



Clutch Pedal Lab Durability

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 determine the durability characteristics of clutch pedal assemblies when subjected to cyclic loads simulating multiple vehicle lives of actual vehicle operation.

Note: Clutch pedal durability testing can also be completed via GMW15335. However, if the pedal assembly has a return or over-center spring, either GMW15150 or GMW14377 must be used to achieve representative cycles on the spring and spring attachments. Durability testing of these parts cannot be accelerated, as can the rest of the pedal assembly through the use of GMW15335.

1.2 Applicability. All passenger vehicles with manual transaxles or transmissions.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14377 GMW15335

3 Resources

3.1 Facilities. GM, Supplier, or contracted test facilities.

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 Permanent or temporary fabricated environmental chamber capable of maintaining pedals at any specified uniform temperature between $-40\text{ }^{\circ}\text{C}$ to $85\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. This chamber must allow application of simulated foot operated loads and resulting pedal motion.

3.2.2 A dry contaminate spray system capable of automatically or manually dispensing a specified quantity or duration of dry contaminant mixture (specified in Appendix A, Table A1) to portions of the pedals. Unless otherwise specified by GM Engineering, the spray shall be aimed at the pivots, push rod interfaces, sensors and other vulnerable areas in a manner that simulates worst case customer vehicle contamination.

3.2.3 Programmable controller and data logger capable of monitoring the position determination devices and controlling the load actuator during cycling. The test controller/data recorder shall also be capable of recording outputs from position determination devices, applied forces, temperature, humidity, and other controlled parameters as specified by GM Engineering, and perform continuous near real time sensor diagnostic checks.

3.2.4 Equipment to supply voltages of $5.0\text{ V} \pm 0.1\text{ V}$ to each position determination device, ground voltage of $0.0\text{ V} \pm 0.1\text{ V}$, and control the test environment as specified.

3.2.5 Test fixture that can accurately position a portion of an actual or simulated Front Of Dash (FOD) including deflections, load actuators, environmental chamber, full travel floor stop (if part of the design, simulated or actual), floor pad, carpeting, floor mat, insulation, pedal stop, and/or other interior vehicle components. These components shall be used in the test based on if, or how, the design that is being tested interfaces with these components. Pedal packaging information math data shall be provided by GM.

3.2.6 Load actuator, capable of applying loads specified in 3.2.3. Loads shall be applied to the lateral center of pedal pad as specified by GM Engineering. Angle of application shall be five (5) degrees left to right in the horizontal plane for 50% of parts tested, and zero (0) degrees for the remainder. See Figure 1.

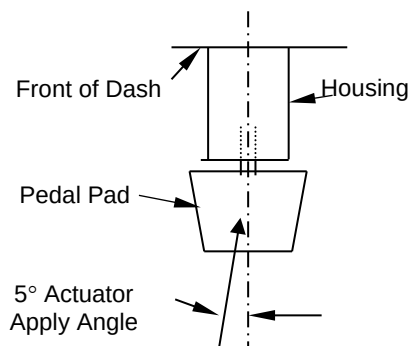


Figure 1: Pedal Apply Angle Plan view

3.2.7 Load transducer that can measure applied force to each test piece within 0 N to 200 N $\pm$ 5 N range.

3.2.8 Heating and cooling sources, i.e., heat gun, nitrogen, carbon dioxide (CO₂), if needed to control test temperature.

3.2.9 A number of devices to be tested simultaneously that simulates clutch system master cylinder push rod peak load, such as a spring.

3.2.10 Contaminant mixture consisting of the following:

- a. 0.14 kg (5 oz) Coarse Air Cleaner Test Dust
- b. 0.14 kg (5 oz) 400 Grit Alumdum
- c. 0.07 kg (2.5 oz) 150 Grit Alumdum
- d. 0.14 kg (5 oz) Rock Salt

3.2.11 Miscellaneous Equipment. Wire harnesses with appropriate connectors for links between connectors and controllers.

3.3 Test Vehicle/Test Piece. Number of samples to be tested per Component Technical Specification (CTS).

3.3.1 Interfacing components important for durability interaction such as push rod ball stud ends attached in a representative manner, i.e., same apply angles and no extra lubrication.

3.4 Test Time.

Calendar time: 30 days to 45 days

Test time: 20 h to 30 h

Coordination time: 5 days to 15 days

3.5 Test Required Information.

3.5.1 Validation performance requirements.

3.5.2 Reliability and durability goals as defined by the CTS shall be achieved.

3.5.3 Interim and final test reports shall contain actual force values and plots, observations of any noise, unusual deflections, change in push rod or pedal travel, and unusual wear.

3.6 Personnel/Skills. Technician shall be competent and experienced at performing component durability tests on electro mechanical systems with applied environments.