



Passenger Vehicle Brief Powertrain 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 brief durability and reliability performance evaluation of a passenger vehicle powertrain and driveline system subjected to severe customer usage.

1.2 Applicability. This specification is applicable to all passenger vehicles. In general, vehicles classified as passenger vehicles are intended to transport passengers and have relatively small cargo hauling capacity, e.g., sedans, coupes, hatchbacks, small Sport Utility Vehicles (SUVs) and crossover vehicles.

This test procedure is to be used to validate the Subsystem Technical Specifications (SSTS) and the Vehicle Technical Specification (VTS) requirement entitled Long-Term Requirement. See VTS Template, 3.2.3.2.4 for additional information.

1.3 Remarks. This durability test specification is intended to provide primarily high level powertrain inputs which are representative of 160 000 km (100 000 mi) operation of a greater-than-average severity customer for occurrences of torque and time at high engine speed.

The primary intent of this test is to provide an accelerated assessment of powertrain performance in a brief period of time (which allows for running repetitions of the test to discover system weak points). This test minimized chassis structural inputs to reduce potential failures, which could slow the completion of the test. In addition, this test does not address low speed, idle, light reverse or city type light shift operation, which in general are viewed as less damaging than higher level powertrain inputs.

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

This test does **not** encompass all known customer usage treatments. Some limitations are due to acceleration usage and some are due to the constraints of the proving ground test facilities. If more rigorous exposure to unique customer usage treatments is desired, other specialized testing should be considered as part of the vehicle test plan. Some considerations should be given to the following:

- GMW15016 Cold Weather Exposure Test
- GMW15730 Hot Weather Exposure Test

Other aspects of vehicle usage which are not sufficiently addressed in this test and should also be considered during the development process include:

- Appropriate temperature aging (thermal cycling) of components; brakes, engine controls, transmission, hoses, seals, etc.
- Chemical degradation; aging, acid rain, bird droppings, ultraviolet radiation, dust exposure, etc.
- Seat and seat restraint usage; normal wear and tear of interior passenger and cargo areas
- Curb impacts, scuffing or pushaways (primarily parking related)
- Non-maintenance of vehicle; lubricants, cleaning, etc.
- Maintenance based on time periods (as opposed to mileage)
- Non-specified fluids and lubricants, i.e., lower grade materials
- Vehicle stuck in snow, ice, sand, mud or deep water

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April 2014

Page 1 of 8

- Tire chain operation; proper and improper
- Accessory operations; windows, wipers, air conditioning, heater, etc.

Comparable test results should be achieved by application of test vehicles on the following proving grounds, according to the attached route descriptions:

- **Guangde Proving Ground** (GMK and PATAC), see Appendix A for route description
- **Lang Lang Proving Ground** (GMH), see Appendix B for route description
- **Milford Proving Ground** (GMNA), see Appendix C for route description

The development of this test standard is in process for the Cruz Alta (GMB), Millbrook (GME) and Dudenhofen (GME) Proving Grounds. This will allow for work sharing between the six (6) sites. It is recognized that many test inputs and test facilities differ for the test sites included, and a continuing effort is being made to communize some test facilities and driving instructions.

Results of this test should be regarded as highly probably to also occur in the hands of some customers in as much as the events contain vehicle treatments based on measured customer vehicle operation. This procedure specifies vehicle operations 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 test inputs.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15016	GMW15480	GMW15554	GMW15715
GMW15444	GMW15527	GMW15708	GMW15728
GMW15445	GMW15550	GMW15709	GMW15730

2.3 Additional References.

- Vehicle Technical Specifications (VTS)
- Subsystem Technical Specifications (SSTS)

2.3.1 Guangde.

DR.GD.AS	DR.GD.EW	DR.GD.TS	DR.GD.ZX
DR.GD.AZ	DR.GD.HI	DR.GD.TZ	DR.GD.ZY
DR.GD.CY	DR.GD.IT	DR.GD.ZO	
DR.GD.ET	DR.GD.PS	DR.GD.ZT	

2.3.2 Lang Lang.

DR.LL.1GMC2	DR.LL.7AS	DR.LL.8TC	DR.LL.OS43
DR.LL.43G0	DR.LL.7TS	DR.LL.HDT	
DR.LL.4PER	DR.LL.8	DR.LL.HI	

2.3.3 Milford.

DR.MF.AS	DR.MF.EW	DR.MF.NL	DR.MF.TS
DR.MF.AZ	DR.MF.HI	DR.MF.PS	DR.MF.TZ
DR.MF.ET	DR.MF.IT	DR.MF.SL	

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April 2014

Page 2 of 8



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3 Resources

3.1 Facilities.

- Guangde Proving Ground (GMK and PATAAC)
- Lang Lang Proving Ground (GMH)
- Milford Proving Ground (GMNA)

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

3.4 Test Time. See Appendix A through Appendix C, Tables A1, B1 and C1.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. The driving instructions that comprise this test are intended to be performed by personnel specifically trained in the proper execution of the driving instruction.

4 Procedure

4.1 Preparation. Maximum vehicle speeds are to be supplied by test responsible personnel for driver reference. If the vehicle is equipped with a manual transmission, the shift point speeds should also be determined and provided.

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.

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

4.2 Conditions.

4.2.1 Environmental Conditions. The driving instructions can be performed in all types of weather. However, in situations where severe weather makes certain driving maneuvers unsafe, events using those maneuvers 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.

4.2.2.1 Vehicle Ballast. Refer to GMW15445 for definitions of ballast conditions and terms. The ballast calculation worksheet in GMW15445, Data Sheet A1, should be used to determine proper ballast mass.

4.3 Instructions. Refer to Appendix A through Appendix C as appropriate for each GM Proving Ground.

4.3.1 Linear Test Content. In order to subject the vehicle to a reasonable simulation of customer usage in a linear manner of operation, distribute the event/ballast combinations as evenly as possible throughout each phase of this test.

4.3.2 Vehicle Break-in. The vehicle should not receive any "break-in" miles unless such are specifically required or recommended in the Owner's Manual in such terms that more than 90% of the vehicle purchasers or users would be expected to follow the recommendation. The intention of this Durability Test is to subject the vehicle to more severe than average operation and it is believed that the omission of the "break-in" miles is more severe than is their inclusion.

If the test requestor determines that "break-in" mileage is required, then the "break-in" procedure should be completed prior to execution of this test procedure.

4.3.3 Driver Responsibilities. The driver is to provide the first indication that the vehicle requires attention. During the execution of the test, the driver is to observe vehicle behavior as would a customer and inform the

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Page 3 of 8

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