



Under Seat Storage Box Strength and 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. Evaluate the strength and durability performance of the under seat storage box.

1.2 Applicability. This specification shall be applicable to any vehicle which contains an under seat storage box installed to the seat or body.

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.

CG1804 Appendix C1 Subsystem Technical Specification (SSTS) (ID)

(ID) = This document is limited to internal use within General Motors and shall not be accessed outside this company. Contact the GM Design Responsible Engineer for further instructions.

3 Resources

3.1 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 Fixture. A rigid mount to simulate the attachment and contacting interfaces to which the under seat storage box may be fixed to. The fixture shall be capable of being mounted to a bedplate or other equivalent work surface.

3.2.2 Environmental Chamber. A chamber capable of achieving and maintaining a range of -20 °C to 60 °C.

3.2.3 Bedplate. An area with adequate work space to securely mount a fixture and its associated parts.

3.2.4 Data Acquisition System (DAQ). A device capable of recording data from a load cell and string potentiometer or linear voltage displacement transducer at a minimum rate of 20 Hz.

3.2.5 Load Cell. A device capable of measuring a force in compression or tension, connecting to a data acquisition system to record the values.

3.2.6 String Potentiometer (String Pot). A draw wire sensor capable of measuring displacement, connecting to a data acquisition system to record values.

3.2.7 Linear Variable Differential Transformer (LVDT). A device capable of measuring fine linear motion, connecting to a data acquisition system to record values.

3.2.8 Loading Device. A device such as a cylinder or universal test machine capable of loading to 980 N and attaching a load cell and load form.

3.2.9 Load Form Plate. Rectangular form measuring 150 mm x 80 mm with 30 mm radius on corners and edges.

3.2.10 Load Form Hook. 90 degree, L-shaped hook with a width of 25 mm, inside length of 25 mm and maximum outside length of 35 mm.

3.2.11 Simulated Cargo. A mass defined by the SSTS (CG1804) to simulate cargo that is carried within the under seat storage box. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.3 Test Vehicle/Test Piece. Not applicable.

3.4 Test Time.

Calendar time: 5d

Test time: 16h

Coordination time: 4h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills.

- GM Design Release Engineer (DRE).
- GM Subsystem Validation Engineer (SVE).
- Just In Time (JIT) Validation Engineer.
- Test Technician familiar with test facilities and equipment.

4 Procedure

4.1 Preparation.

4.1.1 Part Confirmation. Confirm the under seat storage box and its interfacing parts are correct or are the desired revision level.

4.1.2 Mounting. Attach the under seat storage box and its interfacing parts to the fixture. Mount the fixture to an appropriate work surface.

4.2 Conditions.

4.2.1 Environmental Conditions. Conditions shall be applied according to the subsections of 4.3 in this document. The terminologies and temperatures used for “cold”, “ambient”, and “hot” shall be referenced from the Interior Temperature Operating Ranges Table or the Interior Environmental Durability Testing – Temperatures found in the SSTS (CG1804). The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

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 Stow and UnStow Durability.

4.3.1.1 Measure pre-test efforts five (5) times for each action to unlatch, unstow, stow, and latch. Instructions are provided in 5.1.1 on how to process the efforts data. Figure 1 shows an example of a full cycle and efforts to be taken of two (2) under seat storage box variants.

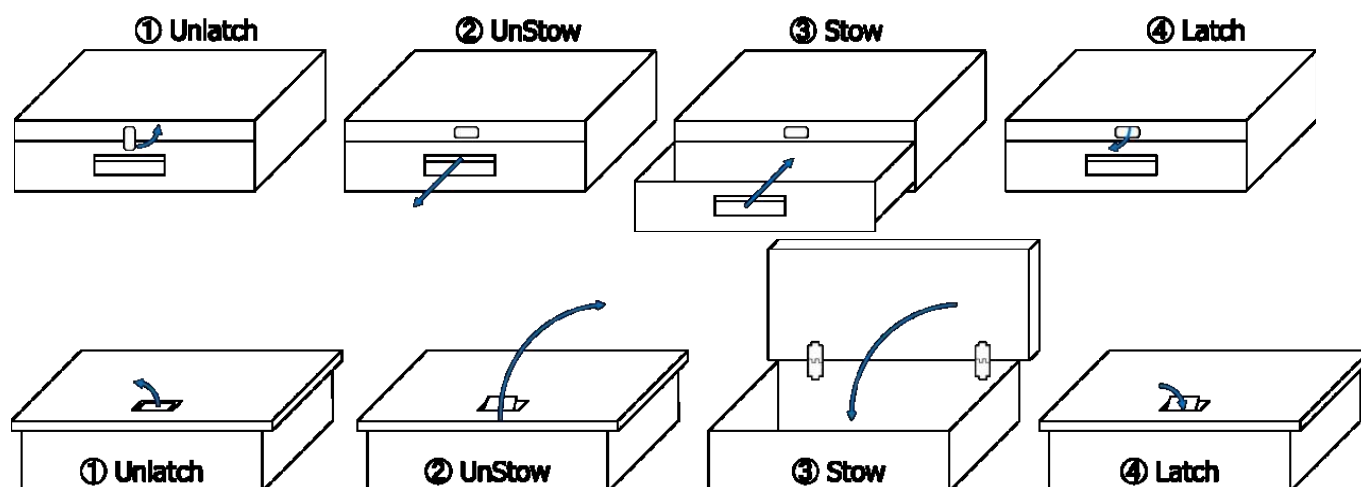


Figure 1: Example of Stow and UnStow Durability of Two Under Seat Storage Box Variants

4.3.1.2 The durability test shall be performed according to the environmental conditions per Interior Environmental Durability Testing – Temperatures Table found in the SSTS (CG1804). The breakdown of cyclers per environmental conditions shall be performed according to the Seat Durability Table found in the SSTS (CG1804). The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

Note: Do not cycle too rapidly generating heat.

4.3.1.3 After the environmental chamber has achieved the target conditions, place the fixtured under seat storage box into the chamber. Place the simulated cargo mass in the under seat storage box, and allow the sample to soak for a minimum of 4 h.

4.3.1.4 Perform a complete use-case cycle by unlatching, unstowing, stowing, and then latching the under seat storage box.

Note: Deviations from complete cycling may be performed with agreement from the GM DRE and GM Subsystem Validation Engineer (SVE).

4.3.1.5 Upon completion of the total cycles and environmental conditions required by the SSTS (CG1804), measure the post-test efforts five times for each action to unlatch, unstow, stow and latch. Instructions are provided in 5.1.1 on how to process the efforts data. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

4.3.2 Stopper Strength.

4.3.2.1 Static.

4.3.2.1.1 In an ambient environment, open the under seat storage box to its maximum travel.

4.3.2.1.2 Position the loading device such that the load form loads the customer intended area. The loading location shall be agreed upon with the GM SVE and or GM DRE.

Note: If the part is not symmetrically opposite, consider multiple tests with biased loads.

4.3.2.1.3 Using a loading device, push or pull the under seat storage box in the direction of travel until failure. Record the load and displacement of the loading device. Figure 2 shows an example of an under seat storage box variant setup for the static stopper strength.

4.3.2.1.4 The under seat storage box shall meet the minimum stopper strength requirement as specified in the SSTS (CG1804). The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.