



Three (3) - Axis Real Time Test to Investigate the Durability of Powertrain Mount Subassemblies on the Powertrain Side Subject to Cyclic Loading

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. Determination of cyclic durability of powertrain mounts subassemblies subject to test site conditions.

1.2 Applicability. Powertrain mount subassemblies on powertrain side of the mount.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 1431-1

2.2 GM Standards/Specifications.

GMW3286

GMW14794

GMW14868

GMW14872

GMW3425

2.3 Additional References.

- Component Technical Specification (CTS)
- Instron Worldwide Headquarters, Norwood, Massachusetts (www.instron.com)
- MTS Systems Corporation, Eden Prairie, Minnesota (www.mts.com)
- Statement of Requirement (SOR)
- Subsystem Technical specification (SSTS)
- Vehicle Technical Specification (VTS)

3 Resources

3.1 Facilities. Appropriate test equipment (e.g., servo-hydraulic test equipment with the corresponding regulating and control devices), with which the tests described can be undertaken, is necessary for the performance of the tests specified.

Instron Structural Test (IST) IST 8800, lab site equipment with corresponding control electronics or equivalent systems, e.g., from MTS Systems Corporation, shall be used.

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. According to the indicated test methods.

3.3 Test Vehicle/Test Piece. The test pieces shall be pretreated if necessary, e.g., pre-corrosion of aluminum alloy components according to GMW3286 or GMW14872, ozone treatment according to ISO 1431-1, or as

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October 2014

Page 1 of 5

required in the Subsystem Technical Specification (SSTS), Statement of Requirement (SOR) or Component Technical Specification (CTS).

3.4 Test Time.

Set up time: 1 week

Signal generation time: 2 weeks

Test time/part (two life cycles): 3 weeks (actual test time will be determined by applicable SSTS reliability requirements (i.e., sample size and life durations))

3.5 Test Required Information.

3.5.1 Load Introduction Coordinates in X, Y and Z Direction. These coordinates shall be stated on the component drawings for the brackets, supports, etc. as network plan coordinates or as a dimensional sketch. The sign definition shall also be fixed in these drawings (see 4.3.1).

The coordinates used shall agree with the conventions used by the design and simulation departments and the system supplier.

3.6 Personnel/Skills. Personnel trained in the use of servo-hydraulic equipment and supporting instrumentation.

4 Procedure

4.1 Preparation.

4.1.1 Clamping the Test Pieces. The powertrain side brackets, supports, and mounts shall be fastened together in accordance with the powertrain mount assembly specification.

4.1.1.1 All the tests listed shall be undertaken with original engine or transmission interface components, as applicable. Deviations shall be agreed with the responsible design department.

4.1.1.2 Depending on the task, some powertrain side components may be replaced by device components. In this case, the geometry of the bracket contact surface, the thread design and the fastening arrangement shall correspond to the original components design.

4.1.1.3 Body side support may be steel plate devices that facilitate the application of the tri-axial loading. The attachment scheme shall preserve vehicle install position.

4.1.1.4 The original clamping geometry shall be used as stated by the responsible design department.

4.1.1.5 Both the steel device plate and the original opposing partner (transmission housing, engine block, etc.) shall be clamped in such a way that no change to the installed position occurs under operating load.

4.1.1.6 If further attachments or intermediate parts are present in the bracket fastening (e.g., bracket for idling rollers or bracket for climate system compressors), these shall be included as original components or device components.

4.1.1.7 Only original components may be used in validation tests on subassemblies.

4.1.2 Assembly and Preparation of the Test Pieces. The test pieces shall be prepared in such a way that cracks or damage occurring in the test pieces is apparent. For example, metal components shall be painted with grey or white paint which guarantees that crack detection is sufficient. However, this paint may not penetrate into joint surfaces or fastened connections and may not be applied to the mating surfaces of the joints.

4.1.2.1 Original bolts or similar bolts with the same head position shall be used to screw on the test pieces. See relevant drawing for assembly instructions (bolts, tightening torques, etc.) For validation tests only, the original bolts shall be used.

4.1.2.2 The bolts shall be tightened with the minimum torque specified. The nominal torque and the minimum angle may only be used for torque/torque angle assembly. The test requester shall be allowed to specify some torque conditions other than minimum. Maximum torque could represent a worst case scenario. Also, torque must be applied to the proper fastener.

4.1.2.3 The position of the bolts shall be marked so that loosening or tightening is apparent visually.

4.1.2.4 To detect relative movement, joined components shall be marked in such a way that these movements can be detected.

4.1.2.5 All torque data for screw fasteners before and after the test shall be reported.

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October 2014

Page 2 of 5