



Door System, 2-Dimensional Center of Gravity Determination

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 determine the 2-dimensional Center of Gravity (CG) location for any trimmed or untrimmed door.

1.2 Foreword.

1.2.1 This test will result in a point or location which represents an approximation of the 2-dimensional center of gravity location on or near the door inner panel.

1.2.2 For some vehicle programs, mass analysts are beginning to record the center of gravity data for components and assemblies. This test may not be required if the information is already available.

1.3 Applicability. This procedure applies to all vehicles having conventional swing-open doors and sliding side doors.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

Subsystem Technical Specifications (SSTS)

Vehicle Technical Specifications (VTS)

3 Resources

3.1 Facilities. Body Test Lab or a similarly equipped test facility.

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: Sections 3.2.1 and 3.2.2 include fixturing and instrumentation typically used by the Body Test Lab 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.

3.2.1.1 A hoist with a strap, chain, cable, or equivalent attachment, or a type of suspension fixture from which the door can be suspended from one point and swing free of all obstruction (see Figure A1).

3.2.1.2 C-Clamp, hook, or equivalent to attach the door to the suspension fixture.

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Documents

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3.2.1.3 Plumb bob on a string (see Figure A1).

3.2.1.4 Marking pen suitable for marking on the inner panel of the door.

3.2.2 Instrumentation.

3.2.2.1 Linear measuring device (i.e., ruler or flexible measuring tape).

Note: This procedure gives an approximate CG location. Therefore, the accuracy of a tape measure (as opposed to a vernier type gauge) is satisfactory.

3.2.2.2 If testing a door with a power window system a 12 V DC power supply and appropriate connectors may be required to move the window to the desired positions (3.5.2).

3.3 Test Vehicle/Test Piece. One sample of the door system to be tested. The system should include all trim, hardware and options as specified in 3.5. Hinges are typically attached to the door, but may be deleted by the requesting engineer. However, a set of hinges may be required to acquire the dimensional data, as in 4.3.2.3.

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

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.

Calendar time: 1 day

Engineer hours: 2 hours

Technician hours: 2 hours

3.5 Test Required Information. The requesting engineer is responsible for providing specifications appropriate to the particular vehicle line being tested. Reference VTS/SSTS paragraph numbers, if applicable.

3.5.1 The required amount of hardware and trim on the door sample.

3.5.2 The window position(s).

3.5.3 Necessity of inclusion of door hinges on the test property or not.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests, and in the use of the referenced test equipment, is critical to achieving the estimated times shown in 3.4.

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 is of correct design level and assembled properly. The requesting engineer will specify the required amount of hardware and trim on the door sample and the position of the window (up or down), all of which will affect the location of the Center of Gravity. Trim and options vary with car lines. Different CG locations can result depending on the combination tested. Record actual door content/configuration on the test Data Sheet A1.

4.1.2 Sample Preparation. This test is normally run on the test subject in an **as received** condition.

4.1.3 Facilities and/or Equipment Preparation. Record any instrumentation calibration information on the attached Data Sheet A1 or an equivalent document.

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified in this document's text or by the requesting engineer, the typical environmental conditions for this test are the temperature, humidity and pressure at the major test facility (3.1). Unless otherwise noted, these conditions are typically 20 °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. Unless this test is being performed on a competitive vehicle, analysis data should be available for the test being performed.

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