GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW15147

Three (3) - Axis Real Time Test to Investigate the Durability of Powertrain Mount Subassemblies on Body Frames/Engine Cradles Subject to Cyclic Loading

1 Scope

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 Foreword. Not applicable.

1.3 Applicability. Powertrain mount subassemblies on body frames/engine cradles.

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 (I)

(I) = This is a standard that is distributed only internally within General Motors. This standard cannot be distributed outside of General Motors. Contact the GM lead engineer for any instructions.

2.3 Additional References.

Component Technical Specification (CTS)

G0 Dudenhofen Proving Ground Documents

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) 8800, lab site equipment with corresponding control electronics, or equivalent systems, e.g., from MTS System 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.

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3.3 Test Vehicle/Test Piece. The test pieces shall be pre-treated if necessary, e.g., pre-corrosion of aluminum alloy components according to GMW3286 or GMW14872, ozone treatment according to ISO 1431-1, or as required in the Subsystem Technical Specification (SSTS), Statement of Requirement (SOR) or Component Technical Specification (CTS).

3.4 Test Time.

Set up: One (1) week.

Signal generation: Two (2) weeks.

Test Time/Part (reference two life cycles): Three (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. Not applicable.

4 Procedure

4.1 Preparation.

4.1.1 Clamping the Test Pieces. The powertrain mounts/housings shall be connected to the test rig in accordance with the assembly specification. Depending on the task, the elastomer mount may be replaced by a fixture part.

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

4.1.1.2 The mount fasteners shall be clamped in such a way that no change to the installed position occurs under operating load.

4.1.1.3 All the tests listed shall be undertaken with original body segments or original engine cradles, as applicable. For a better test quality and simulation, the body segments can be replaced by test equipment. Deviations shall be agreed with the responsible design department.

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 is apparent; e.g., metal components shall be painted with grey or white paint which guarantees that crack detection is sufficiently good. However, this paint may not penetrate into joint surfaces or screwed 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 (e.g., bolts, tightening torques). 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.

4.1.2.3 The test requestor shall be allowed to specify some torque conditions other than minimum. Maximum torque could represent a worst case scenario. Also, torque shall be applied to the proper fastener.

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

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

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

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 Test Setup. See Figure 1 and Figure 2.

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