

# **BU21**

## **Energy Absorber, Mechanical**



### **1. Description**

This procedure describes methods for the repair and replacement of mechanical energy absorbers. Inspection and evaluation requirements are also included.



### **2. Purpose**

The purpose of this procedure is to provide industry-accepted requirements for performing high-quality repair of mechanical energy absorbers. This procedure is intended for use by professionals who are qualified through training and experience.



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## 3. Referenced Documents

The following documents are considered part of this procedure by reference.

### 3.1 Procedures

- BU01S Bumper
- BU02P Bumper Cover
- BU11P Reinforcement
- BU11S Reinforcement
- HM01 Hazardous Materials
- PS01 Personnel Safety
- WE11S GMA (MIG) Fillet Weld

### 3.2 Other Information

- Recycled parts information
- Vehicle-specific repair information



## 4. Equipment And Material Requirements

### 4.1 GMA (MIG) Welding Equipment

Use GMA (MIG) welding equipment as described in **WE11S**.



## 5. Damage Analysis

Inspection procedures depend on the type of mechanical energy absorber. If inspecting a single- or two-stage absorber, spring-loaded hydraulic absorber, or poly gel mitigator (PGM), see 5.1. If inspecting an isolator, see 5.2.

### 5.1 Hydraulic, Spring-Loaded And PGM-Type Absorbers

Inspect hydraulic, spring-loaded, and PGM-type energy absorbers for these conditions:

- visible damage
- leaks
- failure to return to the proper length
- corrosion
- misalignment

Repairs on these types of energy absorbers are limited to the following:

- straightening minor bends in the mounting flanges or bumper mounting plates
- removal of surface corrosion
- refinishing to restore appearance

Note: Follow the vehicle maker's recommendations for repair procedures.

If there is any other type of damage, the absorber must be replaced.

### 5.2 Isolators

Inspect an isolator energy absorber for these conditions:

- visible damage
- failure to return to the proper length
- corrosion
- misalignment

Repairs on isolator energy absorbers are limited to the following:

- welding cracks between the end plate and shaft
- straightening minor bends in the mounting flanges or bumper mounting plates
- removal of minor corrosion
- refinishing to restore appearance

If there is any other type of damage, the isolator must be replaced.



## 6. Personnel Safety

### 6.1 General Safety

General safety information is in **PS01**.

### 6.2 Safety With Mechanical Energy Absorbers

To prevent injury when working with mechanical energy absorbers:

- Do not weld or apply heat to any energy absorber that contains fluid or compressed gas.
- Do not stand directly over, or in front of, an energy absorber while it is being compressed.
- If the unit is still compressed as a result of a collision, be careful of the unit springing back during straightening or removal.
- Depressurize energy absorbers before disposal, by drilling a 3 mm ( $\frac{1}{8}$ " ) hole in the cylinder wall.

### 6.3 Welding Safety

Welding safety information is in **WE11S**.



## 7. Environmental Safety

### 7.1 Hydraulic Fluid

Any hydraulic fluid contained in energy absorbers must be disposed of following local hazardous waste regulations. Hazardous material safety information is in **HM01**.



## 8. Vehicle Protection

### 8.1 Adjacent Areas

Protect adjacent areas when repairing or replacing energy absorbers.



## 9. Repair Procedure

### 9.1 Repair Or Replacement

To repair or replace a mechanical energy absorber:

- 1. Loosen and remove the mounting fasteners. Discard any damaged fasteners.
- 2. Remove the shims, if necessary. Note the placement and number of shims.
- 3. Remove the energy absorber.
- 4. Make necessary repairs according to the type of energy absorber and vehicle maker's recommendations.
- 5. Inspect the repaired or replacement energy absorbers. See **11.1**.
- 6. Position and hold the repaired or replacement energy absorber in place.
- 7. Install the fasteners. If the fasteners are being replaced, use fasteners that are the same size, type, and strength as the original fasteners. Ensure that all coatings and spacers are installed to prevent galvanic corrosion.
- 8. Install the shims, if necessary.
- 9. Adjust the reinforcement to obtain proper alignment of attached and adjacent parts. Follow the vehicle maker's recommendations.
- 10. Torque all fasteners to the vehicle maker's recommendations.



## 10. Use Of Recycled (Salvage) Parts

### 10.1 Condition Of Salvage Parts

Do not use a salvage energy absorber having any of these defects:

- unrepairable damage
- leaks
- indications of previous collapse
- improper previous repairs
- corrosion of the piston or tube, that has caused pitting

### 10.2 Preparation Of Salvage Parts

To prepare a salvage energy absorber for installation:

- Repair any minor damage following **5.1**.
- Clean the part to remove dirt, grease, undercoating, etc.



## 11. Inspection And Testing

### 11.1 Pre-Inspection Of Energy Absorbers

Before installation, perform the following tests on mechanical absorbers.

Twist Test:

- 1. Secure the base of the absorber.
- 2. Attempt to rotate the piston tube by hand.

If the piston tube rotates, replace the absorber.

Collapse Test:

- 1. Measure the overall length of the absorber, following the vehicle maker's measurement recommendations.
- 2. Place the absorber in a hydraulic press or similar piece of equipment.
- 3. Compress the absorber about 12 mm ( $\frac{1}{2}$ ").
- 4. Release the pressure on the absorber and remove it from the press.
- 5. Measure the absorber after approximately one minute.

Replace the absorber if it fails to return to its original length.

### 11.2 Inspection Of Installed Energy Absorbers

After installation, inspect energy absorbers for these conditions:

- proper alignment with attached and adjacent parts
- proper installation of all fasteners

Correct any defects.