



Power Operated Window Systems

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. The purpose of this test procedure is to determine if a vehicle meets the requirements of Federal Motor Vehicle Safety Standard (FMVSS) 118 and the Canadian Motor Vehicle Safety Standard (CMVSS) 118.

1.2 Applicability. Applicability extends to all Passenger cars and Multipurpose Passenger Vehicles (MPV).

1.3 Remarks.

1.3.1 This test procedure outlines the method of testing power operated windows, tailgate glass, sunroofs, and/or other partitions to assure that they remain inoperative to casual, unauthorized use after the ignition key is removed, or optionally, after the ignition key is removed and either front door is opened.

1.3.2 The opening of either front door is to be performed twice. The first time is immediately after the ignition key has been removed. The second time is two minutes after the ignition key has been removed.

1.3.3 Testing immediately after these two time intervals is necessary to assure power to the windows, tailgate glass, sunroofs, and/or other partitions has ceased.

1.3.4 This test also covers the FMVSS 118 and CMVSS 118 Paragraph S6 "Actuation Devices" requirement by testing actuation devices.

1.3.5 All components involved must have the latest production-intent, released-level software and production-intent calibrations.

2 References

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

2.1 External Standards/Specifications.

CMVSS 118 FMVSS 118

2.2 GM Standards/Specifications.

GMW14261

2.3 Additional References.

- Engineering report.
- Test report.

3 Resources

3.1 Facilities. A garage vehicle bay or equivalent is required.

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. See Figure 1 and Figure 2.

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3.2.1 Stainless Steel Sphere. Radius of $19\text{ mm} \pm 0.2\text{ mm}$ with a surface finish between 0.1016 mm and 0.2032 mm (0.004 in and 0.008 in). **Note:** General Motors has chosen to use a stainless steel sphere with a radius of 19 mm ; the CMVSS 118 and FMVSS 118 standards call for a 20 mm sphere.

3.2.2 Force Gauge. Range $\geq 160\text{ N}$. Accuracy $\pm 0.5\text{ N}$.

3.2.3 Inclinometer. Accuracy $\pm 1^\circ$. Used to measure the angle at which the force gauge is applied to the switch under test.

3.2.4 Test Fixture. Used for applying angle and force to overhead console switches.

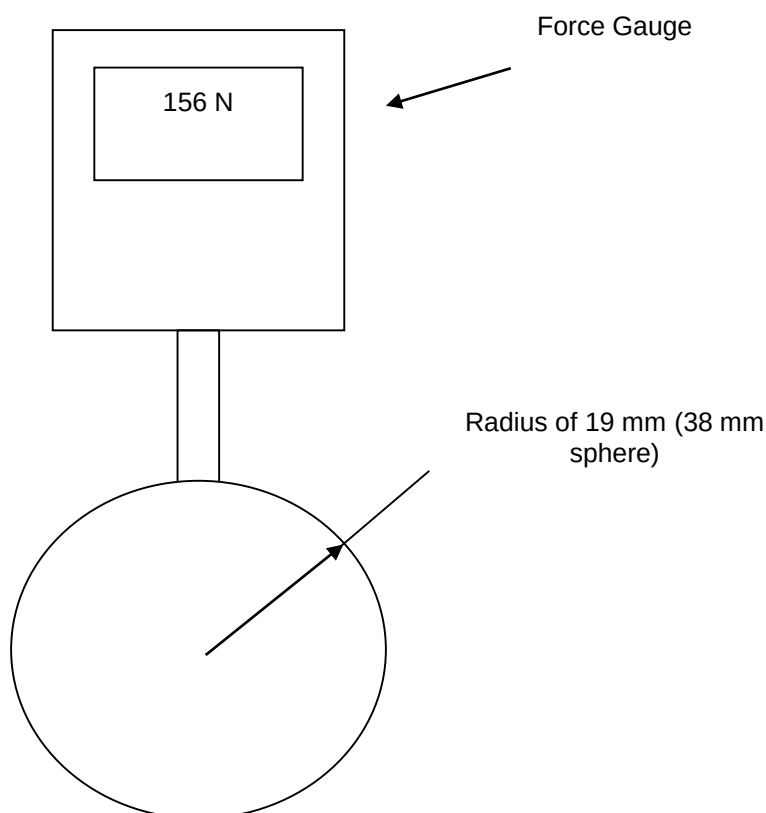


Figure 1: View of Force Gauge on Ball

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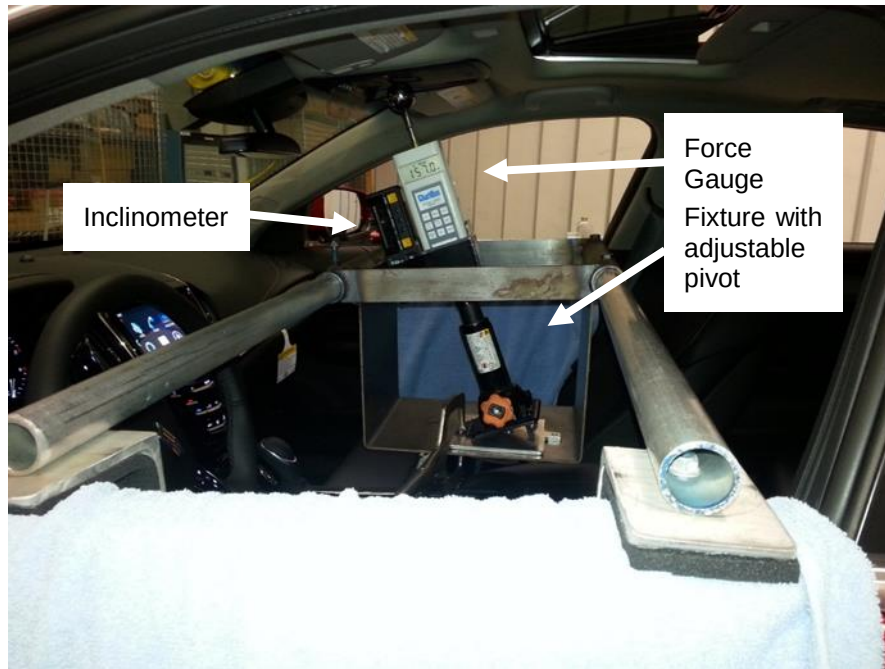


Figure 2: View of Fixture for Applying Force at Angle to Overhead Switches

3.3 Test Vehicle/Test Piece. For validation testing, the test vehicle shall be of the latest build phase with production-intent electrical components and calibrations.

3.4 Test Time.

Calendar time: 4.5 d
 Test hours: 24 h
 Coordination hours: 12 h

3.5 Test Required Information. See Data Sheet A4 in Appendix A.

3.6 Personnel/Skills. No special training is needed.

4 Procedure

4.1 Preparation. Prior to vehicle procurement, assemble a Test Readiness Team (TRT) meeting with the following team members:

- Validation Engineer (VE).
- Vehicle System Engineer (VSE).
- Design Release Engineer (DRE).
- Vehicle Software Integration Engineer (VSIE).
- Assembly Verification Software Engineer/Dynamic Vehicle Testing (AVSE/DVT).

This team will determine the proper vehicle software and/or calibration configurations required to test and verify that the test material is production-intent per the appropriate software development system, for example, Calibration Development System (Cal-DS), General Motors Electronic Controller (GMEC), or the Global Data File Release System (GDFRS).

The appropriate DRE(s) must verify that the test vehicle has production-intent actuation devices. See 4.3.7 for the description of the correct actuation devices.

The Performance/Test Engineer (P/TE) shall perform the following:

- Obtain TRT approval of the vehicle configuration before testing can commence.

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- Complete Data Sheet A4 to document engineering team approval for test.
- Correct any vehicle issues that may affect the test results.
- Assure that appropriate modules have been updated with the calibration files and/or software approved by the TRT.

4.2 Conditions.

4.2.1 Environmental Conditions. An ambient garage environment or dry outside environment is required. The Test Requester must approve any other environmental conditions used.

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 The Body Control Module (BCM) DRE and Lead Switch DRE(s) must complete Data Sheet A4 and the P/TE must complete Data Sheet A4 for test to proceed. The Tester requires the information to perform the test procedure. Complete the instrument calibration Data Sheet A1 in Appendix A.

4.3.2 Condition A.

4.3.2.1 After closing all doors, including trunk and hood, insert key in ignition lock cylinder and rotate to "**Accessory**" position. Open all power-operated windows, tailgate glass, sunroof, and/or partitions to the half-opened position.

4.3.2.2 Pull on key and slowly rotate towards "**Lock**" position until key can just be removed from lock.

4.3.2.3 For vehicles equipped with a keyless system, such as Easy Key or Passive Entry Passive Start (PEPS), place the vehicle in the "**Accessory**" power mode, open all power-operated windows, tailgate glass, sunroof, and/or partitions to the half-opened position and then place the vehicle in the "**Off**" mode. **Note:** For the remainder of this standard, the Easy Key and PEPS systems will be simply referred to as a keyless system.

4.3.2.4 Test 1.

4.3.2.4.1 Immediately after performing 4.3.2 thru 4.3.5 (Conditions A through D), attempt to move each power-operated window, tailgate glass, sunroof, and/or partition by operating the actuation devices from all seating positions. If switches located in the rear seating positions are difficult to reach from the driver seat, it may be necessary to use a second person to activate those switches in order to complete this section quickly – before Retained Access Power (RAP) ceases.

4.3.2.4.2 Record on Data Sheet A2 whether or not any power windows, tailgate glass, sunroof, and/or partition move in either direction.

4.3.2.4.3 Based on results, continue as follows:

4.3.2.4.3.1 If any windows, tailgate glass, sunroof, or partitions **do move**, proceed to 4.3.2.5 (Test 2).

4.3.2.4.3.2 If windows, tailgate glass, sunroof, and/or partitions **do not move**, proceed to 4.3.3, 4.3.4 and 4.3.5 (Conditions B, C, and D).

4.3.2.5 Test 2.

4.3.2.5.1 If windows, tailgate glass, sunroof, and/or partition did move in Test 1 (4.3.2.4) perform 4.3.2 once more.

4.3.2.5.2 Immediately after the key has been removed, fully open the driver door, close it, and then attempt to operate the driver power window in both directions.

4.3.2.5.3 Perform 4.3.2 again. Immediately after the key has been removed fully open the driver door, close it, and then attempt to operate the passenger power window in both directions.

4.3.2.5.4 Continue following the Test 2 (4.3.2.5) sequence for each and every power window, tailgate glass, sunroof, and/or partition.

Note: If windows, tailgate glass, sunroof, and/or partition moved, stop and report results to the P/TE.

4.3.2.5.5 Perform 4.3.2 once more. This time wait 2 minutes after the key has been removed and fully open the driver door and then close it.

4.3.2.5.6 Attempt to operate the power windows, tailgate glass, sunroof, and/or partition in both directions.

4.3.2.5.7 Record on Data Sheet A2 whether or not windows, tailgate glass, sunroof, and/or partition moved.

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Note: If windows, tailgate glass, sunroof, and/or partition moved, stop and report results to the P/TE.

4.3.2.6 Test 3.

4.3.2.6.1 If windows, tailgate glass, sunroof, and/or partition did not move in 4.3.2.5 after driver door has been opened and closed, repeat 4.3.2.

4.3.2.6.2 Immediately after the key has been removed, open the front passenger door fully, close it, and then once more attempt to operate the power windows, tailgate glass, sunroof, and/or partition in both directions.

4.3.2.6.3 Record whether or not windows, tailgate glass, sunroof, and/or partition moved.

Note: If windows, tailgate glass, sunroof, and/or partition moved, stop and report results to the P/TE.

4.3.2.6.4 Perform 4.3.2 once more. This time wait 2 minutes after the key has been removed and fully open the passenger door and then close it.

4.3.2.6.5 Attempt to operate the power windows, tailgate glass, sunroof, and/or partition in both directions.

4.3.2.6.6 Record on Data Sheet A2 whether or not windows, tailgate glass, sunroof, and/or partition moved.

4.3.2.6.7 If windows, tailgate glass, sunroof, and/or partition moved, stop test and report results to P/TE, otherwise proceed with 4.3.3, 4.3.4, and 4.3.5.

Note: If the vehicle can be routinely exited by the driver through a door other than the front passenger or driver doors, e.g., a side door on a van, repeat 4.3.2.6 (Test 3), for all such doors.

4.3.3 Condition B.

4.3.3.1 After closing all doors, including trunk and hood, insert key in ignition lock cylinder and rotate to **"Run"** position. Open all power-operated windows, tailgate glass, sunroof, and/or partitions to the half-opened position. For keyless systems, place vehicle in **"Run"**.

4.3.3.2 Pull on key and slowly rotate towards **"Lock"** position until key can just be removed from lock. For keyless systems, place vehicle in **"Off"**.

4.3.3.3 Return to Test 1 (4.3.2.4), and possibly Test 2 (4.3.2.5), and Test 3 (4.3.2.6).

4.3.4 Condition C.

4.3.4.1 After closing all doors, including trunk and hood, insert key in ignition lock cylinder at **"Lock"** position, for keyless systems place vehicle in **"Off"**, and attempt to open all power-operated windows, tailgate glass, sunroof, and/or partitions to the half-opened position and then rerun Test 1 (4.3.2.4) only.

4.3.4.2 If either windows, tailgate glass, sunroof, and/or partition moved, stop test and report results to the P/TE.

4.3.5 Condition D.

Note: This condition does not apply unless there is an **"Off"** ignition position located between the **"Lock"** and **"Run"** ignition positions.

4.3.5.1 After closing all doors, including trunk and hood, insert key in ignition lock cylinder and rotate to **"Run"** position. Open all power-operated windows, tailgate glass, sunroof, and/or partitions to the half-opened position. For keyless systems, place vehicle in **"Run"**.

4.3.5.2 Shift transmission into a forward gear then turn key to **"Off"** position, for keyless systems place vehicle in **"Off,"** and rerun Test 1 (4.3.2.4), and possibly Test 2 (4.3.2.5), and Test 3 (4.3.2.6).

Note: In the event that a vehicle ignition lock cylinder cannot be rotated to the **"Off"** position when the vehicle transmission is in a forward gear, a Not applicable (N/A) is to be recorded in the table of Data Sheet A2 under the column Condition D.

4.3.6 Exterior Controls. If an actuation device capable of operating the power windows, tailgate glass, sunroof, and/or partition is located on the exterior of the vehicle, determine if this actuation device can be activated only by a key locking system and must be continuously held during closure.

4.3.7 Actuation Devices. The BCM DRE and Lead Switch DRE(s) will identify all possible methods of ability to begin to CLOSE any window, lift gate glass, sunroof, sunshade (any sunshade that can be closed while its associated window or roof panel/sunroof is open) and/or any other glass partition on the vehicle under test.

Note: This section does not apply to actuation devices (switches) that are mounted in the vehicle roof, headliner, or overhead console and that can close a window, sunroof, and/or partition only by continuous rather than momentary switch actuation, or actuation devices that comply with the reversing requirements of FMVSS 118,

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Paragraph S5 "Automatic reversal systems". This also applies if a vehicle convertible top closes and then requires window closure at the completion of roof movement.

4.3.7.1 Visually inspect all power-operated window, tailgate glass, sunroof, and/or partition actuation devices.

4.3.7.2 Note switches that are not a pull-type. An example of a non-pull-type switch would include a rocker and/or a paddle type switch.

4.3.7.3 If the vehicle has switches that are not a pull-type for any window operation, other than described in the preceding Note, then stop the test and notify the P/TE.

4.3.7.4 Record findings in the table on Data Sheet A3 (DRE Supplied Information).

4.3.7.5 Test any actuation device, with exception of those in the preceding Note that is mounted in the occupant compartment of a vehicle and can be used to close a power-operated window, tailgate glass, sunroof, and/or partitions.

4.3.7.6 These actuation devices shall not cause such windows, tailgate glass, sunroof, and/or partitions to begin closing from any open position when contacted by the smooth, rigid, spherical surface of a 19 mm radius sphere, and tested as specified in 3.2.

4.3.7.7 Actuation Devices Test Procedure.

4.3.7.7.1 Close all doors, including trunk and hood, and place vehicle in the **"Run"** power mode.

4.3.7.7.2 Open all power windows, tailgate glass, sunroof, and partitions. Identify each actuation device that shall be tested to this requirement.

Note: The Overhead Console Team shall determine the most susceptible overhead console configuration to the sphere test through bench testing and/or Computer Aided Engineering (CAE) analysis. An engineering report shall be generated with those results and attached to the test report. The Electrical Performance Team shall test two samples of the identified overhead console configuration at the vehicle level.

Before the Start of the Test: Determine the worst case angle (maximum angle from vertical before sphere slips) of sphere application to all four sides (driver side, trunk side, engine side and passenger side) of all applicable switches in the vehicle. See Data Sheet A3 (Development Test). All part design variants need to be considered for testing. Measuring of angle shall be done with an inclinometer fastened to the force gauge and using a force of 156 N.

4.3.7.7.3 Using a sphere as specified in 3.2 and a force gauge assembly, attempt to close each power window, tailgate glass, sunroof, and partition, except those described in the Note in 4.3.7, by contacting each actuation device in the master control panel and individual actuation devices with the spherical side of the sphere. Test at 90° and then at the worst case angle (maximum angle from vertical before sphere slips) from all four sides of the switch from the Development Test. See Figure 3. Apply force only once at each angle direction. Use the test fixture as specified in Figure 2 for overhead console switches and use manual application of angled sphere for all other applicable switches. This should be done on all four sides if possible. Driver/passenger sides may not be possible since door trim may interfere for door window switches.

The P/TE MUST evaluate (with the test sphere) both the open (when this side first closes and then opens) and close sides of EVERY functionally capable switch that has the ability to begin to close any window, lift gate glass, sunroof, sunshade (any sunshade that can be closed while its associated window or roof panel/sunroof is open) and/or other glass partition. For example, sunroof glass slide open and glass tilt open both sides of both switches need to be evaluated.

Record switch force data in Data Sheet A3 (Force Data).

Note: Do not drag or rotate the sphere across the actuation device. Push in a vector fashion.

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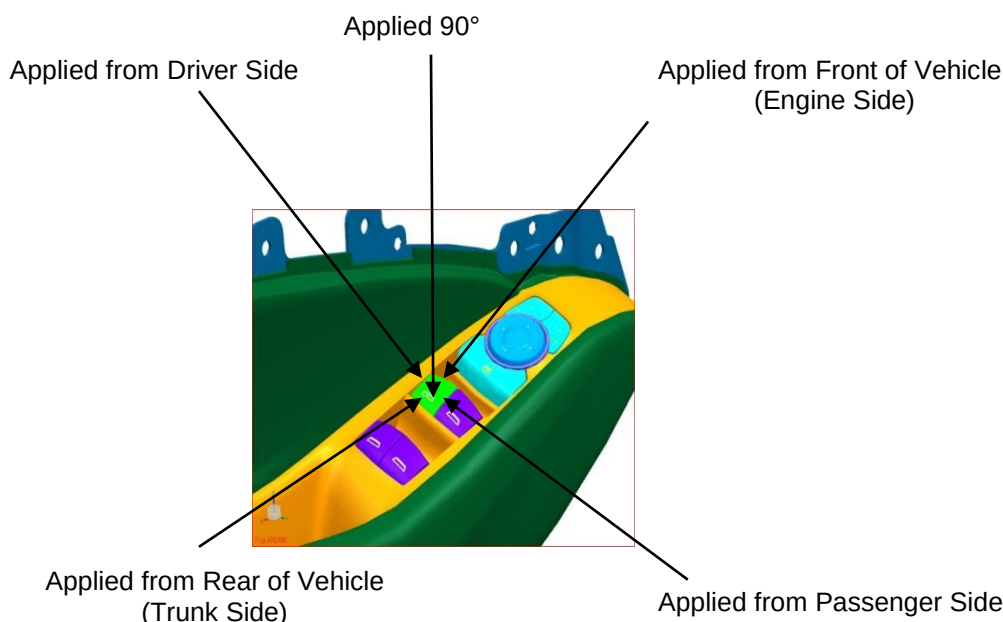


Figure 3: Directions to Apply Force to Sphere

4.3.7.7.4 For devices that move the power window, tailgate glass, sunroof, and/or partition in the close direction, record a "Fail" on Data Sheet A3 (Pass/Fail Data) and that the test is complete for that device under test.

4.3.7.7.5 For the actuation devices that cannot be contacted by the sphere to close the power window, tailgate glass, sunroof, and/or partition, continue attempting to close it/them by applying the following force to the actuation device.

4.3.7.7.5.1 Apply a force not to exceed 156 N (35 lb) to the geometric center of the sphere.

4.3.7.7.5.2 The force should be applied in an approximately normal (90°) direction to the trim surface.

4.3.7.7.6 For actuation devices that can be contacted and move the power window, tailgate glass, sunroof, and/or partition in the close direction, after the application of the 156 N (35 lb), record a "Fail" on Data Sheet A3 (Pass/Fail Data).

4.3.7.7.7 For actuation devices that cannot be contacted by the sphere prior to or after the application of the force, re-apply the linear force not to exceed 156 N (35 lb) at any angle from 0° to 180° from the plane of the actuation device.

4.3.7.7.8 This is a final attempt to make contact with the actuation device in a manner that closes the power window, tailgate glass, sunroof, and/or partition.

4.3.7.7.9 The sphere shall be directionally applied in such a manner that, if unimpeded, it would make contact with the actuation device.

4.3.7.7.10 Record the results indicating whether any applicable master or individual actuation device is capable of closing any window, tailgate glass, sunroof, and/or partition when subjected to the applied force.

4.3.7.7.11 For any actuation device that did not cause the windows, tailgate glass, sunroof, and/or partitions to begin closing, record a "Pass". Otherwise record a "Fail" in the adjacent column on Data Sheet A3 (Pass/Fail Data) and contact the P/TE immediately.

4.3.8 Remote Actuation Device. There is no current remote actuation device being developed or designed for use on a vehicle in the United States or Canada meeting the requirement of S4(g) of FMVSS 118. Devices currently used are radio frequency devices and do not meet part of this requirement of being incapable of closing the power window, partition or roof panel if the device and the vehicle are separated by an opaque surface and do not meet the requirement of incapable of closing the power window, partition or roof panel from a distance of more than 11 m from the vehicle.

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