I-CAR®

Uniform Procedures For Collision Repair UPCR

# DT21 Halfshafts

 v.4.0

## 1. Description

This procedure describes the diagnosis, replacement, and inspection of axle halfshafts. Diagnosis, repair, replacement, and inspection of constant velocity (CV) joints is also included.

## 2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for performing high-quality repair of axle halfshafts. 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

BR51 Brakes, Anti-Lock And Traction Control
HM01 Hazardous Materials
PS01 Personnel Safety
WA01 Wheel Alignment, Front
WA11 Wheel Alignment, Rear

### 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:

- ❏ ball joint removal and pressing tool
- ❏ boot clamp removal and installation tool
- ❏ snap-ring pliers
- ❏ special axle-removing tools
- ❏ vehicle-specific special tools

## 5. Damage Analysis

### 5.1 General Damage

Inspect halfshafts and CV-joints for these conditions:

- ❏ visible damage
- ❏ improper previous repairs
- ❏ corrosion that has caused pitting
- ❏ excessive halfshaft end play at the transmission
- ❏ fluid leaks at the output shaft and the transmission
- ❏ stretched or damaged CV-joint boots
- ❏ damaged, loose, or missing CV-joint boot clamps
- ❏ damaged tone ring, if applicable (see **BR51**)

Note: Do not assume a CV-joint requires replacement because it is loose. CV-joints have some physical looseness by design. Follow the vehicle maker's recommendations. Road-test the vehicle, if possible, to confirm the diagnosis or verify proper operation of the halfshaft and CV-joints. See **11.2**. Further checks may be required to determine the location and extent of damage.

### 5.2 Halfshaft Inspection

If there is boot or clamp damage, or evidence of a failed CV-joint, the halfshaft should be removed from the vehicle and mounted in a vise for further inspection and part replacement. See **9.1–9.6.**

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## 5. Damage Analysis (cont'd)

To isolate CV-joint damage:

- ❏ Check for contamination by inspecting the grease on the CV-joint for grittiness or a milky appearance.
- ❏ Inspect the bearing cage, inner race, and joint housing for damage, wear, and corrosion.
- ❏ Check the bearings or rollers for damage or wear by tilting the joint to its maximum angle and plunging it in and out. The plunging action should be smooth, with no catching.
- ❏ Inspect the rollers and bearings on tripod-design CV-joints for damage, wear, or discoloration.

Damaged or worn parts must be replaced to restore proper halfshaft performance. Verify the availability of replacement parts. It may be necessary to replace CV-joints on both halfshafts to restore proper performance. Follow the vehicle maker's recommendations for the replacement of halfshaft parts.

## 6. Personnel Safety

### 6.1 General Safety

General safety information is in **PS01**.

### 6.2 Safety With Halfshafts And CV-Joints

To prevent injury when working with halfshafts and CV-joints:

- ❏ Properly raise and support the vehicle.
- ❏ Properly support the halfshaft during removal and installation.
- ❏ Use the proper tools, and follow the equipment and vehicle makers' recommendations.

## 7. Environmental Safety

### 7.1 Grease

Collect and properly dispose of contaminated grease.

Hazardous material safety information is in **HM01**.

## 8. Vehicle Protection

### 8.1 Halfshaft And CV-Joint

To prevent damage to halfshafts, CV-joints, and related parts:

- ❏ Support both ends of the halfshaft during removal and installation procedures. Do not allow the halfshaft to hang by a CV-joint.
- ❏ Do not move a vehicle when a halfshaft or CV-joint is disconnected.
- ❏ Do not use an air impact wrench on halfshaft and CV-joint fasteners.
- ❏ Do not hammer on the threaded end of a halfshaft.
- ❏ Do not use the axle fastener to pull a CV-joint into the hub.
- ❏ Install wooden pads or other protection on vise jaws before clamping a halfshaft in a vise. Avoid overtightening the vise.
- ❏ Prevent contaminating the inside of CV-joint boots.
- ❏ Do not pull or push on the ends of the CV-joints.
- ❏ Do not strike the outside housing of CV-joints.
- ❏ Do not use the inner CV-joint as a slide hammer when removing the halfshaft.
- ❏ Do not allow the ball or needle bearings to fall loose from inner CV-joints.
- ❏ Only use the grease supplied with the replacement boot or joint. Do not intermix greases when packing CV-joints.
- ❏ Plan to replace one-time or damaged fasteners.
- ❏ Do not reuse snap rings, clips, clamps, or cotter pins.

### 8.2 Anti-Lock Brake System (ABS) Parts

On vehicles equipped with ABS, do not damage the wheel-speed sensors or tone rings when servicing CV-joints. For inspection and replacement procedures for ABS parts, see **BR51**.

## 9. Repair Procedure

### 9.1 Halfshaft Removal

To remove a halfshaft:

- ❏ 1. Remove the wheel cover and the wheel hub cover, if required for access to the hub fastener.
- ❏ 2. Properly lift and support the vehicle.
- ❏ 3. Loosen the hub fastener.
- ❏ 4. Remove the wheel and tire assembly.
- ❏ 5. Drain the transaxle or differential fluid, if required.
- ❏ 6. Remove the hub fastener. Replace one-time or damaged fasteners. Use replacement fasteners that are the same grade, size, and type as the original fasteners.

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❑ 7. Disconnect the brake caliper from the spindle. Do not allow the caliper to hang by the brake hose.
❑ 8. Separate the lower ball joint from the steering knuckle assembly, or rear bearing carrier, if required.
❑ 9. Disconnect the inner CV-joint from the transaxle or differential.
❑ 10. Separate the halfshaft shaft from the hub, using a special tool if required.
❑ 11. Remove the halfshaft from the vehicle.

### 9.2 Halfshaft Installation

To install a halfshaft:

❑ 1. Position the halfshaft on the vehicle, duplicating the original mounting method. Properly support the halfshaft.
❑ 2. Reconnect the inner CV-joint to the transaxle or differential.
❑ 3. Reconnect the ball joint to the steering knuckle assembly or rear bearing carrier.
❑ 4. Reconnect the brake parts.
❑ 5. Reinstall the hub fastener.
❑ 6. Reinstall the wheel and tire assembly.
❑ 7. Replace the transaxle or differential fluid.
❑ 8. Lower the vehicle.
❑ 9. Torque the wheel and hub fasteners to the vehicle maker's recommendations.
❑ 10. Check the front or rear wheel alignment.
❑ 11. Road-test the vehicle.

### 9.3 CV-Joint Boot Removal

To remove a CV-joint boot:

❑ 1. Remove the halfshaft from the vehicle. See **9.1**.
❑ 2. Secure the halfshaft in a vise. Avoid overtightening the vise.
❑ 3. Cut the boot clamps from the joint boot. Replace the boot clamps.
❑ 4. Scribe a mark on the shaft, at the small end of the boot.
❑ 5. Remove the boot from the joint.
Note: On some vehicles, the inner CV-joint and boot must be removed before removing the outer CV-joint boot. Follow the vehicle maker's recommendations.
❑ 6. Remove the attaching clip and separate the CV-joint from the axle shaft. Do not allow the ball or needle bearings to fall loose from inner CV joints.
❑ 7. Remove the joint boot from the axle shaft. Clean the axle shaft.
❑ 8. Inspect the inner parts of the CV-joint for damage, corrosion, etc. Inspect the grease in the joint for contamination. Damage to the inner parts or grease contamination requires replacement of the CV-joint or halfshaft.

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### 9.4 CV-Joint Boot Installation

To install a replacement CV-joint boot:

- ❑ 1. Install the replacement boot on the halfshaft. Align the small end of the boot with the indicated mark.
- ❑ 2. Install a replacement small boot clamp.
- ❑ 3. Install the CV-joint on the halfshaft, using a replacement clip.
- ❑ 4. Pack the joint and boot with the proper grease.
- ❑ 5. Pull the boot over the joint and into its proper position. Properly shape the boot around the joint, without stretching it. Purge the boot of any air that may be trapped inside.
- ❑ 6. Install a replacement large boot clamp.

### 9.5 CV-Joint Removal

To remove a CV-joint for replacement:

- ❑ 1. Remove the halfshaft. See **9.1**.
- ❑ 2. Scribe a mark on the shaft at the small end of the boot.
- ❑ 3. Remove the boot clamps, and the boot.
- ❑ 4. Clean all excess grease from the halfshaft and CV-joint.
- ❑ 5. Follow the vehicle maker's recommendations for removing the joint from the axle shaft. Replace any removed clips, snap rings, or cotter pins.
- ❑ 6. Thoroughly clean the shaft and inspect it for wear. Check the grease for contaminants, such as dirt or water.
- ❑ 7. Wipe any remaining grease from the splines and shaft.
- ❑ 8. Solvent-clean the surface where the boot clamps on the halfshaft. Dry thoroughly.

### 9.6 CV-Joint Installation

To install a replacement CV-joint:

- ❑ 1. Slide the replacement clamp and boot onto the halfshaft.
- ❑ 2. Position the replacement joint on the splines and tap the mount on until it seats. Make sure the CV-joint is properly locked on the shaft.
- ❑ 3. Install a replacement clip or snap ring.
- ❑ 4. Thoroughly pack all of the supplied grease into the assembly.
- ❑ 5. Install the replacement boot and reinstall the halfshaft on the vehicle. See **9.2.**

 

## 10. Use Of Recycled (Salvage) Parts

### 10.1 Condition Of Salvage Parts

Do not install salvage halfshafts or CV-joints having any of these defects:

- ❏ evidence of having been heated, welded, or damaged
- ❏ damaged or mis-shaped boot
- ❏ evidence of CV-joint contamination

Use salvage CV-joint boots, only if they are part of a complete halfshaft assembly.

## 11. Inspection And Testing

### 11.1 Halfshaft And CV-Joint Inspection

When repairs are completed, inspect halfshafts and CV-joints for these conditions:

- ❏ proper installation of boot clamps
- ❏ no evidence of damage to the CV-joint housing
- ❏ proper boot shape, with no evidence of stretching
- ❏ fasteners torqued to the vehicle maker's recommendations

Correct any defects.

### 11.2 Halfshaft And CV-Joint Road-Test

Road-test the vehicle and check for these conditions:

- ❏ loud clicking noise during full right and left turns when the vehicle is driven forward and backward
- ❏ drivetrain vibration
- ❏ unusual noises or vibrations when accelerating, upshifting, downshifting, or turning

Correct any defects.