



Sunshade for Side Window

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. Testing sunshades according to various performance criteria.

1.2 Applicability. All sunshades for side windows on rear doors, including horizontal and vertical positions.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3059

GMW14264

2.3 Additional References.

- Durability Door Slam Test (from the GM Engineering Closures Group)
- General Vehicle Durability Schedule (see the responsible GM engineer)
- Specific Procedures for Soak Requirements (see the responsible GM engineer)
- Vehicle Technical Specification (VTS).

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities.

3.1.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.1.2 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.

3.1.1.3 Milford Proving Grounds, Dudenhofen test center (Belgian block wave road, Rheinstraße) or equivalent proving ground.

3.1.1.4 Climatic chamber capable of achieving the temperatures described in Table 1.

3.1.2 Equipment.

3.1.2.1 Tensile/compression gauge with hook.

3.1.2.2 Steel ruler.

3.1.3 Test Vehicle/Test Piece. Complete rear door assembly including fastening material for the sunshade.

3.1.4 Test Time. Determined as needed.

3.1.5 Test Required Information. As specified.

3.1.6 Personnel/Skills. Test Engineer.

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3.2 Preparation. Not applicable.

3.3 Conditions.

3.3.1 Environmental Conditions. All performance requirements shall be fulfilled within a temperature range of -30 °C to +80 °C. If not otherwise stated, the tests on each part shall be conducted in the order shown in Table 1.

Table 1: Test Conditions

Order	Conditions
1	Thermal soak for 1 h at +80 °C ± 3 °C.
2	Conduct test at +80 °C ± 3 °C and record results.
3	Thermal soak for at least 1 h at +23 °C ± 3 °C.
4	Thermal soak for 1 h at -30 °C ± 3 °C.
5	Conduct test at -30 °C ± 3 °C and record results.
6	Thermal soak for at least 1 h at +23 °C ± 3 °C.
7	Conduct test at +23 °C ± 3 °C and record results.

3.3.2 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.

Tests that are to be performed "at temperature" (i.e., cold and hot) are to be conducted in the environmental chamber after an appropriate minimum soak time has been reached (refer to Specific Procedures for Soak Requirements or Table 1). The tests are to be performed in the chamber at the temperature specified. Parts to be tested are not to be soaked and subsequently removed from the chamber at any time during the test (i.e., soaking the parts in the chamber and bringing them into an ambient temperature lab at any time during the test is not permissible under this specification).

3.4 Instructions. Not applicable.

3.5 Data. Not applicable.

3.6 Safety. This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3.7 Documentation. Samples of components or material released to this standard shall be tested for conformity with the requirements of this standard and approved by the responsible GM Department prior to the start of delivery of production level components or materials.

Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

If not otherwise agreed to, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.7.1 Test Results. Subjective evaluation shall be performed according to GMW14264.

The results shall be entered in the relevant data sheets (see Appendix A; Data Sheet A1, Appendix B; Data Sheet B1, Appendix C; Data Sheet C1 and Appendix D; Data Sheet D1).

Variables shall be provided for values which are not explicitly listed and shall be taken from the applicable appendix under the relevant variables. Deviations of set values are specified on the part drawing.

4 Requirements and Procedure

4.1 General. The sunshade shall be checked for conformance to the current development or release status before each test.

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All fasteners shall be present, undamaged and correctly installed. If this is not the case, the fasteners shall be supplemented or corrected. Any modifications shall be noted.

4.1.1 Test samples shall be installed in design position prior to testing.

4.1.2 At least three samples shall be tested or as specified by the Subsystem Validation Engineer.

4.2 Actuation Forces. All measured values to be determined in 4.2 and 4.3 shall be recorded at least three (3) times (one time per sample according to 4.1.2). All samples must be subjected to all temperatures or as specified in the test procedure and documented in the data sheets (see Appendix A, Appendix B, Appendix C and Appendix D).

4.2.1 Measurement of the Withdrawal Force F1 in Withdrawal Direction. This requirement shall apply to the horizontal and vertical sunshades. The withdrawal direction is defined as the straight line from the exit point of the sunshade to the catch position.

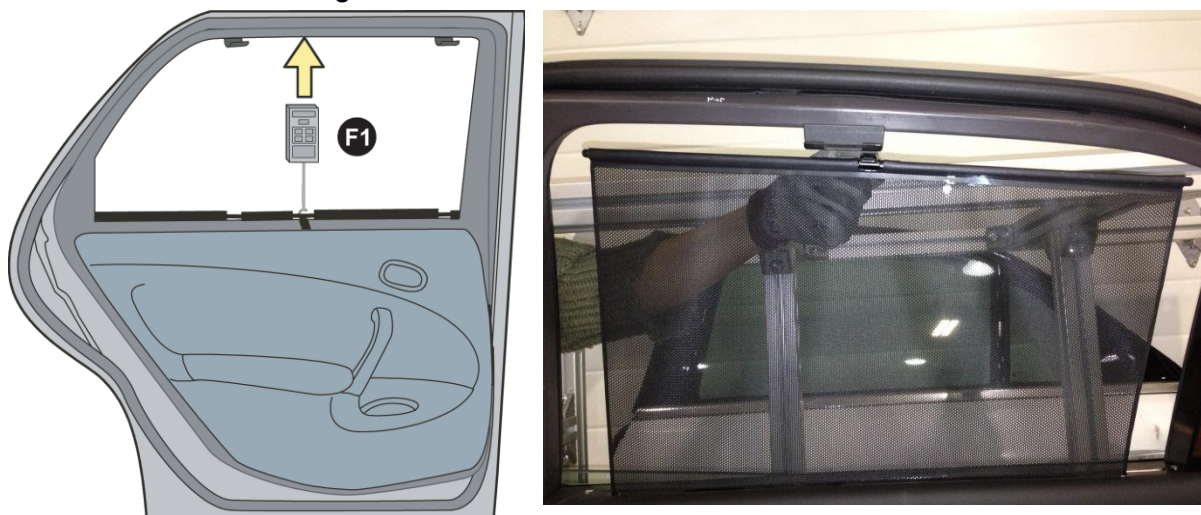
The required withdrawal force F1 shall be taken from Appendix D, Data Sheet D1. The tension force at the top position (just below the catches) shall be no less than 8 N and the withdrawal shall be no more than 16 N.

The tensile/compression gauge with hook shall be used for measuring the withdrawal force F1.

The hook of the tensile/compression gauge shall grip the fixing rod at the relevant position on the handle and shall pull the sunshade down (just below) to the height of the catches (see Figure 1).

It shall be ensured that the sunshade is not pulled over the catches during withdrawal. The sunshade shall not be pulled against the end stop.

Figure 1: Measurement of Withdrawal Force F1



4.2.2 Measurement of Withdrawal Force F2 at 45 Degree Angle to the Withdrawal Direction. This requirement shall apply to the horizontal and vertical sunshades. The required withdrawal force F2 shall be taken from Appendix D, Data Sheet D1.

The test shall be performed as for measurement F1. Withdrawal angle is 45 degrees to withdrawal direction, vehicle interior (see Figure 2).

It shall be ensured that the sunshade is pulled at the specified angle during withdrawal.

The sunshade shall not be pulled against the end stop.

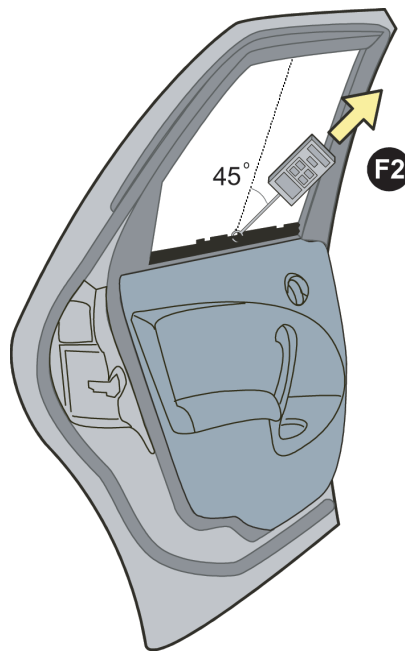
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Figure 2: Measurement of Withdrawal Force F2



4.3 Tension Forces.

4.3.1 Measurement of Tension Force F3 Bottom Position. This requirement shall apply to the horizontal and vertical sunshades. The required tension force F3 shall be taken from Appendix D, Data Sheet D1.

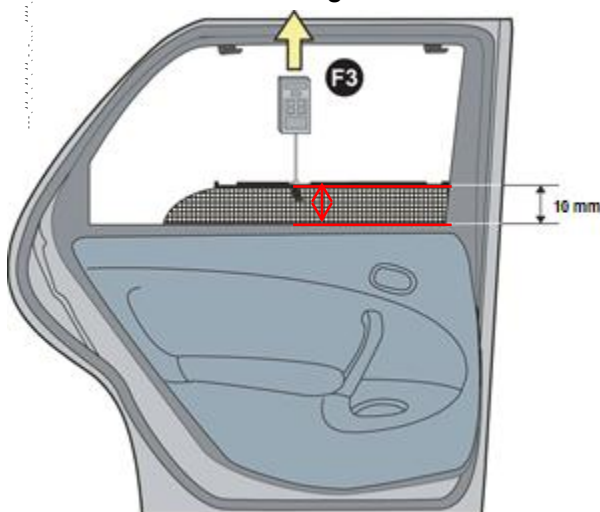
The tensile/compression gauge with hook shall be used for measuring the tension force F3.

The hook of the tensile/compression gauge shall grip the fixing rod at the relevant position on the handle.

In order to measure the tension force F3 in the bottom position, the sunshade shall be pulled out by 10 mm and shall be measured in the handle position, the hook of the tensile/compression gauge shall be engaged in the fixing rod and the tension force measured (see Figure 3 and Figure 4).

It shall be ensured that the position of the measuring device does not change during the measurement.

Figure 3: Measurement of Bottom Tension Force F3



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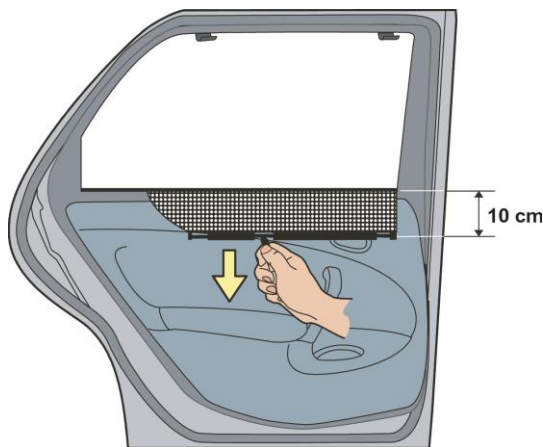
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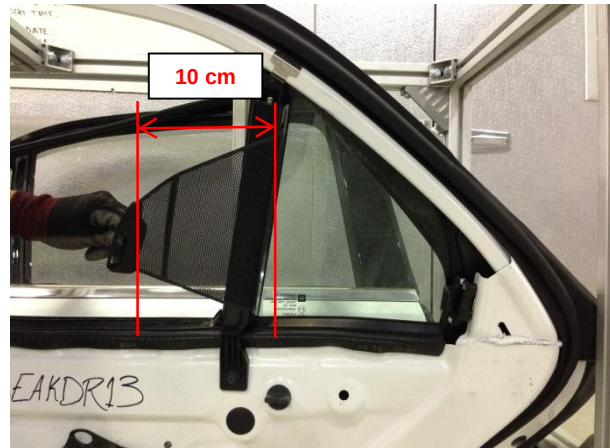
4.3.2 Retraction Test. This requirement shall apply to the horizontal and vertical sunshades. When performing the retraction test, the sunshade shall be pulled out 10 cm by hand, against the opposite normal operation condition (downwards or forward for the horizontal and vertical sunshade, respectively). See Figure 4.

When released, the sunshade shall retract automatically and completely.

Figure 4: Retraction Test



Horizontal Sunshade

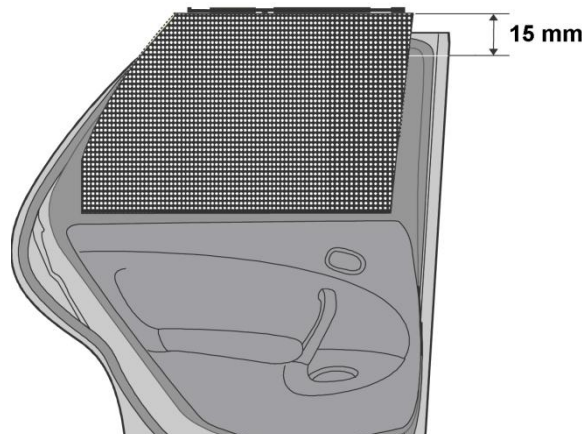


Vertical Sunshade

4.3.3 Excess Length Test. This requirement shall apply to the horizontal and vertical sunshades. For the test, the sunshade shall be pulled out to the maximum length. The excess length is defined as the difference between the maximum withdrawal length and the withdrawal length of the sunshade when engaged.

The excess length shall measure 15 mm minimum (see Figure 5).

Figure 5: Measurement of the Excess Length



4.3.4 Durability Test. This requirement shall apply to the horizontal and vertical sunshades. The reliability shall be 97.8% or greater at 50% confidence for one severe customer usage with an assumed Weibull slope of 1.5.

That means: Test six (6) parts to a maximum of three (3) times life to the following cycling temperature profile.

- Measure efforts before cycling and after each life.
- Normalize part to $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ after hot and cold cycles to avoid inducing thermal shock.

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