GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW17231

Final Drive Ring Gear Retention 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 evaluate the performance of the ring gear retention to the differential case.

1.2 Applicability. Test is applicable for front and rear axles used in light trucks and passenger vehicles

1.3 Remarks. This standard addresses cyclic laboratory tests conducted on final drive assemblies in which the ring gear retention is monitored and evaluated.

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.

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

3 Resources

3.1 Facilities. The test facility shall have a valid International Organization for Standardization (ISO) certificate, which is noted in the test report.

The tests shall be performed in a facility approved by GM. The environment of the test facility must be specified in the Vehicle Technical Specification (VTS), and used for validation purposes.

A bedplate large enough for securing the test rig to accommodate the largest rear axle on test and capable of withstanding dynamic loading of the rig/specimen is required.

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. Fixtures, reaction members, and adapters to mount the test axle assembly.

3.3 Test Vehicle/Test Piece. Complete final drive assembly, suitably modified if necessary, for controlled input and separate output torques, lubricant retention and mounting. A minimum of six (6) assemblies is suggested.

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3.4 Test Time.

Calendar time:	20 days
Test hours:	25 hours (each piece)
Coordination hours:	8 hours

3.5 Test Required Information. Possible sources are:

- Statement of Requirements (SOR)
- Subsystem Technical Specification (SSTS)
- Validation Cross Reference Index (VCRI)

3.6 Personnel/Skills. 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 All samples shall be inspected for geometrical conformance with the appropriate specimen drawing (and weld specification, if applicable). Any non-compliant specimens must be set aside and a compliant specimen be tested in its place.

4.1.2 Check that all parts and fixtures needed are included for the mounting.

4.1.3 Paint critical areas with an appropriate color (e.g., white) to make it easier to find cracks.

4.1.4 Test Stand Review. The test setup and methodology must be reviewed with the GM System Validation Engineer (SVE). The GM SVE may request review by the Design Release Engineer (DRE) and/or the Bill of Material Family Owner (BFO). Photographs and/or computer aided design images of the test must be provided.

4.1.5 Identify and record on Table A1, Appendix A, the type of ring gear retention utilized (e.g., bolt, rivet, press fit, etc.)

4.1.6 Mount final drive assembly to pedestals anchored to bedplate. Couple input pinion shaft to drive mechanism and each output point to an absorber.

4.1.7 Install inspection cover (if any) and overfill axle, so pinion bearings are to constantly running in oil.

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.

4.2.3 Test Load. The axle is to be run at full axle torque capacity unless otherwise determined by the requesting engineer.

4.3 Instructions.

4.3.1 Unless otherwise specified, the GM SVE is to approve test setup.

4.3.2 Take photograph or digital image of test configuration.

4.3.3 New test samples shall be used. For product validation testing off-tool parts are mandatory. For design validation testing prototype parts may be used.

4.3.4 The test sample orientation on the test bench shall be the same as within the vehicle. Any deviation needs to be approved by the GM SVE and/or the DRE.

4.3.5 Test shall be controlled and monitored by a computer program. Load, displacement and cycles of the specimen shall be monitored through entire test until failure.

4.3.6 Failure mode is to be recorded and failure location shall be identified for each test specimen. Pictures shall be taken for typical failure modes and any anomalous failures documented and photographed.

4.3.7 Run the ring gear at 10 rpm ± 3 rpm. While rotating, ramp up the torque to the test torque (typically full axle capacity) over four (4) full revolutions.

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