



Fixed Glass Sunshade Assembly

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.

Note: The use of **shall** in this document denotes a binding provision that must be adhered to unless a deviation is granted in writing by the responsible Program Team Leadership and/or the component/subsystem Bill of Material (BOM) Family Owner (BFO). The use of **should** denotes a preference or desired conformance, which if not adhered to, must be documented and disclosed to General Motors. Unless otherwise noted, all requirements apply over the conditions and useful life as described herein. General Motors shall be the final arbiter of performance if the requirements stated herein are not objectively defined. The design and execution of the Fixed Glass Sunshade Assembly must be in accordance with the application regulations of Section 2.

Note: This standard is a General Motors Global Document. All requirements herein shall be adhered to as GM Global Requirements for the Fixed Glass Sunshade Assembly except where noted for specific GM programs.

1.1 Purpose. The main purpose of the Fixed Glass Sunshade Assembly is to provide a decorative, and functional trim covering of the underside of the vehicle's roof fixed glass. The Fixed Glass Sunshade Assembly Subsystem also provides packaging provisions for all other functional or decorative elements in this region of the vehicle interior. The main purpose of the shade is to block exterior light from coming through the roof glass, or in the open position, to allow exterior light into the passenger compartment.

1.2 Applicability. This standard established performance requirements, design constraints, and validation requirements for a Fixed Glass Sunshade Assembly. The requirements contained in this document only apply to parts released under this version of requirements when included in supplier Statement of Requirement (SOR). The Analysis Development Validation (ADV) plan shall be complete per Statement of Requirements (SOR) Validation Appendix G2 requirements and any new standards/Component Technical Specification (CTS) updates at Integration Vehicle Material Required Date (IV/MRD) be included in the Design Review Based on Failure Modes (DRBFM) and/or peer reviews, with validation considerations considered in that process, and effected via Engineering Work Order (EWO) for program specific standard updating. (The program team shall contact the Global Technology Engineering (GTE) to ensure the latest standard templates are being used).

1.3 Remarks. The Fixed Glass Sunshade Assembly is listed under the following Uniform Parts Classification (UPC), Functional Name Address (FNA) and Bill of Material (BOM) nomenclature.

- **UPC** = 1C 3M
- **FNA** = 0404A Fixed Glass Sunshade
- **BOM Row** = 433.01.04 Fixed Glass Sunshade Assembly Row

2 References

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

2.1 External Standards/Specifications.

CMVSS 201	FMVSS 201	GSO 98	TRIAS 48
ECE R21.01	FMVSS 302	SAE J1344	TS 16949

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2.2 GM Standards/Specifications.

GMW3059	GMW3232	GMW14089	GMW14797
GMW3115	GMW7293	GMW14124	GMW14892
GMW3116	GMW7294	GMW14234	GMW15531
GMW3118	GMW8518	GMW14444	GMW15862
GMW3121	GMW14011	GMW14573	GMW16331

2.3 Additional References.

- Best Practice (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).
- Best Practice Number Knowledge Packet (K-PAC) FMVSS 201-1
- Best Practice Number Knowledge Packet (K-PAC) FMVSS 201-4
- CG3496 (CG3496 Overhead Substrate Steady State Part Monitoring (SSPM))
- Design Appearance Requirement (DAR)
- Design Practices and Constraints
- Development Planning Schedule
- Dimensional Technical Specification (DTS)
- Enterprise Engineering Knowledge System (E2KS)
- Ergonomics Guidelines
- GM Engineering Materials and Process Standards
- GM Global Legal Database
- GM Legal Staff Requirements
- GM Human Factors Design Objective Number 107 Sunroof Sunshade
- GM Materials Specification
- GM Supply Power
- GME Recycled Materials File
- Incomplete Vehicle Document
- Manufacturing Technical Specification (MTS)
- Master Process Documents (MPD)
- Owner's Manual
- Roof Rail Airbag (RRAB) Subsystem Technical Specification (SSTS)
- RRAB Validation Specification
- Service Manual
- SOR Appendix B (CG2360 Molded Roof Trim SOR Appendix B _ Performance Based)
- SOR Appendix C2 (CG2180 ROOF TRIM APPENDIX C2)
- SOR Appendix F5 (CG2186 Appendix F5 Materials Appearance Engineering Requirements Integrated Interior System)
- SOR Appendix F7
- SOR Appendix F10
- SOR Appendix H (CG1054 Appendix H GM Location Specific Requirements)
- SOR Validation Appendix G2 (CG1419 Appendix G2 For Overhead Systems)
- Squeak and Rattle Noise Glossary
- Supplier Quality
- Vehicle Technical Specification (VTS)

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- World Vehicle Regulation Manual (WVRM)

3 Requirements

3.1 System/Subsystem/Component/Part Definition. The Fixed Glass Sunshade Assembly for a vehicle interior is defined as the part that is shipped to the assembly plant for installation of the component to the vehicle. This typically includes:

- Sunshade with Handle
- Track System

3.1.1 Appearance. The Fixed Glass Sunshade Assembly shall reflect the vehicle interior-styling theme in accordance with the brand character. It also reflects the design quality as expressed in surface attributes such as material texture, grain, color and gloss, as well as the execution of joints, interfaces (fit, flush and alignment). Statement of Requirements (SOR) Appendix F5 and/or SOR Appendix F10 defines the program grain, color and gloss requirements. The SOR Appendix F7 defines the fit and finish Dimensional Technical Specifications (DTS) requirements for execution of joints, and interfaces. The SOR Appendix F7 also provides Key Product Characteristics/Perceived Quality Characteristic (KPC/PQC) and part drawing tolerance and locating requirements. Tool marks such as; split lines, parting lines, weld lines, injection mold gate lines and or burrs that may be visible to the customer are not permitted on any component within the sunroof system.

3.1.1.1 Interior Appearance.

- a. All visible mechanical parts and covers shall be matte black, unless otherwise specified by GM Engineering. See SOR Appendix F5 or SOR Appendix F10 for Guide Rail colors.
- b. Headliner interface to the sunroof Day Light Opening (DLO) to be specified in SOR Appendix B.
- c. All colors and graining must meet all GM Engineering requirements per SOR Appendix F5 and SOR Appendix F10.
- d. The appearance characteristics of all visual interior surfaces visible through the fixed glass shall be compatible with other vehicle content.
- e. The upper surface of the sunshade shall have black finish, except the pull cup handle unless otherwise specified by GM Engineering.
- f. The sunshade shall cover and overlap the inner opening to the headliner. The gap between the sunshade and the nominal surface contour of the headliner treatment shall not exceed the maximum gap requirement in the DTS.
- g. The visible parts shall not have ejection marks, burrs or other objectionable features.

3.1.2 Content. The required physical and functional content for the Fixed Glass Sunshade Assembly are identified in SOR Appendix B - General Program Description.

3.1.2.1 Physical Content. The required physical and functional content for the Fixed Glass Sunshade Assembly are identified in SOR Appendix B - General Program Description (e.g., see items; 3.1.2.1a thru 3.1.2.1c).

- a. Sunshade
- b. Track System
- c. Pull Handle, as Required

Note: Include sub-components that help define the subsystem such as acoustic materials, fasteners, sealing and anti-itch materials, etc.

3.1.2.1.1 Sunshade. The sunshade pull cup color on the upper surface of the sunshade may be the interior color.

- a. The sunshade shall slide rearward until only the handle area remains forward of the rear interior aperture.
- b. The hard panel or light block roller sunshade shall not move forward of the glass panel.

3.1.2.1.2 Sunshade Requirements.

- a. The use of vented sunshades shall not allow direct light in the occupant eyes. Use of vented sunshades is specified in SOR Appendix B.
- b. The sunshade pull cup must not transmit light.

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- c. The sunshade pull cup must meet all ergonomic hand requirements when the sunshade is in the full open position.
- d. A hard panel sunshade shall not move forward of the glass panel leading edge at any position during vehicle dynamic road inputs.
- e. The sunshade panel shall be able to compensate for non-parallelism of the guide system and eliminate any cross car play.
- f. Sunshade to headliner, lace or trim ring gap shall be contact-free with a constant of 1 mm to 2 mm gap in any sunshade position.
- g. The sunshade shall be continuously guided in the rail over the entire movement of the sunshade.
- h. The forward and rearward movement of the sunshade shall be damped.
- i. The sliding channel for the sunshade must not be open at the top of the rail section.
- j. The headliner daylight opening must be covered completely by the sunshade.
- k. The driver shall manually activate opening and closing of the sunshade.
- l. The visible outer edge of the roller sunshade (nonattached to the guide rails) must not show fabric fraying.
- m. The sunshade shall cover and overlap the inner opening to the headliner.

3.1.2.1.3 Sunshade Operation.

- a. Alternative sunshade operation shall be offered as requested in the SOR Appendix B.

3.1.2.1.4 Further Interfaces.

- a. Body in White
- b. Formed Headliner

3.1.2.2 Functional Content. The Fixed Glass Sunshade Assembly should provide the basic functions described in the following:

3.1.2.2.1 An aesthetic appearance that covers the fixed glass and is in harmony with the rest of the vehicle interior.

3.1.2.2.2 Kinetic energy absorption to satisfy CMVSS 201U and FMVSS 201U Head Impact requirements.

3.1.2.2.3 A soft feel (tactility) for intentional and unintentional vehicle occupant contacts.

3.1.2.2.4 Color fastness, durability, cleanability, resistance to environmental influences, and retention of physical integrity.

3.1.2.2.5 Allow for Roof Rail Air Bag (RRAB) deployments.

3.1.2.2.6 Allow for movement of the shade to allow light into, or block light from the interior compartment.

3.1.3 Ambient Environment. Reference the Vehicle Technical Specification (VTS) for ambient environment. The Fixed Glass Sunshade Assembly must meet the performance requirements identified in this specification while operating within these environmental conditions. Temperature ranges recommended are -30 °C to 85 °C unless otherwise defined in the VTS. VTS documents calling out temperatures outside this range will require parts to be able to be operated, but not necessarily be fully functional at extreme temperature. Full function shall return to the assembly within the recommended temperature range.

3.1.3.1 Low Temperature Requirement. For the vehicles sold in selected countries only, see Appendix A, Table A1, the cold temperatures can be modified as shown in Table 1.

Table 1: Low Temperature Deviation Temperatures

Assumes Tinted Glass Usage	Low	Normal	High
Overhead Surfaces	-20 °C	Not applicable	95 °C
Relative Humidity	0%	10% to 80%	100%

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3.1.3.2 High Temperature Requirement. For the vehicles sold in selected countries only, see Appendix A, Table A2, the hot temperatures can be modified as shown in Table 2.

Table 2: High Temperature Deviation Temperatures

Assumes Solar Glass Usage	Low	Normal	High
Overhead Surfaces	-30 °C	Not applicable	65 °C
Relative Humidity	0%	10% to 80%	100%

3.1.3.3 Thermal/Humidity Environment. The anticipated operating conditions relative to temperature and humidity are listed in the VTS.

Note: If no requirements are identified in the VTS then default to; 0% to 100% humidity.

3.1.3.4 Shipping and Storage Environment. The anticipated shipping and storage conditions relative to temperature and humidity are 90 °C and 50% Relative Humidity (RH) or program specific. There are shipping conditions which are unique and could be more severe than the environment inside a vehicle. These conditions must be anticipated and designed for when designing garnish trim and when designing shipping containers.

3.1.3.4.1 Adhesion in Shipping and Storage Environment. Adhesively applied components shall remain retained to trim at the elevated temperatures used in shipping environments. Anticipated temperatures are 90 °C and 50% Relative Humidity or program specific. To check the adhesion, run the adhesion test per GMW14892, using the preceding temperature. Do not use the full environmental cycle, but soak the trim in a chamber for 4 h, prior to testing the trim.

3.1.4 Interfaces.

3.1.4.1 External-To-Vehicle to Subsystem: General Assembly Process. Vehicle Assembly Process imposes product requirements for the Fixed Glass Sunshade Assembly.

3.1.4.1.1 Modularity: Component Retention to Substrate. The extent of modularity is program and/or region specific. When modularity is required, the Fixed Glass Sunshade Assembly shall be securely retained to the Overhead Substrate in such a manner as to withstand the rigors of shipping and the vehicle assembly process.

3.1.4.1.2 Ergonomics During Assembly. The installation process of the Fixed Glass Sunshade Assembly shall meet GM ergonomic and assembly requirements in all regions (i.e., weight, fastener insertion force, etc.) Requirements can be found in GMW14234. Additionally, all installation related Occupational Safety and Health Administration (OSHA) requirements shall be met in North America.

3.1.4.2 Subsystem to Subsystem. The following describes interfaces between Fixed Glass Sunshade Assembly and other subsystems with which it has a physical or functional relationship.

3.1.4.2.1 Fixed Glass Sunshade Assembly Best Practices. The Fixed Glass Sunshade Assembly shall conform to the Fixed Glass Sunshade Assembly Best Practices located in Enterprise Engineering Knowledge System (E2KS). The Fixed Glass Sunshade Assembly Best Practice Knowledge Set is stored in Interior Community of Practice (CoP). (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).

3.1.4.2.2 Safety Management.

3.1.4.2.2.1 Head Impact. The Fixed Glass Sunshade Assembly contributes to vehicle compliance with FMVSS 201U-Upper Interior Impact. The Fixed Glass Sunshade Assembly shall include energy absorbing features that contribute to vehicle-level compliance to the requirements of FMVSS 201U. The Fixed Glass Sunshade Assembly shall be designed to meet all applicable Best Practices included in the FMVSS 201U Knowledge Set. Contact the appropriate safety performance engineer for details and requirements. (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).

3.1.4.2.2.1.1 The initial design of the Fixed Glass Sunshade Assembly shall be restricted to the design features listed in Best Practice Number K-PAC FMVSS 201-1, and packaging boundaries found in Best Practice Number K-PAC FMVSS 201-4, or its most recent successor. Deviations from these Best Practices require the approval of the responsible FMVSS 201 Performance Engineer and the BOM Leader. (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).

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3.1.4.2.2.2 Roof Rail Airbag. For all vehicles, which incorporate Roof Rail Airbags (RRAB), the following requirements apply:

The Fixed Glass Sunshade Assembly shall provide all necessary requirements and accommodations for the Roof Rail Airbag by performing as further indicated in this section.

3.1.4.2.2.2.1 Attachments/Anchors. The Fixed Glass Sunshade Assembly shall have sufficient points of attachment to withstand the deployment loads of the RRAB without substantially dislodging from design. The number and location of added fasteners will vary depending on included hard fastening points and deployment forces imparted to the Roof Trim Subsystem (RTS).

3.1.4.2.2.2.2 Deployment. The Fixed Glass Sunshade Assembly structural/mechanical properties shall meet the deployment mode requirements by flexing as necessary.

3.1.4.2.2.2.3 Airbag Performance. The Fixed Glass Sunshade Assembly shall not detrimentally delay airbag deployment per GMW3115, GMW3118 and GMW3121 or direction granted by the responsible vehicle performance engineer, through temperature ranges of -30 °C to +85 °C.

- a. Any components or fragments of the Fixed Glass Sunshade Assembly that partially or fully separate from the Roof Trim subsystem (through fracture or dislodging) shall be evaluated for functional deficiency or injury potential to the occupant during the RRAB deployment through temperature ranges of -30 °C to +85 °C. Any component that diminishes the function of the RRAB or is judged to have injury potential shall be corrected-as evaluated by the RRAB and Fixed Glass Sunshade Assembly Product Development Team (PDT) members.
- b. The Fixed Glass Sunshade Assembly shall not damage the RRAB itself during deployment.
- c. The Fixed Glass Sunshade Assembly shall not present sharp or rough edges that may cut or snag the RRAB during deployment.
- d. The Fixed Glass Sunshade Assembly shall not prevent the RRAB from meeting the deployment requirements as specified in GMW3121, GMW3115 and GMW3118.
- e. For System Validation with Environmentally conditioned components, aging of the Fixed Glass Sunshade Assembly shall be completed according to GMW3118 unless otherwise stated in the SOR Validation Appendix G2; aging of the RRAB shall be completed according to the RRAB Subsystem Technical Specification (SSTS). System testing shall be completed according to RRAB validation specification.

3.1.5 Usage Definition. The range of physical dimensions of the user population for which the Fixed Glass Sunshade Assembly requirements herein apply are bounded by the 5th percentile female and the 95th percentile male.

3.2 Product Characteristics. The extent of modularity is program and/or region specific. When modularity is required, the Fixed Glass Sunshade Assembly shall be securely retained to the Overhead Substrate in such a manner as to withstand the rigors of shipping and the vehicle assembly process.

3.2.1 Performance Requirements. The following specifies the functional performance requirements for the Fixed Glass Sunshade Assembly. The component is to perform as specified prior to and after exposure to durability and environmental conditioning as designated.

3.2.1.1 Material and Part Performance. Material and material related part performance requirements are specified in the SOR Appendix F10. The Fixed Glass Sunshade Assembly shall meet the appropriate material related part performance requirements per GMW14444. **Note:** The following approvals shall be required as applicable: plastic, paint, textile, construction and color approval as defined in SOR Appendix F10. Additionally, adhesive requirements will be contained in the SOR Appendix F10.

3.2.1.2 Color/Gloss/Grain/Appearance. The requirements for the Fixed Glass Sunshade Assembly relative to color/gloss/grain/appearance are identified in SOR Appendix F5 and later in Color and Trim Design Appearance Requirements (DAR).

3.2.1.3 Interior Fittings. The Fixed Glass Sunshade Assembly shall meet Export ECE R21.01, CMVSS 201 and FMVSS 201 requirements for all countries that a vehicle is being exported to per program.

3.2.1.4 Other Regulatory Requirements. The Fixed Glass Sunshade Assembly shall meet FMVSS 302 and other flammability requirements, including TRIAS 48 and GSO 98. Testing shall also meet GMW3232.

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3.2.1.5 Fixed Glass Sunshade Assembly (Roof Rail Mounted). The Fixed Glass Sunshade Assembly allows occupants to open or close the shade to allow or block exterior light into the interior. It shall also meet the following:

3.2.1.5.1 For attachment clips, the installation loads shall be less than 50 N for palm installation, 15 N for finger or thumb installation, and shall meet the Ergonomics Guidelines as called for in 3.3.1.2.1.1.

3.2.1.6 Fixed Glass Sunshade Assembly. The Fixed Glass Sunshade Assembly allows occupants to open or close the shade to allow or block exterior light into the interior.

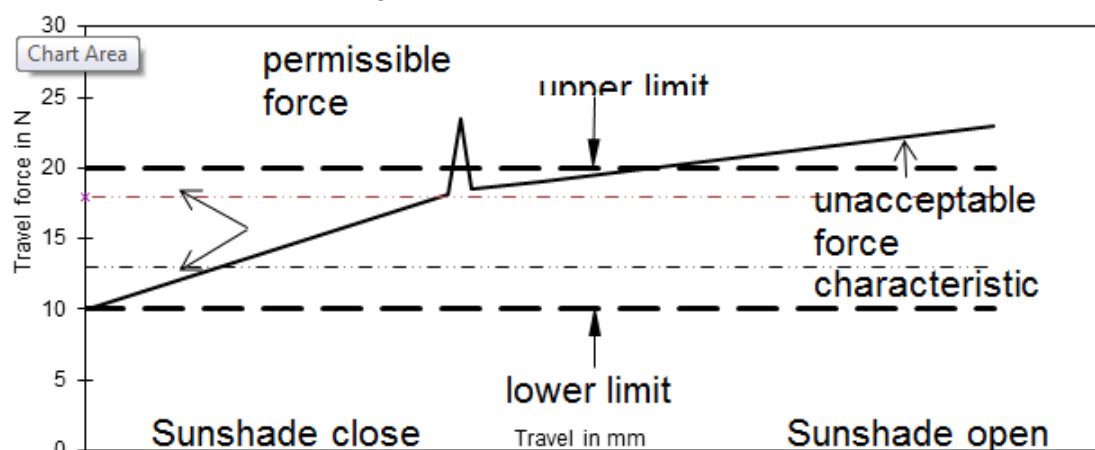
3.2.1.6.1 Sunshade.

- a. Disturbing sliding panel noises are not permitted. Sound quality must be approved by GM Squeak and Rattle Engineer.
- b. The sunshade shall not move by itself during maximum braking maneuvers, (panic stop).

3.2.1.6.2 Hard Panel Sunshade.

- a. These test requirements are component level test requirements unless otherwise specified.
- b. There shall be no (For/Aft) sunshade movement caused by vehicle dynamic road inputs.
- c. With the sunshade in any position, the sunshade shall not move more than 20 mm due to inertia during maximum braking maneuvers of up to $V_{abuse} = 1.2G$ (panic stop).
- d. The sunshade must meet applicable legal requirements, (e.g., occupant protection, flammability, glazing material).
- e. The sunshade after 10 open-close cycles, shall operate at less than 30 N efforts when tested at Ambient (23 °C), Hot (85 °C), and Cold (-30 °C). Soak parts for 1 h before cycling at temperature.
- f. After (50 cycles and 24 h rest) the force to operate the sunshade must be $15 \text{ N} \pm 5 \text{ N}$ (see Figure 1).
- g. The sunshade shall not have any abrupt change of operating effort (+5 N) through the entire length of the travel except for the detent (see Figure 1).
- h. After 500 cycles the sunshade force must be greater than 10 N and the sunshade shall not move more than 20 mm due to inertia during maximum braking maneuvers of up to $V_{abuse} = 1.2G$ (panic stop).
- i. The sunshade cycle speed when validating the sunshade module shall be within a range of $V_{hard} = 100 \text{ mm/s}$ to 125 mm/s .
- j. Normal operating open/closed speed is 20 mm/s to 40 mm/s.

Figure 1: Sunshade Travel Force



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