Uniform Procedures For Collision Repair UPCR

RE31 Tensioners, Seat Belt

 v.4.0

1. Description

This procedure describes methods for the replacement, inspection and testing of explosive and mechanical seat belt tensioner systems.

2. Purpose

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

3. Referenced Documents

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

3.1 Procedures

HM01 Hazardous Materials
PS01 Personnel Safety
RE01 Seat Belt
RE21 Airbag Systems

3.2 Other Information

Equipment-specific information
Vehicle-specific repair information

4. Equipment And Material Requirements

4.1 Equipment

The use of this equipment is included in this procedure:

- ❏ digital volt-ohm meter (DVOM)
- ❏ jumper wires
- ❏ electro-static discharge (ESD) strap

Caution: Ensure that the DVOM has an output less than 10 mA (0.01 A) on the lowest ohmmeter range, with the probes shorted.

Some explosive seat belt tensioners may require these additional items:

- ❏ tensioner simulator or load tool
- ❏ universal or vehicle-specific breakout box
- ❏ universal or vehicle-specific scan tool
- ❏ vehicle-specific manual deployment tool

5. Damage Analysis

Follow the vehicle maker's recommendations for post-deployment inspection and replacement of parts. Some vehicle makers require complete tensioner system replacement if either the tensioners or airbags have deployed, or if there is physical damage to the seat belt or tensioner.

5.1 General Damage

Inspect the seat belt tensioner for these types of damage:

- ❏ visible damage
- ❏ deployment
- ❏ damaged or worn seat belt webbing (see **RE01**)
- ❏ webbing that does not extend from the retractor smoothly and easily (see **RE01**)
- ❏ damaged or non-functioning buckles (see **RE01**)
- ❏ loose or damaged anchoring bolts (see **RE01**)

5.2 Electronic Parts

Inspect for visible damage to these electronic parts on explosive seat belt tensioner systems:

- ❏ control unit and control-unit mounting
- ❏ sensors or sensor mountings
- ❏ wiring harness or connectors

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5. Damage Analysis (cont'd)

5.3 Explosive Tensioner System Operation Check

If there is no visible damage to the tensioner parts, check the operation of the system. See **11.1**.

6. Personnel Safety

6.1 General Safety

General safety information is in **PS01**.

6.2 Safety With Airbag Systems

Airbag safety information is in **RE21**.

6.3 Safety With Non-Deployed Explosive Tensioners

Before working on a collision-damaged vehicle with an undeployed explosive tensioner, disarm the passive restraint system following the vehicle maker's recommended procedure.

To prevent injury from an accidental deployment during repairs, even if the system is disarmed:

- ❏ Do not place your hands or loose objects in the seat belt retractor area.
- ❏ Use a simulator or load tool during testing, if required by the vehicle maker.
- ❏ Be aware that electronic memory savers supply enough power to deploy a tensioner.
- ❏ Do not apply electrical power to any part unless directed by a service manual. This includes using an ohmmeter or other self-powered measuring equipment.

Note: Some explosive tensioners feature non-electric, mechanical firing mechanisms. Follow the vehicle maker's recommendations for disarming and rearming these devices.

6.4 Safety When Manually Deploying Explosive Tensioners

To prevent injury when manually deploying explosive tensioners:

- ❏ Follow the vehicle maker's procedures and equipment recommendations. A special tool may be required.
- ❏ Deploy tensioners inside the vehicle, unless the vehicle maker recommends deployment outside the vehicle. Make sure there is no one in the vehicle during the deployment.

If an undeployed explosive tensioner cannot be deployed using manual deployment procedures, it may have to be returned to the vehicle maker. See **7.1**.

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6. Personnel Safety (cont'd)

6.5 Safety With Replacement Explosive Tensioners

To prevent injury when storing or handling replacement explosive tensioners:

- ❏ Store the replacement tensioners in a clean, dry place, away from any heat sources.
- ❏ Do not allow the tensioners to be exposed to sparks, fire, moisture, or impact.
- ❏ Do not carry any system parts by the wiring harness or pigtail.
- ❏ Follow the vehicle maker's recommendations if a part is dropped or shows visible signs of damage.

7. Environmental Safety

7.1 Undeployed Explosive Tensioner

Do not dispose of an undeployed explosive tensioner. If it cannot be manually deployed, return the undeployed tensioner to the vehicle maker. Follow these requirements:

- ❏ Use the same box that the replacement tensioner was shipped in. There may be shipping instructions with the replacement tensioner.
- ❏ Make sure the package is properly labeled for hazardous materials. Hazardous material shipping information is in **HM01**.

8. Vehicle Protection

8.1 Electronic System

To protect computers and other sensitive parts from damage:

- ❏ Follow the vehicle maker's recommendations for recording and resetting electronic memories.
- ❏ Ensure that the ignition switch is in the LOCK position, and the key is removed.
- ❏ Disconnect and isolate the negative battery cable, and disarm the passive restraint system. Follow the vehicle maker's recommendations.
- ❏ Carefully remove computer modules when welding or heating within 300 mm (12"), or a greater distance when recommended by the vehicle maker.
- ❏ Protect computer modules, connectors, and wiring from dirt, heat, static electricity, and moisture.
- ❏ Loosen or remove any wiring harnesses or electrical parts that could be damaged during the repair process.

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8. Vehicle Protection (cont'd)

To protect diagnostic modules:

- ❏ Avoid touching electrical terminals.
- ❏ Use a static grounding strap when handling the module.
- ❏ Do not store modules near electric welders or other high-energy electrical equipment.
- ❏ Do not make DVOM tests of the module unless directed by a service manual.
- ❏ Do not open the package of the replacement module until it is to be installed on the vehicle.

9. Repair Procedure

9.1 Replacement Of Explosive Seat Belt Tensioner Parts

To replace explosive seat belt tensioner parts:

- ❏ 1. Disarm the passive restraint system. Follow the vehicle maker's recommended procedure. Use a tensioner simulator or load tool if necessary.
- ❏ 2. Replace damaged tensioner system parts as required, following the vehicle maker's recommendations.
- ❏ 3. Re-activate the system. Keep the simulator or load tool installed, if applicable.
- ❏ 4. Check the system operation. See **11.1**.

9.2 Replacement Of Mechanical Seat Belt Tensioner Parts

To replace mechanical seat belt tensioner parts:

- ❏ 1. Remove seats and trim panels for access, if required.
- ❏ 2. Remove fasteners holding the seat belt assembly to the vehicle.
- ❏ 3. Remove the seat belt assembly.
- ❏ 4. Visually inspect tensioner system parts for damage.
- ❏ 5. Remove the tensioner cable, if required.
- ❏ 6. Replace parts as required.
- ❏ 7. Reinstall the seat belt assembly.
- ❏ 8. Reinstall the tensioner cable. Reroute the cable in the original location. Follow the vehicle maker's recommendations.
- ❏ 9. Lubricate the cable following the vehicle maker's recommendations.
- ❏ 10. Torque the fasteners to the vehicle maker's recommendations. Make sure that the webbing and cable are not twisted and are routed correctly.
- ❏ 11. Reinstall trim panels and seats, as required.
- ❏ 12. Check the system operation. See **11.2**.

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9. Repair Procedure (cont'd)

9.3 Undeployed System

To service explosive seat belt tensioner systems when the tensioners have not deployed:

❏ 1. Disarm the passive restraint system. Follow the vehicle maker's procedure. Use a simulator or load tool if necessary.
❏ 2. Visually inspect tensioner system parts for damage.
❏ 3. Replace parts as required. If a non-deployed tensioner will be replaced, it must be manually deployed following the vehicle maker's recommendations. See **9.4**.
❏ 4. Re-activate the system. Keep the simulator or load tool installed, if applicable.
❏ 5. Check the system operation. See **11.1**.

9.4 Manual Deployment

To manually deploy an explosive seat belt tensioner:

❏ 1. Follow the vehicle maker's recommendations for connecting the wiring harness and other special equipment to the tensioner.
❏ 2. Stretch the wiring harness to its full length.
❏ 3. Detonate the explosive tensioner. The tensioner should immediately deploy.
❏ 4. After the tensioner has cooled, dispose of it as non-hazardous material.

10. Use Of Recycled (Salvage) Parts

Do not install salvage seat belt tensioner system parts.

11. Inspection And Testing

11.1 Explosive System Operation Check

To verify that the explosive seat belt tensioner system is operating properly:

- ❏ 1. Follow the tensioner system operation check (self-test) in the vehicle maker's service manual.
- ❏ 2. Turn the ignition switch ON.
- ❏ 3. Observe the operation of the dash lamp. Make sure the lamp is displaying the proper sequence.
- ❏ 4. If the dash lamp indicates a system problem, follow the vehicle maker's diagnostic method, using the chart in the service manual. Not all systems use trouble codes. A specialty tester or scan tool may be required for diagnosing the system.
- ❏ 5. Make the necessary repairs and repeat steps 1–4.
- ❏ 6. Clear all stored codes using the vehicle maker's recommended procedure and equipment.
- ❏ 7. Disarm the system following the vehicle maker's recommendations.
- ❏ 8. Remove the tensioner simulator or load tool, if installed.
- ❏ 9. Install the tensioner.
- ❏ 10. Re-activate the system following the vehicle maker's recommendations.
- ❏ 11. Verify that the dash lamp goes out.
- ❏ 12. Road-test the vehicle to check the dash lamp and electrical accessories for proper operation.

If the dash lamp remains on or continues to flash, there are still problems in the system. This does NOT mean the system is disabled. Make the necessary repairs and repeat steps 1–4.

11.2 Mechanical System Operation Check

Follow inspection recommendations from the vehicle maker for the specific tensioner system.

In addition, inspect replaced seat belts for these conditions:

- ❏ proper routing of seat belt webbing
- ❏ webbing extends from the retractor smoothly and easily
- ❏ functioning buckles
- ❏ proper tightening of anchor bolts

Correct any defects.