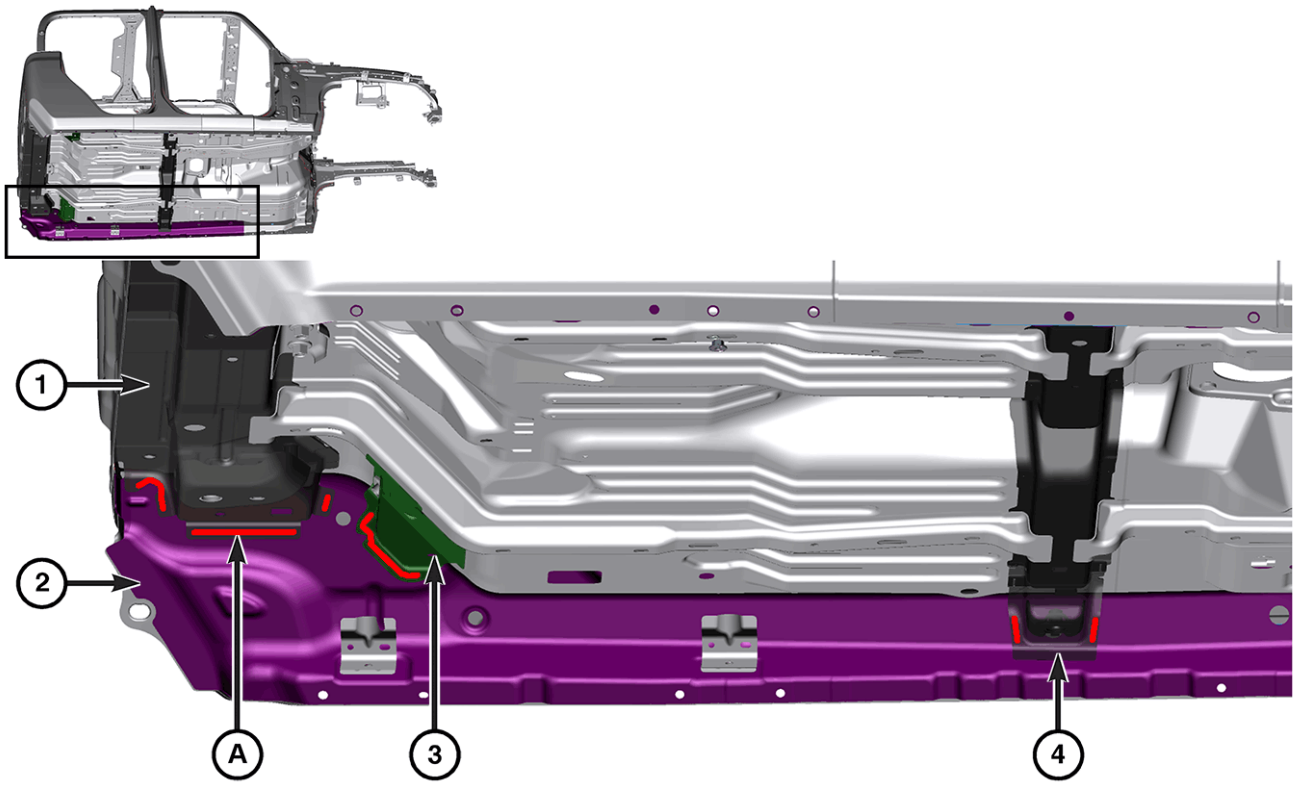
1- Rear Floor Pan (Transparent for Clarity)
2- Inner Sill Panel
3- Right Front Floor Pan
4- Front Seat Retention Crossmember
5- Underbody Hold Down Support
6- Rear Crossmember
7- Cab Back Panel Brace (Transparent for Clarity)
A- Structural Adhesive



3103154474

Rear Floor Interior (1 of 2)

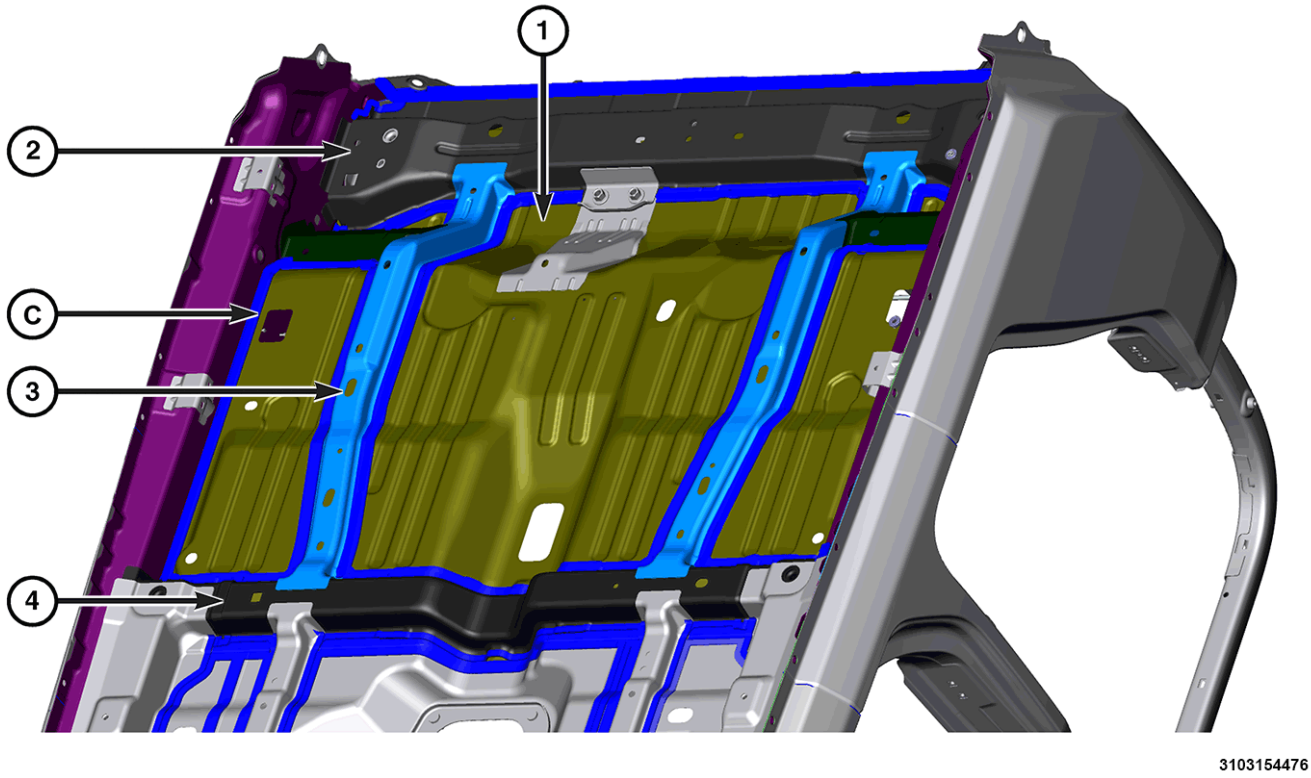
NOTE: Left side view shown, right side similar.
1- Rear Floor Pan
2- Inner Sill Panel
3- Right Front Floor Pan
C- Seam Sealer



3103154477

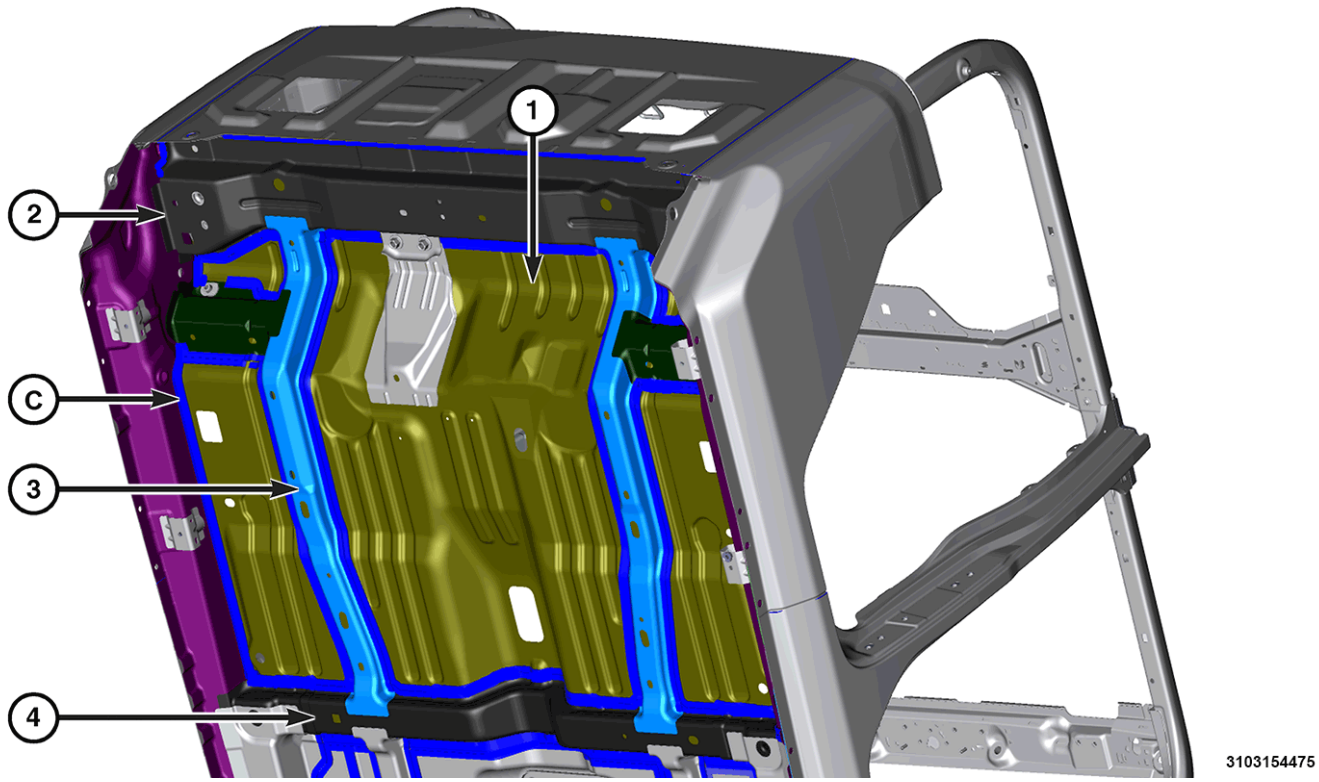
Floor Crossmembers

NOTE: Left side view shown, right side similar.
1- Rear Crossmember (Transparent for Clarity)
2- Inner Sill Panel
3- Floor Pan Support Bracket (Transparent for Clarity)
4- Front Seat Retention Crossmember (Transparent for Clarity)
A- Structural Adhesive



Rear Floor Exterior (1 of 2)

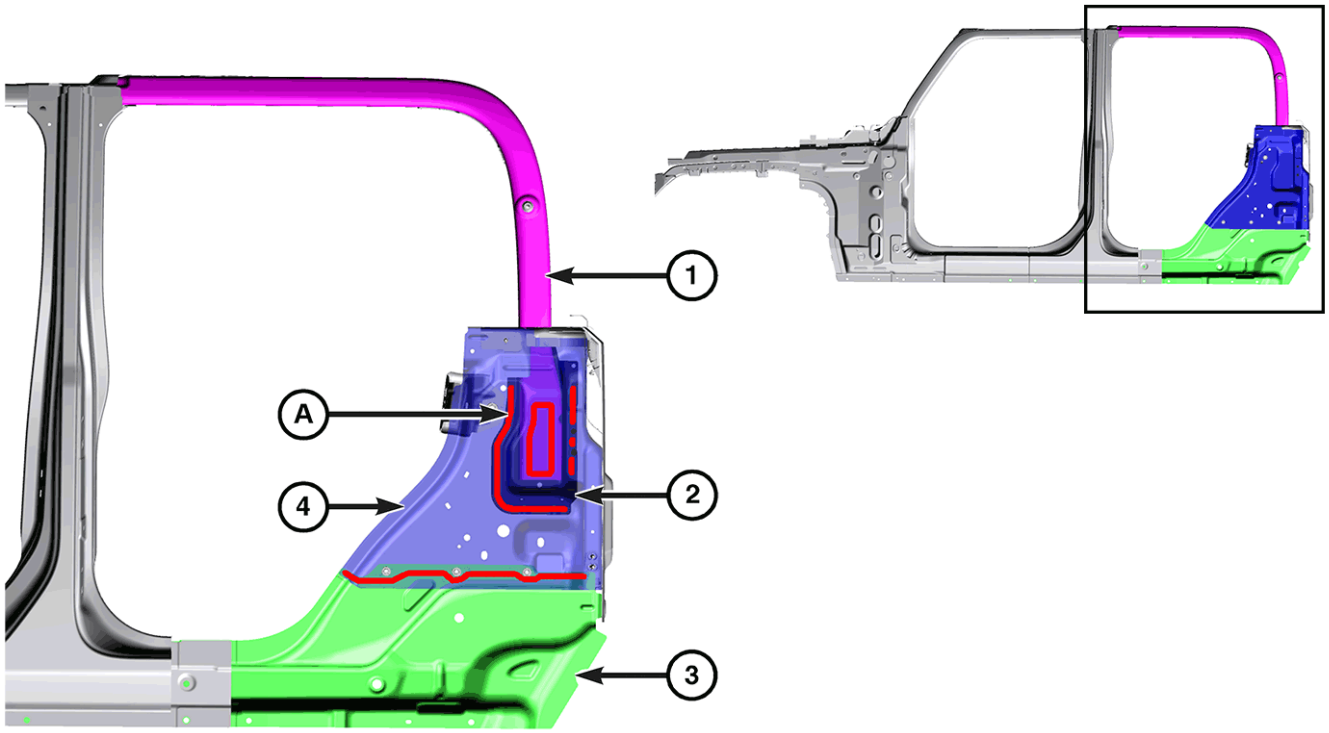
NOTE: Left side view shown, right side similar.
1- Rear Floor Pan
2- Rear Crossmember
3- Underbody Hold Down Support
4- Front Seat Retention Crossmember
C- Seam Sealer



Rear Floor Exterior (2 of 2)

NOTE: Left side view shown, right side similar.

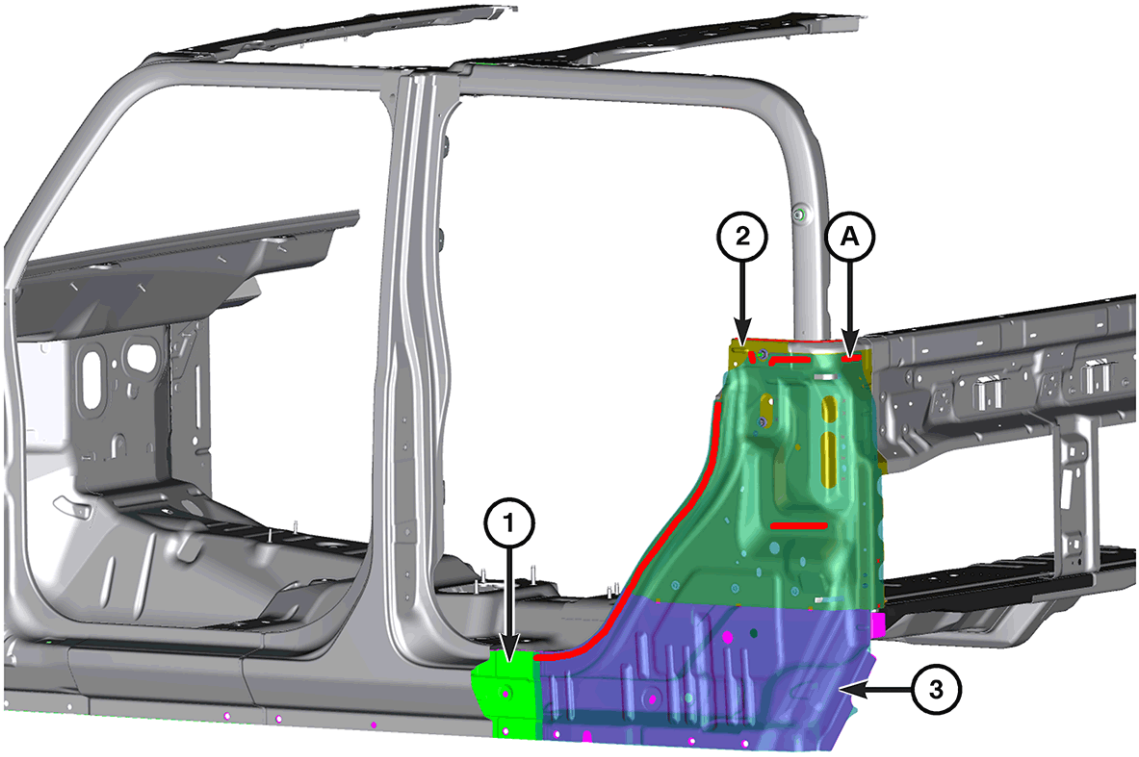
1- Rear Floor Pan
2- Rear Crossmember
3- Underbody Hold Down Support
4- Front Seat Retention Crossmember
C- Seam Sealer



3103154478

Inner Quarter Panel

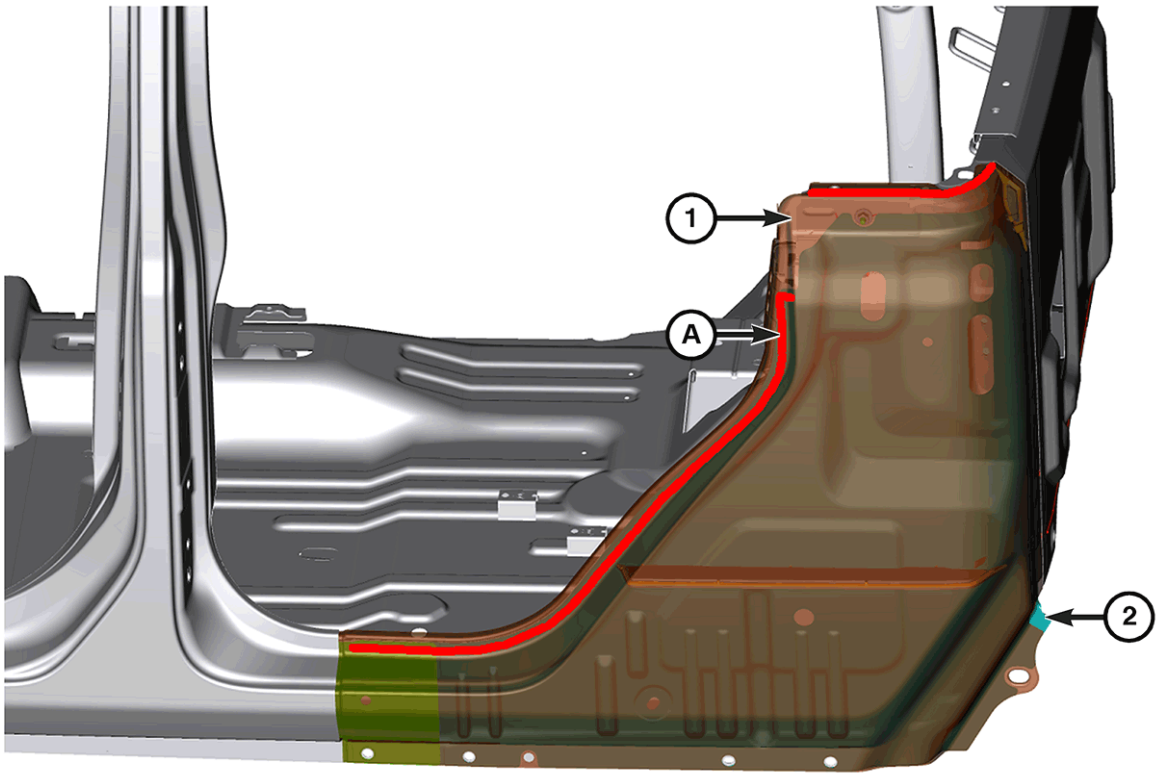
NOTE: Left side shown, right side similar.
1- Rear Sport Bar
2- Sport bar Support Bracket
3- Inner Sill Panel
4- Inner Quarter Panel (Transparent for Clarity)
A- Structural Adhesive



3103154479

C-pillar Reinforcement

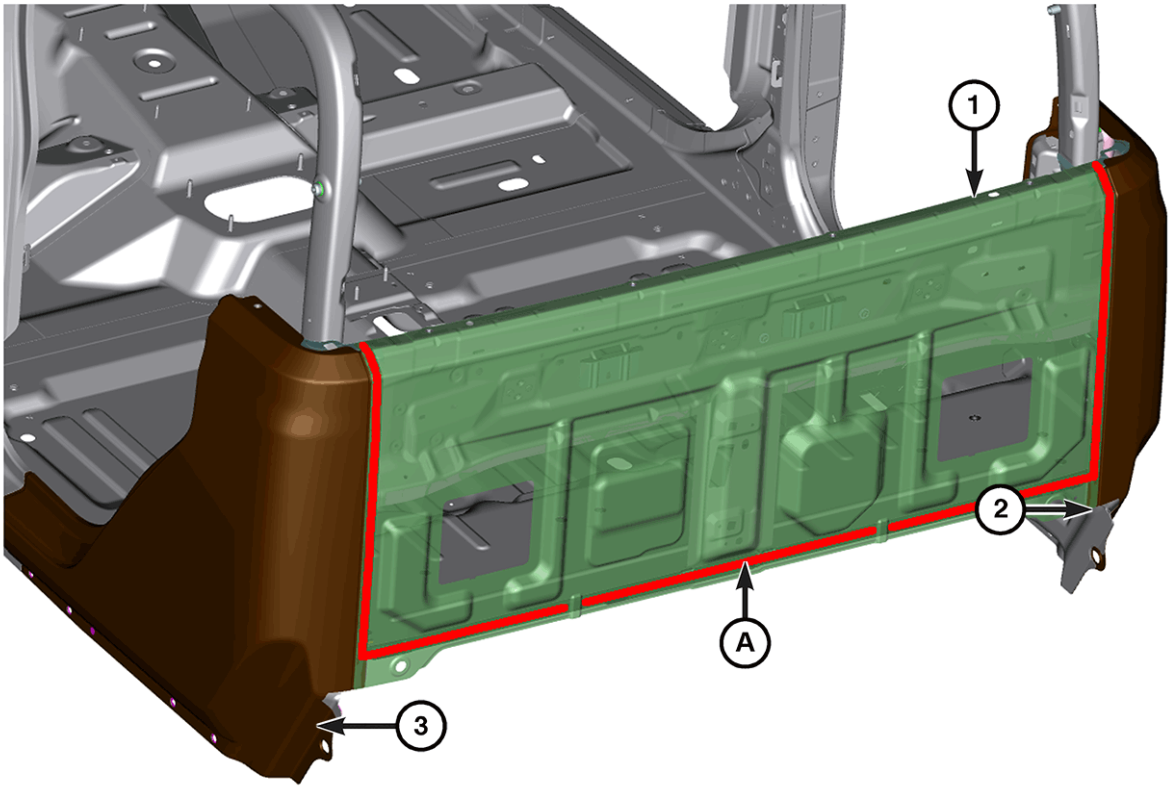
NOTE: Left side shown, right side similar.
1- Outer Sill Panel
2- Inner Quarter Panel
3- C-pillar Reinforcement (Transparent for Clarity)
A- Structural Adhesive



3103154480

Rear Body Side Aperture

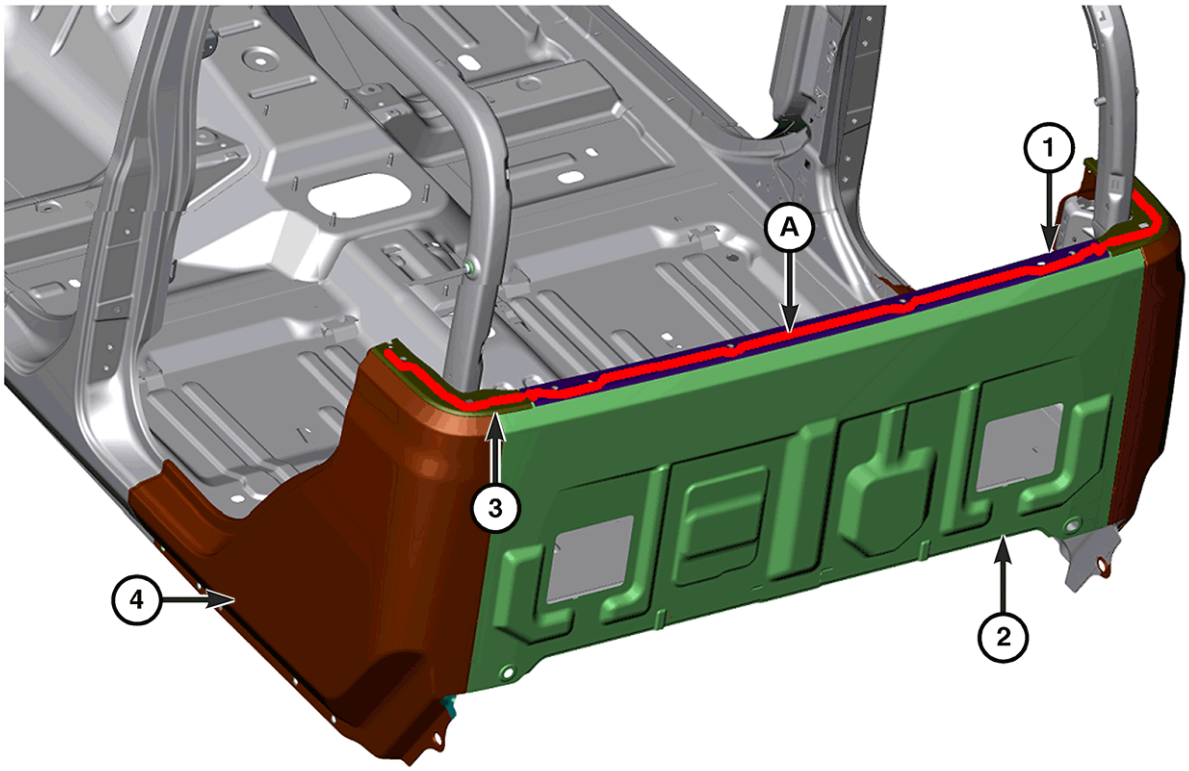
NOTE: Left side shown, right side similar.
1- Rear Body Side Aperture (Transparent for Clarity)
2- C-pillar Reinforcement
A- Structural Adhesive



3103154483

Cab Back Panel

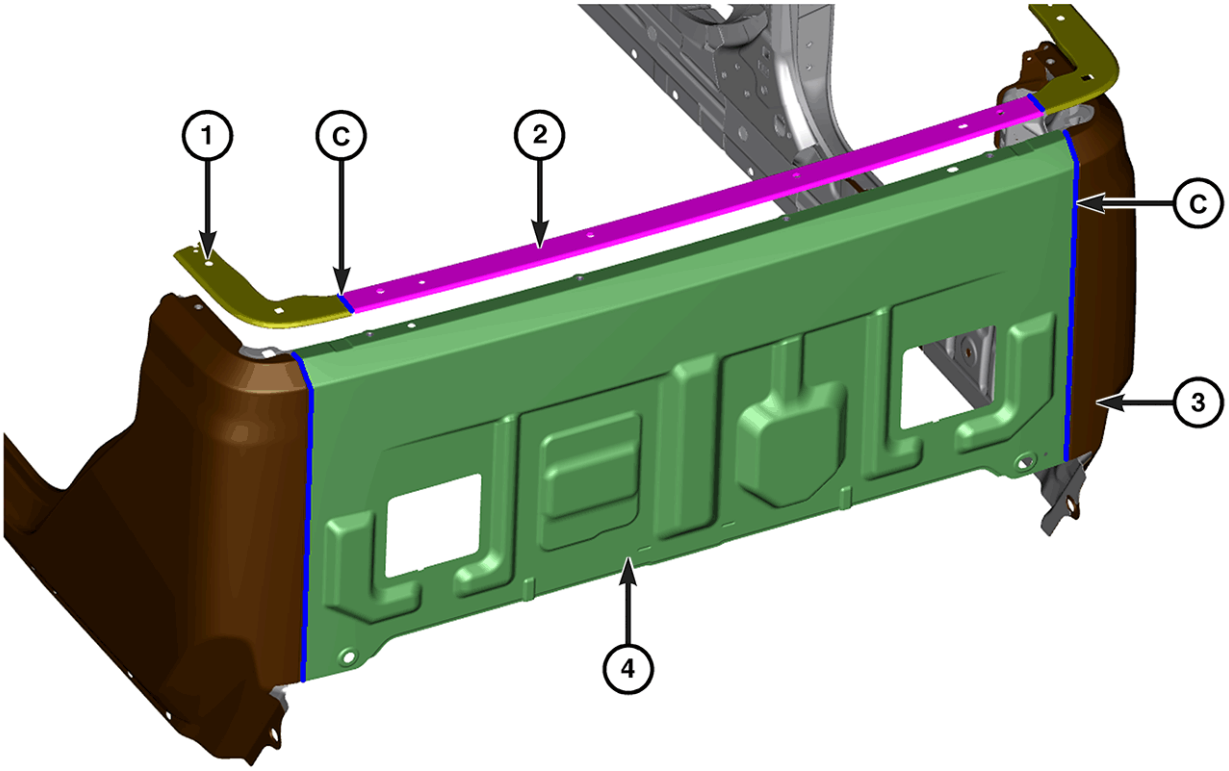
NOTE: Left side shown, right side similar.
1- Cab Back Panel (Transparent for Clarity)
2- Right Rear Body Side Aperture
3- Left Rear Body Side Aperture
A- Structural Adhesive



3103154482

Belt Rail Retainers

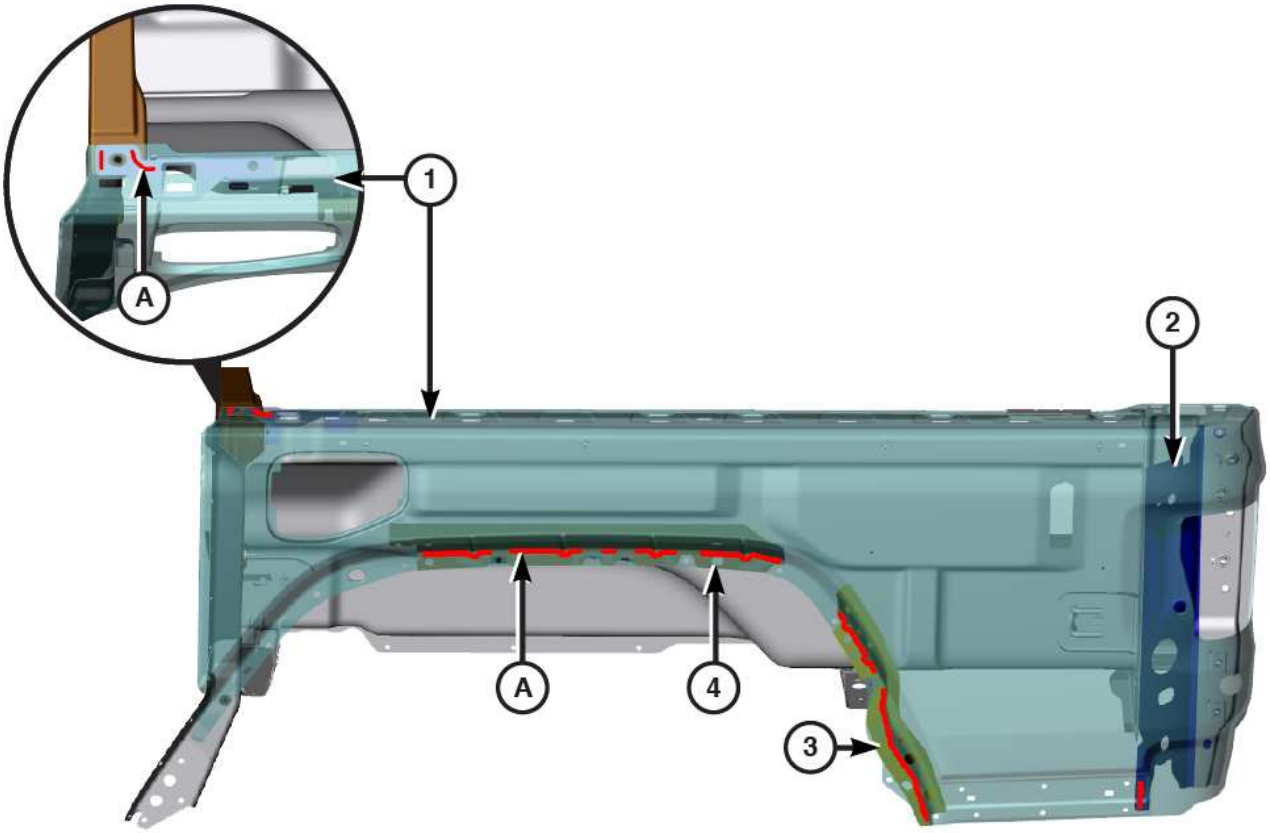
NOTE: Left side shown, right side similar.
1- Center Belt Rail Retainer (Transparent for Clarity)
2- Cab Back Panel
3- Left Belt Rail Retainer (Transparent for Clarity)
4- Rear Body Side Aperture
A- Structural Adhesive



3103154484

Cab Back Panel And Belt Rail Retainers

NOTE: Left side shown, right side similar.
1- Center Belt Rail Retainer
2- Center Belt Rail Retainer
3- Rear Body Side Aperture
4- Cab Back Panel
C- Seam Sealer

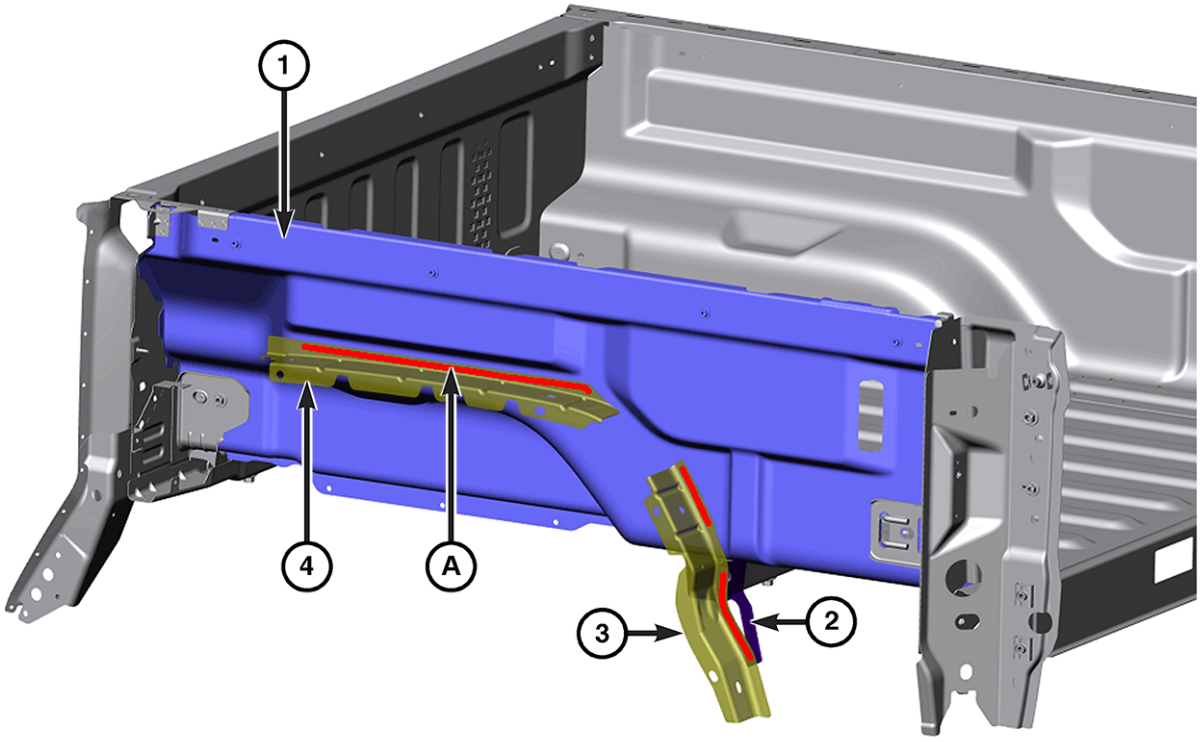


3103154457

Box Side Outer Panel

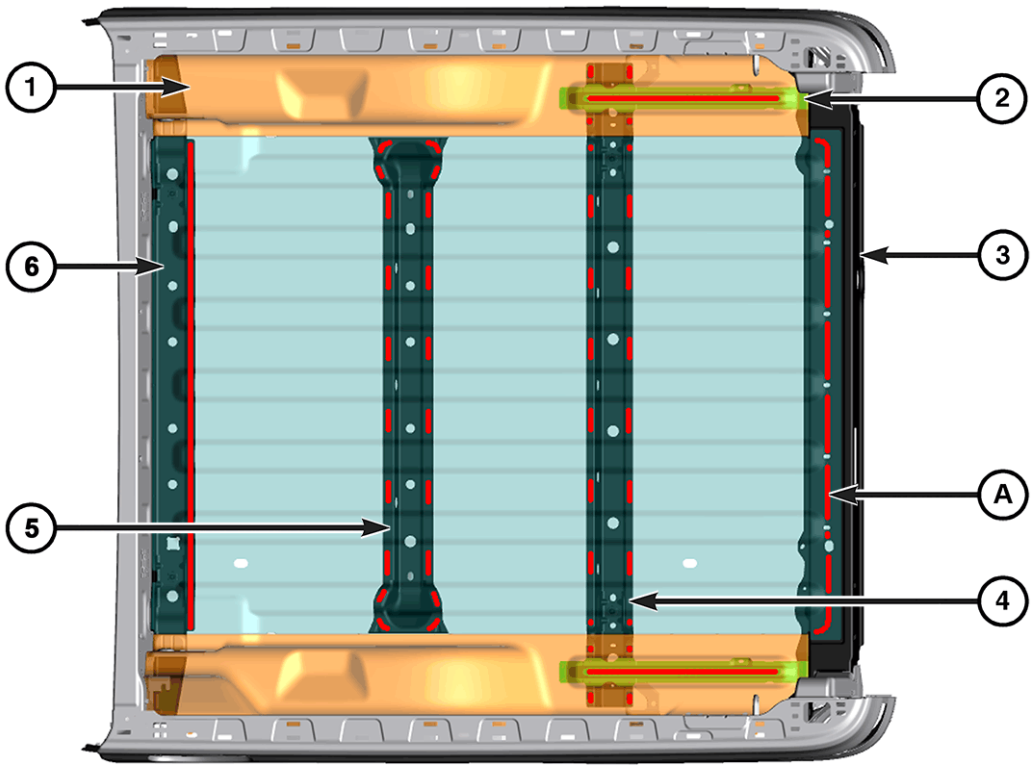
NOTE: Left side shown, right side similar.

1- Box Side Outer Panel (Transparent for Clarity)
2- Wheelhouse Inner Panel
3- Wheelhouse Inner Extension
4- D-Pillar Reinforcement
A- Structural Adhesives



Box Side Inner Panel

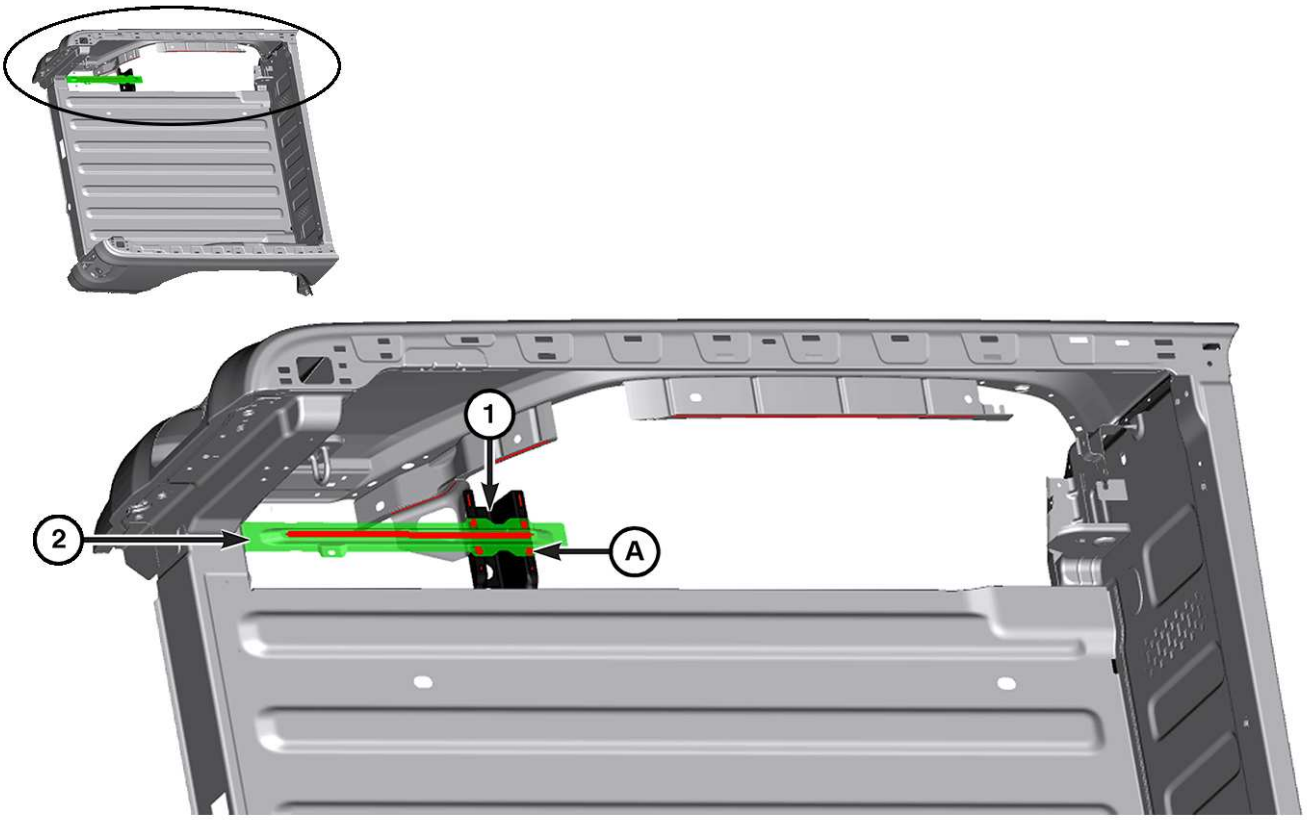
NOTE: Left side shown, right side similar.
1- Box Side Inner Panel (Transparent for Clarity)
2- Wheelhouse Inner Reinforcement
3- Wheelhouse Inner Extension (Transparent for Clarity)
4- Wheelhouse Inner Panel (Transparent for Clarity)
A- Structural Adhesives



3103154459

Box Floor Panel

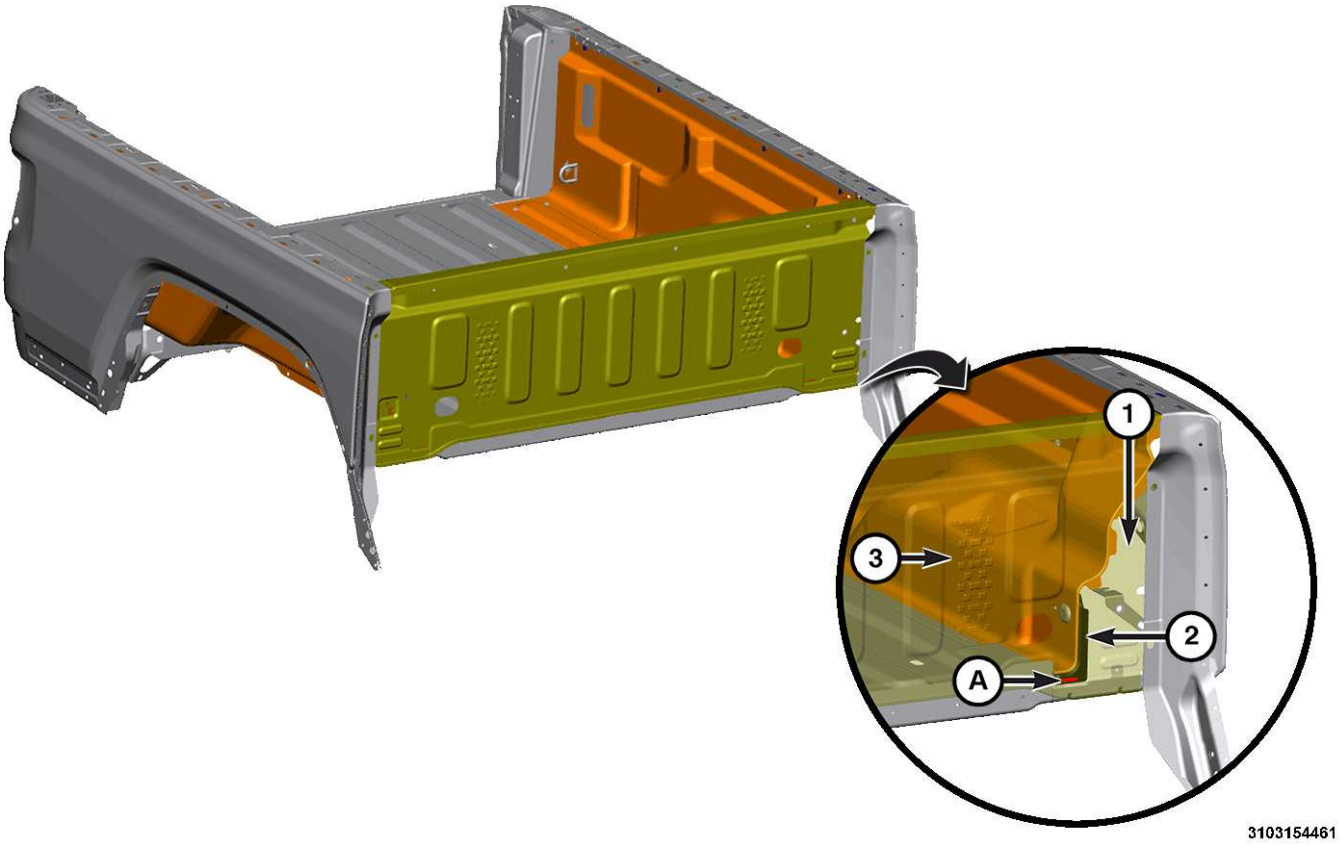
1- Box Side Inner Panel
2- Box Side Inner Reinforcement
3- Closeout Panel
4- Rear Box Crossmember
5- Center Box Crossmember
6- Front Box Crossmember
A- Structural Adhesives



3103154460

Box Side Inner Reinforcement

1- Rear Box Crossmember
2- Box Side Inner Reinforcement
A- Structural Adhesives



Box Front Panel

1- Front Box Panel
2- Tie Down Mounting Reinforcement
3- Box Side Inner Panel
A- Structural Adhesives