



Axle Lube Flow Test

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. To subjectively rate the amount of lubricant flow through the pinion bearings (typically referred to as the head/tail bearings) of an axle carrier (front or rear), the lube flow path from the cover pan, and to determine the lubricant level at the wheel bearings in the case of a rear axle or the disconnect housing in the case of a front axle.

1.2 Applicability. This procedure is applicable to beam axles, and front and rear drive modules of open differential configuration, for use in passenger cars and light trucks.

1.3 Remarks. This procedure utilizes a clear plastic housing in order to observe the interior lube flow pattern.

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.

- CG4396
- Component Technical Specification (CTS)
- Statement of Requirements (SOR) Appendix C
- Subsystem Technical Specification (SSTS)
- Validation Cross Reference Index (VCRI)

3 Resources

3.1 Facilities. This test requires a lab/test cell for component testing. Use facilities having the test equipment described in 3.2 appropriate for the test(s) being run.

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 The lab must be equipped with a dynamometer with a means of applying a minimum of 5000 rpm input speed to the axle, as well as a means of measuring and recording the input and output shaft speeds, and potentially applying a variable load to the outputs.

3.2.2 Tilt stand to simulate angles in document Axle Statement of Requirements (SOR) Appendix C (Subsystem Technical Specification (SSTS)).

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3.2.3 Video equipment to record the lube flow at the following areas:

- a. Standard or high speed video of cover pan/differential bearing area.
- b. Real-time standard video of pinion bearing feed port, pinion bearing sump, and pinion bearing return port. Disconnect housing/tube for a front axle. Left Hand/Right Hand (LH/RH) wheel bearings/tubes in the case of a rear axle.

3.3 Test Vehicle/Test Piece. Clear Stereolithography (SLA) axle housing, tubes, and cover are used to allow fluid flow observation/subjective rating.

3.4 Test Time.

Calendar time: 2 days

Test hours: 4 hours

Coordination hours: 8 hours

3.5 Test Required Information.

3.5.1 Possible sources are:

- Component Technical Specification (CTS)
- Statement of Requirements (SOR)
- Subsystem Technical Specification (SSTS) (for Axle or Rear Drive Module)
- Validation Cross Reference Index (VCRI)

3.5.2 The engineer must equate vehicle speed to pinion speed (rpm). Enter results in Table 1 and on CG4396.

3.5.3 If lube flow analysis under banking angles (lateral or side-to-side) is desired, the requesting engineer must fill-in the wanted angles in Table 1 and on CG4396 Data Log Run Table.

3.6 Personnel/Skills.

3.6.1 The dynamometer operator must be trained on spin test stand.

3.6.2 Test technician should be proficient in proper selection and operation of the equipment listed in 3.2.

4 Procedure

4.1 Preparation.

4.1.1 Provided the sample will be driven through the input only, the differential will have to be locked so that both axle shafts turn at the same output speed. Typically this is done during the build of the test sample. Should dynamometer speeds be controlled on both the input and outputs of the test sample, the modification to the differential is not required. When operating in drive mode the differential must be locked.

4.1.2 When operating in disconnect mode the pinion must be locked.

4.1.3 Install a thermocouple to read the temperature of the oil near the bottom of the differential sump. Installation of thermocouple can be facilitated via the use of the fill plug located in the cover pan, or preferably via the use of the drain plug located in the bottom of the carrier (if available).

4.1.4 Mark and document oil level (on the clear housing test piece).

4.1.5 Measure and document (on the test piece) the distance between the oil level and bottom of the fill plug at the nominal, minimum, and maximum oil volume (include photographs). The differential pin must be horizontal unless otherwise specified.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

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 Fill the axle carrier with the specified part number, type, and quantity of lubricant as stated by the test engineer.

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