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| GM WORLDWIDE ENGINEERING STANDARDS | Test Procedure | GMW17234 |

# Vertical Axle Housing Beaming 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.** The purpose of this test is to determine the fatigue life of an axle assembly when subjected to a vertical load.

**1.2 Applicability.** This procedure is applicable to beam axles.

## 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.

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

The tests shall be performed in the designated testing environment at each GM regional site.

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. 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.**

**3.2.1** A hydraulic power system and test machine that is compatible with the strength of the components being tested. Since the fatigue test will be carried out using load control mode, the testing machine must have servo-



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hydraulic load-monitoring system mounted in series with specimen. The load and displacement must be monitored continuously until the failure occurs.

**3.2.2** Two vertical actuators are required to run this test. The actuator must be appropriately sized for the size axle tested. The actuators must be able to maintain a frequency of up to 10 Hz. Displacement, load and cycle count should be able to be recorded**.**

**3.2.3** The test equipment shall be capable of producing the loads required in this document. The equipment must also be capable producing the frequency specified by GM engineers.

**3.2.4** A bedplate large enough to accommodate the largest rear axle on test.

**3.2.5** Fixturing to hold the axle in position. This may include angle stands, V-blocks, heim joints, and other fasteners to complete the setup.

**3.3 Test Vehicle/Test Piece.** It is recommended to run a minimum of six (6) samples for this testing unless otherwise stated by the test engineer.

**3.4 Test Time.** (Based on 500 000 cycles for each piece; running 24 h, 7 days/week.)

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| Calendar time: | 43 days |
| Test hours: | 56 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.** Fixturing should be designed to hold the axle at the wheel ends and mount to the bedplate. An adaptor must be fabricated for the actuators to apply load at the spring seats.

**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.

**4.2 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.



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