GM	WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW15980

Full Size Pickup Truck Structural Durability 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 provide a common global structural durability evaluation of a full size pickup truck. This test standard provides severe chassis structural inputs representing customer vehicle usage.

1.2 Applicability. Full Size Pickup Trucks.

1.3 Remarks. This standard is intended as the basis for structural laboratory tests and analytical modeling of structural subsystems and components. This test standard is not to be used as a road evaluation. The base test is to be run by two wheel drive (2WD) pickup trucks. For four wheel drive (4WD) pickup trucks, the additional 4WD content is to be run along with the base test content.

1.3.1 The events repeated to the specified number of times provide high and medium amplitude structural inputs for severe customer usage. Structural inputs are defined as vertical, lateral, fore-aft, chassis torsion, and full stop steering. Inputs other than these are present at a much lower severity and are incidental to obtaining the representative structural inputs.

1.3.2 Due to the abbreviated nature of this test procedure, the less damaging and often time-consuming inputs are greatly reduced or eliminated.

1.3.3 GMW15980 does not encompass all known customer usage treatments or road types. Some of the limitations are due to the accelerated nature of the test and some are due to the constraints of the test site environment and test facilities. Additionally, the database for defining the worldwide vehicle operating environment is evolving and periodic content changes to GMW15980 are expected.

1.3.4 If more rigorous exposure to unique customer usage treatments is desired, other specialized testing should be considered as part of the overall vehicle dependability test plan. Some considerations should be given to the following:

- GMW15016 Cold Weather Exposure Test
- GMW15730 Hot Weather Exposure Test
- GMW18048 Desert Off-Road Structural Test (for vehicles with off-road capability)

1.3.5 Results of this test should be regarded as highly probable to also occur in the hands of some customers inasmuch as the driving instruction contains vehicle treatments based on measured customer vehicle operation. This procedure specifies vehicle operation designed to match data collected on groups of randomly selected customers' vehicles. The intent of the test is to subject the vehicle to the treatment of a greater than average severity customer for each of the measured structural inputs.

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2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3238	GMW15193	GMW15554	GMW15730
GMW3241	GMW15444	GMW15556	GMW16180
GMW3423	GMW15445	GMW15557	GMW16933
GMW14264	GMW15550	GMW15706	GMW18048
GMW15016	GMW15553	GMW15708	

2.3 Additional References.

- Steering Subsystem Technical Specifications (SSTS) –Steering Gear/Tie Rod/Linkage High Load Fatigue.

2.3.1 Milford.

DL.MF.4B	DL.MF.CB	DL.MF.HB	DL.MF.SA
DL.MF.4E	DL.MF.CP	DL.MF.IT	DL.MF.SF
DL.MF.4F	DL.MF.CR	DL.MF.JS	DL.MF.SH
DL.MF.4G	DL.MF.CS	DL.MF.MC	DL.MF.TT
DL.MF.4H	DL.MF.DP	DL.MF.PX	DL.MF.TZ
DL.MF.4R	DL.MF.DS	DL.MF.PY	DL.MF.VM
DL.MF.4S	DL.MF.DT	DL.MF.PZ	DL.MF.WE
DL.MF.4W	DL.MF.EB	DL.MF.Q5	DL.MF.WF
DL.MF.4X	DL.MF.EG	DL.MF.RB	DL.MF.WH
DL.MF.AZ	DL.MF.EX	DL.MF.RP	DL.MF.XF
DL.MF.BP	DL.MF.HA	DL.MF.S7	

3 Resources

3.1 Facilities. Milford Proving Ground (USA).

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 Some method of accurate speed indication should be provided to the driver for accurate execution of the driving instructions.

3.2.2 Some type of acceleration/deceleration rate indicator should also be provided to the driver.

3.3 Test Vehicle/Test Piece. Test vehicle equipped as specified.

3.4 Test Time. Repair, inspection, routine maintenance, refueling, and downtime will increase the total test time.

Calendar time:	0 d
Test time:	1077 h
Coordination time:	0 h

3.5 Test Required Information. Not applicable.

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3.6 Personnel/Skills. If data measurements are required the events that comprise this test are intended to be performed by personal specifically trained in the proper execution of the driving instructions. Refer to the appropriate proving ground driving instruction documents and related risk assessments.

Different driver license requirements, knowledge of test content, and mandatory health checks for involved personnel have to be considered.

4 Procedure

4.1 Preparation. Current maximum allowable vehicle speed to be supplied by test responsible personnel to ensure the vehicle is operated safely. If the vehicle is equipped with a manual transmission, the shift point speeds should also be determined and provided.

4.1.1 Measurement of adjustments and settings may be made as deemed necessary to document the condition of the vehicle. These measurements must be made without significantly affecting the adjustment or setting being considered. The intent of these measurements is to document the condition of the vehicle without changing the state of the original assembly.

4.1.2 Vehicles being operated on this test for any other purposes (e.g., design evaluation) should be prepared in a manner appropriate to that particular test intent.

4.2 Conditions.

4.2.1 Environmental Conditions. For data acquisition, in situations where severe weather makes certain driving events unsafe they should be postponed until road conditions improve.

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.

Limited environmental shielding of transducers and other instrumentation may require that loads acquisition be postponed during wet road conditions.

Road Load Data Acquisition (RLDA) measurements of some events should only be run during dry road conditions, (e.g., aggressive brake events, standing start wide open throttles) otherwise peak loads may be reduced due to tire slip.

4.2.3 Ballast. Ballast definitions are explained in GMW15445 Vehicle Ballast.

The ballast calculation data sheets in Appendix D of GMW15445 should be used to determine the proper ballast mass.

Vehicles with configurable cargo areas should use the cargo carrying configuration for Gross Vehicle Mass (GVM) ballast during test phases 3 and 4 of this test. Throughout test phases 1, 2, and 5, the passenger carrying configuration should be used for GVM ballast.

4.3 Instructions. Perform the driving instructions listed in:

- Table A1: Specified Full Size Pickup Truck Events – Cycles at Ballast (Appendix A) or,
- Table A2: Heavy Duty Pickup Truck Specified Events – Cycles at Ballast (Appendix A) as appropriate.

4.3.1 Anti-lock Brake System. If the vehicle is not equipped with an Anti-lock Brake System (ABS) or if the system is inoperative, this content should be deleted for the test.

4.3.2 Traction Control System. If the vehicle is not equipped with a Traction Control System (TCS) or if the system is inoperative, this content should be deleted for the test.

4.3.3 Additional Test Content. Additional test content can be run in conjunction with the base test content to meet specific needs.

4.3.3.1 Four Wheel Drive Addition. For 4WD trucks, the 4WD addition should be added to the base test. The specified events listed in the test are to be run in addition to the base 2WD test events.

4.3.3.2 Steering Subsystem/Component Addition. For steering subsystem testing, additional steering events are listed.

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Each test table includes additional content that should be included in any steering subsystem or component testing. These additional cycles should not be included in other tests such as full vehicle tests.

The Steering Ride and Handling (R&H) events are recorded at three different speeds [80 km/h, 89 km/h and 89/97 km/h (50 mph, 55 mph, and 55/60 mph)], as described in DR.MF.CR. At each speed, three separate events of the procedure are performed, for a total of nine Steering R&H events per ballast condition. Both Light Vehicle Mass (LVM) and GVM ballast conditions should be measured. One third of the total steering R&H cycles are to be reproduced in the test at each speed. The test performer should choose the recorded Steering R&H event at each speed (six total to choose from – three LVM and three at GVM) that provides the most fatigue damage and use that event for all cycles at that speed.

The Steering Panic Brake events are recorded at 80 km/h, 89 km/h and 89/97 km/h (50 mph, 55 mph, and 55/60 mph) and once again at a driver determined speed for a total of four Steering Panic Brake events per ballast condition as described in DR.MF.CP. Both LVM and GVM ballast conditions should be measured. Of the recorded Steering Panic Brake events (eight total to choose from – four at LVM and four at GVM), the test performer should choose the event that provides the most fatigue damage and use that event for all Steering Panic Brake cycles.

One cycle of a Curb Rim Pull event DR.MF.RP should include four measured conditions per load level; right tire against the curb right turn, right tire against the curb left turn, left tire against the curb right turn, left tire against the curb left turn.

4.3.3.3 Additional Powertrain Mount Laboratory Test Content. For laboratory tests that include powertrain mount loads, City content is performed in addition to the base test content.

4.3.4 Test Scheduling Guidelines. In order to subject the vehicle to a reasonable simulation of customer usage in a linear manner of operation, distribute the driving instructions as evenly as possible throughout the test.

5 Data

5.1 Calculations. Due to variability in measured high level load inputs, the following events should be recorded two times:

- 7.2% Extended Grade Chatters (DL.MF.EG)
- 7.2% Hill Lap (DL.MF.WH)
- Panic Brake Event (DL.MF.BP)
- Pothole #3 (DL.MF.PZ)
- Seven Sisters Lap (DL.MF.S7)

Similarly, the following event should be recorded three times:

- Belgian Block Lap (DL.MF.EB)

During test development, the event repetitions should be evenly spread throughout the multiple runs for the base fatigue damage calculations. The test engineer may then choose to use a single run which is most advantageous to simulate the event and to produce similar fatigue damage as the base calculation using multiple run repetitions.

5.2 Interpretation of Results. In general, the structural durability test contains a more complete distribution of loads and therefore, represents customer usage better than the structural content in the general durability test.

5.2.1 Subjective Rating Scale. The subjective rating scale should be used to document subjective evaluations of fluid leaks, squeaks and rattles, disturbances, performance items and seat comfort. Refer to GMW14264 Subjective Rating Scales for more information.

5.3 Test Documentation. With reference to this test standard, the test results shall be presented in a test report. Written and photographic documentation is to be generated and maintained on all factors involved in the test.

All involved parties should agree upon and follow established standards regarding the appropriate documentation for the test (e.g., RLDA workbooks and checklists, data recorder setup files, test incident reporting).

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