



Transfer Case Range Shift Clash Abuse

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 test procedure is to determine the durability of a transfer case when subjected to repeated abuse "clash" shifting in and out of the a non-synchronized low range.

1.2 Applicability. This test applies to four wheel drive vehicles that incorporate the use of a transfer case to distribute torque to both front and rear axles. Additionally, this transfer case shall have, as part of its internal mechanism, optionally selected driving ranges (gear reduction) that are not synchronized.

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.

- CG190 (ID)
- CG4631

(ID) = This document is limited to internal distribution within General Motors and shall not be distributed outside this company. Contact the GM Lead Engineer for further instructions.

3 Resources

3.1 Facilities. GM Proving Grounds, Milford, Michigan or equivalent.

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

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. Test vehicle equipped as specified by the Design Engineer.

Note: Axles should be selected with the highest numerical ratio available, with the smallest available tire size.

3.3 Test Vehicle/Test Piece. The vehicle shall be equipped with specific driveline configuration requested. It may be possible to interchange driveline, chassis controls, tires and wheels, and powertrain hardware and software to accomplish multiple test configurations on the same vehicle.

3.3.1 Test Vehicle. Validation must be performed on a full vehicle equipped as listed in 3.3.1.1 through 3.3.1.5.

3.3.1.1 A standard release transmission.

3.3.1.2 The released combination of powertrain components that creates the greatest loading on the test component(s).

3.3.1.3 Any vehicle body style for which the test transfer case is released.

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3.3.1.4 Vehicle Ballast. Production intent vehicle curb weight plus driver and equipment.

3.3.1.5 Drivetrain Hardware. All drivetrain hardware that is being validated should be new.

3.3.2 Test Materials/Components.

3.3.2.1 One (1) transfer case assembly.

3.3.2.2 Sufficient quantity of the test lubricant to fill the transfer case to the manufacturer's recommended level. Record lubricant data.

3.4 Test Time.

Calendar time: 1 days

Test hours: 5 hours

Coordination hours: 1 hour

3.5 Test Required Information. If the vehicle is equipped with an electric or automatic shift transfer case, the person performing the test must understand the shift logic of the vehicle being tested. Range shifts on these vehicles require certain conditions to be met before the shift can be completed. Typically, if the conditions are not met at the time of the request the shift will complete when the conditions are met as long as this occurs before the time out period. However, some systems may require the conditions to be met at the time of the request in order to complete the shift.

3.6 Personnel/Skills. Test Technician should be proficient in operation of the facilities listed in 3.1, proper selection and operation of the equipment listed in 3.2, knowledge as a trained driver with ability to conduct end of test inspection of test parts, if required, and be familiar with the general operation of transfer cases as listed in 3.5.

4 Procedure

4.1 Preparation.

4.1.1 Fill the transfer case with the specified quantity of released lubricant.

4.1.2 Inflate the tires to specification.

4.1.3 Inspect the test component to verify it complies with part specification and record results.

4.1.4 Record the part number and serial number of the test component.

4.1.5 Run the test at vehicle curb weight.

4.2 Conditions.

4.2.1 Environmental Conditions. Test can be run in wet or dry conditions. Do not run on roads with accumulated snow.

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 Warm up the component by driving for 10 minutes at 89 km/h (55 mph) in Four Wheel Drive Mode, High Range (4H).

4.3.2 Drive to the test location and stop.

4.3.3 If equipped with a manual transmission, it should be in 1st gear; automatic transmission should be in Drive. If equipped with a manual shift transfer case, accelerate to 8 km/h (5 mph) and maintain this speed. If equipped with an electric or automatic shift transfer case, the vehicle should be accelerated to 13 km/h to 16 km/h (8 mph to 10 mph), then the transmission should be shifted to Neutral and the vehicle allowed to gradually slow down.

4.3.4 If equipped with a manual shift transfer case quickly shift the transfer case from 4H to Four Wheel Drive Mode, Low Range (4L). In an electric or automatic shift transfer case vehicle depending on the range shift logic, the appropriate switch should be pushed immediately after the transmission is shifted to Neutral and as the vehicle slows down to the programmed shift limit, the transfer case will automatically shift into the desired range or press the button repeatedly until it is noted that the range shift is in progress. Observe and note all noises and whether the unit actually achieved a 4H to 4L shift.

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