



Door Window System, Operating 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 performance characteristics and operating endurance capabilities of power and manual window systems.

1.2 Applicability. This procedure applies to all passenger cars, light duty trucks, and medium duty trucks having conventional "raise and lower" side door mounted window systems. It can also be applied to quarter windows, station wagon end-gate systems, etc. However, modifications in fixturing and/or setup may be necessary to accommodate these different systems.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15094

GMW15663

GMW15938

2.3 Additional References. The supplier shall work with the GM responsible engineer to comprehend these requirements.

- 1987 C-Car Customer Measurement Program Report dated November 30, 1990.
- CG2910 Pre-Test Checklist for Test Ready Properties (Contact GM Engineering).
- CG2916 Design Review Based on Test Results (DRBTR) Checklist (Contact GM Engineering).
- Front and Rear Side Closures Global Subsystem Technical Specifications (GSSTS).
- Studies made in August 1991 (TWO 03950-384, Report No. 001-696-091-014).

3 Resources

3.1 Facilities.

- Major Facility. GMNA Body Test Lab or similarly equipped test lab.
- Minor Facility. Designated body slot, environmental chamber.

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 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.

- Handheld Voltmeter
- 0 V to 20 V/50 A DC power supply

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Documents

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- Programmable Sequence Controller, i.e., computer, Window Test Controller, etc.
- Fan or air line to cool motor
- AC Servo Motor with torque transducer (manual window systems)
- Adapter for window regulator handle (manual window systems)
- Data acquisition system with plotter capability

3.2.1 Fixturing.

3.2.1.1 If testing a power window system, an electrical wire lead is necessary between the window regulator motor and the sequence controller connector; recommend 14 gauge wire, approximately 150 mm (6 in) long, to approximate 0.0 Ω resistance. Refer to Front and Rear Side Closures Global Subsystem Technical Specifications GSSTS section 3.1.5.3.

3.2.1.2 Adapter for window regulator handle.

3.2.1.3 Fan or air line to cool the window motor during cycling.

3.2.1.4 A body or door cart.

Note: If testing a frameless glass system, a body or buck is required for validation testing. It is difficult to represent on a fixture factors such as window seals, door overbend, etc. If testing a door with an upper frame, discuss with the requesting engineer to determine if door overbend affects the window system performance, and if a body is necessary to create the overbend condition.

3.2.2 Instrumentation.

3.2.2.1 Power Window System.

3.2.2.1.1 Regulated power supply (20 VDC, 50 A).

3.2.2.1.2 Programmable sequence controller, i.e., window test controller, etc.

3.2.2.1.3 Handheld voltmeter.

3.2.2.1.4 Proximity Sensors or equivalent to detect window movement and desired positioning.

3.2.2.2 Manual Window System.

3.2.2.2.1 AC Servo Motor.

3.2.2.2.2 Manual Window Regulator Console (including Data Acquisition equipment).

3.3 Test Vehicle/Test Piece.

3.3.1 A fully assembled door, including a manual or power window system, and a complete glass guidance system, including belt strips, run channels, stops, and any items affecting window system performance. A body may be necessary for reasons stated in note in 3.2.1.4. A door trim pad may be required since it may add stiffness to the inner panel, or the inner belt strip may be integral with the door trim pad. It is recommended that the door assembly be dimensionally certified before testing is started. See Pre-Test Checklist for Test Ready Properties in Global Document Management (GDM) under document number CG2910.

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

Calendar time:	51 d
Test hours:	124 h
Coordination hours:	28 h

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 test details, running multiple samples (times shown are for one system), etc.

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 this time.

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

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.

The following specifications or information are required to run this test:

3.5.1 Durability Cycle Requirement, including cycle definition. See Side Closure SSTs, table 3.1.5.3-I.

3.5.2 Sequence and Percentage of Cycle Count in Environmental conditions.

3.5.3 Manual Window System Stall Torque.

3.5.4 Power Window System Stall Voltage.

3.5.5 Power Window Stall Time.

3.5.6 Stall Force (can help during set up of window system).

3.5.7 Environmental test conditions, i.e., temperature, humidity, wet, salt, dust, etc.

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

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. Check for cracks, paint chips, dents, etc., document any variation/deviation in assembly, etc.

Note: If applicable, check that rivet mandrels are secure. Inspect regulator for adequate lubrication.

4.1.2 Sample Preparation. This test is normally run on the test subject in an "as received" condition. If it is requested to be run in a specifically adjusted condition, follow the applicable procedure(s).

4.1.2.1 If it is necessary to assemble the door, use proper rivet gun tips and torque specifications. If applicable, adjust all stops and window channels properly. See the requesting engineer for information.

4.1.2.2 Mark all window system fasteners and attachments to check for movement and rotation during test.

4.1.2.3 If on a body, measure and adjust the gap and seal margin dimensions to ensure they meet design specifications. Reference GMW15938.

4.1.3 Facilities and/or Equipment Preparation. Record the instrumentation calibration information on Instrument Calibration Data Sheet A1. Alternate data recording systems, such as the Global Engineering Equipment Tracking System (GEETS) may be used, as long as they document the pertinent data shown in Data Sheet A1

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 (3.1.1). Unless otherwise noted, these 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. The following instructions are divided into manual window systems and power window systems. Use the applicable set of instructions.

4.3.1 Setup Instructions.

4.3.1.1 Setup Instructions for Manual Window System.

4.3.1.1.1 Perform any functional/operational tests/evaluations as requested by responsible engineer. Specifically, cycle the window system through at least 5 cycles to ensure proper operation and seating of all system components. As applicable, note any irregular sounds or erratic operation indicating a potential problem with design, manufacture, or assembly and verify observations with the requesting engineer.