



Halfshaft to Wheel Bearing Audible Click Audit

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. The purpose of this standard is to evaluate complete vehicles to determine if the halfshaft Constant Velocity Joint (CVJ) to wheel bearing interface creates a clicking noise when subjected to various driving maneuvers.

1.2 Applicability. This procedure is applicable to Two Wheel Drive (2WD) and Four Wheel Drive (4WD) passenger vehicles and trucks that are equipped with halfshafts either in front, rear, or both.

1.3 Remarks. This test procedure is intended to simulate torque reversals in the driveline system which may produce a clicking noise that may be heard both inside and outside the vehicle. The objective of any driveline system design is to produce a product that does not click when subjected to loads within the design specification. Click noise is typically created in a non-conforming system when there is microscopic movement between the CVJ body and the wheel bearing.

This procedure is to be used to evaluate vehicles for clicking noises at various stages of individual vehicle life cycle. For example, this procedure could be performed at specified intervals over a test or durability vehicle's life cycle. Due to increasing wear/clearance of spline interface, click noise may worsen over a vehicles lifetime.

Clicking noise can take place in the following locations:

- Front halfshafts (Front Wheel Drive (FWD), All Wheel Drive (AWD) or 4WD)
- Rear halfshafts (AWD or 4WD with independent rear suspension or Rear Wheel Drive (RWD) with independent rear suspension)

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- CG2604 Halfshaft Click Evaluation Data Table (ID)
- Global Document Management (GDM) (ID)

ID = This reference is limited to internal access within General Motors. Contact the GM Lead Engineer for further instructions.

3 Resources

3.1 Facilities.

- Level parking lot or paved surface free of obstructions and other vehicles
- Sloped parking area with a 10% or greater slope that is at least twice as long as the vehicle being tested

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

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3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment. Not applicable.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Vehicle. A vehicle with a representative engine, transmission, tires and driveline system installed. Often halfshaft click develops over time and/or mileage, therefore it is suggested that a set of components to be tested have already accumulated 3200 km (2000 mi) prior to running this test procedure. Vehicles that are going to be monitored over their entire life cycle can be tested at any specified interval in their life cycle. Tests conducted after 3200 km (2000 mi) of mileage accumulation will be most representative of system performance over time.

3.3.2 Test Piece. Representative halfshafts, washers, retaining nuts and wheel bearings. Components to be installed with released torque and process. Torque can be varied between minimum and maximum released torque depending on objective of evaluation.

3.4 Test Time.

Calendar time: 1 day

Test hours: 1 hour

Coordination hours: 1 hour

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Test personnel must be familiar with typical halfshaft click noises. See CG2604 for video/audio file that contains recordings of typical click noise.

4 Procedure

4.1 Preparation. Install test components or document vehicle number, mileage, date and installed driveline components if testing existing vehicle configuration. Data shall be recorded on Data Sheet CG2604.

4.2 Conditions.

4.2.1 Environmental Conditions. Ambient atmospheric conditions.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Preparation. Test to be performed with the windows down and in a quiet environment. Evaluation should be performed both when vehicle is at ambient (i.e., driveline components at ambient outside temperature) and warmed up to normal operating temperatures. Vehicle warm up should consist of normal driving of approximately 4 km to 5 km, which shall consist of several normal stop and go events.

4.3.2 Evaluation. Start vehicle and perform the following evaluations while listening for **Click** noise from interface of half shafts to wheel bearings.

Note: Noise will come from behind the wheels.

4.3.2.1 Evaluation Auto Transmission/Electric Drive.

4.3.2.1.1 Step 1. Shift from park to reverse and perform normal reverse drive away.

4.3.2.1.2 Step 2. Shift from reverse to drive and perform normal forward drive away.

4.3.2.1.3 Step 3. Shift from park to reverse while holding the service brake pedal to prevent vehicle movement and then apply 25% throttle. Release throttle after engine comes up to appropriate stable speed.

Note: This step may not be applicable for electric drive.

4.3.2.1.4 Step 4. Shift from reverse to drive while holding the service brake pedal to prevent vehicle movement and then apply 25% throttle. Release throttle after engine comes up to appropriate stable speed.

Note: This step may not be applicable for electric drive.

4.3.2.1.5 Step 5. On a 10% (or greater) pad/surface with all evaluations performed in the **uphill** direction: Repeat 4.3.2.1.1 and 4.3.2.1.4.

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