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BODY REPAIRS - GENERAL INFORMATION

ADHESIVES, FIXINGS AND CONSUMABLES (G2296944)

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ADHESIVES, FIXINGS AND CONSUMABLES

Through extensive research, Jaguar Land Rover (JLR) has identified the most appropriate method to rectify aftermarket damage. It is key to safety and vehicle integrity that only the approved methods, materials and equipment are used. To successfully complete structural repairs to JLR products, it is necessary for the repairs to follow the correct aftermarket process for adhesive (bonding), riveting and welding to make sure vehicle integrity is maintained after a collision.

BONDING/ADHESIVE

This section provides information on the bonded joints used in repair. The following topics are covered:

- **Equipment.**
- **Surface preparation.**
- **Bonding Application.**

It is a pre-requisite that any person undertaking any repairs, which involve panel bonding, has attended JLR Approved Training and has achieved the correct skill level to undertake these processes.

3M 08115



Equipment

The approved bonding equipment consists of:

- Approved two-pack adhesive applicator.

Surface Preparation

- Remove the original adhesive, E-Coat primer (new panels) and paint from the bonded or welded areas. Use a fine bristle disc.
- Clean all the bonded areas with an applicable VOC compliant product for the removal of surface contamination.
- Straighten all metal, and “dry-fit” the parts.
- Clamp the part in position and examine for fit and alignment.
- Remove the panel from the vehicle.

Pre-treating (coupling agent) the panels to be bonded promotes the improved adhesion of the bonding adhesive.

⚠ CAUTION:

Bonding without pre-treatment will reduce the performance of the joint.

- Apply JLR approved 'weld through' primer to all areas to be welded. **Adhesive should not be applied to these areas.**

Bonding Application

The approved bonding adhesive is supplied in a two-pack cartridge.

A two-pack cartridge applicator with a disposable mixing nozzle is used for the application of the adhesive.



- Apply an adhesive bead to the prepared surfaces of both pieces to be bonded.
- Using a plastic spreader or acid brush, tool out the adhesive to cover all bare surfaces.
- Apply a 5 mm "zig zag" bead directly to either the replacement panel or vehicle structure.
- Make sure a continuous bead of adhesive surrounds the fixing holes.

NOTES:

- On completion, the mixing nozzle must be discarded. Make sure an air tight seal is provided for the cartridges.
- The following technical information and data should be considered representative or typical only.

The following times have been determined with ambient air temperature and substrate temperature @ 70°F (21°C) and are considered typical values.

- **Work Time**-90 Minutes
- **Clamp Time**-4 Hours
- **Cure Time**-24 Hours

NOTE:

Panel Bonding Adhesive is a two-part epoxy adhesive which provides extended work-time but can be rapidly cured with heat.

3M Impact Resistant Structural Adhesive - 07333

NOTE:

Coupling agent pre-treatment is not required with 07333.



Surface Preparation

- Remove any original adhesive, or E-Coat from new panels.
- Clean the surface to be treated using approved pre-cleaner/degreaser.

NOTE:

No pyrosil required with this adhesive.

Bonding application



NOTE:

Set fasteners while the adhesive is still uncured, typically within 2 hours of adhesive application.

- Apply an adhesive bead to the prepared surfaces of both pieces to be bonded.
- Using an acid brush, tool out the adhesive to cover all bare surfaces.
- Apply a 5 mm "zig zag" bead directly to either the replacement panel or vehicle structure.
- Apply a large enough bead to allow the adhesive to fill all voids and squeeze out of the flange seam, indicating that the joint is completely sealed.
- Make sure a continuous bead of adhesive surrounds fixing holes.

FIXINGS

There are six groups of fixings used, other than conventional nuts and bolts. It is important that the correct procedures are followed for the removal and replacement of these fixings and, where applicable, the correct tools are used.

- **Self Piercing Rivet (SPR)**
- **Flow Form Rivet (FFR)**
- **Breakstem Fastener (BSF)**
- **Friction Drilling Screw (FDS)**
- **Torx and Rivnut**
- **Earth Stud**

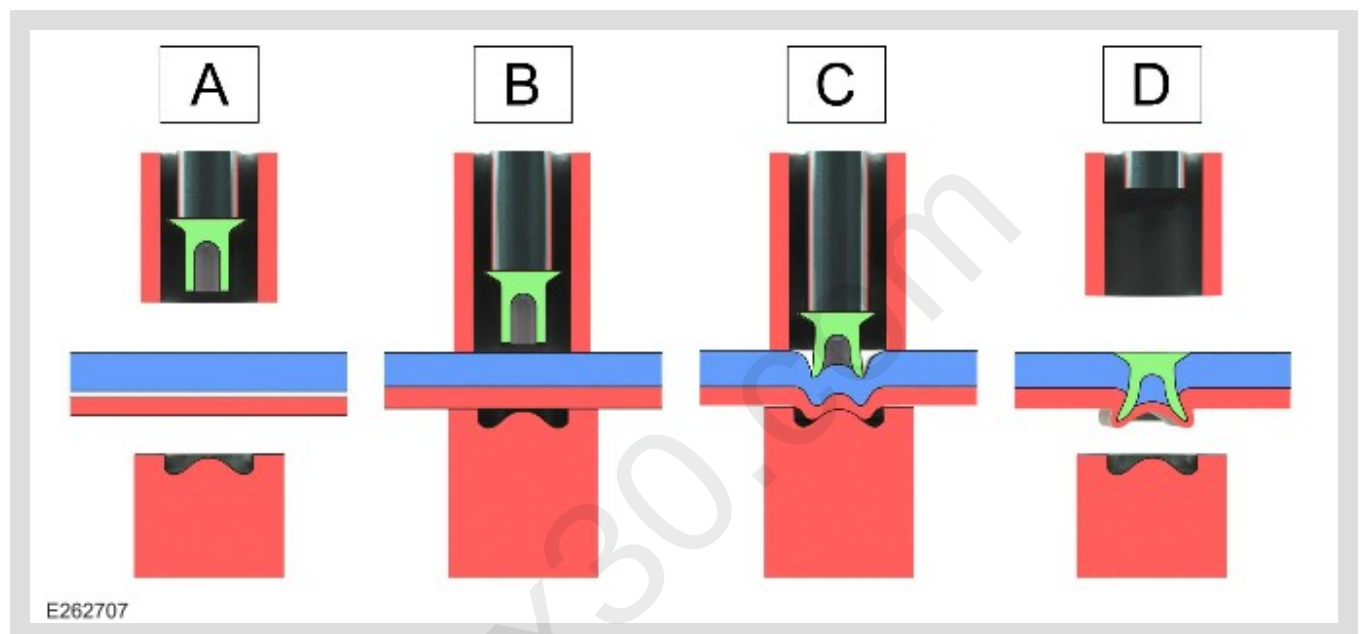
SELF PIERCING RIVET (SPR)



Self Piercing Rivets (SPRs) provide a fast, single operation jointing process where pre drilled holes are not required. A process of clamping the panel materials between the die and the blank holder press the rivet into the material. The rivet pierces the top panel and the die shape causes the rivet to flare within the panel to form a mechanical interlock. The die shape also causes a button to form on the underside of the lower panel. Rivets are available in various sizes dependent on the size of the stack of panels to which they are installed. A stack refers to the combined gauge of the panels being joined.

NOTE:

It is important to identify the correct Self Piercing Rivet (SPR) by referencing the procedure and table below prior to installation.



Jaguar Land Rover Approved Self Piercing Rivet (SPR) Tools.

Advel ESN50



NOTE:

Do not use the ESN50 tool for rivet installation where the necessary installation pressure is more than **50kN**.

TKR PNP90 XT2.



△ NOTES:

- The TKR PNP90 XT2 **with** the docking station is the JLR approved tool.
- The TKR PNP90 XT2 **without** the docking station is **NOT** approved.

XPress 800



E263914

NOTES:

- The Xpress 800 **with** the work station is the JLR approved tool.
- The Xpress 800 **without** the docking station is **NOT** approved.

Pip die



E234312

Flat bottom die



E234311

Shallow die



E234310

CAUTION:

Operating the Self Piercing Rivet (SPR) installation tool with no SPR or material in position will damage the tool Die.

Removal

Align the plunger and anvil over the fixing and press the trigger. Pressing the trigger will allow the plunger to act on the fixing and remove it from the panel.

Where tool access is impossible, drill out the remnant using a 5.3mm Cryobit drill bit. Remove all debris.

Self-piercing removal tools can be used with an optional, larger 'C' frame for improved access. Installation of the new rivet should be located close to the original rivet location and not in the centre to preserve land for further repairs. The same process is followed for any subsequent replacements. Where access for the tool is restricted and cannot be used, or there is insufficient space on the panel, the fixings should be replaced with Breakstem Fasteners, unless the repair method dictates otherwise.

Installation

NOTE:

Prior to replacing a Self Piercing Rivet (SPR), a test should be performed using identical panel materials. Make sure that all settings are correct and an acceptable joint has been achieved.

Load the new fixing into the JLR approved tool. Align the tool over the fixing position and press the trigger. As the trigger is pressed, the tool will clamp itself onto the work piece and install the fixing.

Service Repair Fasteners.

NOTES:

- It is important to identify and select the correct fixing by referencing this table prior to installation.
- Make sure the JLR approved Self Piercing Rivets (SPRs), die type and load are used during installation.
- Where original rivet holes cannot be used, replacement rivets should be positioned close to the original rivet location/hole location.

Installation of the new rivet should be located close to the original rivet location and not in the centre to preserve land for further repairs. The same process is followed for any subsequent replacements.

-	-	-	SELF PIERCING RIVETS	-	-	-
SPR TYPE NO. JAGUAR	JAGUAR PART NUMBER	SPR TYPE NO. LAND ROVER	LAND ROVER PART NUMBER	RIVET LENGTH	RIVET APPLICATION FORCE	DIE DESCRIPTION
J1	C2C9705	L1	LR043550	5 mm	20 kN	Pip
J1A	C2C9705	L1A	LR043550	5 mm	30 kN	Pip
J1B	C2C9705	L1B	LR043550	5 mm	30 kN	Flat Bottom
J1C	C2C9705	L1C	LR043550	5 mm	20 kN	Flat Bottom
J1D	C2C9705	L1D	LR043550	5 mm	25 kN	Flat Bottom
J1E	C2C9705	L1E	LR043550	5 mm	25 kN	Pip
J1F	C2C9705	L1F	LR043550	5 mm	35 kN	Flat Bottom
J1G	C2C9705	L1G	LR043550	5 mm	35 kN	Pip
J1HS	C2C9705	L1HS	LR043550	5 mm	45 kN	Shallow
J1IS	C2C9705	N/A	N/A	5 mm	40 kN	Shallow
J2	C2C20589	L2	LR043556	5 mm	30 kN	Pip
J2A	C2C20589	L2A	LR043556	5 mm	30 kN	Flat Bottom
J2B	C2C20589	L2B	LR043556	5 mm	25 kN	Flat Bottom
J2C	C2C20589	L2C	LR043556	5 mm	40 kN	Pip
J2D	C2C20589	L2D	LR043556	5 mm	35 kN	Flat Bottom
J2E	C2C20589	L2E	LR043556	5 mm	45 kN	Flat Bottom
J2F	C2C20589	L2F	LR043556	5 mm	40 kN	Flat Bottom
J2G	C2C20589	L2G	LR043556	5 mm	45 kN	Pip

-	-	-	SELF PIERCING RIVETS	-	-	-
SPR TYPE NO. JAGUAR	JAGUAR PART NUMBER	SPR TYPE NO. LAND ROVER	LAND ROVER PART NUMBER	RIVET LENGTH	RIVET APPLICATION FORCE	DIE DESCRIPTION
J2H	C2C20589	N/A	N/A	5 mm	35 kN	Pip
J2J	C2C20589	L2J	LR043556	5 mm	60 kN	Flat Bottom
J3	C2C9706	L3	LR043551	6 mm	30 kN	Flat Bottom
J3A	C2C9706	L3A	LR043551	6 mm	25 kN	Flat Bottom
J3B	C2C9706	L3B	LR043551	6 mm	35 kN	Flat Bottom
J3C	C2C9706	L3C	LR043551	6 mm	40 kN	Flat Bottom
J3D	C2C9706	L3D	LR043551	6 mm	35 kN	Pip
J3E	C2C9706	L3E	LR043551	6 mm	30 kN	Pip
J3F	C2C9706	L3F	LR043551	6 mm	45 kN	Pip
J3G	C2C9706	L3G	LR043551	6 mm	40 kN	Pip
J4	C2C9707	L4	LR043552	6.5 mm	30 kN	Pip
J4A	C2C9707	L4A	LR043552	6.5 mm	30 kN	Flat Bottom
J4C	C2C9707	L4C	LR043552	6.5 mm	35 kN	Flat Bottom
J4D	C2C9707	L4D	LR043552	6.5 mm	35 kN	Pip
J4E	C2C9707	N/A	N/A	6.5 mm	40 kN	Pip
N/A	N/A	L4F	LR043552	6.5 mm	40 kN	Flat Bottom
J5	C2C9711	L5	LR043553	7 mm	50 kN	Flat Bottom
J5B	C2C9711	L5B	LR043553	7 mm	40 kN	Flat Bottom
J5C	C2C9711	L5C	LR043553	7 mm	30 kN	Flat Bottom
J5D	C2C9711	L5D	LR043553	7 mm	30 kN	Pip
J5E	C2C9711	L5E	LR043553	7 mm	35 kN	Flat Bottom
J5F	C2C9711	L5F	LR043553	7 mm	45 kN	Flat Bottom
J5G	C2C9711	L5G	LR043553	7 mm	40 kN	Pip
J5H	C2C9711	L5H	LR043553	7 mm	45 kN	Pip
N/A	N/A	L5IS	LR043553	7 mm	45 kN	Shallow
N/A	N/A	L5JS	LR043553	7 mm	50 kN	Shallow
N/A	N/A	L5K	LR043553	7 mm	50 kN	Pip
J6	C2C20591	L6	LR043557	8 mm	50 kN	Pip

-	-	-	SELF PIERCING RIVETS	-	-	-
SPR TYPE NO. JAGUAR	JAGUAR PART NUMBER	SPR TYPE NO. LAND ROVER	LAND ROVER PART NUMBER	RIVET LENGTH	RIVET APPLICATION FORCE	DIE DESCRIPTION
J6A	C2C20591	L6A	LR043557	8 mm	40 kN	Pip
J6B	C2C20591	L6B	LR043557	8 mm	40 kN	Flat Bottom
J6C	C2C20591	L6C	LR043557	8 mm	50 kN	Flat Bottom
J6DS	C2C20591	L6DS	LR043557	8 mm	45 kN	Shallow
J6E	C2C20591	L6E	LR043557	8 mm	45 kN	Flat Bottom
J7	C2C9712	L7	LR043554	8 mm	40 kN	Flat Bottom
J7A	C2C9712	L7A	LR043554	8 mm	50 kN	Flat Bottom
J7B	C2C9712	L7B	LR043554	8 mm	45 kN	Flat Bottom
J7C	C2C9712	L7C	LR043554	8 mm	35 kN	Flat Bottom
J7D	C2C9712	L7D	LR043554	8 mm	45 kN	Pip
J7E	C2C9712	L7E	LR043554	8 mm	50 kN	Pip
J8	C2C9713	L8	LR043555	9 mm	40 kN	Flat Bottom
J8A	C2C9713	L8A	LR043555	9 mm	45 kN	Flat Bottom
J8B	C2C9713	L8B	LR043555	9 mm	50 kN	Flat Bottom
J9	C2C9713	L9	LR043558	9 mm	40 kN	Flat Bottom
J9A	C2C9713	L9A	LR043558	9 mm	45 kN	Flat Bottom
J9B	C2C9713	L9B	LR043558	9 mm	34 kN	Flat Bottom
J9C	C2C9713	L9C	LR043558	9 mm	50 kN	Flat Bottom
J10	C2C20590	L10	LR099821	7 mm	40 kN	Flat Bottom
J10A	C2C20590	L10A	LR099821	7 mm	45 kN	Flat Bottom
J10B	C2C20590	L10B	LR099821	7 mm	35 kN	Flat Bottom
J10C	C2C20590	L10C	LR099821	7 mm	50 kN	Pip
J10D	C2C20590	L10D	LR099821	7 mm	45 kN	Pip
J10E	C2C20590	L10E	LR099821	7 mm	40 kN	Shallow
J10F	C2C20590	L10F	LR099821	7 mm	50 kN	Flat Bottom
J11	C2P7761	L11	LR043560	8 mm	35 kN	Flat Bottom
J11A	C2P7761	L11A	LR043560	8 mm	35 kN	Pip
J11B	C2P7761	L11B	LR043560	8 mm	40 kN	Pip

-	-	-	SELF PIERCING RIVETS	-	-	-
SPR TYPE NO. JAGUAR	JAGUAR PART NUMBER	SPR TYPE NO. LAND ROVER	LAND ROVER PART NUMBER	RIVET LENGTH	RIVET APPLICATION FORCE	DIE DESCRIPTION
J11C	C2P7761	L11C	LR043560	8 mm	45 kN	Flat Bottom
J11D	C2P7761	L11D	LR043560	8 mm	40 kN	Flat Bottom
J11E	C2P7761	L11E	LR043560	8 mm	50 kN	Flat Bottom
J11F	C2P7761	L11F	LR043560	8 mm	50 kN	Flat Bottom
J12	C2C20592	L12	LR099822	8.5 mm	50 kN	Flat Bottom
J12A	C2C20592	L12A	LR099822	8.5 mm	45 kN	Flat Bottom
J12B	C2C20592	L12B	LR099822	8.5 mm	40 kN	Flat Bottom
J12CS	C2C20592	L12CS	LR099822	8.5 mm	50 kN	Shallow
J12D	C2C20592	L12D	LR099822	8.5 mm	50 kN	Pip
J13	C2C22612	L13	LR043559	7 mm	45 kN	Flat Bottom
J13A	C2C22612	L13A	LR043559	7 mm	50 kN	Flat Bottom
J13B	C2C22612	L13B	LR043559	7 mm	45 kN	Pip
J13C	C2C22612	L13C	LR043559	7 mm	40 kN	Flat Bottom
N/A	N/A	L13DS	LR043559	7 mm	45 kN	Shallow
J14	T4N10924	L14	LR099827	7.5 mm	35 kN	Flat Bottom
J14A	T4N10924	L14A	LR099827	7.5 mm	50 kN	Flat Bottom
J14B	T4N10924	N/A	N/A	7.5mm	45 kN	Flat Bottom
J14CS	T4N10924	L14CS	LR099827	7.5 mm	35 kN	Shallow
J14D	T4N10924	N/A	N/A	7.5 mm	35 kN	Pip
N/A	N/A	L14DS	LR099827	7.5 mm	45 kN	Shallow
J14ES	T4N10924	L14ES	LR099827	7.5 mm	40 kN	Shallow
N/A	N/A	L14F	LR099827	7.5 mm	40 kN	Pip
N/A	N/A	L14FS	LR099827	7.5 mm	45 kN	Shallow
N/A	N/A	L14GS	LR099827	7.5 mm	50 kN	Shallow
N/A	N/A	L14HS	LR099827	7.5 mm	60 kN	Shallow
J15	T4N13556	L15	LR099824	8 mm	40 kN	Pip
J15AS	T4N13556	L15AS	LR099824	8 mm	45 kN	Shallow
J15B	T4N13556	L15B	LR099824	8 mm	45 kN	Flat Bottom

-	-	-	SELF PIERCING RIVETS	-	-	-
SPR TYPE NO. JAGUAR	JAGUAR PART NUMBER	SPR TYPE NO. LAND ROVER	LAND ROVER PART NUMBER	RIVET LENGTH	RIVET APPLICATION FORCE	DIE DESCRIPTION
J15C	T4N13556	L15C	LR099824	8 mm	40 kN	Flat Bottom
J15DS	T4N13556	L15DS	LR099824	8 mm	40 kN	Shallow
J15E	T4N13556	L15E	LR099824	8 mm	45 kN	Pip
J15FS	T4N13556	N/A	N/A	8 mm	50 kN	Shallow
N/A	N/A	L15G	LR099824	8 mm	40 kN	Flat Bottom
J16	T2H15804	L16	LR099825	9 mm	45 kN	Flat Bottom
J16AS	T2H15804	L16AS	LR099825	9 mm	50 kN	Shallow
J16C	T2H15804	L16C	LR099825	9 mm	50 kN	Pip
J16D	T2H15804	L16D	LR099825	9 mm	50 kN	Flat Bottom
J16ES	T2H15804	L16ES	LR099825	9 mm	40 kN	Shallow
J16FS	T2H15804	L16FS	LR099825	9 mm	45 kN	Shallow
N/A	N/A	L16G	LR099825	9 mm	45 kN	Pip
N/A	N/A	L16HS	LR099825	9 mm	70 kN	Shallow
J17	C2C20594	L17	LR099823	9.5 mm	45 kN	Pip
J17A	C2C20594	L17A	LR099823	9.5 mm	45 kN	Flat Bottom
J17B	C2C20594	L17B	LR099823	9.5 mm	50 kN	Flat Bottom
J17C	C2C20594	L17C	LR099823	9.5 mm	40 kN	Flat Bottom
J18	T4N11943	L18	LR100016	10 mm	50 kN	Flat Bottom
J18AS	T4N11943	N/A	N/A	10 mm	50 kN	Shallow
J18BS	T4N11943	N/A	N/A	10 mm	60 kN	Shallow
N/A	N/A	L18D	LR100016	10 mm	45 kN	Flat Bottom
J19	N/A	L19	LR099830	8.5 mm	35 kN	Flat Bottom
J19A	N/A	L19A	LR099830	8.5 mm	40 kN	Flat Bottom
J19B	T2H14244	L19B	LR099830	8.5 mm	45 kN	Flat Bottom
J19C	N/A	L19C	LR099830	8.5 mm	50 kN	Flat bottom
J19CS	T2H14244	L19CS	LR099830	8.5 mm	50 kN	Shallow
J19DS	T2H14244	L19DS	LR099830	8.5 mm	45 kN	Shallow
J19ES	T2H14244	N/A	N/A	8.5 mm	40 kN	Shallow

-	-	-	SELF PIERCING RIVETS	-	-	-
SPR TYPE NO. JAGUAR	JAGUAR PART NUMBER	SPR TYPE NO. LAND ROVER	LAND ROVER PART NUMBER	RIVET LENGTH	RIVET APPLICATION FORCE	DIE DESCRIPTION
N/A	N/A	L19FS	LR099830	8.5 mm	60 kN	Shallow
N/A	N/A	L19G	LR099830	8.5 mm	45 kN	Flat Bottom
J20S	T4N10928	L20S	LR099828	7.5 mm	45 kN	Shallow
J20AS	T4N10928	L20AS	LR099828	7.5 mm	50 kN	Shallow
J20BS	T4N10928	L20BS	LR099828	7.5 mm	40 kN	Shallow
J20C	T4N10928	N/A	N/A	7.5 mm	50 kN	Pip
N/A	N/A	L21AS	LR099826	9.5 mm	45 kN	Shallow
N/A	N/A	L21B	LR099826	9.5 mm	45 kN	Flat Bottom
N/A	N/A	L21C	LR099826	9.5 mm	60 kN	Flat Bottom
N/A	N/A	L21JS	LR099826	9.5 mm	60 kN	Shallow
N/A	N/A	L21KS	LR099826	9.5 mm	45 kN	Shallow
N/A	N/A	L21L	LR099826	9.5 mm	70 kN	Pip
N/A	N/A	L21MS	LR099826	9.5 mm	50 kN	Shallow
J21S	T4N10929	L21S	LR099826	9.5 mm	50 kN	Shallow
J22	N/A	L22	LR099829	9 mm	50 kN	Flat Bottom
J22A	N/A	L22A	LR099829	9 mm	40 kN	Flat Bottom
J22B	N/A	L22B	LR099829	9 mm	45 kN	Pip
J22C	T4N10927	L22C	LR099829	9 mm	45 kN	Flat Bottom
J22DS	T4N10927	L22DS	LR099829	9 mm	45 kN	Shallow
J23	T4N10925	L23	LR105719	10.5 mm	50 kN	Flat Bottom
J24S	C2P24963	N/A	N/A	7.5 mm	45 kN	Shallow
N/A	N/A	L25	LR146802	11 mm	65 kN	Flat Bottom
N/A	N/A	L25AS	LR146802	11 mm	50 kN	Shallow

FLOW FORM RIVET (FFR)

Flow Form Rivets (FFRs) are an alternative fixing to Self Piercing Rivets (SPRs) and Breakstem Fasteners (BSFs). During the repair, if there is not sufficient space to install an SPR, and a BSF is not applicable. The procedure will specify the installation of an FFR.

**NOTE:**

Only install Flow Form Rivets (FFRs) where identified in the procedure.

Advantages of Flow Form Rivets:

- Multiple material stack combinations
- Joint can be repeated
- Low profile joint.



- 'A' Flow Form Rivet (FFR).
- 'B' FFR compressed and formed.

Planishing.

Planishing Matrice-(K2) Die-(K1) Matrice 6 mm-(BL6)



Hole Punching/Calibration.

Die-(K1) Matrice 6 mm-(BL6) Punching Crown 6 mm-(SLR6)



Hole Punching/Calibration. - Countersunk.

Matrice 6 mm-(BL6) Countersunk Die-(K5) Punching Crown 6 mm-(SLR6)



Flow Form Rivet Die.

Closing Die-(C1) Setting Die-(C16)



Jaguar Land Rover Approved Flow Form Rivet (FFR) Tools.

XPress 800 - RS-06v4

NOTE:

Only use JLR approved tools shown for Flow Form Rivet (FFR) removal and installation.



E266573

TKR XT2 - TKR-STA-168

 NOTE:

Only use JLR approved tools shown for Flow Form Rivet (FFR) removal and installation.



E263915



NOTE:

Use only the JLR approved tools, during the repair procedure.

Removal

Use a belt sander or die grinder to remove the head of the Flow Form Rivet (FFR).

With the head removed, punch out the center of the fixing with a 4 mm punch. Remove all unwanted material.



NOTE:

If Flow Form Rivet (FFR) removal is necessary during repairs, and a duplicate joint is necessary, make sure that the hole diameter is intact. Align the new panel and complete a check before proceeding

Planishing

When Self Piercing Rivet (SPR) removal and Flow Form Rivet (FFR) installation is instructed, it is necessary to planish the panel before removal. The procedure will remove the SPR button on the inner panel and reform the material.



CAUTION:

Flow Form Rivet (FFR) planishing - operation pressure of 20kN - 40kN, dependant on stack material and Self Piercing Rivet (SPR) button diameter.

 NOTE:

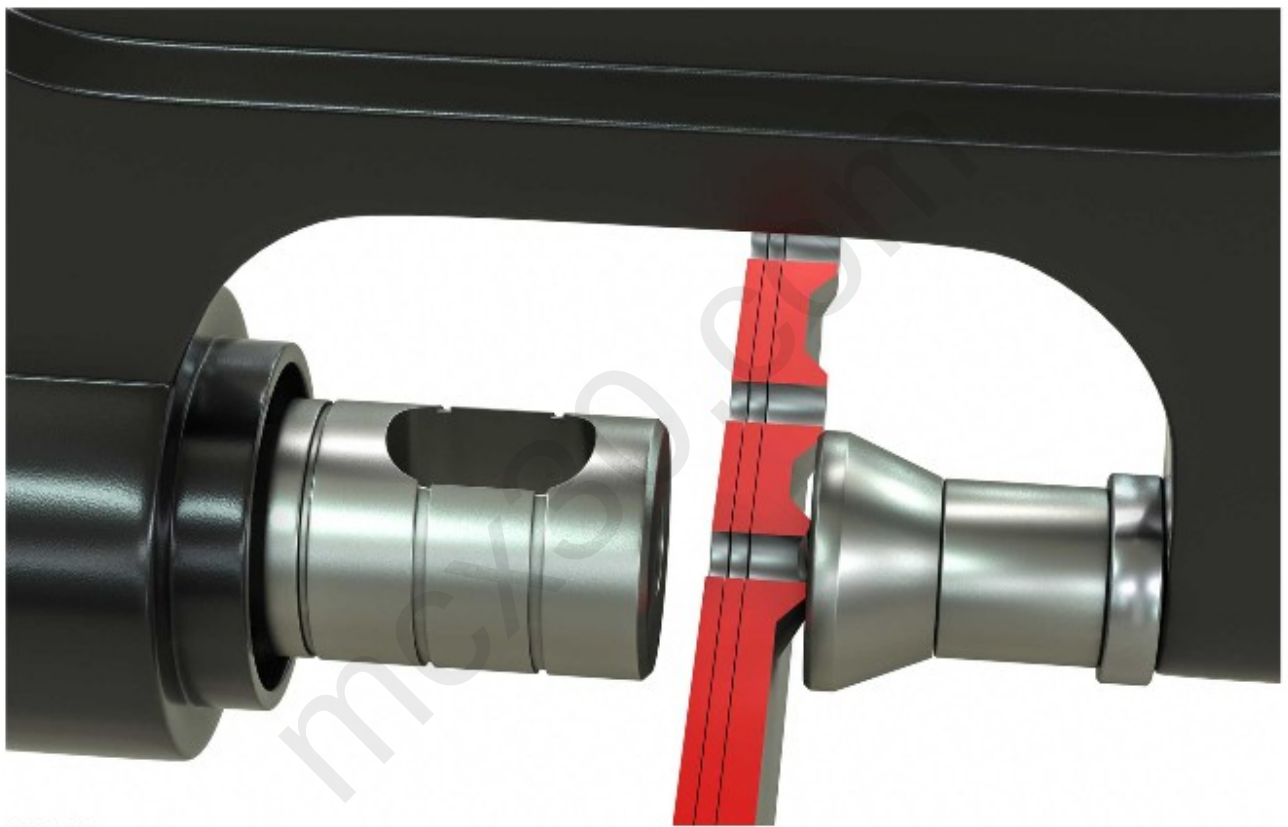
Make sure that the planishing procedure is done before removal of the panel.

Install the planishing die set to the 'C' frame of the tool.

 NOTE:

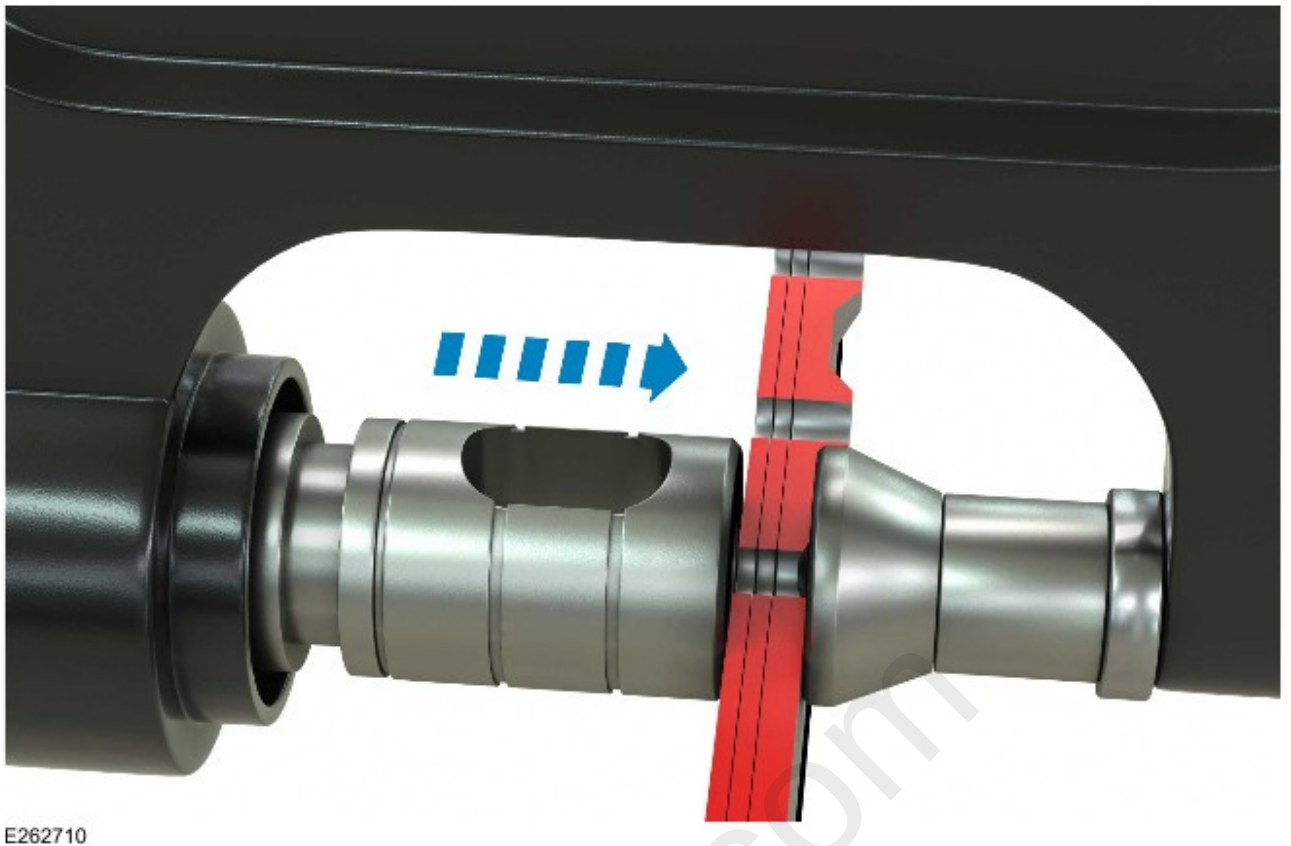
The center pin on the die will help set the position of the tool on the panel.

- Engage the tool on the center of the hole and Self Piercing Rivet (SPR) button.



E262709

- Operate the tool. The tool will attach to the panel surface. The material (SPR button) is planished flat.



E262710

Installation

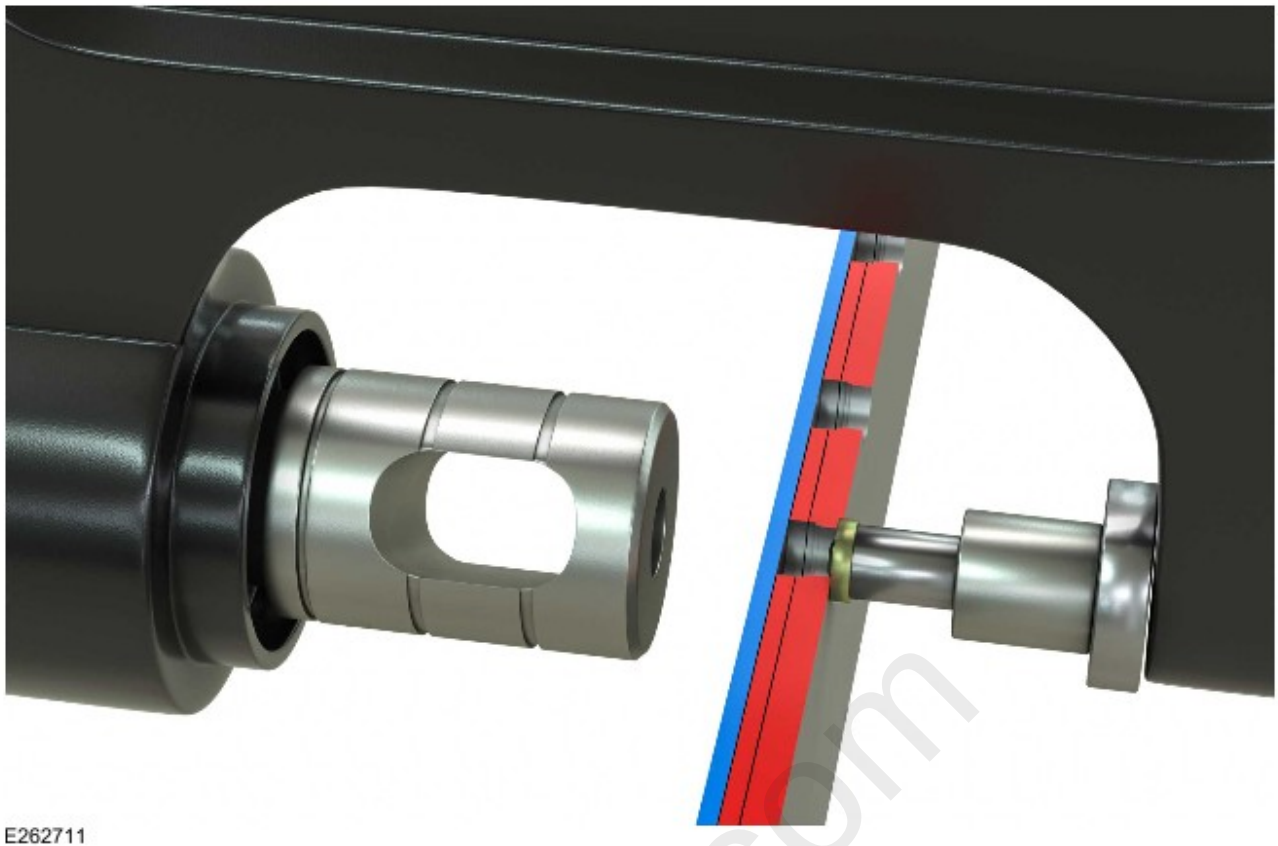
Hole Punching

Install the Matrice and Punching Crown to the 'C' frame of the tool.

ⓘ CAUTION:

Flow Form Rivet (FFR) hole punching - operate tool at maximum pressure.

- Align the new panel into position and complete a check.
- Set the tool on the hole. Engage the punching and calibration die.

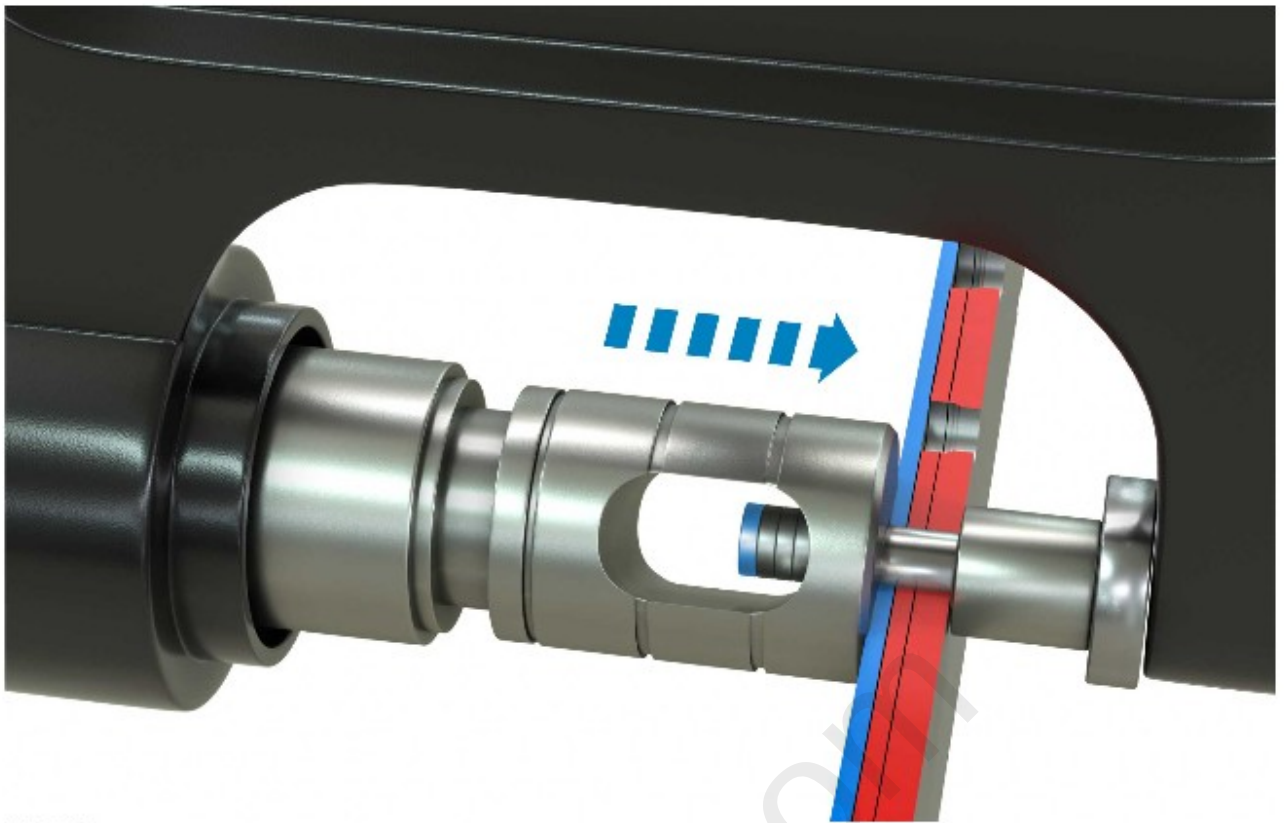


E262711

 NOTE:

Set the punching and calibration die to the center of the hole.

- Operate the tool. The tool will push the punching die through the hole and new panel to make a calibrated hole for the Flow Form Rivet (FFR).



E262712

NOTE:

It is important to refer to the workshop manual and table in this document for identification and selection of the fixings before installation.

Flow Form Rivet (FFR) Installation.

Install the Flow Form Rivet (FFR) dies in the 'C' frame of the tool.

CAUTION:

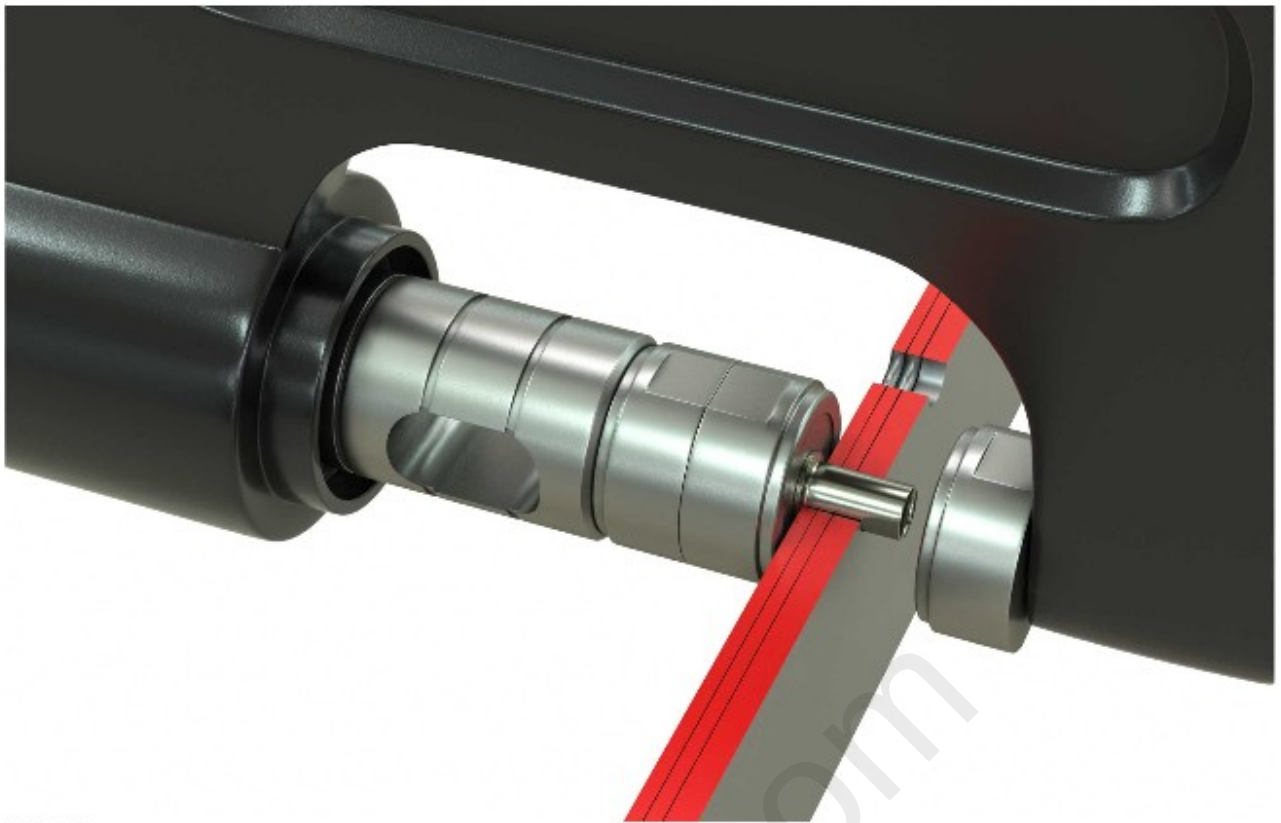
Flow Form Rivet (FFR) - Installation operation pressure - 55 kN.

- Set the Flow Form Rivet (FFR) in the hole.

NOTE:

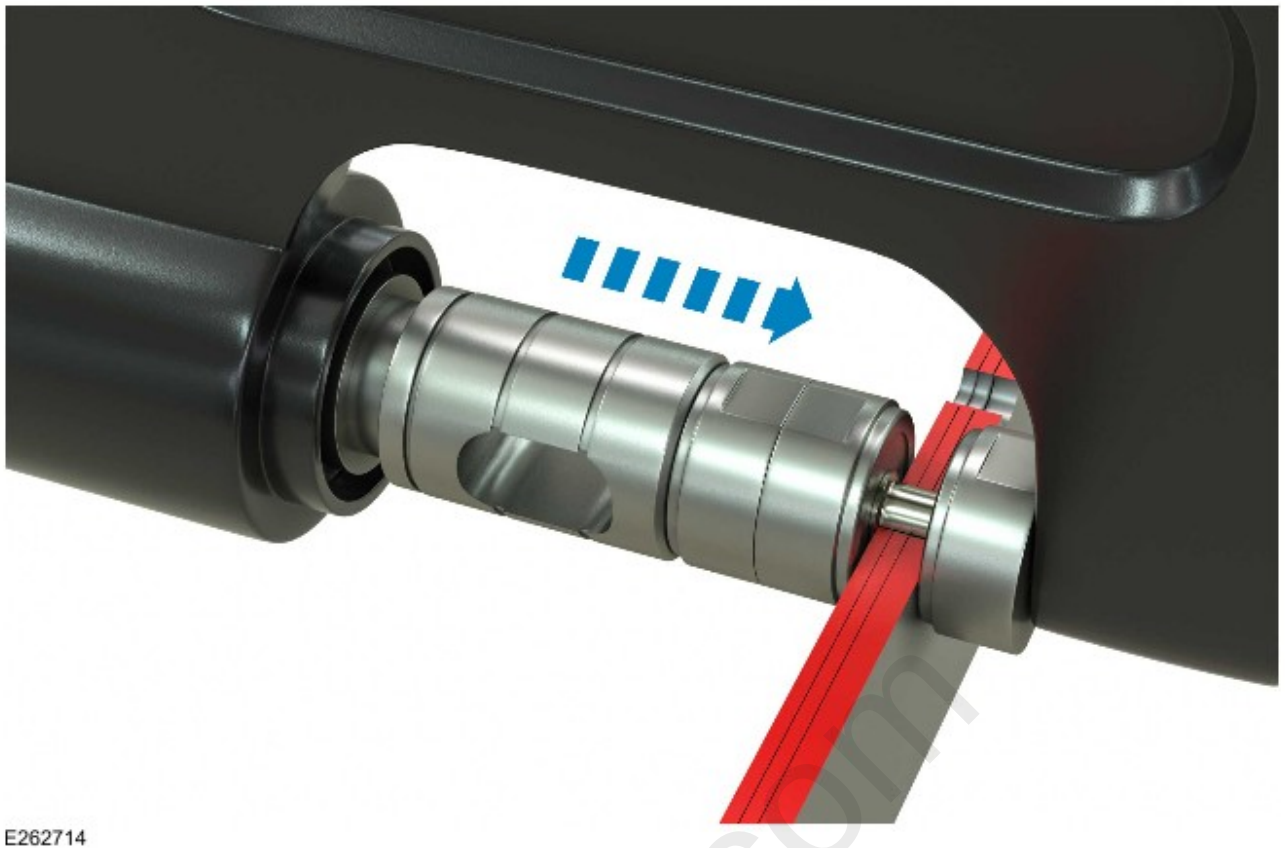
Wet adhesive will hold the FFRs in position during installation.

- Engage and set the tool on the FFR.

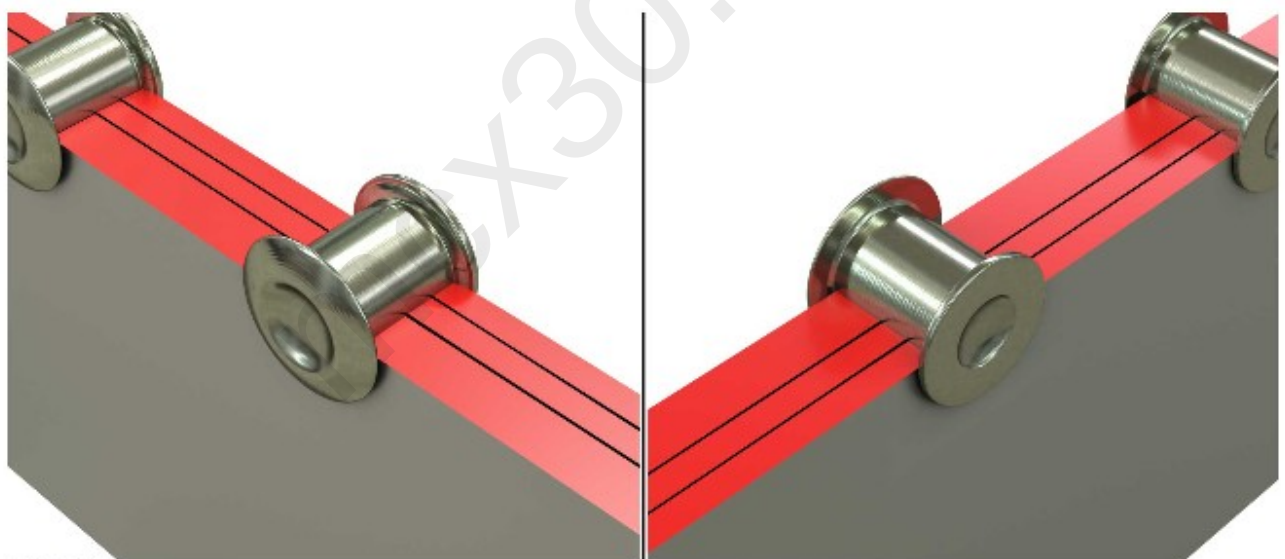


E262713

- Operate the tool, the FFR is compressed and formed as indicated.



E262714



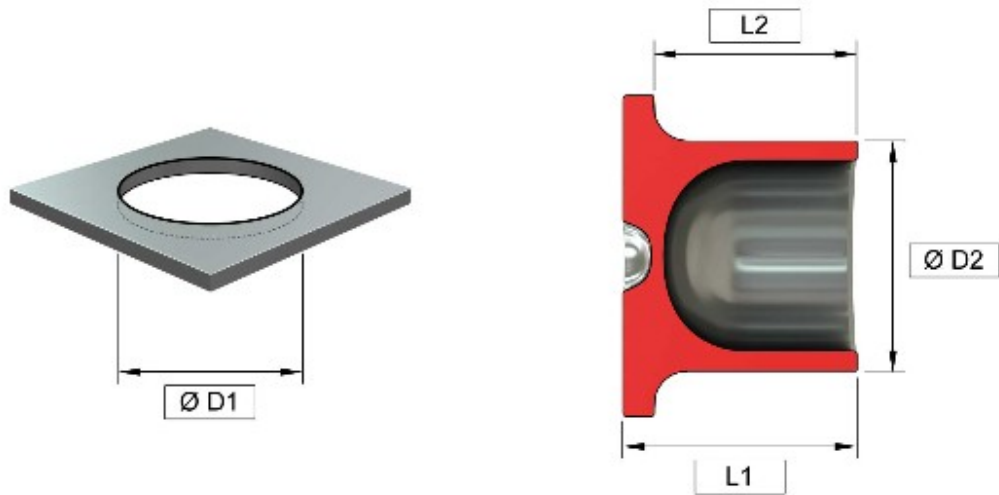
E262715

Flow Form Rivet (FFR) Selection

In line with the JLR continuous improvement program, repair procedures will contain the latest fixing data available upon publication.

⚠ CAUTION:

Always refer to the workshop manual procedure for Flow Form Rivet (FFR) values during repairs. Only install FFR where indicated in the workshop manual.

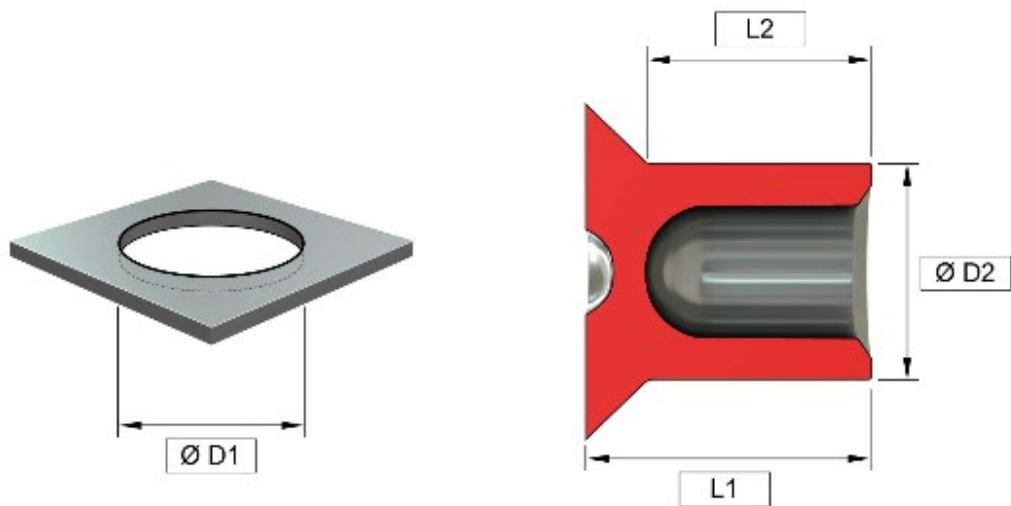


E262833

⚠ CAUTION:

Flow Form Rivet (FFR) - Installation operation pressure - 55 kN.

FLOW FORM RIVET (FFR)	REQUIRED HOLE DIAMETER (D1)	LENGTH (L1)	LENGTH (L2)	RIVET DIAMETER (D2)	JLR PART NUMBER	PART NUMBER
S0	6.0 mm	6.9 mm	5.8 mm	5.6 mm	LR146791	777232
S1	6.0 mm	8.1 mm	7.0 mm	5.6 mm	LR146792	777212
S2	6.0 mm	9.3 mm	8.2 mm	5.6 mm	LR146794	777213
S3	6.0 mm	10.6 mm	9.5 mm	5.6 mm	LR146795	777214
S4	6.0 mm	12.6 mm	11.5 mm	5.6 mm	LR146796	777233
S5	6.0 mm	TBC	TBC	5.6 mm	TBC	777234



E262834

⚠ CAUTION:

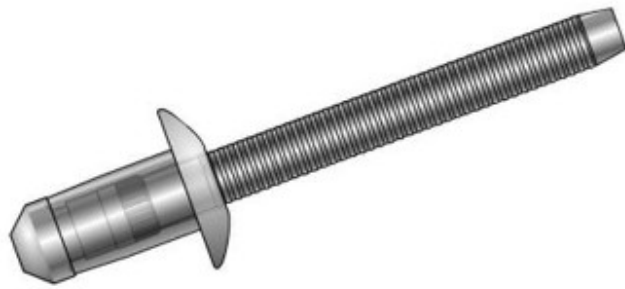
Flow Form Rivet (FFR) - Installation operation pressure - 55 kN.

COUNTERSUNK FLOW FORM RIVET (CFFR)	REQUIRED HOLE DIAMETER (D1)	LENGTH (L1)	LENGTH (L2)	RIVET DIAMETER (D2)	JLR PART NUMBER	PART NUMBER
CS0	6.0 mm	5.8 mm	4.1 mm	5.7 mm	LR146797	777304
CS1	6.0 mm	7.8 mm	6.1 mm	5.7 mm	LR146798	777300
CS2	6.0 mm	9.0 mm	7.3 mm	5.7 mm	LR146799	777301
CS3	6.0 mm	10.1 mm	8.4 mm	5.7 mm	LR146800	777302
CS4	6.0 mm	11.5 mm	9.2 mm	5.7 mm	LR146801	777303

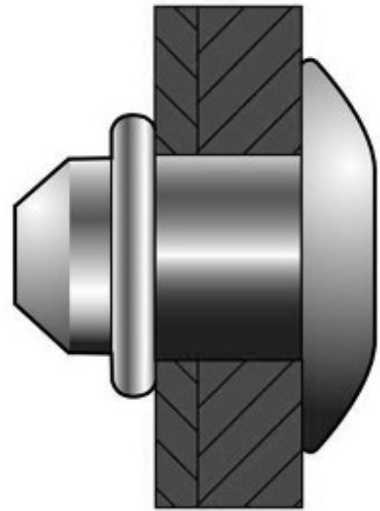
BREAKSTEM FASTENER (BSF)

Breakstem Fasteners (BSFs) are used in repair if the joint/stack cannot be accessed from both sides or require a greater load.

- BSFs will cope with joint/stack sizes of 1.5 mm to 12 mm.
- A pre-drilled 6.5 mm hole will be required before installation.
- To identify the correct size and part number of structural BSFs used in repair, always refer to the Topix procedure.



E146646



Breakstem Fasteners have the following benefits:

- Exceptional shear and tensile strength
- Large blind side bearing area against the rear sheet
- Interference lock formed by a splined stem
- Spreads the tail bearing/clamp load on the rear sheet
- Provides strong, vibration resistant joints
- No loose stems

Jaguar Land Rover Approved Breakstem Fastener (BSF) Tools.

Genesis G4



E72044

Taurus 4



E232541

ProSet XT4



E232542

XPress 800 (BR20/BR50)



E262981

Removal

Breakstem Fasteners (BSFs) used in production are removed by removing the centre of the fixing using a 4 mm punch. When the centre has been removed, drill out the remnant using a 6.5 mm Cryobit drill bit. Remove all debris.

Breakstem Fasteners (BSFs) used in after market repair are removed by removing the head of the fixing using a belt sander or die grinder. Then remove the centre of the fixing using a 4 mm punch. Remove all debris.

Installation

Make sure a JLR approved installation tool is used during the repair process. Prior to replacement, make sure the fixing hole has been drilled to 6.5mm, using a Cryobit drill bit and all debris has been removed.

Check that you have the correct size Breakstem Fastener (BSF) for replacement and insert it into the JLR approved tool. Use the weight of the tool to apply light pressure as the BSF is inserted into its hole. Press the trigger, which will tighten the BSF in the hole, when a pre-determined pressure is reached the wasted stud will be ejected into the tool.

Breakstem Fastener Selection

When the repair procedure requires the installation of a Breakstem Fastener (BSF), the stack code is identified within the repair procedure.

⚠ CAUTION:

Always refer to the workshop manual procedure for Breakstem Fastener (BSF) values when completing repairs.

In line with the JLR continuous improvement program, repair procedures will contain the latest fixing data available upon publication.

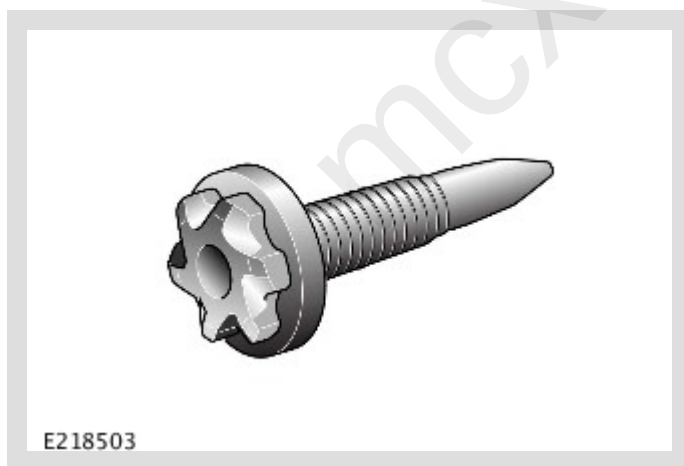
Documents containing the Breakstem Fastener (BSF) **grip range** will require the BSF selection from the table below.

- **For example:**
- BSF 3.5 = grip range 2.8mm to 4.8mm. **Selection should be towards the center of the grip range.**
- BSF 3.5 would require either BSF B or BSF L (Land Rover) or BSF 2 or BSF 11 (Jaguar).

LAND ROVER - BREAKSTEM FASTENER TYPE	PART NUMBER	JAGUAR - BREAKSTEM FASTENER TYPE	PART NUMBER	GRIP RANGE	DIMENSIONS	TYPE
BSF A	LR044284	BSF 1	C2S45252	1.5 mm to 3.5 mm	6.5 x 13 mm	Clinch
BSF B	LR044283	BSF 2	C2C36006	2.8 mm to 4.8 mm	6.5 x 15 mm	Clinch
BSF C	LRO44286	BSF 3	C2C36026	4.8 mm to 6.8 mm	6.5 X 17 mm	Clinch
BSF D	LRO43912	BSF 4	C2C36024	6.8 mm to 8.8 mm	6.5 X 19 mm	Clinch

LAND ROVER - BREAKSTEM FASTENER TYPE	PART NUMBER	JAGUAR - BREAKSTEM FASTENER TYPE	PART NUMBER	GRIP RANGE	DIMENSIONS	TYPE
BSF E	LRO44287	BSF 5	T2H15812	7.5 mm to 9.5 mm	6.5 X 20 mm	Clinch
BSF F	LRO44285	BSF 6	C2C36008	8.8 mm to 10.8 mm	6.5 X 18 mm	Clinch
BSF G	LRO44288	BSF 8	T2H15813	3.2 mm to 12.0 mm	6.5 X 27 mm	Countersunk - clinch
BSF H	LRO43932	BSF 7	C2P4773	2.0 mm to 9.5 mm	6.5 X 24 mm	Large head tubular
BSF J	LRO94293	BSF 9	T4N10217	2.0 mm to 9.5 mm	6.5 X 24 mm	Large head tubular
BSF K	LR147839	BSF 10	T4K7061	1.5 mm to 3.5 mm	6.5 x 13 mm	Clinch
BSF L	LR147840	BSF 11	T4K7059	2.8 mm to 4.8 mm	6.5 x 15 mm	Clinch
BSF M	LR147841	BSF 12	T4N9856	4.5 mm to 7.0 mm	6.5 X 17 mm	Clinch
BSF N	LR147842	BSF 13	T4K7060	6.8 mm to 8.8 mm	6.5 X 19 mm	Clinch
BSF O	LR147843	BSF 14	T4K7063	8.8 mm to 10.8 mm	6.5 X 18 mm	Clinch

FRICITION DRILLING SCREWS (FDS)



NOTE:

When M5 Friction Drilling Screws (FDS) are removed in service, they must be replaced with a new larger M6 FDS.

This process is also called thermal drilling, flow drilling, form drilling, or friction stir drilling.

This joining method enables high-quality assembly of thin sheet metals made of steel and aluminum. The fixing is pressed against a target material with both high rotational speed and high pressure. This process produces a high

local production of heat, which softens the material. The excess material forms a sleeve, which makes it possible to create very strong threaded joint in thin material.

- The main benefits of Friction Drilling Screw (FDS) is one-sided accessibility for application and screw removability.
- The screw joint is able to transfer high pull-out forces and high shearing strength.

Removal

- Screw out the M5 FDS using a battery operated tool or hand tools.
- Clean the area and remove any debris using industrial vacuum cleaner.

Installation

- Position the new M6 FDS in the original position.
- Screw in the FDS until the required torque is reached.

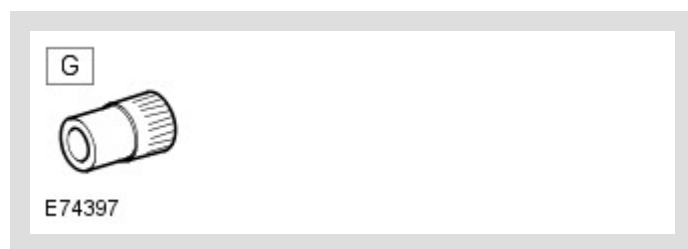


NOTE:

Install the Friction Drilling Screw (FDS) screw using 2-4 Nm of torque until flush with the panel, then apply additional 4 Nm of torque (8-10 Nm total). Overall torque should not exceed 11 Nm.

DESCRIPTION	JAGUAR LAND ROVER SERVICE NUMBER
M6 Friction Drilling Screw (FDS)	T4K7064

TORX SCREW AND RIVNUT



A Torx Screw and Rivnut are used where the installation of a Hemlok would give a poor cosmetic appearance. There are also occasions where the Torx Screw and Rivnut replaces a Breakstem Fastener (BSF), where there is no access for the Genesis G4. The Rivnut acts as the thread.

DESCRIPTION	JAGUAR SERVICE NUMBER
Rivnut (G)	C2C 10348
Torx Screw (J)	C2G 1964

Removal

The removal of the Torx Screw is completed using a T30 Torx Driver. The Rivnut is not an original fixing.

Installation



The Torx Screw is installed using a T30 Torx Driver. The Rivnut is installed using the Wurth HES412 Rivet Nut Thread Setter, (Part No: 964948900).

EARTH STUD

Secure and reliable earthing is imperative for trouble free function of electronic components and management systems. A solid permanent joint is needed for long term stability under load, even with high short term amperage values and corresponding heat generation.

The earth bond comprises two components:

- A conical dowel having a male thread.
- A cylindrical flanged bush.

A tensile force is applied to the dowel using a hand hydraulic tool with a pre-determined pulling force. As the dowel is pulled through the bush, the bush remains fixed in the structure and expands within the hole making electrical contact. The tool completes its cycle resulting in a permanent electrical connection.

Removal/Preparation

Damaged or broken studs:

- Locate the broken or cross-threaded stud.
- Dress the broken stud to a safe and acceptable repair standard.
- Complete drilling in close proximity to the broken /cross-threaded stud.

Installation

- Measure and mark stud location.
- Using a stepped cutter, drill a hole in the mounting plate to a predetermined diameter depending on the material and the stack thickness.
- Screw the earth bond stud into the nose of the applicator tool. The flange of the stud should be flush with the panel surface.
- Place the new stud into the drilled hole. Apply pressure to the trigger of the applicator tool until audible click is heard. This will indicate the applicator tool has reached the end of its cycle.



Glenair earth bonding system is the approved equipment to repair the earth studs on JLR vehicles.

Earth Bond Selection

Earth Bonds for use with Aluminum

GLENAIR PART NUMBER	THREAD SIZE	HOLE SIZE	PLATE/MATERIAL THICKNESS	TORQUE VALUE	TOOL SETTING
80958	M6	11.5 to 11.7 mm	1.5 to 4 mm	8 Nm	PMT6/PMTC6
80960	M6	10.5 to 10.7 mm	> 4 mm	8 Nm	PMT6/PMTC6
80976	M6	11.5 to 11.7 mm	1.5 to 4 mm	8 Nm	PMTC6
80977	M6	10.5 to 10.7 mm	> 4 mm	8 Nm	PMTC6
81931	M8	15.0 to 15.2 mm	1.5 to 4 mm	15 Nm	PMT8
81930	M8	13.5 to 13.7 mm	> 4 mm	15 Nm	PMT8

GLENAIR PART NUMBER	THREAD SIZE	HOLE SIZE	PLATE/MATERIAL THICKNESS	TORQUE VALUE	TOOL SETTING
80959	M10	19.0 to 19.2 mm	2 to 4 mm	34 Nm	PMT 10
80961	M10	15.0 to 15.2 mm	> 4 mm	34 Nm	PMT 10

Earth Bonds for use with Steel

GLENAIR PART NUMBER	THREAD SIZE	HOLE SIZE	PLATE/MATERIAL THICKNESS	TORQUE VALUE	TOOL SETTING
80923	M6	11.5 to 11.7 mm	1.5 to 4 mm	8 Nm	PMT6/PMTC6
80925	M6	8.5 to 8.7 mm	> 4 mm	8 Nm	PMT6/PMTC6
80974	M6	11.5 to 11.7 mm	1.5 to 4 mm	8 Nm	PMTC6
80975	M6	8.5 to 8.7 mm	> 4 mm	8 Nm	PMTC6
81929	M8	15.0 to 15.2 mm	1.5 to 4 mm	15 Nm	PMT8
81928	M8	11.5 to 11.7 mm	> 4 mm	15 Nm	PMT8
80924	M10	19.0 to 19.2 mm	2 to 4 mm	34 Nm	PMT 10
80926	M10	13.5 to 13.7 mm	> 4 mm	34 Nm	PMT 10

Tool Setting Selection

PART NUMBER	PULLING FORCE	WEIGHT	LENGTH	OPTIONAL TEST GAUGE
PMT6	10 KN	1.28 kg	185 mm	80928
PMTC6	10 KN	1.28 kg	185 mm	80928
PMT8	18 KN	1.28 kg	185 mm	80928
PMT10	25 KN	1.28 kg	185 mm	80928

APPROVED SERVICE CONSUMABLES FOR REPAIR

BRAND	USAGE	DESCRIPTION	PRODUCT NUMBER	ALTERNATIVE PRODUCT
3M	Sealing	-	-	-
3M	Sealing	Polyurethane Cartridge Extruded Seam Sealer (gray)	08684	08362
3M	Sealing	Polyurethane Cartridge Extruded Seam Sealer (white)	08689	08368
3M	Sealing	Polyurethane Cartridge Extruded Seam Sealer (black)	08694	08367

BRAND	USAGE	DESCRIPTION	PRODUCT NUMBER	ALTERNATIVE PRODUCT
3M	Sealing	Polyurethane Cartridge Extruded Seam Sealer (beige)	50740	08365
3M	Sealing	Polyurethane Sachet 310ml (gray)	08782	08361
3M	Sealing	Polyurethane Sachet 310ml (white)	08787	08360
3M	Sealing	Polyurethane Sachet 310ml (black)	08789	N/A
3M	Sealing	Polyurethane Sachet 600ml (gray)	08783	N/A
3M	Sealing	Polyurethane Sachet 600ml (white)	08788	N/A
3M	Sealing	Polyurethane Sachet 600ml (black)	08793	N/A
3M	Sealing	Sprayable Seam Sealer 2K Polyurethane 150ml (gray)	08823	N/A
3M	Sealing	Sprayable Seam Sealer 2K Polyurethane 250ml (gray)	08800	N/A
3M	Sealing	Sprayable Seam Sealer (gray)	08851	08374
3M	Sealing	Super Seam Sealer Can (gray)	08537	08656
3M	Sealing	Super Seam Sealer Brush	08540	N/A
3M	Sealing	Sprayable Seam Sealer Cartridge (gray)	08374	08374
3M	Body Caulking	Body Caulking	08578	08568
3M	Sealing	Caulkable Sealer (white)	08855	08369
-	Adhesive/Bonding	-	-	-
3M	Adhesive/Bonding	Manual Applicator 50ml	08190	N/A
3M	Adhesive/Bonding	Impact Resistant Structural Adhesive	07333	N/A
3M	Adhesive/Bonding	Panel Bonding Adhesive	08115	N/A
3M	Adhesive/Bonding	Manual Applicator and Nozzle	08117	N/A
-	Tape and Film	-	-	-
3M	Tape and Film	Acrylic Tape PT1100 Double Sided (6mm x 40m)	80318	06387
3M	Tape and Film	Acrylic Tape PT1100 Double Sided (9mm x 20m)	80319	N/A
3M	Tape and Film	Acrylic Tape PT1100 Double Sided (12mm x 20m)	80320	06388
3M	Tape and Film	Acrylic Tape PT1100 Double Sided (19mm x 20m)	80322	06389
3M	Tape and Film	Acrylic Tape PT1100 Double Sided (25mm x 20m)	80323	N/A

BRAND	USAGE	DESCRIPTION	PRODUCT NUMBER	ALTERNATIVE PRODUCT
3M	Tape and Film	Polyolefin Adhesion Promotor	05917	05907
3M	Tape and Film	Abrasion Resistance Film	8210	84906
3M	Tape and Film	Abrasion Resistance Film	8219	84901
-	Cavity Wax	-	-	-
3M	Cavity Wax	Body Shultz High Coverage	08964	N/A
3M	Cavity Wax	Cavity Wax Plus	8852	08852
-	Underbody Coating	-	-	-
3M	Underbody Coating	Body Shutz Coating 1L Can (black)	08861	08864
3M	Underbody Coating	Body Shutz Coating 500ml Aerosol (black)	08877	08881
3M	Underbody Coating	Bodyguard Stone chip Coating Can (black textured)	08868	N/A
3M	Underbody Coating	Bodyguard Stone chip Coating Can (beige textured)	08874	N/A
3M	Underbody Coating	Bodyguard Stone chip Coating Can (white textured)	08878	N/A
3M	Underbody Coating	Bodyguard Stone chip Coating Can (gray textured)	08879	N/A
3M	Underbody Coating	Bodyguard Stone chip Coating Can (black flat)	08158	N/A
3M	Underbody Coating	Bodyguard Stone chip Coating Can (gray flat)	08159	N/A
3M	Underbody Coating	Anti-Chip Coating Smooth (gray)	08886	N/A
3M	Underbody Coating	Anti-Chip Coating Smooth (Aerosol) (gray)	08889	N/A
3M	Underbody Coating	Auto Adhesive Aerosol Trim (clear)	08080	N/A
-	Trim Adhesive	-	-	-
3M	Trim Adhesive	Auto Adhesive Brushable Trim (clear)	08150	08061
3M	Trim Adhesive	Contact Adhesive Aerosol (amber)	08090	N/A
-	Sound Deadening	-	-	-
3M	Sound Deadening	Sound Deadening Sheets	08840	N/A
-	Flexible parts repair material	-	-	-
3M	Flexible parts repair material	EZ Sand Multi Purpose Repair Material	-	05887
-	Weld Through Primers	-	-	-
3M	Weld Through Primers	Weld Thru II Coating	50410	5917

BRAND	USAGE	DESCRIPTION	PRODUCT NUMBER	ALTERNATIVE PRODUCT
-	Cleaners and degreasers	-	-	-
3M	Cleaners and degreasers	General Purpose adhesive cleaner	08984	N/A
-	Cavity Foam	-	-	-
3M	Cavity Foam	3M Flexible foam	8463	N/A
-	Abrasive Discs	-	-	-
3M	Abrasive Discs	Roloc Bristle Discs	07528	7528

BRAND	USAGE	DESCRIPTION	PRODUCT NUMBER
Teroson	-	-	-
-	Sealing	-	-
Teroson	Sealing	Terostat 9100 - 1K PUR - Adhesive sealant - white	1896978
Teroson	Sealing	Terostat 9100 - 1K PUR - Adhesive sealant - gray	1896976
Teroson	Sealing	Terostat 9200 - 1K PUR - Adhesive sealant - black	1896974
Teroson	Sealing	Terostat 9320SF - Sprayable seam sealant - gray	1357960
Teroson	Sealing	Terostat 9320SF - Sprayable seam sealant - black	1358054
Teroson	Sealing	Terostat 9320SF - Sprayable seam sealant - ochre	1358059
Teroson	Sealing	Terolan special sealant brushable 1.4 kg tin	799671
Teroson	Sealing	Terostat RB 7 Round profile plastic sealing band	142216
-	-	-	-
Teroson	Sealing	Terostat 9120 SF - white 310 ml	1358213
Teroson	Sealing	Terostat 9120 SF - black 310 ml	1358214
Teroson	Sealing	Terostat 9220 Power adhesive sealant - black 310 ml	2026592
-	Sealing Tape and Primer	-	-
Teroson	Sealing	Terotape seam sealing tape 10mm x 16mm	451115
Teroson	Sealing	Terokal primer aerosol 150 ml	267078
-	Cavity Wax	-	-
Teroson	Cavity Wax	Terotex 400 1L can	784176
Teroson	Cavity Wax	Terotex 400 10L tin	784149
Teroson	Cavity Wax	Terotex 400 60L barrel	784190

BRAND	USAGE	DESCRIPTION	PRODUCT NUMBER
Teroson	Cavity Wax	Teroson 215 cavity spray 500ml aerosol	794224
-	Underbody Wax	-	-
Teroson	Underbody Wax	Terotex wax black 1L can	794862
-	Underbody Coating	-	-
Teroson	Underbody Coating	Terotex record 2000 underbody coating 1L can - gray	767197
Teroson	Underbody Coating	Terotex record 2000 underbody coating 1L can - black	767198
Teroson	Underbody Coating	Terotex super 3000 aqua anti chip compound 1L can - black	1335491
Teroson	Underbody Coating	Terotex super 3000 aqua anti chip compound 1L can - light	882415
-	Corrosion Protection	-	-
Teroson	Corrosion Protection	Zinc spray 400 ml	333170
-	Anti Corrosive Agent	-	-
Teroson	Corrosion Protection	Terotex 350 1L can	793958
Teroson	Corrosion Protection	Terotex 350 10L can	793960
Teroson	Corrosion Protection	Terotex 350 60L barrel	793957
-	Sound Deadening	-	-
Teroson	Sound Deadening	Terodem SP 100 alu - 50 x 25	150012
Teroson	Sound Deadening	Terodem SP 300 - 50 x 50	150055
Teroson	Sound Deadening	Terodem SP 300 - 100 x 50	150054
-	Glazing Adhesive	-	-
-	Glazing Adhesive	Teroson PU 8597 HMLC (High Modulus)	1467800