



Door Handle System Inside and Outside, Strength Test

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. To evaluate the strength of the inside and outside door handle systems by subjecting them to specified loads.

1.2 Foreword. The strength of the handle itself is proven in the component state. The reason for this test is to determine if the handle, its mounting method, and all linkages and connections to the latch itself will withstand the strength load and still function properly. This test will also determine possible damage modes when subjected to ultimate loads.

1.3 Applicability. This standard applies to all passenger cars, light duty trucks, and medium duty trucks having conventional, swing open side door systems. This standard also applies, without modification, to sliding side doors, rear cargo doors, liftgates, tailgates, and end gates.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15084 GMW15831

2.3 Additional References. Release Documentation, including:

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

3 Resources

3.1 Facilities. The facility should have all of the equipment listed in 3.2 and be capable of providing the conditions required in 4.2.

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.

Note: The following list(s) include fixturing and instrumentation typically used by the GM North America Body Test Laboratory to perform this test. Other equipment may be substituted at the discretion of the testing facility as long as it provides the same data and/or data record, with equivalent accuracy as specified herein or by the requestor.

3.2.1 Fixturing.

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November 2013

Page 1 of 9

3.2.1.1 This test can be conducted with the door assembled to a body or rigidly fixed to a door cart or other structure. If run in conjunction with handle functional tests, it is recommended that the door be on a body for reasons specified in the Door Lock System, Lock Cylinder – Effort Test (GMW15831).

3.2.1.2 Force gage accessories as required to pull or push the inside and/or outside handle.

3.2.2 Instrumentation.

3.2.2.1 Force gage with a capacity approximately 1.5 times the specified load to be applied.

3.2.2.2 Torque wrench with a capacity approximately 1.5 times the torque to be applied.

3.3 Test Vehicle/Test Piece.

3.3.1 One (1) vehicle, body or buck with appropriate door weatherstrips if necessary.

3.3.2 One (1) fully assembled and trimmed door including all parts and reinforcements, inside and outside handle assemblies, latching assembly, locking mechanism and any other parts which may influence the handle unlatching efforts. It is recommended that the door assembly be dimensionally certified before testing is started.

3.4 Test Time. The following is an estimate of the amount of time (work hours) needed to perform this procedure.

Note: These time estimates are approximate averages. Actual times vary considerably depending on early component failures (and subsequent availability of replacement parts), testing to varying multiples of cycle lives, varying requirements for frequency of environmental test conditions, scheduling problems for test facilities, test equipment malfunctions, scheduling of overtime and/or multiple shifts, scheduling of **witnesses** for tests, actual readiness of test samples upon receipt, unique or additional requests for detailed test information, running multiple samples (times shown are for one (1) system), etc.

3.4.1 These times consider preparation and other downtime, actual test, and analysis of data in capturing a total calendar time. Report writing, approval, processing, etc., are not part of these times.

Technician Resource: 8 hours

Engineer Resource: 4 hours

Calendar Duration - total: 1 day

3.5 Test Required Information. The requesting engineer is responsible for providing specifications appropriate to the particular vehicle line being tested (reference VTS/SSTS if applicable).

3.5.1 Testing worst case scenarios may uncover some potential problems. Discuss with the requesting engineer if testing should include some worst case scenarios. Depending on which test is being performed and which level of parts or systems is being tested, consider if any of the following may apply.

- Tolerance stack-ups.
- Build variations.
- Misalignment.
- Minimum/maximum fastener torque(s).
- Lubrication.
- Environmental extremes.
- Location of customer representative load application.
- Symmetry (left hand vs. right hand).
- Color.
- Mold or die source, etc.

3.5.2 The following specifications or information are required to run this test. Additional specifications may be required for other types of handle systems.

3.5.2.1 The maximum torque or load/force the inside and outside handle system must be able to withstand without any perceivable degradation in function.

3.5.2.2 The direction of torque or loads on the handle.

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November 2013

Page 2 of 9

3.5.2.3 Point or area of load application on the handle. Appendix A, Figure A1.

3.5.2.4 As applicable, any ultimate strength torque or load/force the inside and outside handle system must withstand.

3.5.2.5 Any specific fastener torque values to be used in the door assembly.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests, and experience in the use of the referenced test equipment is critical to achieving the estimated times shown in 3.4.1.

4 Procedure

4.1 Preparation.

4.1.1 Sample Inspection. The test and requesting engineers should inspect the test items to ensure all material listed in 3.3 through 3.3.2 is of correct design level and assembled properly. Measure and record any areas of visible deformation and/or breakage. Note especially any of these discrepancies in the handles and the areas immediately adjacent to the handles.

4.1.2 Sample Preparation. Ensure all fasteners necessary for handle assembly installation are torqued to their nominal specified values, unless otherwise directed by requestor.

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified in this document's text or by the requesting engineer, this test is to be run at ambient, typically the environmental conditions at the major test facility (3.1.1). Unless otherwise noted, ambient conditions are typically 22 °C ± 3 °C, relative humidity of 40% ± 20%, and atmospheric pressure equivalent to the local barometric pressure which is variable during any given day and from day to day.

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 Setup Instructions. Perform any functional/operational tests/evaluations as requested or as may be referenced in Section 2.

4.3.1.1 Specifically, cycle each handle system through at least five (5) full cycles to ensure proper operation and seating of all system components. Note any irregular sounds or erratic operation indicating a potential problem with the assembly or design, and verify observations with the requesting engineer.

4.3.1.2 Consult with the requesting engineer to determine the area on the outside handle where a customer would normally grip or apply force to open the door (3.5.2.3). It is suggested that a sketch or drawing of the handle be made showing the load application point. Mark the area on the handle if desired.

4.3.1.3 Refer to the Door Handle System Inside and Outside, Unlatching Effort (GMW15084) procedure for typical functional tests for the inside and outside door handles. These same functional checks will be performed again after the Door Handle System Inside and Outside, Strength Test procedure is completed (GMW15840).

4.3.2 Test Operation Instruction - Outside Handle.

4.3.2.1 Engage the door lock. Using a hand held force gage and hook accessory or other appropriate adapter, position the hook under the center of the handle **finger grip** area as determined in 4.3.1.2. See Appendix A, Figure A1 and apply a specified force (3.5). Holding the force gage so that it remains normal to the handle load, contact surface throughout the entire travel, pull using a smooth and constant effort. This will reduce the possibility of false readings due to sudden starts or stops.

Note: For push button outside handles, substitute a flat target shape force gage accessory for the hook, and use a smooth pushing motion to apply the specified force.

4.3.2.2 Check to see if the handle/latch mechanism is still operational. Measure and record any areas of visible deformation and/or breakage. Note especially any of these discrepancies in the handle and the area immediately adjacent to the handle.

4.3.2.2.1 Repeat all functional checks which were performed in 4.3.1.

Note: Repeating checks here will monitor the effects of outside handle tests on the total unlatching system.

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November 2013

Page 3 of 9