Developing Best-In-Class Repairability Guidelines and Procedures

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I-CAR (Inter-Industry Conference on Auto Collision Repair)

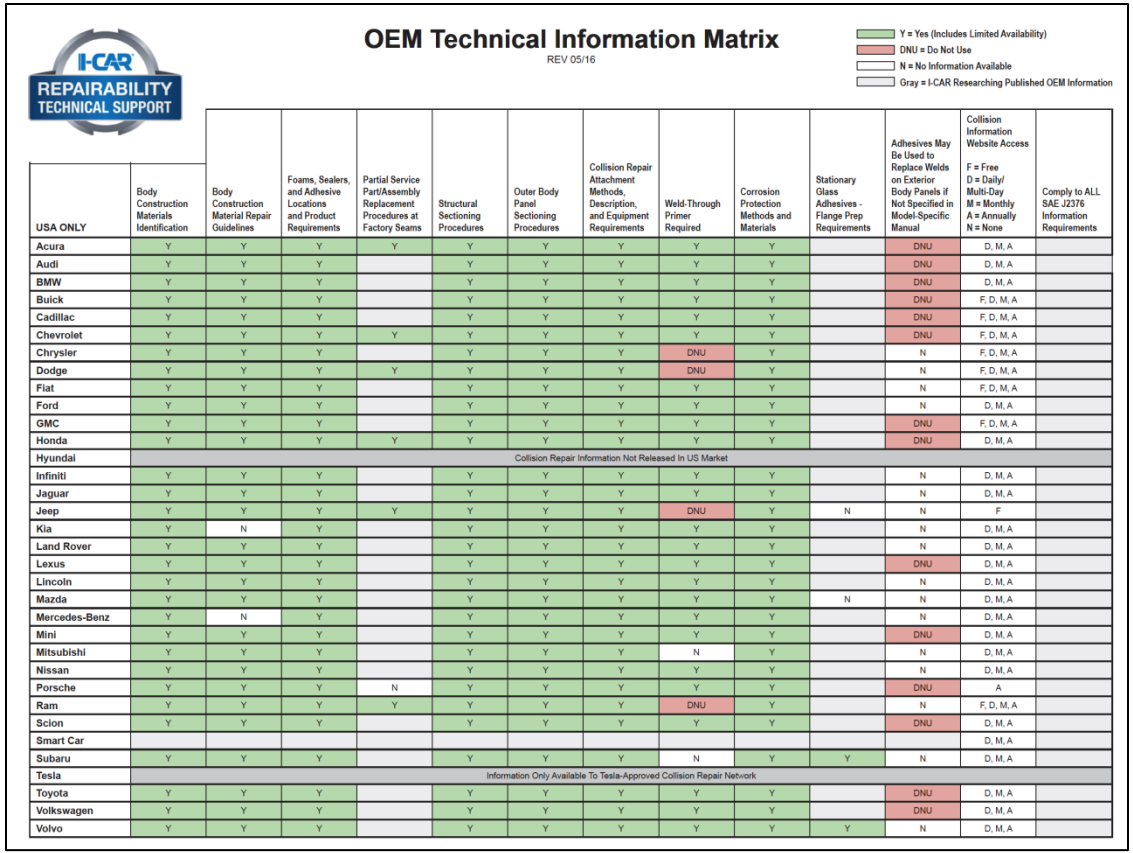
I-CAR Vision

Every person in the collision repair industry has the information, knowledge, and skills to perform complete, safe and quality repairs for the ultimate benefit of the consumer.

2017 Recap

- Material Identification
- Repairability Guidelines
- Standardization and Continued Expansion of Repair Information Types
- Improved Alignment/Standardization of Attachment Methods Used for Collision Repairs

Repair Information



OEM Technical Information Matrix

REV 05/16

I-CAR REPAIRABILITY TECHNICAL SUPPORT

Y = Yes (Includes Limited Availability)
DNU = Do Not Use
N = No Information Available
Gray = I-CAR Researching Published OEM Information

USA ONLY	Body Construction Materials Identification	Body Construction Material Repair Guidelines	Foams, Sealers, and Adhesive Locations and Product Requirements	Partial Service Part/Assembly Replacement Procedures at Factory Seams	Structural Sectioning Procedures	Outer Body Panel Sectioning Procedures	Collision Repair Attachment Methods, Description, and Equipment Requirements	Weld-Through Primer Required	Corrosion Protection Methods and Materials	Stationary Glass Adhesives - Flange Prep Requirements	Adhesives May Be Used to Replace Welds on Exterior Body Panels if Not Specified in Model-Specific Manual	Collision Information Website Access F = Free D = Daily/ Multi-Day M = Monthly A = Annually N = None	Comply to ALL SAE J2376 Information Requirements
Acura	Y	Y	Y	Y	Y	Y	Y	Y	Y		DNU	D, M, A	
Audi	Y	Y	Y		Y	Y	Y	Y	Y		DNU	D, M, A	
BMW	Y	Y	Y		Y	Y	Y	Y	Y		DNU	D, M, A	
Buick	Y	Y	Y		Y	Y	Y	Y	Y		DNU	F, D, M, A	
Cadillac	Y	Y	Y		Y	Y	Y	Y	Y		DNU	F, D, M, A	
Chevrolet	Y	Y	Y	Y	Y	Y	Y	Y	Y		DNU	F, D, M, A	
Chrysler	Y	Y	Y		Y	Y	Y	DNU	Y		N	F, D, M, A	
Dodge	Y	Y	Y	Y	Y	Y	Y	DNU	Y		N	F, D, M, A	
Fiat	Y	Y	Y		Y	Y	Y	Y	Y		N	F, D, M, A	
Ford	Y	Y	Y		Y	Y	Y	Y	Y		N	D, M, A	
GMC	Y	Y	Y		Y	Y	Y	Y	Y		DNU	F, D, M, A	
Honda	Y	Y	Y	Y	Y	Y	Y	Y	Y		DNU	D, M, A	
Hyundai	Collision Repair Information Not Released In US Market												
Infiniti	Y	Y	Y		Y	Y	Y	Y	Y		N	D, M, A	
Jaguar	Y	Y	Y		Y	Y	Y	Y	Y		N	D, M, A	
Jeep	Y	Y	Y	Y	Y	Y	Y	DNU	Y	N	N	F	
Kia	Y	N	Y		Y	Y	Y	Y	Y		N	D, M, A	
Land Rover	Y	Y	Y		Y	Y	Y	Y	Y		N	D, M, A	
Lexus	Y	Y	Y		Y	Y	Y	Y	Y		DNU	D, M, A	
Lincoln	Y	Y	Y		Y	Y	Y	Y	Y		N	D, M, A	
Mazda	Y	Y	Y		Y	Y	Y	Y	Y	N	N	D, M, A	
Mercedes-Benz	Y	N	Y		Y	Y	Y	Y	Y		N	D, M, A	
Mini	Y	Y	Y		Y	Y	Y	Y	Y		DNU	D, M, A	
Mitsubishi	Y	Y	Y		Y	Y	Y	N	Y		N	D, M, A	
Nissan	Y	Y	Y		Y	Y	Y	Y	Y		N	D, M, A	
Porsche	Y	Y	Y	N	Y	Y	Y	Y	Y		DNU	A	
Ram	Y	Y	Y	Y	Y	Y	Y	DNU	Y		N	F, D, M, A	
Scion	Y	Y	Y		Y	Y	Y	Y	Y		DNU	D, M, A	
Smart Car												D, M, A	
Subaru	Y	Y	Y		Y	Y	Y	N	Y	Y	N	D, M, A	
Tesla	Information Only Available To Tesla-Approved Collision Repair Network												
Toyota	Y	Y	Y		Y	Y	Y	Y	Y		DNU	D, M, A	
Volkswagen	Y	Y	Y		Y	Y	Y	Y	Y		DNU	D, M, A	
Volvo	Y	Y	Y		Y	Y	Y	Y	Y	Y	N	D, M, A	

http://bit.ly/2pdB9hd

Body Repair Manual Needs

- Material Identification
- Repairability Guidelines
- Foams, Sealers and Adhesive Locations and Product Requirements
- Partial Service Part/Assembly Replacement Procedures at Factory Seams
- Structural Sectioning Procedures
- Outer Body Panel Sectioning Procedures

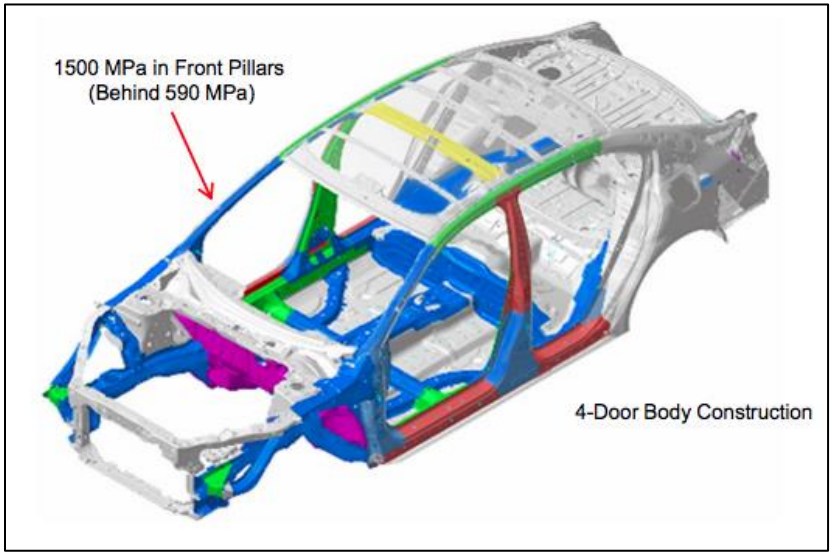
Body Repair Manual Needs (cont'd)

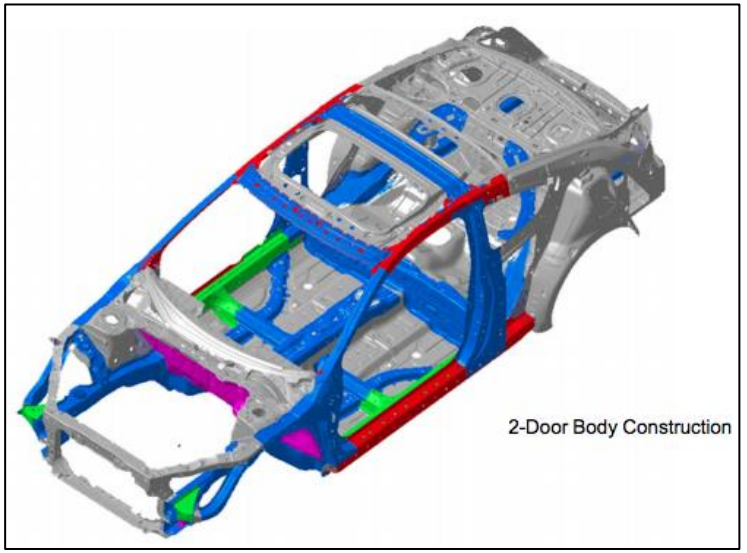
- Collision Repair Attachment Methods, Description and Equipment Requirements
- Weld-Through Primer Requirements
- Corrosion Protection Methods and Materials
- Stationary Glass Adhesives and Flange Prep Requirements
- Adhesive Bonding Options
- Layout and Search Functionality

Material Identification

- Key to Repairability
- Important During Damage Assessment & Repair
  - Collision Repairers
  - Insurers
- Easily Accessible
- Need Tensile Strength Identified (Mild, HSS, UHSS)

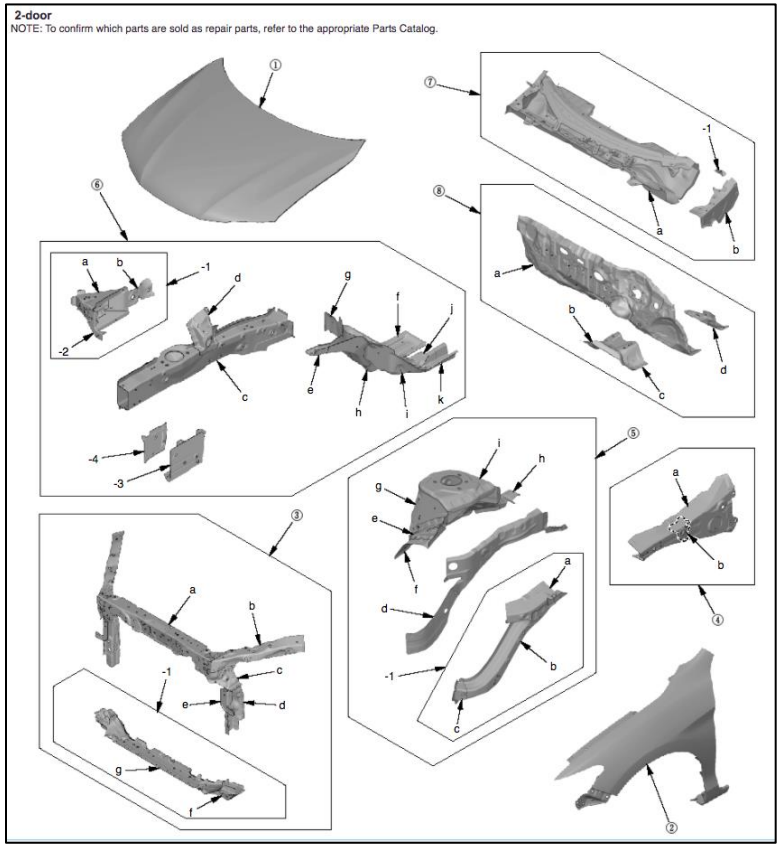
Material Identification





Honda Accord

Material Identification (cont'd)



2-door

NOTE:

- The parts marked with numbers are sold as repair parts.
- The parts marked with letters are not sold separately and are shown only for reference.
- [ ]: Thickness unit: mm (in)
- High-strength steel sheet: Tensile strength 340 to 1500 MPa.

No.	Part Name		Tensile Strength (MPa)	Zinc-Plating
①	Hood	Skin [0.7 (0.028)]	340	○
		Frame [0.55 (0.0217)]	270	○
②	Front Fender [0.7 (0.028)]		270	○
③	Front Bulkhead Complete			
	a: Bulkhead Center Frame, Upper [0.8 (0.031)]/Lower [1.0 (0.039)]		270	○
	b: Bulkhead Side Frame, Inner and Outer [0.8 (0.031)]		270	○
	c: Bulkhead Side Stay Plate [0.8 (0.031)]		270	○
	d: Bulkhead Side Stay [1.0 (0.039)]		270	○
	e: Bumper Beam Bracket [2.3 (0.091)]		590	○
-1	Front Bulkhead Lower Crossmember Set			
	f: Bulkhead Lower Crossmember [0.8 (0.031)]		270	○
	g: Lower Crossmember Plate [1.0 (0.039)]		270	○
④	Front Wheelhouse Upper Member Complete			
	a: Front Side Member [1.4 (0.055)]		590	○
	b: Upper Member Bulkhead [1.0 (0.039)]		270	○
⑤	Front Wheelhouse Complete			
-1	Front Wheelhouse Lower Member Set			
	a: Wheelhouse Upper Front Member [0.8 (0.031)]		270	○
	b: Wheelhouse Lower Member [0.8 (0.031)]		440	○
	c: Wheelhouse Lower Member Patch [2.0 (0.079)]		270	○
	d: Wheelhouse Upper Inner [1.0 (0.039)]		590	○
	e: Wheelhouse Gusset [1.0 (0.039)]		590	○
	f: Front Wheelhouse [0.7 (0.028)]		270	○
	g: Damper Housing [1.2 (0.047)]		270	○
	h: Damper Housing Extension [0.7 (0.028)]		270	○
	i: Damper Base [3.2 (0.126)]		270	○
⑥	Front Side Frame Complete			
-1	Bumper Beam Side Bracket Set			
-2	Bumper Beam Side Bracket [2.3 (0.091)]		590	○
	a: Side Frame Front Box [2.0 (0.079)]		780	○
	b: Side Frame Front Box Rear [2.3 (0.091)]		590	○
-3	Subframe Support Bracket [1.6 (0.063)]		590	○
-4	Subframe Front Plate [2.0 (0.079)]		270	○
	c: Front Side Frame [1.6 (0.063)]/Front Side Backplate [1.4 (0.055)]		590	○
	d: Wheelhouse Front Lower Gusset [1.6 (0.063)]		270	○
	e: Side Frame Rear Stiffener [1.8 (0.071)]		590	○
	f: Side Frame Rear End [1.8 (0.071)]		590	○
	g: Outrigger [1.4 (0.055)]		590	○
	h: Subframe Rear Bracket [1.6 (0.063)]		440	○
	i: Subframe Bracket Frame [2.3 (0.091)]		440	○
	j: Subframe Bracket Patch [2.0 (0.079)]		590	○
	k: Subframe Bracket Frame Rear [1.4 (0.055)]		590	○

Honda

Material Identification (cont'd)

2-door

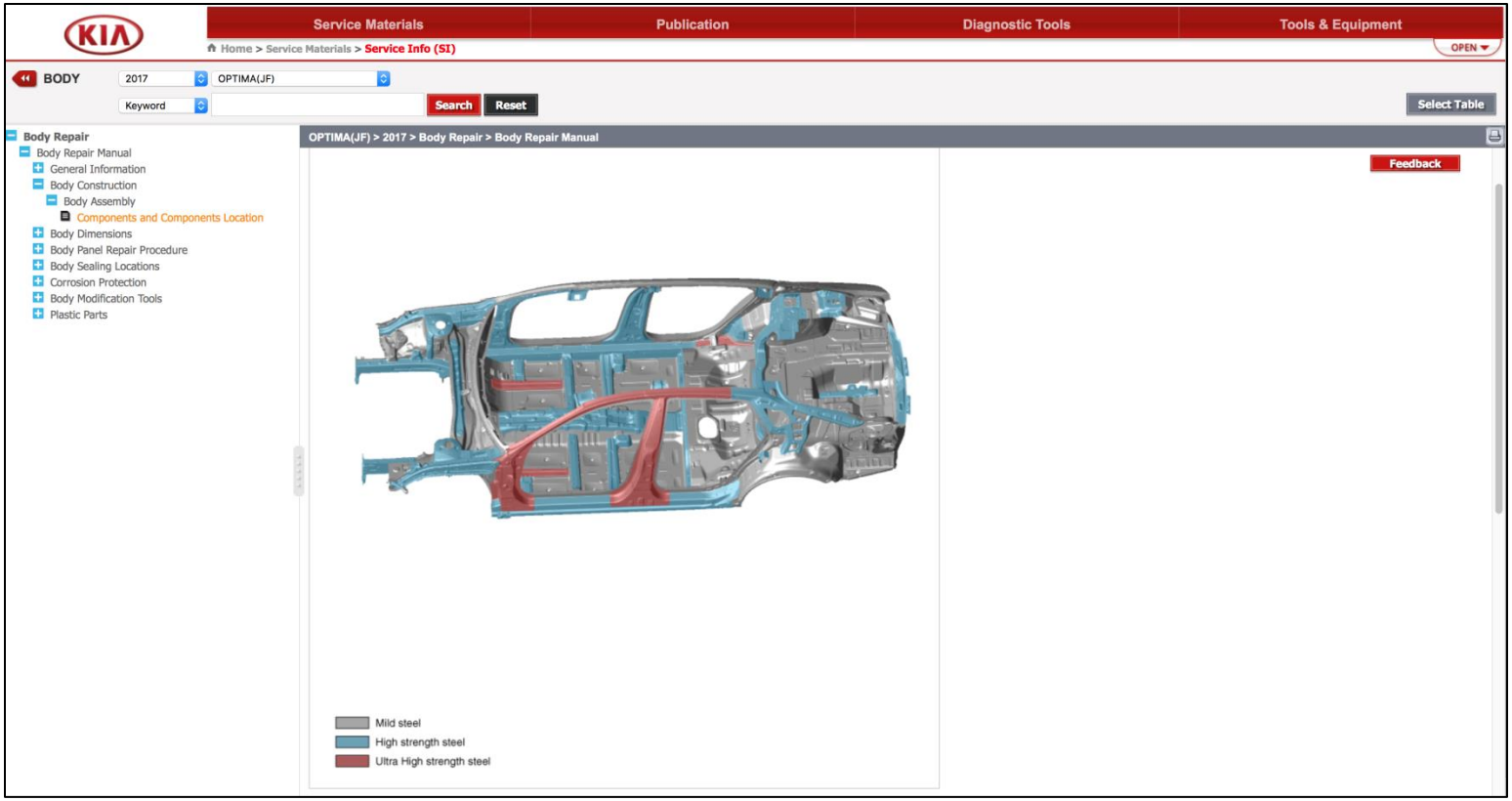
NOTE:

- The parts marked with numbers are sold as repair parts.
- The parts marked with letters are not sold separately and are shown only for reference.
- [ ]: Thickness unit: mm (in)
- High-strength steel sheet: Tensile strength 340 to 1500 MPa.

No.	Part Name		Tensile Strength (MPa)	Zinc-Plating
①	Hood	Skin [0.7 (0.028)]	340	o
		Frame [0.55 (0.0217)]	270	o
②	Front Fender [0.7 (0.028)]		270	o
③	Front Bulkhead Complete			
	a: Bulkhead Center Frame, Upper [0.8 (0.031)]/Lower [1.0 (0.039)]		270	o
	b: Bulkhead Side Frame, Inner and Outer [0.8 (0.031)]		270	o
	c: Bulkhead Side Stay Plate [0.8 (0.031)]		270	o
	d: Bulkhead Side Stay [1.0 (0.039)]		270	o
	e: Bumper Beam Bracket [2.3 (0.091)]		590	o

Honda

Material Identification (cont'd)



Kia
Optima

Repairability Guidelines

Recommended GM Steel Reparability Matrix

Steel ID Stamping Symbols[4]	Grade	GM Specifications	Welding Method			Cold repair	Use of Heat for repair	Temp. Range	Maximum Heat
			MIG	RSW	MIG Braze[1]				
	Mild Steel Laminate steel	GM6409M (all) GMW2M (all)	Yes NO	Yes Yes	Yes NO	Yes[2] Yes[2]	Yes NO	Up to 1200 °F (650 °C)	90 sec. x 2
	Bake Hardened	GM6093M (all) GMW3032M(all)	Yes	Yes	Yes	Yes[2]	Yes	Up to 1200 °F (650 °C)	90 sec. x 2
	Solid Solution-Strengthened		Yes	Yes	Yes	Yes[2]	Yes	Up to 1200 °F (650 °C)	90 sec. x 2
	High Strength, Low Alloy	GM6208M (all), GM6218M(all), GM3032M(HR CR grades)	Yes	Yes	Yes	Yes[2]	Yes	Up to 1200F (650 °C)	90 sec. x 2
	Dual Phase ≤799 MPA min. UTS	GMW3032M (HR DP and CR DP grades) GMW3399M (HR DP, CR DP and HR HE grades with TS<800MPa)	Yes	Yes	Yes	Yes[2]	No	N/A	N/A
DPX ≥800MPA	Dual Phase ≥800 MPA min. UTS[3]	GMW3399M(all other HR DP, CR DP and HR HE Grades)	Yes[3]	Yes	Yes[3]	No	No	N/A	N/A
M B	UHSS[3] Martensitic[3] Boron (PHS/Hot-Stamped)[3]	GM6123M (all) GMW3399M (all MS grades) GMW14400	Yes[3]	Yes	Yes[3]	No	No	N/A	N/A

[1] Must use 8mm x16mm slotted holes
[2] Cold repairs can be performed if damage excludes kinks.
[3] Mig Plug Only, NO STITCH WELDING. These steels may NOT be used as a backer for stitch welding. NOTE. Deviation from this chart is ONLY allowed if there has been a crash analysis completed by the Design Engineer and a Service procedure has been written. NOTE number values are tensile strength
[4] ISO Symbol for repair.
Note: GM does not endorse repair of door impact beams.
Dual phase Steels up to DP 800 may be sectioned with a sleeve or backer plate.

General Motors

Ford-Recommended Steel Repairability Matrix

Grade	Trade Descriptions	Welding Method			Cold Repairs	Use of Heat for Repair	Temp. Range	Maximum Heat
		MIG	RSW	MIG Braze				
Mild Steel	Mild	Yes	Yes	N/A	Yes**	Yes	Up to 1200°F (650°C)	90 sec. X 2
Laminate Steel	Quiet Steel	No	Yes	No	Yes**	No	N/A	N/A
Bake-Hardened	BH 180, BH 210, BH 250, BH 280	Yes	Yes	Yes	Yes**	Yes	Up to 1200°F (650°C)	90 sec. X 2
Solid Solution-Strengthened		Yes	Yes	Yes	Yes**	Yes	Up to 1200°F (650°C)	90 sec. X 2
High-Strength, Low-Alloy	HSLA 250, HSLA 350, HSLA 550	Yes	Yes	Yes	Yes**	Yes	Up to 1200°F (650°C)	90 sec. X 2
Dual-Phase <= 600 Mpa UTS (particular to 780and 980 grades)***	DP 500, DP 600	Yes	Yes	Yes	Yes**	No	N/A	N/A
UHSS Martensitic Boron****	Bare Boron USIBOR	Yes* (plug weld only)	Yes	Yes	No	No	N/A	N/A
TRIP	TRIP 590, TRIP 780, TRIP 980	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTE: MIG Braze allowed for non-structural applications only.
* Mig Plug Only, NO STITCH WELDING.
** Cold repairs can be performed if damage excludes kinks; may section only if Workshop Manual procedure allows.
*** Dual-phase steels DP 700, DP 780 and DP 980 must be replaced at factory joints; may section only if Workshop Manual procedure allows.
**** Boron components must be replaced at factory joints; no sectioning allowed.

Ford GENUINE PARTS

Ford

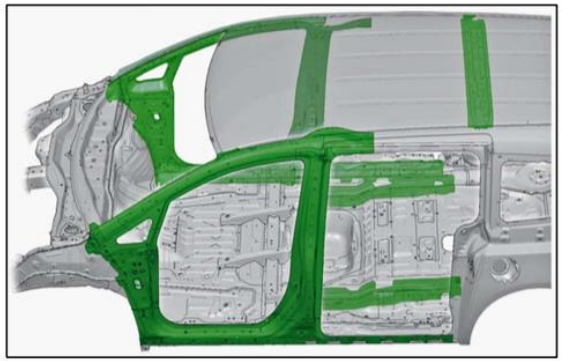
Repairability Guidelines (cont'd)

Welding Precautions and Information

REPAIRING 1,500 MPa STEEL PARTS

Observe these precautions when repairing 1,500 MPa steel parts:

- NEVER attempt to straighten damaged 1,500 MPa steel parts because they may crack.
- 1,500 MPa steel parts MUST be replaced at factory seams using squeeze-type resistance spot welding (STRSW).
- MIG brazed joints should be used ONLY in locations not accessible by a spot welder.
- To assure adequate weld tensile strength, always set the spot welder to the specifications provided in the body repair manual.



Important Information

Parts made of Ultra High Strength Steel (UHSS/1,500MPa/ USIBOR, Hot Stamp) must be installed as a complete part. No sectioning allowed. Ultra High Strength Steel requires special welding equipment, procedures, and settings. See the welding section of the appropriate body repair manual. Failure to use the proper equipment or follow the proper procedures can result in an unsafe repair.

Honda

Foams, Sealers and Adhesives

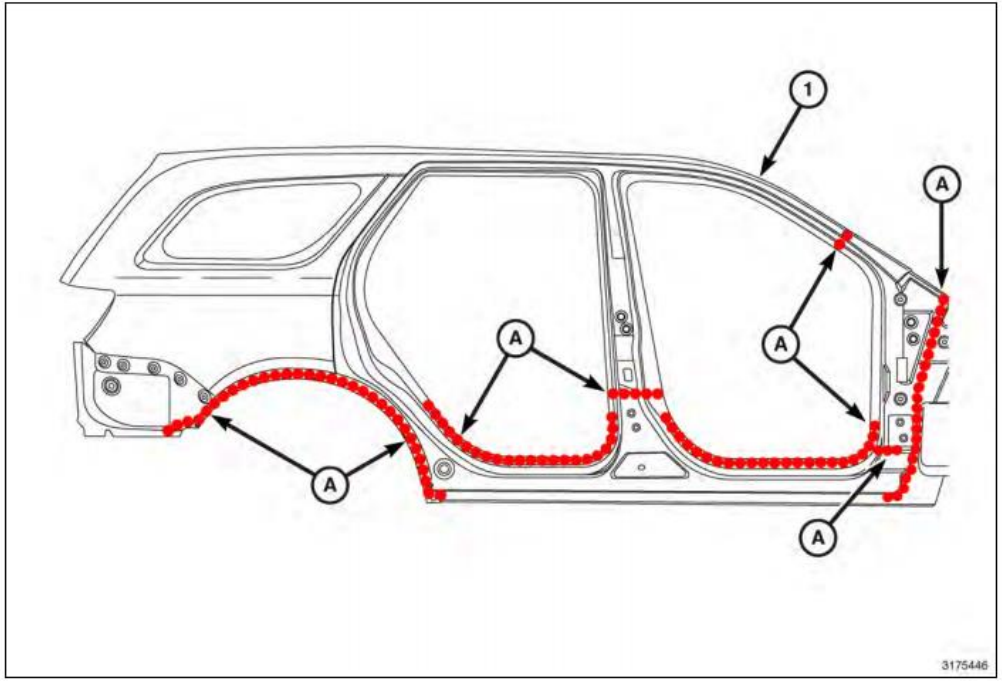


Fig. 53 Right Body Side Aperture

1 - RIGHT BODY SIDE APERTURE

A - STRUCTURAL ADHESIVE

Dodge Durango

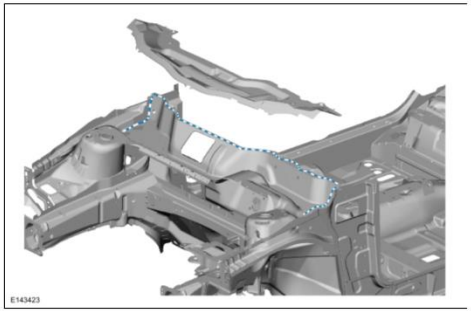
Foams, Sealers and Adhesives (cont'd)

Sealer, Underbody Protection Material and Adhesives

Adhesives

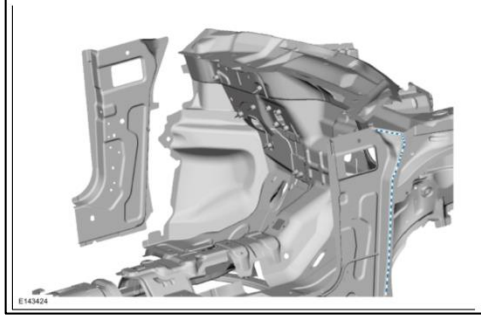
NOTE: *The following illustrations are examples of structural adhesive application and are not all inclusive.*

Upper Cowl Panel to Lower Cowl Panel



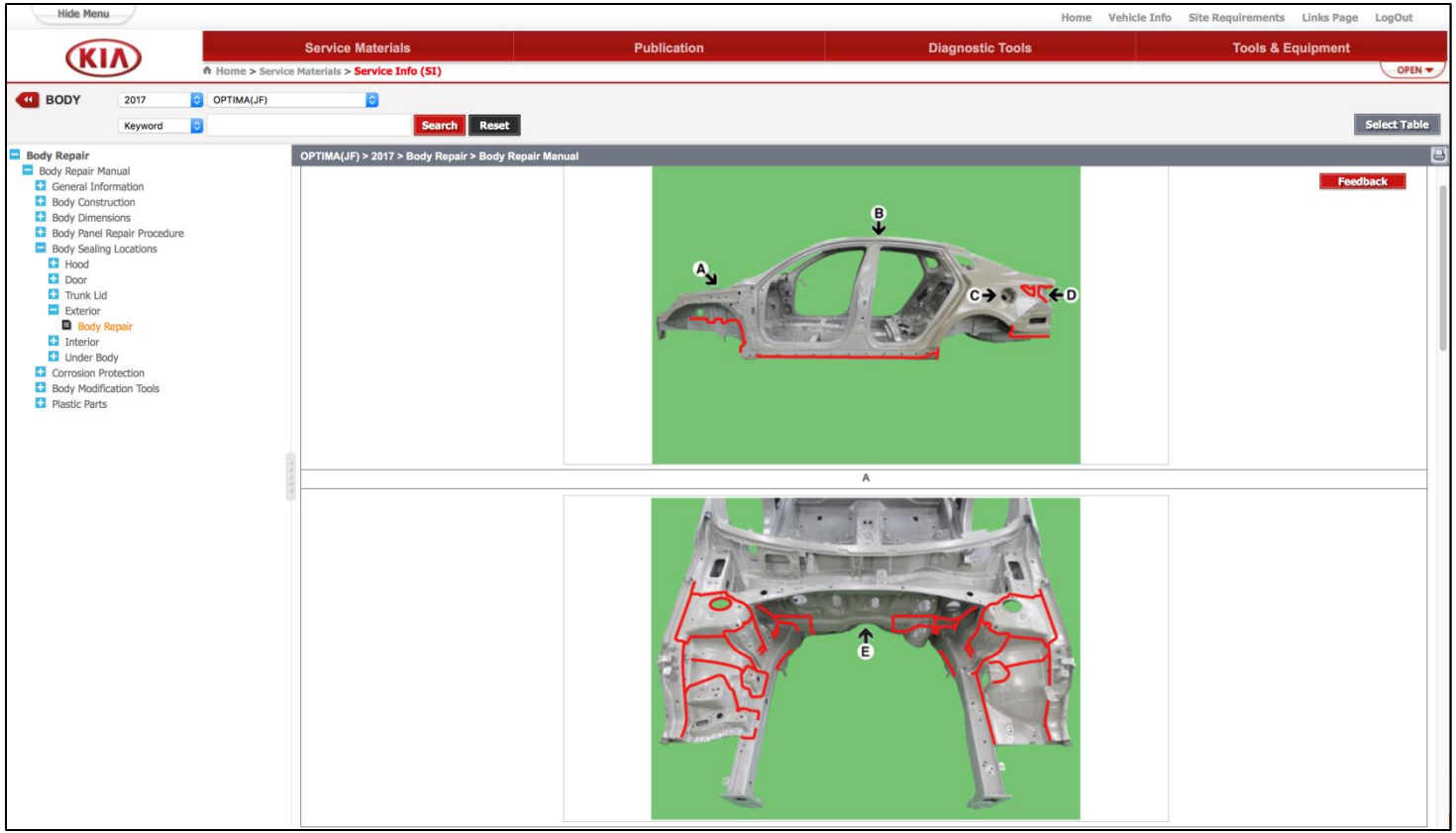
Front Structure to A-Pillar

NOTE: *Right Hand (RH) side shown, Left Hand (LH) side similar.*



Ford Focus

Foams, Sealers and Adhesives (cont'd)



Kia Optima

Partial Part Replacement Seams

Service Information

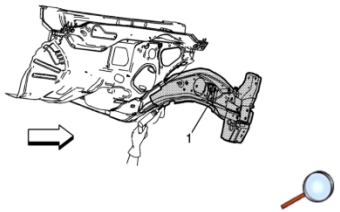
2017 Chevrolet Impala | Impala Service Manual 9410864 | Body Repair | Collision Repair | Repair Instructions | **Document ID: 2369713**

Front Compartment Front Half Rail Replacement

Removal Procedure

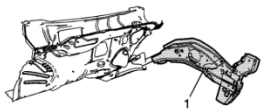
Warning: Refer to Approved Equipment for Collision Repair Warning.

1. Disable the SIR System. Refer to SIR Disabling and Enabling.
2. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection.
3. Remove the front compartment upper side rail. Refer to Front Compartment Upper Side Rail Replacement.
4. Remove the headlamp mount panel.
5. Remove the front wheelhouse. Refer to Front Wheelhouse Panel Replacement.
6. Visually inspect the damage. Repair as much of the damage as possible.
7. Remove the sealers and anti-corrosion materials from the repair area, as necessary. Refer to Anti-Corrosion Treatment and Repair.



Note: Record the number and location of the factory welds for installation of the front compartment front half rail.

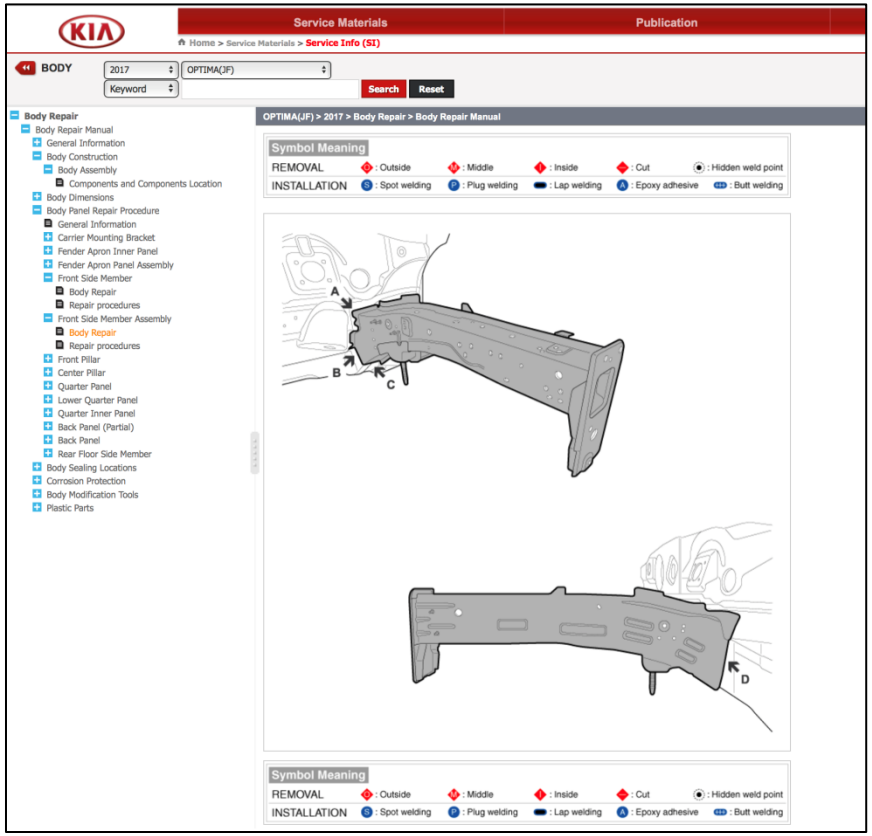
8. Locate and drill out all the necessary factory welds (1).



Chevrolet Impala

Partial Part Replacement (cont'd)

Kia Optima



Structural Sectioning Procedures

Service Information

2018 Chevrolet Cruze (Gen II - VIN B) | Cruze Gen II - VIN B Service Manual Israel, US/Canada 10983987 | Body Repair | Collision Repair | Repair Instructions |

Document ID: 4325310

Front Compartment Side Rail Sectioning

Removal Procedure

Warning: Approved Equipment for Collision Repair Warning.

Warning: Collision Sectioning Warning.

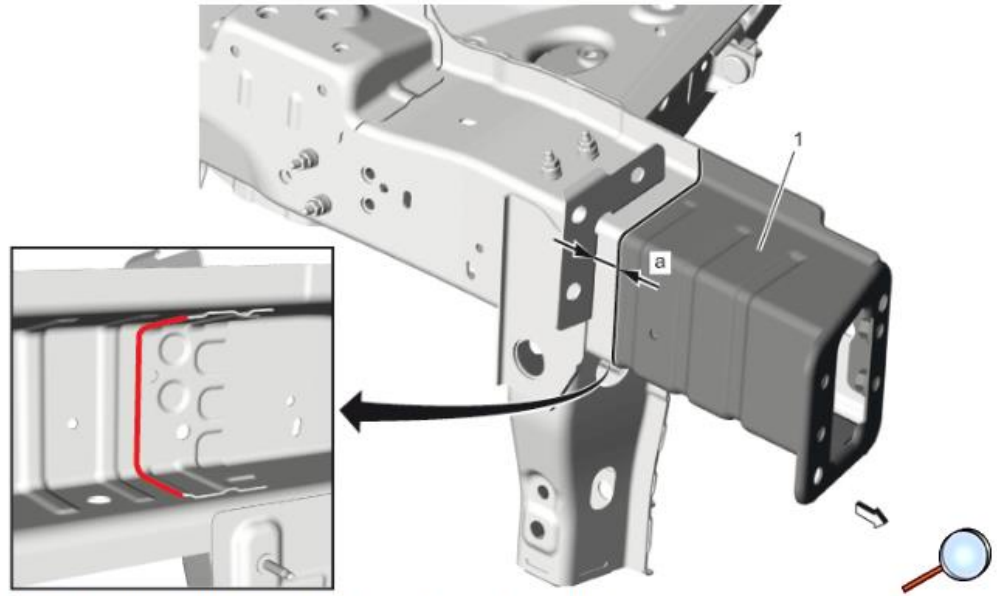
Warning: Glass and Sheet Metal Handling Warning.

1. Disable the SIR system. SIR Disabling and Enabling.
2. Battery Negative Cable»Disconnect Battery Negative Cable Disconnection and Connection
3. Remove all related panels and components.
4. Visually inspect the damage.Repair as much of the damage as possible.
5. Remove the sealers and anti-corrosion materials from the repair area as necessary.

Chevrolet Cruze

Structural Sectioning Procedures

7. Cut the front compartment front outer side rail.



8. Create a cut line on the front compartment front side rail (1).
   - a = **15 mm**

Note: Do NOT damage any inner panels or reinforcements.

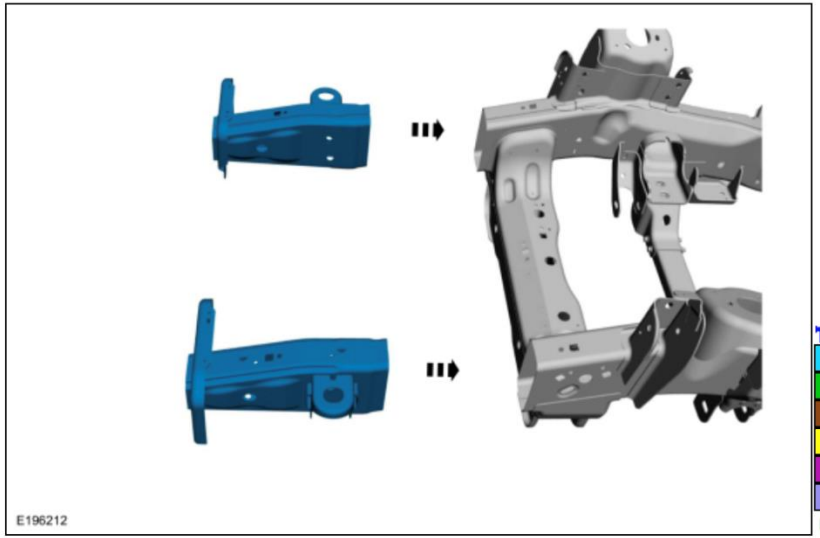
9. Cut the front compartment front side rail.

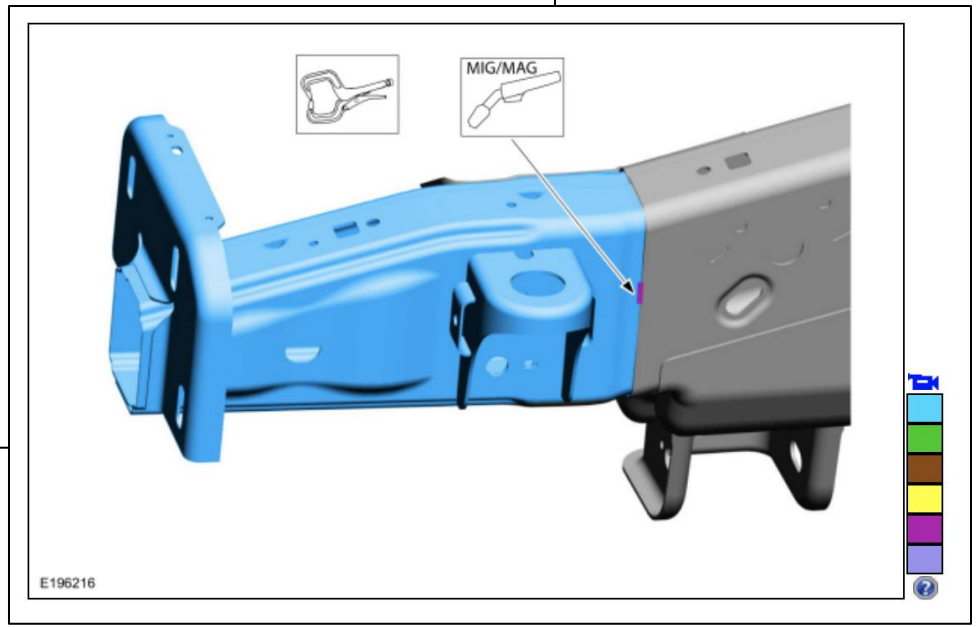
Chevrolet Cruze

Structural Sectioning Procedures

4. **NOTE:** *The replacement front frame components are production parts designed with a taper to insert into the front rail section to assist in alignment and welding operations.*

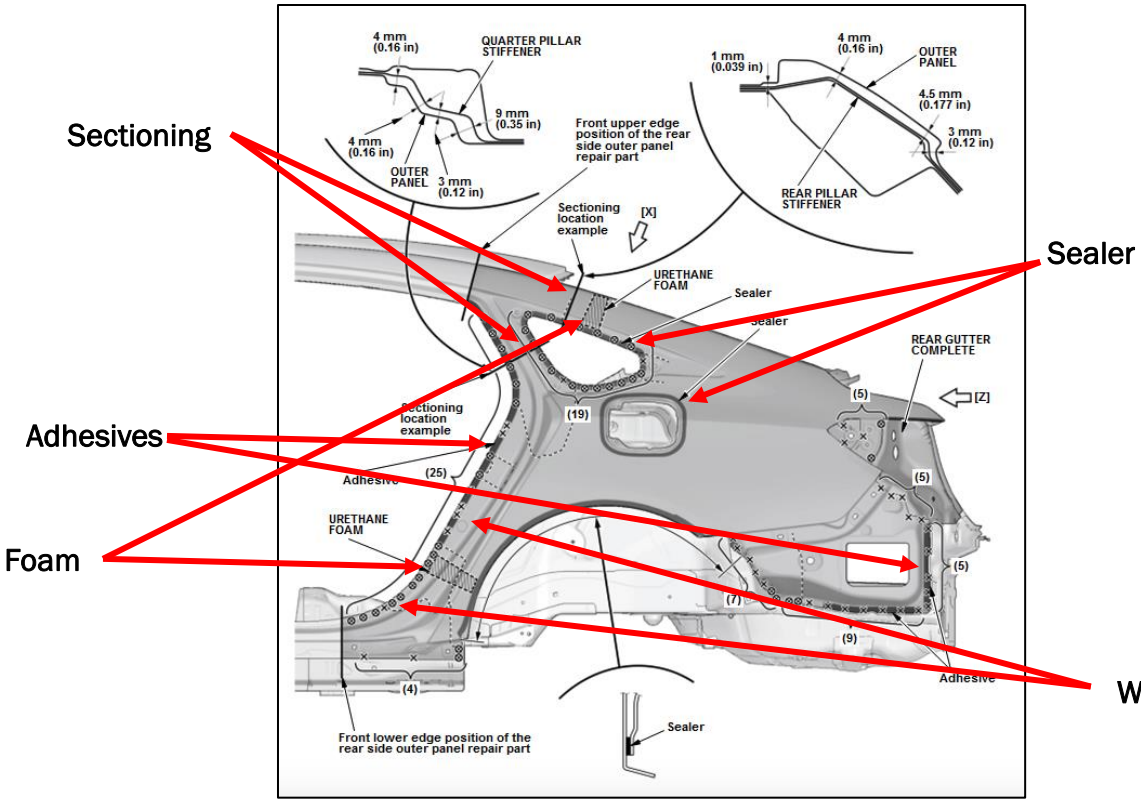
Front frame short section overview.





Ford F-150

Outer Body Panel Sectioning Procedures



Honda

Outer Body Panel Sectioning Procedures (cont'd)

techinfo.toyota.com

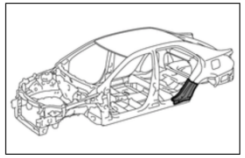
English | French | Spanish

Hide Tree / Max Tree

- Toyota 2012 - 2017 Camry Collision Repair Manual (BM18L0U)
  - Vehicle Exterior
    - BODY DIMENSIONS
    - BODY WELD POINT
      - BODY LOWER BACK PANEL
      - CAUTION LABEL
      - CENTER BODY PILLAR
      - COWL TOP SIDE PANEL
      - COWL TOP SIDE UPPER PANEL
      - COWL TOP TO APRON BRACE
      - FIT STANDARD / ADJUSTMENT METHOD
      - FRONT BODY PILLAR
        - CUT AND JOIN REPLACEMENT SECTIONS; 2012 - 2017 MY Camry [09/2011
      - FRONT DOOR OUTER PANEL
        - ASSEMBLY REPLACEMENT; 2012 - 2017 MY Camry [09/2011 -]
      - FRONT FENDER APRON
      - FRONT FENDER FRONT APRON
      - FRONT SIDE MEMBER
      - NAME PLATE
      - QUARTER PANEL
        - CUT AND JOIN REPLACEMENT SECTIONS (SMALL AREAS); 2012 - 2017 MY
        - ASSEMBLY REPLACEMENT; 2012 - 2017 MY Camry [09/2011 -]
      - QUARTER PANEL END HOUSING
      - QUARTER WHEEL HOUSING OUTER PANEL
      - RADIATOR LOWER SUPPORT
      - RADIATOR SIDE SUPPORT
      - RADIATOR SUPPORT
      - REAR DOOR OUTER PANEL
      - REAR FLOOR LOWER FRONT CROSSMEMBER
      - REAR FLOOR PAN
      - REAR FLOOR SIDE MEMBER
      - REAR FLOOR SIDE PANEL
      - ROCKER PANEL
      - ROCKER REAR PANEL
      - ROOF PANEL (for Sliding Roof)
      - ROOF PANEL (for Standard Roof)
      - SPECIFIED TORQUE
    - FOREWORD / CAUTION / SECTION
    - INTRODUCTION
    - PAINTING / COATING

Last Modified: 6-2-2016	6.6 F	**Doc ID:** RM0000000SL000X
Model Year Start: 2012	**Model:** Camry	**Prod Date Range:** [09/2011 -]
Title: BODY WELD POINT: QUARTER PANEL: CUT AND JOIN REPLACEMENT SECTIONS (SMALL AREAS); 2012 - 2017 MY Camry [09/2011 -]		

CUT AND JOIN REPLACEMENT SECTIONS (SMALL AREAS)



Quarter Panel Replacement Using Adhesive

Work Procedure

1. Cut the wheel arch portion.
2. Heat the quarter panel adhesive area and remove the quarter panel.

   HINT:

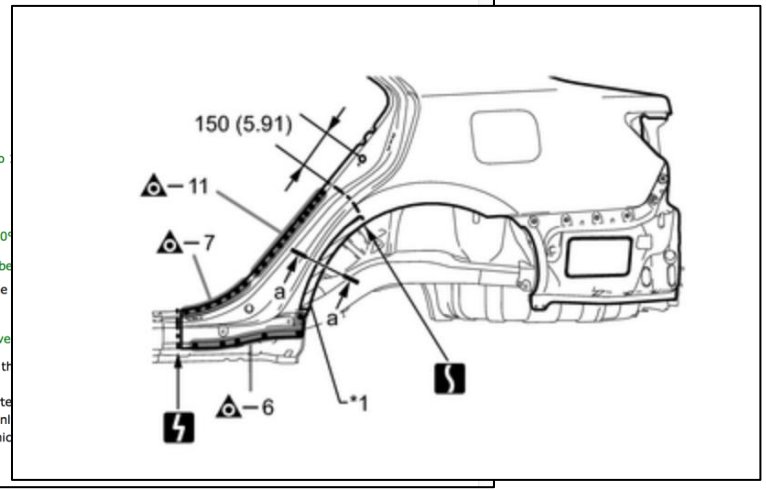
   Using an industrial heater gun or gas burner, heat the quarter panel to 110 to
3. Clean off any adhesive that remains on the vehicle.

   HINT:

   - Using an industrial heater gun or gas burner, heat the adhesive to 110 to 140°
   - Using a scraper, scrape away the adhesive.
   - If adhesive remains, the strength of any subsequently applied adhesive will be
4. Using a disc grinder or belt sander, scuff and sand any adhesive that remains on the

   HINT:

   Scuff at a width of approximately 10 mm (0.39 in.) over the previous adhesive
5. Apply adhesive to the exposed metal areas on the vehicle. Using a spatula, spread th
6. Apply adhesive to the vehicle again.
7. Using #60-120 grit sandpaper, scuff the adhesive application area on the new quarte
8. Apply adhesive to the new quarter panel. Using a spatula, spread the adhesive evenl
9. Using a vise grip or the palms of your hands, press the quarter panel so that the thic
10. Complete installation the new quarter panel.
11. Dry the adhesive areas of the new quarter panel.



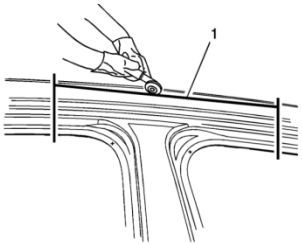
Toyota Camry

Outer Body Panel Sectioning Procedures (cont'd)

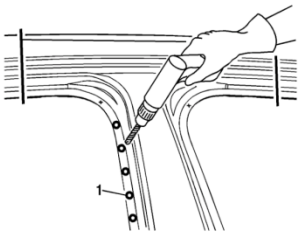
Service Information

2018 Chevrolet Malibu | Malibu Service Manual Israel, N America 10665650 | Body Repair | Collision Repair | Repair Instructions | **Document ID: 4245691**

Center Pillar Sectioning - Outer

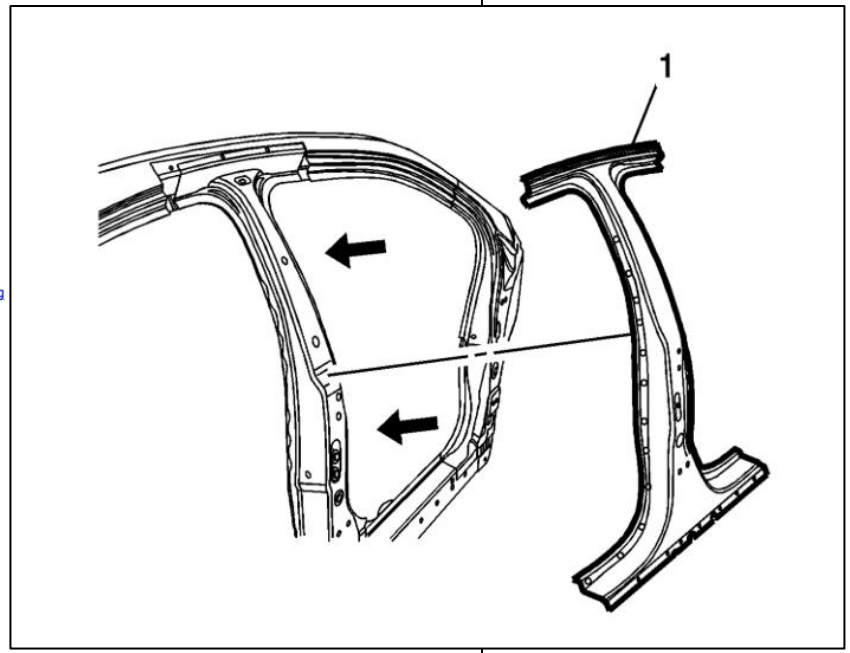


9. Cut access window (1) in the center pillar outer.
10. Perform additional sectioning procedures as needed depending on damage to vehicle. Quarter Outer Panel Sectioning

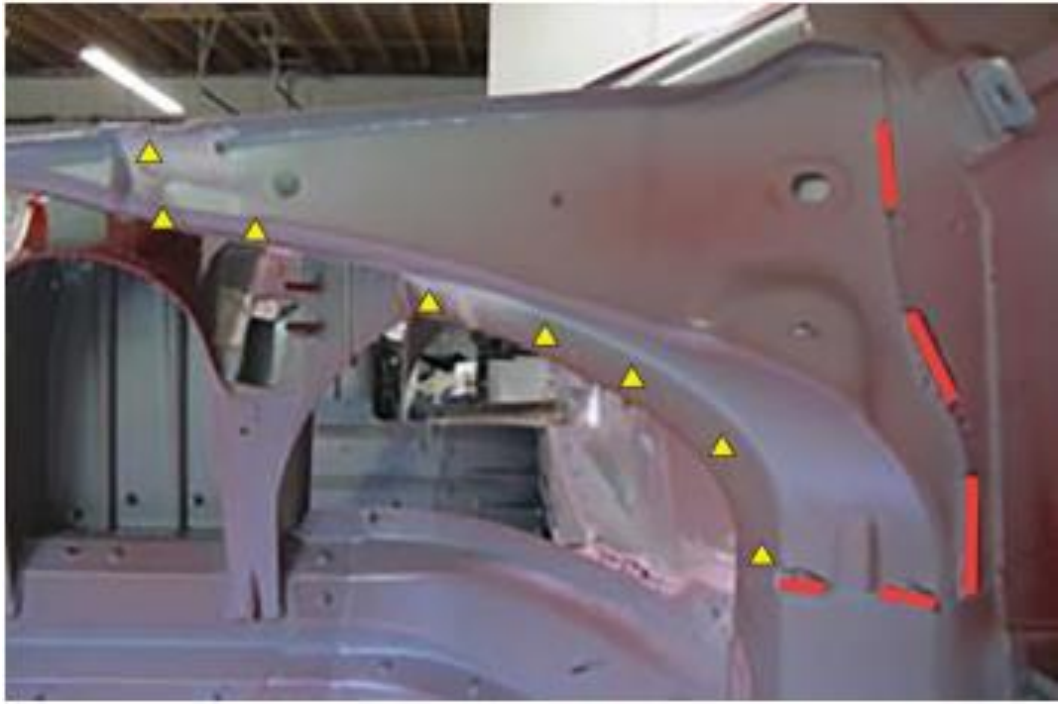


11. Locate and remove all factory welds (1). Note the number and location of welds for installation of the service part.

Chevrolet Malibu



Attachment Methods

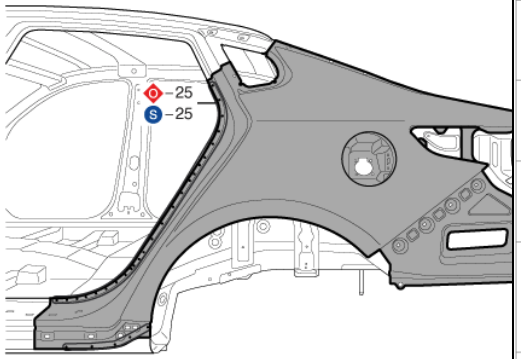


Tesla Model S

Symbol	Description	Notes
	Factory rivet	
	Spot weld - one layer	NOTE: This symbol is used for spot welds that are removed by drilling through one layer.
	Spot weld - two layers	NOTE: This symbol is used for spot welds that are removed by drilling through two layers.
	Factory self-piercing rivet (SPR)	
	Factory BOM (blind, oversize mechanically locked fastener)	
	Factory pin and collar	
	Laser weld	
	Plug weld	
	Riv tack	
	Rivnut	
	Bolt, hex-head	
	Bolt, Torx-head	
	Bolt, Allen-head	
	Sheet metal screw	
	Nut	
	Stud	

Symbol	Description
	Weld
	Cut line
	Bond path
	Structural adhesive
	Urethane

Attachment Methods (cont'd)



25 : Weld points
25 — : Out side (Remove weld point and panel position)

25 : Weld points
A S 25 — A : Epoxy adhesive
S : Spot weld (Installation weld point and panel position)

: Cut (Removal)
: Butt weld (Inatallation)

● : Removal
● : Installation

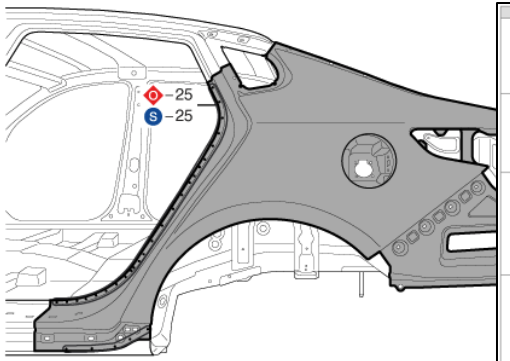
⚠ CAUTION

Check new panel before removing the existing panel as parts supply unit can be changed without prior notice according to engineering change.

Removal Symbol	Used for	Figure
O	Outside	
M	Middle	
I	Inside	
—	Cut	
●	Hidden welding point	
▲	Riveting point	

Kia Optima

Attachment Methods (cont'd)



25 : Weld points
25 : Out side (Remove weld point and panel position)

25 : Weld points
A : Epoxy adhesive
S : Spot weld (Installation weld point and panel position)

: Cut (Removal)
: Butt weld (Inatallation)

● : Removal
● : Installation

⚠ CAUTION

Check new panel before removing the existing panel as parts supply unit can be changed without prior notice according to engineering change.

Installation Symbol	Used for	Figure
S	Spot welding	
P	Plug welding	
	Butt welding	
	Lap welding	
A	Epoxy adhesive	
R	Riveting	

Kia Optima

Attachment Methods (cont'd)

Fastener Symbol	Fastener Type	Fastener Image	Part Number	Fasteners Per Bag
●	Rivet, 4.8mm, 1.6–6.9mm		1028719-00-A	10
●	Structural Rivet, 6.5mm, 2.0–9.5mm (short)		1028408-00-A	10
●	Structural Rivet, 6.5mm, 3.0–13.5mm (medium)		1062559-00-A	10
●	Structural Rivet, 6.5mm, 2.0–15.9mm (long)		1028409-00-A	10
●	Countersunk Rivet, 4.8 mm (short)		1069308-00-A	10
●	Countersunk Rivet, 4.8 mm (long)		1069326-00-A	10

Tesla

Fastener Symbol	Fastener Type	Fastener Image	Part Number	Fasteners Per Bag
○	Countersunk Rivet, 6.5 mm		1069327-00-A	10
●	Structural Bulb Rivet, 6.5 mm		1063943-00-A	10
●	Structural Flange Rivet, 6.5 mm		1062558-00-A	10
◆	SPR, 5x4		1026936-00-A	10
◆	SPR, 5x4.5		1026938-00-A	10
◆	SPR, 5x5		1026939-00-A	10

Equipment

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Item Detail

▶ Table of Contents ▶ Collision Repair ▶ Welders and Accessories

Image shown above may not be the actual product. Product and price information are subject to change without notice.

MI200T Spot Welder
Model: CASCEL025000
Supplier Name: CHIEF AUTOMOTIVE TECHNOLOGIES

P [redacted]
Add To Cart

Back

Description

Chief's MI200T Spot Welder is the ideal solution for all high strength steel body repairs. The MI200T offers worry-free welding through the TrueAutoMode™ automatic welding system. TrueAutoMode™ detects the metal type and thickness, as well as the presence of adhesives and insulation, and then automatically adjusts and sets the welding parameters accordingly. It provides instant feedback to the technician about the weld result, while simultaneously logging the results into memory.

Features

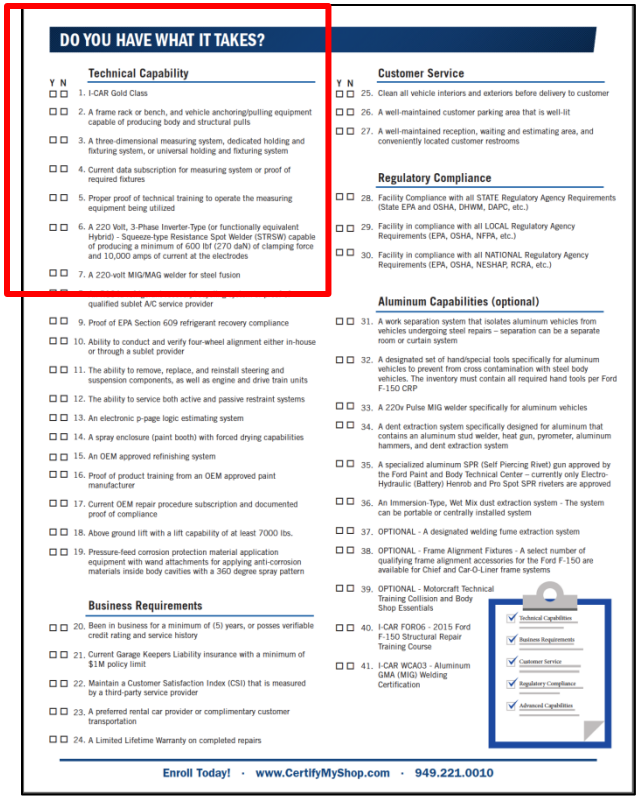
- Designed for all vehicle body repairs with high strength steels
- Simple to follow LCD user interface
- High performance lightweight transformer pliers - 40% less power than standard cable plier welder
- C-pliers with multiple size arms available
- Detects and adjusts welding parameters
- Logs data for each repair
- Provides feedback on the quality of every weld
- Almost 20 feet of welding cable for increased reach
- High duty cycle - no waiting for cool
- Includes two day training voucher for Chief University ($655 value - valid for 12 months after install). Classes are offered across the country on various collision related fields and students receive I - Car credits.

Includes

- CASCEL051720 Overhead Balancer and 360° Gyro C Arm
- CASCEL021402 Insulated C1 Arm
- CASCEL054196 Arm Mounting Bracket
- CASCEL048935 Starter Box of Caps

Honda

Equipment (cont'd)



DO YOU HAVE WHAT IT TAKES?

Technical Capability

Y N
- ☐☐ 1. I-CAR Gold Class
- ☐☐ 2. A frame rack or bench, and vehicle anchoring/pulling equipment capable of producing body and structural pulls
- ☐☐ 3. A three-dimensional measuring system, dedicated holding and fixturing system, or universal holding and fixturing system
- ☐☐ 4. Current data subscription for measuring system or proof of required fixtures
- ☐☐ 5. Proper proof of technical training to operate the measuring equipment being utilized
- ☐☐ 6. A 220 Volt, 3-Phase Inverter-Type (or functionally equivalent Hybrid) - Squeeze-type Resistance Spot Welder (STRSW) capable of producing a minimum of 600 lbf (270 daN) of clamping force and 10,000 amps of current at the electrodes
- ☐☐ 7. A 220-volt MIG/MAG welder for steel fusion
- ☐☐ 9. Proof of EPA Section 609 refrigerant recovery compliance
- ☐☐ 10. Ability to conduct and verify four-wheel alignment either in-house or through a sublet provider
- ☐☐ 11. The ability to remove, replace, and reinstall steering and suspension components, as well as engine and drive train units
- ☐☐ 12. The ability to service both active and passive restraint systems
- ☐☐ 13. An electronic p-page logic estimating system
- ☐☐ 14. A spray enclosure (paint booth) with forced drying capabilities
- ☐☐ 15. An OEM approved refinishing system
- ☐☐ 16. Proof of product training from an OEM approved paint manufacturer
- ☐☐ 17. Current OEM repair procedure subscription and documented proof of compliance
- ☐☐ 18. Above ground lift with a lift capability of at least 7000 lbs.
- ☐☐ 19. Pressure-feed corrosion protection material application equipment with wand attachments for applying anti-corrosion materials inside body cavities with a 360 degree spray pattern

Business Requirements

- ☐☐ 20. Been in business for a minimum of (5) years, or posses verifiable credit rating and service history
- ☐☐ 21. Current Garage Keepers Liability insurance with a minimum of $1M policy limit
- ☐☐ 22. Maintain a Customer Satisfaction Index (CSI) that is measured by a third-party service provider
- ☐☐ 23. A preferred rental car provider or complimentary customer transportation
- ☐☐ 24. A Limited Lifetime Warranty on completed repairs

Customer Service

- ☐☐ 25. Clean all vehicle interiors and exteriors before delivery to customer
- ☐☐ 26. A well-maintained customer parking area that is well-lit
- ☐☐ 27. A well-maintained reception, waiting and estimating area, and conveniently located customer restrooms

Regulatory Compliance

- ☐☐ 28. Facility Compliance with all STATE Regulatory Agency Requirements (State EPA and OSHA, DHWM, DAPC, etc.)
- ☐☐ 29. Facility in compliance with all LOCAL Regulatory Agency Requirements (EPA, OSHA, NFPA, etc.)
- ☐☐ 30. Facility in compliance with all NATIONAL Regulatory Agency Requirements (EPA, OSHA, NESHAP, RCRA, etc.)

Aluminum Capabilities (optional)

- ☐☐ 31. A work separation system that isolates aluminum vehicles from vehicles undergoing steel repairs – separation can be a separate room or curtain system
- ☐☐ 32. A designated set of hand/special tools specifically for aluminum vehicles to prevent from cross contamination with steel body vehicles. The inventory must contain all required hand tools per Ford F-150 CRP
- ☐☐ 33. A 220v Pulse MIG welder specifically for aluminum vehicles
- ☐☐ 34. A dent extraction system specifically designed for aluminum that contains an aluminum stud welder, heat gun, pyrometer, aluminum hammers, and dent extraction system
- ☐☐ 35. A specialized aluminum SPR (Self Piercing Rivet) gun approved by the Ford Paint and Body Technical Center – currently only Electro-Hydraulic (Battery) Henrob and Pro Spot SPR riveters are approved
- ☐☐ 36. An Immersion-Type, Wet Mix dust extraction system - The system can be portable or centrally installed system
- ☐☐ 37. OPTIONAL - A designated welding fume extraction system
- ☐☐ 38. OPTIONAL - Frame Alignment Fixtures - A select number of qualifying frame alignment accessories for the Ford F-150 are available for Chief and Car-O-Liner frame systems
- ☐☐ 39. OPTIONAL - Motorcraft Technical Training Collision and Body Shop Essentials
- ☐☐ 40. I-CAR FORO6 - 2015 Ford F-150 Structural Repair Training Course
- ☐☐ 41. I-CAR WCA03 - Aluminum GMA (MIG) Welding Certification

Technical Capabilities
Business Requirements
Customer Service
Regulatory Compliance
Advanced Capabilities

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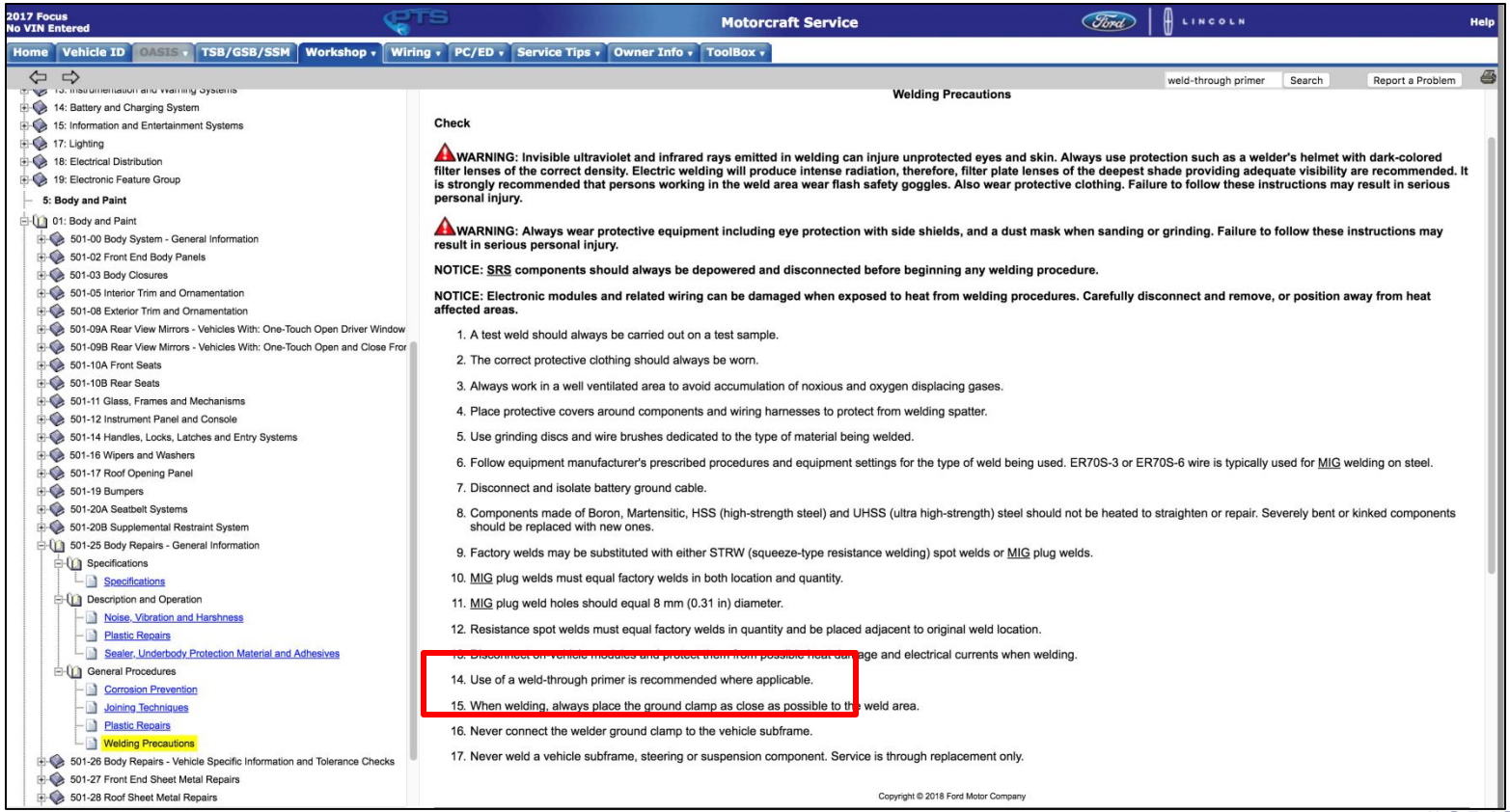
Technical Capability

Y N
- ☐☐ 1. I-CAR Gold Class
- ☐☐ 2. A frame rack or bench, and vehicle anchoring/pulling equipment capable of producing body and structural pulls
- ☐☐ 3. A three-dimensional measuring system, dedicated holding and fixturing system, or universal holding and fixturing system
- ☐☐ 4. Current data subscription for measuring system or proof of required fixtures
- ☐☐ 5. Proper proof of technical training to operate the measuring equipment being utilized
- ☐☐ 6. A 220 Volt, 3-Phase Inverter-Type (or functionally equivalent Hybrid) - Squeeze-type Resistance Spot Welder (STRSW) capable of producing a minimum of 600 lbf (270 daN) of clamping force and 10,000 amps of current at the electrodes
- ☐☐ 7. A 220-volt MIG/MAG welder for steel fusion

Assured Performance Network (APN)

Weld-Through Primer Requirements



Ford
Focus

Weld-Through Primer Requirements (cont'd)

Print | Generate PDF

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 inst 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 m 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 so 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 sho 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 a 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 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. Placemer 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 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 sp Placement of a new weld over an original weld location may lead to metal fatigue or poor weld quality.**

FCA

Weld-Through Primer Guidelines: Fiat Chrysler Automobiles - UPDATE

Posted on January 19, 2017 | Share: | Author: RTS | Print

Weld-through primers are generally a zinc-based product that is applied to the mating surfaces prior to welding. When the weld is performed, the zinc liquefies and flows into the weld-pool, protecting the weld from corrosion. Many OEMs have a position on when and how to use weld-through primer or when it shouldn't be utilized. Let's see what Fiat Chrysler Automobiles (FCA) recommends and where this information can be found.

FCA has recently updated their weld-through primer recommendations. Previously written manuals by Fiat recommended the use of weld-through primer, while Chrysler written manuals advised against the use of weld-through primer. The newly updated editions of all FCA manuals **forbid** the use of weld-through primer. However, you may find that currently on the free site that some manuals have not yet been updated and still recommend using weld-through primer. Per our contact at FCA, the free site is still in the process of being updated and weld-through primer should **not** be used.

Use the vehicle-specific body repair manuals to determine which type of welding is required for the repair you are performing. Failure to follow OEM procedures will sacrifice the safety and quality of the repair.

For additional FCA information, check out the following pages:

Chrysler OEM Information
Dodge OEM Information
Fiat OEM Information
Jeep OEM Information
RAM OEM Information

Corrosion Protection Methods and Materials

Service Information

2017 Chevrolet Malibu | Malibu Service Manual Israel, N America 9460077 | **Document ID: 2096919**

Anti-Corrosion Treatment and Repair

Undercoating and Closed Cavity Coatings

Warning: When applying sound deadeners, or anti-corrosion materials due care and preventative measures must be exercised to prevent any material from being sprayed into door and quarter panel mechanisms such as door locks, window run channels, window regulators and seat belt retractors, as well as any moving or rotating mechanical or suspension parts on the underbody, particularly the parking brake cable. After material application, be sure that all body drain holes are open. Improper application may increase chance of corrosion damage or limit the operation of moving parts, resulting in personal injury.

Any procedure that disturbs these special treatments, such as panel replacement or collision damage repair operations, may leave the metal unprotected and result in corrosion. Proper recoating of these surfaces with service-type anti-corrosion material is essential.

After repair and/or replacement parts are installed, all accessible bare metal surfaces must be treated with metal conditioner and reprimed. Refer to the GM Approved Refinish Materials book which identifies the paint systems you may use.

The latest revision of the GM Approved Refinish Materials booklet is located on the GM Genuine Parts website at www.genuinegmparts.com.

After a collision, some vehicle structure areas such as frame rails, cross-members and rocker panel sections may need to be repaired. In most cases, the anti-corrosion materials need to be removed to perform these repairs. These materials are classified into two types: Closed Cavity coatings and Undercoat coatings. The primary difference is the way the products set up or "dry". Both are intended to protect the surface they are applied to from corrosion caused by water, salt water or Magnesium Chloride blended de-icing compounds used to thaw icy winter roads. They also can provide a measure of sound deadening.

The Closed Cavity coatings remain sticky to the touch and will seep into seams initially and over extended periods of time. Closed Cavity coatings provide the best corrosion protection inside of rocker panel sections, pillar sections, frame rails, cross-members, doors, rear compartment lids and closed areas of hoods - anywhere that is concealed or closed off to exterior surfaces.

The Undercoat coatings are "dry to the touch" and offer the best corrosion protection and sound deadening for floor pans, wheelhouses, inside rear compartment and underhood areas - anywhere the coated surface is exposed.

Below is a listing of Undercoat coatings and Closed Cavity coatings that GM believes to be reliable. While others may exist, we have found these products, or equivalents to them, can be used with satisfactory results. Always use these products according to their manufacturer's recommendations.

The following products are available from *Automotive International/Valugard. Contact them at 1-800-543-7156, or at www.valugard.net

Stock number	Type	Description
VG-104	WAX/SOLVENT BASED UNDERCOAT	Traditional Wax/Solvent based Undercoating available in aerosol or spray gun canister Meets OE specifications for corrosion resistance
VG-076M	HYBRID (SOLV./WATER) UNDERCOAT	Meets OE specifications for corrosion resistance
VG-140	WATER BASED UNDERCOAT	Meets OE specifications for corrosion resistance
VG-101	WAX BASED CLOSED CAVITY COATING	Meets OE specifications for corrosion resistance
VG-UCG	CANISTER UNDERCOATING GUN	High quality undercoating gun uses canister packaging of undercoating
VG-CRG	CANISTER CLOSED CAVITY COATING GUN	High quality closed cavity coating gun uses canister packaging of coating and comes with 30 in inner panel application tube with nozzle

Chevrolet Malibu

Corrosion Protection (cont'd)

501-25 Body Repairs - General Information
General Procedures

2017 Focus
Procedure revision date: 07/2/2013

Corrosion Prevention

Special Tool(s) / General Equipment

 ST3277-A	300-SAT12740 UBE Gun
 ST3278-A	300-SAT9795 HRS Rust Gun

Materials

Name	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
ValuGard™ Premium Undercoating VG101, VG101A	-
ValuGard™ Rust Inhibitor VG104, VG104A	-

Repair

NOTE: *Undercoating*

NOTE: *The following illustrations are not vehicle specific and are intended for reference only.*

1. **WARNING: Before beginning any service procedure in this section, REFER to Safety Warnings in section 100-00 General Information. Failure to follow this in result in serious personal injury.**

   Refer to: Body Repair Health and Safety and General Precautions (100-00 General Information, Description and Operation).

2. Wire brush the area and make sure the surfaces are free of oil, dirt and other foreign material. Carry out the undercoating process in the following sequence.

3. Thoroughly clean and degrease metal surfaces to remove wax and grease.
   Material: Motorcraft® Metal Surface Prep / ZC-31-A

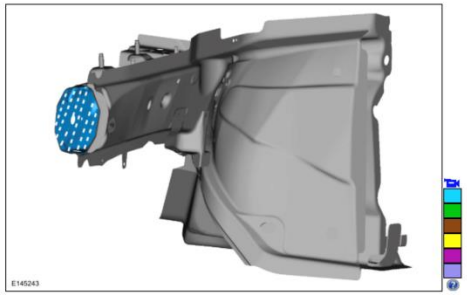
4. For best results, the vehicle should be at room temperature.

Ford Focus

Ford F-150

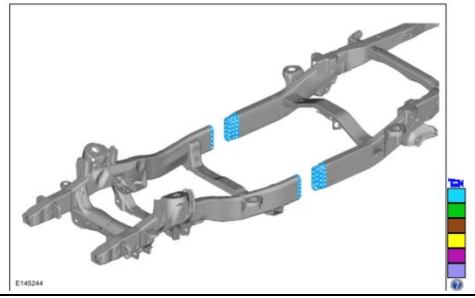
11. **NOTE:** *Cross section view of typical unibody frame rail shown.*

    Apply Rust Inhibitor to the inner surfaces of the rail after carrying out welding process. Depress trigger and wait 2-3 seconds and slowly pull the wand to make sure the area is completely fogged.

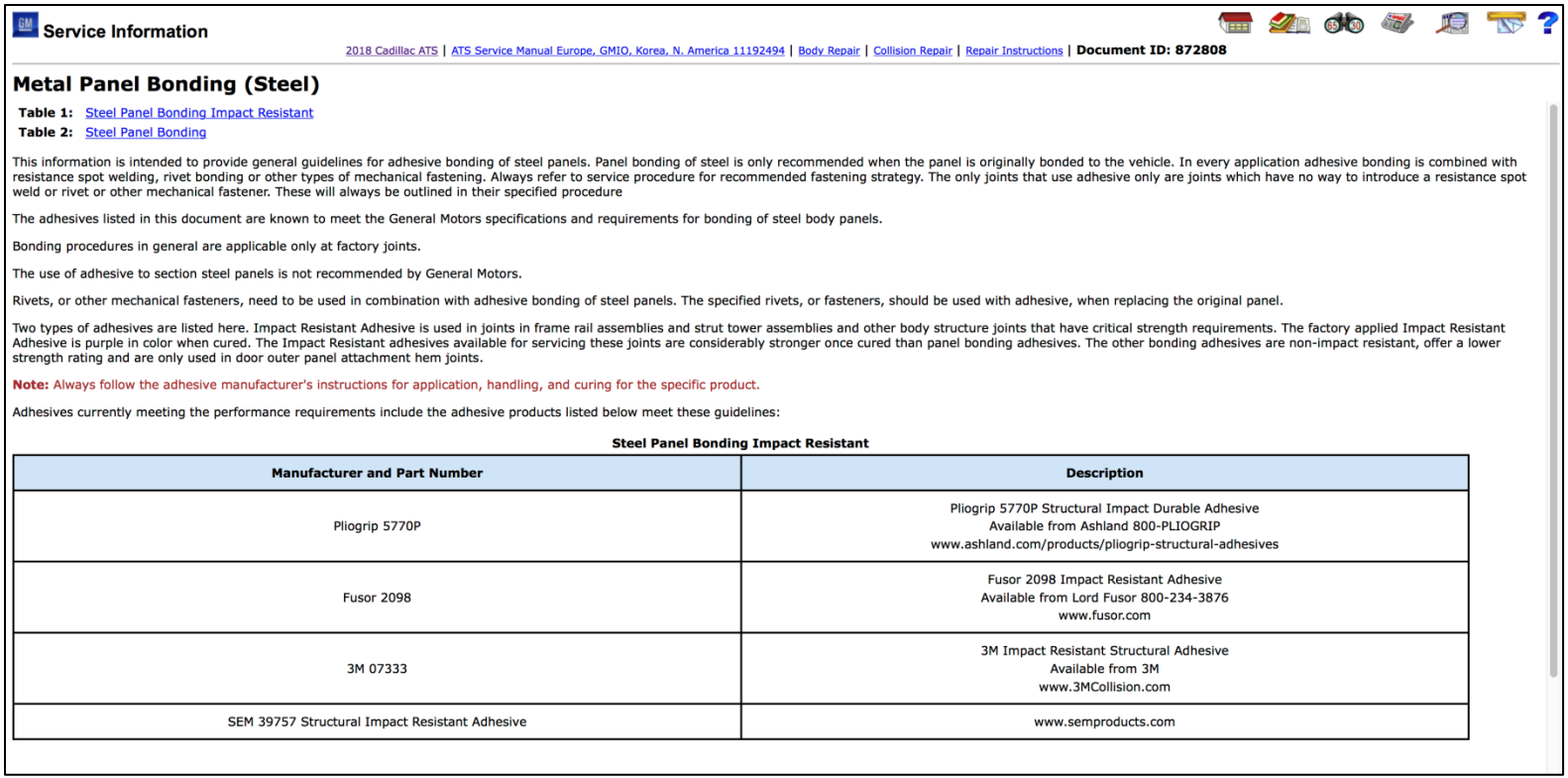


12. **NOTE:** *Full frame vehicle, front rail-to-mid rail section repair shown.*

    Apply Premium Undercoating to the exposed surfaces after carrying out the welding process. Make sure to completely cover any bare metal areas.



Adhesive Bonding Options



Service Information

2018 Cadillac ATS | ATS Service Manual Europe, GMIO, Korea, N. America 11192494 | Body Repair | Collision Repair | Repair Instructions | **Document ID: 872808**

Metal Panel Bonding (Steel)

Table 1: Steel Panel Bonding Impact Resistant
Table 2: Steel Panel Bonding

This information is intended to provide general guidelines for adhesive bonding of steel panels. Panel bonding of steel is only recommended when the panel is originally bonded to the vehicle. In every application adhesive bonding is combined with resistance spot welding, rivet bonding or other types of mechanical fastening. Always refer to service procedure for recommended fastening strategy. The only joints that use adhesive only are joints which have no way to introduce a resistance spot weld or rivet or other mechanical fastener. These will always be outlined in their specified procedure

The adhesives listed in this document are known to meet the General Motors specifications and requirements for bonding of steel body panels.

Bonding procedures in general are applicable only at factory joints.

The use of adhesive to section steel panels is not recommended by General Motors.

Rivets, or other mechanical fasteners, need to be used in combination with adhesive bonding of steel panels. The specified rivets, or fasteners, should be used with adhesive, when replacing the original panel.

Two types of adhesives are listed here. Impact Resistant Adhesive is used in joints in frame rail assemblies and strut tower assemblies and other body structure joints that have critical strength requirements. The factory applied Impact Resistant Adhesive is purple in color when cured. The Impact Resistant adhesives available for servicing these joints are considerably stronger once cured than panel bonding adhesives. The other bonding adhesives are non-impact resistant, offer a lower strength rating and are only used in door outer panel attachment hem joints.

Note: Always follow the adhesive manufacturer's instructions for application, handling, and curing for the specific product.

Adhesives currently meeting the performance requirements include the adhesive products listed below meet these guidelines:

Steel Panel Bonding Impact Resistant

Manufacturer and Part Number	Description
Pliogrip 5770P	Pliogrip 5770P Structural Impact Durable Adhesive Available from Ashland 800-PLIOGRIP www.ashland.com/products/pliogrip-structural-adhesives
Fusor 2098	Fusor 2098 Impact Resistant Adhesive Available from Lord Fusor 800-234-3876 www.fusor.com
3M 07333	3M Impact Resistant Structural Adhesive Available from 3M www.3MCollision.com
SEM 39757 Structural Impact Resistant Adhesive	www.semproducts.com

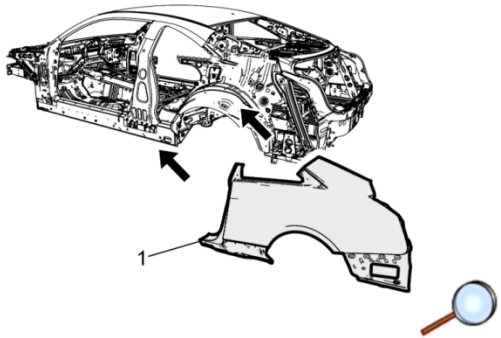
Cadillac ATS

Adhesive Bonding Options (cont'd)

Service Information

2018 Cadillac ATS | ATS Service Manual Europe, GMIO, Korea, N. America 11192494 | Body Repair | Collision Repair | Repair Instructions | **Document ID: 3807006**

Quarter Outer Panel Sectioning (Coupe)

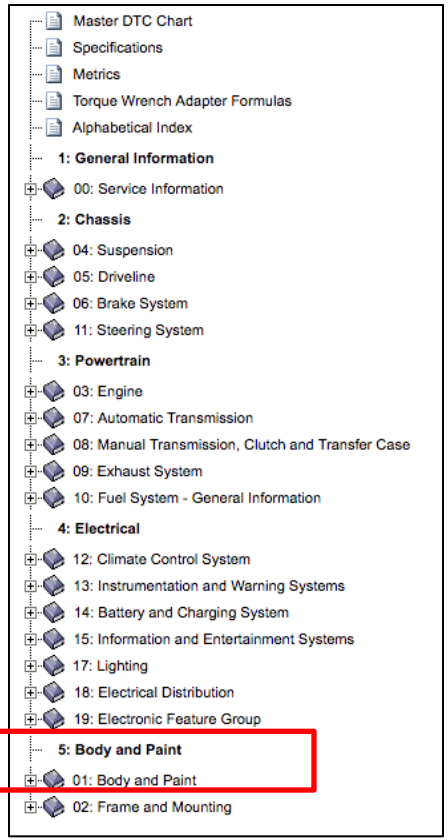


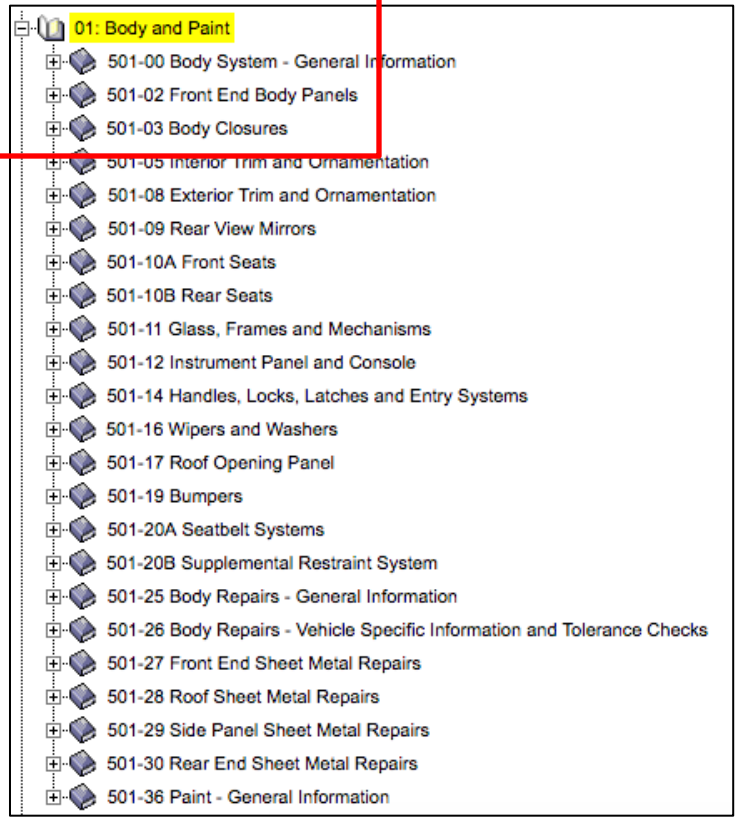
Note: Apply panel bonding adhesive to the entire joint between the outer wheelhouse panel and the quarter outer panel.

5. Position the new service panel and clamp in place (1).
6. Perform the sectioning procedure.

Cadillac ATS

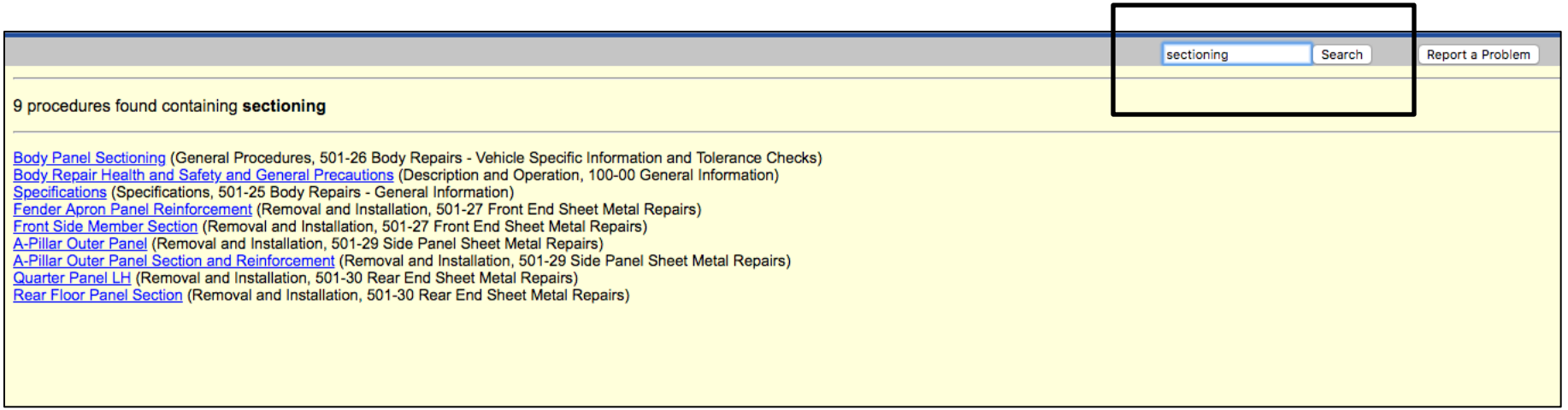
Layout and Search Functionality





Ford

Layout and Search Functionality (cont'd)



Ford

For More Information

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