



Transfer Case Low Range 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 procedure is to evaluate the transfer case under high torsional loads in both a forward drive and a forward overrun direction while operating in Four Wheel Drive Mode, Low Range (4L).

1.2 Applicability. This test is applicable to Four Wheel Drive (4WD) vehicles with transfer cases containing a low range gear.

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)
- CG4630

(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.

3.2.1 Engine tachometer.

3.2.2 Thermocouples, connecting wire, and digital readouts or electronic data recorder to monitor engine oil, radiator tank top, transmission, transfer case, and rear axle fluid temperatures.

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 One (1) transfer case assembly.

3.3.1.1 Sufficient quantity of the test lubricant to fill the Transfer Case to the manufacturer's recommended level. Record lubricant data.

3.3.2 Four Wheel Drive (4WD) test vehicle with the engine and transmission configuration producing the most torque input to the transfer case.

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3.3.3 Ballast vehicle to 100% Gross Vehicle Weight (GVW).

3.3.4 If equipped with manual locking hubs, the hubs should be locked.

3.4 Test Time.

Calendar time: 3 days

Test hours: 12 hours

Coordination hours: 4 hours

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 Safety inspect the vehicle.

4.1.2 Check fluid levels.

4.1.3 Inflate the tires to recommended specification.

4.1.4 Ballast the vehicle to maximum Gross Vehicle Weight Rating (GVWR).

4.1.5 Calibrate the speedometer.

4.1.6 Install thermocouples to monitor.

- Engine oil
- Engine coolant
- Transfer case
- Rear axle

4.1.7 Tune the engine to manufacturer's recommendation.

4.2 Conditions.

4.2.1 Environmental Conditions. Do not perform this test under wet or slippery 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 Position the vehicle at the base of the 27% grade and shift to 4L. If equipped with manual locking hubs, lock them.

4.3.2 Proceed forward up the grade at Wide Open Throttle (WOT), upshifting as necessary to keep engine speed between 4000 rpm to 4500 rpm.

4.3.3 Continue to the top of the grade and back off the throttle at the top.

4.3.4 Make a U-turn at the top. It is permissible to shift to Two Wheel Drive Mode, High Range (2H) in order to make the U-turn. If the vehicle was shifted back to 2H, shift back into 4L and overrun in first gear back to the bottom of the 27% grade. Brake, if necessary, to avoid overspeeding the engine.

4.3.5 At the bottom, proceed with caution to turn around the vehicle in the area at the bottom of the 27% grade. It is permissible to shift the vehicle back to 2H for the turn around. This concludes one (1) cycle.

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