GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW17232

Hypoid Gearset Fatigue 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 determine the fatigue life of the hypoid gearset in a rear axle assembly.

1.2 Applicability. This specification is applicable to all axle assembly hypoid gearsets.

1.3 Remarks. The primary intent of this test is to compare rear axle gearsets to determine the influence of variables in gear material, lubricants, bearing preload, and/or gear contact 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.

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

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.

A bedplate large enough for securing the test rig and capable of withstanding dynamic loading of the rig/specimen is required.

The test shall be performed in the designated testing environment at each GM regional site. The environment specified in Subsystem Technical Specification (SSTS) must be used for validation purposes. The ambient temperature shall be between 18 °C and 25 °C.

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. The test equipment shall be capable of accurately applying the loading conditions described in this document. The equipment must be able to apply these inputs at vehicle-specific levels (forces, etc.) and frequencies specified separately by the SSTS or the test requestor. All measurement equipment must be capable of accurately making the measurements specified.

© Copyright 2015 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW17232 2015

3.3 Test Vehicle/Test Piece. The test axle is required and must be specified by the test requestor. The axle should be qualified to represent the model year content. Any variation should be noted on the test request and report. A minimum of six (6) gear sets is suggested.

3.4 Test Time. (Based on 16 000 cycles for each piece; running 24 h, 7 days/week.)

Calendar time:	67 days
Test hours:	266 hours (each piece)
Coordination hours:	8 hours

3.5 Test Required Information. Determine the axle assembly's gear ratio and any limitations with respect to this procedure. 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 Oil Circulation. Install a modified cover with fittings to allow the sump fluid to be circulated through an external cooler to maintain axle temperature of 80 °C.

4.2 Conditions.

4.2.1 Environmental Conditions. The ambient temperature shall be between 18 °C and 25 °C.

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 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 Break-In.

4.3.7.1 Ramp the output speed of the axle up to 80 rpm ± 2 rpm in 10 s.

© Copyright 2015 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW17232 2015