



Overhead Console

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 Overhead Console 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 Overhead Console Assembly except where noted for specific GM programs.

1.1 Purpose. The main purpose of the Overhead Console is to provide a decorative interface with the headliner and functional attachment for storage compartments, lighting, displays, audio microphones, controls, modules, switches, sensors, etc., required per program specific requirements.

1.2 Applicability. This standard established performance requirements, design constraints, and validation requirements for an Overhead Console Assembly. The requirements contained in this document only apply to parts released under this version of requirements when included in the supplier Statement of Requirements (SOR).

The Analysis Development Validation (ADV) plan shall be complete per 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 Overhead Console Assembly is listed per the Uniform Parts Classification (UPC), Functional Name Address (FNA) and BOM nomenclature.

- UPC = 1C3J
- FNA = 3600A Console Assembly - Roof
- BOM Row = 40.03:03:06
- VPPS = 433.06. Vehicle Partitioning and Product Structure (VPPS)

2 References

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

2.1 External Standards/Specifications.

Article 95	ECE R46.02	GSO 98	SAE/USCAR-25
Article 111-3	ECE R94	KMVSS 101	TRIAS 48
CMVSS 201	FMVSS 118	KMVSS 102	TS 16949
CMVSS 302	FMVSS 201	SAE J839B	
ECE R21	FMVSS 208	SAE J2602-2	
ECE R46.01	FMVSS 302	SAE/USCAR-21	

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2.2 GM Standards/Specifications.

GMW3059	GMW3431	GMW14234	GMW15272
GMW3097	GMW6992	GMW14241	GMW15424
GMW3103	GMW7293	GMW14264	GMW15609
GMW3110	GMW7294	GMW14269	GMW15841
GMW3115	GMW8518	GMW14444	GMW15862
GMW3116	GMW14011	GMW14573	GMW15987
GMW3118	GMW14089	GMW14797	GMW16157
GMW3121	GMW14118	GMW14872	GMW16219
GMW3172	GMW14124	GMW14892	GMW16331
GMW3191	GMW14155	GMW15049	GMW17000
GMW3232	GMW14188	GMW15118	

2.3 Additional References.

- Best Practice INTDRTR16 (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).
- Best Practice IPTRIM58 (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).
- Best Practice Number KPAC MVSS201-X (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).
- CG1663 – Global Component Technical Specification Template – Controls Appendix C
- CG2474 – GM Diagnostic Infrastructure Validation Procedure
- CG2492 – Interior Lighting General Program Description – Appendix B (or X)
- CG2999 – Component Software Validation Requirements
- Color and Trim Design Appearance Requirements (CTDAR)
- Connector Request Form
- Development Planning Schedule
- Dimensional Technical Specification (DTS)
- Ergonomics Best Practice (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).
- Global Traceability List (can be found on the Key Characteristics Designation System (KCDS) webpage via the A-Z List in Socrates under "K")
- GM Engineering Materials and Process Standards
- GM Global Legal Database
- GM Human Vehicle Integration (HVI)
- GM Legal Staff Requirements
- GM Materials Specification
- GM Recommended Connector Catalog
- GM Supply Power
- Human Machine Design Objectives KPAC HFCD-4
- HVI Program Storage Allocation List Tracker (SALT) List
- HVI Socrates Web site
- Incomplete Vehicle Document
- Interior Best Practices (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).

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- Interior Lighting Best Practices (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).
- Interior Lighting Subsystem Technical Specifications
- Manufacturing Technical Specification (MTS)
- Notice of Action (NOA) GICC-112
- Notice of Decision 005
- Overhead Console Assembly Best Practices located in Enterprise Engineering Knowledge System (E2KS) (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).
- Owner's Manual
- Potential Contaminants Section of the Program Specific Vehicle Technical Specification (VTS)
- Program Notebook > 05 Engineering/Integration Areas > Human Factors/Harmony
- Roof Rail Airbag (RRAB) Subsystem Technical Specification (SSTS)
- RRAB Validation Specification
- Service Manual
- SOR Appendix B
- SOR Appendix C2
- SOR Appendix F5 (CG2186)
- SOR Appendix F6
- SOR Appendix F7
- SOR Appendix F8
- SOR Appendix F9
- SOR Appendix F10
- SOR Appendix F11
- SOR Appendix F12
- SOR Appendix H
- SOR Appendix X
- SOR Validation Appendix G2
- Squeak and Rattle Noise Glossary
- TS-INT-001
- Vehicle Technical Specification (VTS)
- World Vehicle Regulation Manual (WVRM)

3 Requirements

The use of **shall** in this document denotes a binding provision that must be adhered to. **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 operation of the Roof Trim Subsystem must be in accordance with the application regulations of Section 2.

3.1 System/Subsystem/Component/Part Definition. The Roof Console is a subsystem located at or near the center of the headliner that positions and supports components of other vehicle subsystems for the comfort, convenience, and protection of vehicle occupants.

The Overhead Console Assembly shall give an integrated impression and convey a quality image. The components in the Overhead Console Assembly shall include all fasteners and optional content.

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The Overhead Console Assembly for a vehicle interior is defined as the part that is shipped to the assembly plant or a sub-assembly location for installation to the vehicle or overhead assembly. This typically includes:

- Overhead Console
- Fastener
- Retainer
- Screw Cover
- Protective Packaging

Features may need to be provided for a Value Added Assembler (VAA) to assemble the Overhead Console Assembly to an Overhead Trim System. The Overhead Console Assembly supports safety requirements for interior occupant impact and field of vision.

3.1.1 Appearance. The Overhead Console 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). SOR Appendix F5 defines the part appearance requirements (color, grain, gloss); Design Quality responsible. SOR Appendix F10 defines the part material requirements; Materials Engineering responsible. The SOR Appendix F7 defines the fit and finish Dimensional Technical Specification (DTS) requirements for execution of joints, and interfaces. The SOR Appendix F7 also provides Key Product Characteristic (KPC)/Perceived Quality Characteristic (PQC) and part drawing tolerance and locating requirements. The color, pattern, aesthetics, and other related qualities shall be evaluated and approved by the responsible Design Quality Launch Lead as an acceptable match to the Master when viewed under conditions set forth in GMW6992.

3.1.1.1 Specific appearance requirements for the Overhead Console Assembly are provided in SOR Appendix B.

3.1.1.2 These conditions shall not be visible from a normal standing or sitting position, inside or outside of the vehicle.

- Pin Holes
- Cut Edges
- Flow Lines
- Blisters
- Cracks
- Intake Point
- Discoloring
- Varnish Burrs
- Sink Marks
- Flashes
- Tool Parting Lines
- Frayed Material
- Wrinkles
- Puckers
- Mottling
- Adhesive Voids
- Other Visual Imperfections

3.1.1.3 Haptics. The haptic characteristics (tactile feel) of console functions (storage door function, button activation, etc.) shall be evaluated subjectively. A rating of seven (7) or higher is required during evaluation according to GMW14264.

3.1.2 Content. The Overhead Console Assembly physical and functional content.

3.1.2.1 Physical Content. Typical content of an Overhead Console consists of bezels, trim plates, fasteners, lighting/lamps (reading/dome/ambient), storage compartments, displays, sensors and electronic modules,

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switches and/or buttons. SOR Appendix B details the new and reuse component content of the program specific Roof Console.

3.1.2.2 Functional Content. The Overhead Console Assembly should provide basic functions.

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

3.1.2.2.2 Meet Human Vehicle Integration (HVI) requirements for customer operation and usage. See GM Human Vehicle Integration (HVI) Socrates Web site.

3.1.2.2.3 A secure and stable operation for all components, which are functional to the occupants.

3.1.2.2.4 Kinetic energy absorption to satisfy CMVSS 201U and FMVSS 201U head impact requirements.

3.1.2.2.5 A secure but soft feel (tactility) for intentional and unintentional vehicle occupant contacts.

3.1.2.2.6 Colorfastness, durability, cleanability, resistance to environmental influences, and retention of physical and structural integrity.

3.1.2.2.7 Allow for Roof Rail Airbag (RRAB) deployments.

3.1.2.2.8 A means for providing illumination of the interior for entry, exit, ambient and/or reading.

3.1.2.2.9 Compliance to all applicable governmental regulations and laws.

3.1.3 Ambient Environment. Reference the Vehicle Technical Specification (VTS) for ambient environment. The Overhead Console 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 temperatures can be modified as shown in Table 1.

Table 1: Low Temperature Deviation Temperatures

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

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/Visor 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 the Overhead Console Assembly and the shipping containers.

3.1.3.4.1 Clip Retention in Shipping and Storage Environment. The retainer, once installed to an Overhead, must meet a minimum retention of 30 N. Attachment screws shall be present and engaged to 1.2 mm ± 0.75 mm.

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3.1.3.4.2 Adhesion in Shipping and Storage Environment. Adhesively applied components shall remain retained to the Overhead Console trim at the elevated temperatures used in shipping environments. Anticipated temperatures are 90 °C and 50% Relative Humidity (RH) or program specific. To check the adhesion, run the adhesion test per GMW14892, at 90 °C. Do not use the full environmental cycle, but soak the console in a chamber for four (4) h, prior to peel testing the adhesively bonded items.

3.1.3.5 Contaminants. The contaminants which may come in contact with the Overhead Console Assembly are described in the Potential Contaminants Section of the Program Specific Vehicle Technical Specification (VTS).

3.1.4 Interfaces.

3.1.4.1 External-To-Vehicle to Subsystem: General Assembly Process. Vehicle assembly process imposes product requirements for the Overhead Console 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 Overhead Console Assembly shall be securely retained to the Overhead 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 Overhead Console 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. Interfaces between Overhead Console Assembly and other subsystems with which it has a physical or functional relationship.

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

3.1.4.2.2 Safety Management.

3.1.4.2.2.1 Head Impact. The Overhead Console Assembly contributes to vehicle compliance with FMVSS 201u-Upper Interior Impact. The Overhead Console Assembly shall include energy absorbing features that contribute to vehicle-level compliance to the requirements of FMVSS 201U. The Roof Trim Subsystem 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 In the initial design of the Overhead Console Assembly, added countermeasure components shall be restricted to those listed in Best Practice Number KPAC MVSS201-X, or its most recent successor. Deviations from this best practice require the approval of the responsible FMVSS 201 Performance Engineer on the program. All countermeasures must meet the requirements of the Materials Specification GMW15609.

3.1.4.2.2.2 Roof Rail Airbag. For all vehicles, which incorporate Roof Rail Airbag (RRAB). The Overhead Console 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 Overhead Console Assembly shall have sufficient points of attachment to withstand the deployment loads of the RRAB without substantially dislodging from design position excepting the surfaces immediately over and outboard of the RRAB. The number and location of added fasteners will vary depending on included hard fastening points and deployment forces imparted to the Overhead Console Assembly.

3.1.4.2.2.2.2 Deployment. The Overhead Console Assembly will flex as necessary to meet the RRAB deployment requirements. The interfaces with garnish, overhead and the overhead console structural/mechanical properties shall meet the deployment mode requirements by flexing as necessary. It may be necessary to modify the design to support RRAB deployment requirements.

3.1.4.2.2.2.3 Airbag Labels (if Required). All vehicles that include roof rail airbags shall incorporate permanent identification using the word "AIRBAG".

Permanently locate the identification immediately adjacent to the pillar top(s) or along the rail(s) out of which the RRAB deploys, adjacent to each seating position with airbag coverage.

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The identification shall be of sufficient size and contrast to be easily visible by vehicle occupants. (Reference Notice of Decision 005).

In vehicles with RRAB standard (100% content) the "AIRBAG" label may be located on the Roof Trim. Any implementation in the Roof Trim Subsystem (RTS) should be coordinated with the Garnish Trim per the overall vehicle program requirements.

3.1.4.2.2.4 Airbag Performance. The Garnish Trim System (GTS)/Roof Trim System (RTS) 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.

- Any components or fragments of the Overhead Console Assembly that partially or fully separate from the 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/Overhead Product Development Team (PDT) members.
- The Overhead Console Assembly shall not damage the RRAB itself during deployment.
- The Overhead Console Assembly shall not present sharp or rough edges that may cut or snag the RRAB during deployment.
- The Overhead Console Assembly shall not prevent the RRAB from meeting the deployment requirements as specified in GMW3121, GMW3115 and GMW3118.
- For system validation with environmentally conditioned components, aging of the Overhead Console 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.

3.1.4.3 Appearance of Overhead Console from External to Vehicle. All visible edges of the Overhead Console Assembly that are or may become visible from outside the vehicle shall be aesthetically covered.

3.1.5 Usage Definition. The range of physical dimensions of the user population for which the Overhead Console 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, all components, accessories, wiring, fasteners, etc., which comprise this subsystem shall be securely retained to the Overhead Console Assembly in such a manner as to withstand the rigors of shipping and the vehicle assembly process.

3.2.1 Performance Requirements. Functional performance requirements for the Overhead Console Assembly. The assembly is to perform as specified prior to and after exposure to durability and environmental conditioning as designated. See Appendix B - Test Preparation and Evaluation for testing details.

3.2.1.1 Material and Part Performance. Material and material related part performance requirements are specified in the SOR Appendix F10. The Overhead Console Assembly shall meet the appropriate material related part performance requirements per GMW14444. **Note:** 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 Overhead Console Assembly relative to color/gloss/grain/appearance are identified in SOR Appendix F5 and later Color and Trim Design Appearance Requirements (CTDAR).

3.2.1.3 Human Machine Interface. Overhead Console Assembly components and interfaces shall comply with the Human Machine Design Objectives KPAC HFCD-4 located in Enterprise Engineering Knowledge System (E2KS). (The supplier shall work with the GM Design Release Engineer to comprehend this requirement). The Overhead Console Assembly Best Practice Knowledge Set is stored in Interior Community of Practice (CoP).

3.2.1.3.1 Switch/Button/Indicator Control Visibility. Switch/Button/Indicator Control Visibility must meet Human Machine Design Objectives KPAC HFCD-4 for console mounted controls.

3.2.1.3.2 Switch/Button Electrical Performance. All stand-alone switches shall be validated to GMW3172 prior to release for packaging in the overhead console. Switches and buttons that are released as an integrated part of the overhead console shall meet the requirements of CG1663.

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3.2.1.3.3 Switch Interface to Trim (Product Validation Confirmation). The interface between the console trim and any electrical switch mounted to the trim shall comply with the requirements of GMW15987.

Note: This is a Product Validation (PV) requirement that will be evaluated under the supervision of the GM Supplier Quality organization as part of the Production Part Approval Process (PPAP).

3.2.1.4 Interior Fittings. The Overhead Console Assembly shall meet Export ECE R21, KMVSS 101, CMVSS 201 and FMVSS 201 requirements for all countries that a vehicle is being exported to per program.

3.2.1.5 Flammability. The subsystem and its components, shall satisfy the burn resistance requirements of FMVSS 302, CMVSS 302 (Canada - where applicable), Article 95, GSO 98 and TRIAS 48 according to GMW3232.

3.2.1.6 Other Regulatory Requirements. The Overhead Console Assembly shall meet KMVSS 102 and ECE R 94.01 for Airbag labels. Switches/Buttons shall conform to FMVSS 118. Other regulatory requirements applicable to the vehicle countries of export.

3.2.1.7 General Requirements for Console Components.

3.2.1.7.1 Switch/Button/Indicator Control Visibility. Switch/Button/Indicator Control Visibility must meet Human Machine Design Objectives KPAC HFCD-4 for console mounted controls.

3.2.1.7.2 Switch Interface to Overhead Console. The switch interface to the Overhead Console shall conform to the design features found in Best Practices INTDRTR16 and IPTRIM58. (The supplier shall work with the GM Design Release Engineer to comprehend this requirement).

3.2.1.7.3 Miscellaneous Requirements.

- a. Parts near an airbag must be securely fastened and must not become projectiles.
- b. Stationary and moving parts in close proximity to wiring harnesses must not have sharp edges in order to prevent chafing.
- c. Wire harness routing shall be designed to account for part and vehicle motion.
- d. Provide adequate access to all connections for assembly and service.
- e. Withstand assembly, actuation and abuse forces as defined by this specification. If a part is not defined, it shall withstand forces of 200 N minimum unless otherwise specified in SOR Appendix C2, without breakage, loss of function or disengagement of other components.
- f. Withstand environmental conditions and forces encountered in transportation or handling.
- g. If required, provide and properly secure service loops to prevent squeaks and rattles.
- h. Stationary and moving trim must not expose underlying parts through openings.
- i. Fasteners are not to be visible from any seating positions or while entering and exiting the vehicle.
- j. Parting lines for all parts shall comply with GMW15424.
- k. Light leaks are not permitted through or between components of the subsystem that may be seen by front or rear seat occupants.
- l. If required, clearly identify covers, features, and their operation to the user with an appropriate ISO or GM approved symbol or label (for example an arrow indicating which direction to push).

3.2.1.7.4 Fit.

- a. Tolerances for gap, parallelism, and flushness shall be defined in the program specific Dimensional Technical Specification (DTS). The global dimensional technical specification or "0.0" gap and flushness shall be the default when a program specific DTS or requirement does not exist.
- b. Design all components with features to align with adjacent parts.
- c. Use tolerance stacks, root mean square, and/or Variation Simulation Modeling (VSM) for designing and manufacturing the parts to achieve the DTS.
- d. Part imperfections, manufacturing marks, and unfinished edges shall not be visible with the doors open, from outside the vehicle, from any vehicle seating position, or while operating features.

3.2.1.7.5 Rotating Storage Bins, Doors, and Compartments.

- a. Compartment doors shall stay closed during crash tests, airbag deployments, and head impact.

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- b. Covered interior storage compartments that can normally be used for personal effects shall remain closed per the regional government regulations in the country of sale (i.e., FMVSS 201 S5.3 and Article 111-3) with these inertial loads and/or specific regional requirements as calculated per SAE J839B.
 - Load of 10G in the horizontal lateral direction.
 - Load of 10G in the vertical direction.
 - Load of 30G in the horizontal longitudinal direction.
- c. Covered storage compartment closing sound shall consist of one perceivable impact sound of short duration rather than an initially perceived impact sound followed by rebound sounds and/or ringing sounds or rattles. The closing sound spectral content is to be biased toward low frequency.
- d. Flocking/bin lining or its color shall not transfer onto items within a storage compartment.
- e. The Roof Console storage bins/features shall be able to accommodate the items identified in the HVI Program Storage Allocation List Tracker (SALT) List. The Storage Allocation List Tracker (SALT) is documented in the Program Notebook > 05 Engineering/Integration Areas > Human Factors/Harmony, and includes:
 - List of items to be accommodated in each storage space.
 - Dimensions of items to be accommodated.
 - Location of individual or dedicated storage features (e.g., sunglasses, tissue holders).
 - Storage space retention requirements.
 - Brand specific storage requirements.
- f. Maximize the usable storage space of Roof Console storage while balancing its appearance.
 - Rectangular shaped bins are more usable than complex shaped bins.
 - Storage bin and door surfaces should be flat with minimal intrusions into the bin.
 - Areas inside the bin should not trap small items.
 - The bin and door should be approximately the same size (cross vehicle dimension).
- g. Roof Console storage bins should be easy to use.
 - Storage space should allow contents to be easily seen and accessed.
 - Other components should not block access into the storage bin.
 - The open storage door should not obstruct accessing the bin.
 - An open storage door should not intrude on the occupant.
 - The storage bin contents shall not shift and compromise the storage actuation device (i.e., pivot, latch, damper) causing an inoperable condition.
- h. The damping mechanism shall not make any noise.
- i. An open storage bin/door shall not obstruct Theft Intrusion Sensor function, confirmed through design criteria and virtual reviews through the product development.
- j. The door or compartment should have a feature or be labeled to identify where to activate the door or latch.
- k. The finger contact area shall be free of any unfinished edges or finger pinch areas.
- l. The operation shall be smooth and bind free.
- m. The latching and unlatching efforts shall be 5.0 N minimum and 17.0 N maximum, dependent on bin size, and measured at the center of the intended activation area. The efforts shall be measured at a speed of 50 cm/minute.
- n. The storage bin/door shall not allow small objects to become lodged behind the console, trim plate, or between components.

3.2.1.8 Squeak and Rattle Component Requirements. The requirement is to have absolutely no customer annoyance due to squeaks and rattles. The final authority for the determination of whether a noise is objectionable lies with the Buyer Lead Engineer and/or the Squeak and Rattle (S and R) Engineer. Squeaks and rattles include, but are not limited to all the noises described in the Squeak and Rattle Noise Glossary.

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3.2.1.8.1 Supplier Responsibility. The supplier is to accept full responsibility to produce squeak and rattle free, subsystems and/or components. The supplier shall cooperate with the buyer and/or other supplier's to assure that no squeak and rattle annoyance occurs at the interface of their subsystem/component to the body, chassis or other subsystem/component. If an objectionable noise is found during any phase of the program, it will be the supplier's responsibility, with Buyer cooperation, to eliminate the noise and demonstrate resolution in a vehicle prior to exiting the program phase. If the noise is found in pilot or production, the supplier will be responsible to develop a containment plan (and fix), as well as short and long term solutions, as appropriate. Any issue raised during these processes, which is demonstrated to be the responsibility of the supplier, shall be corrected with urgency at no additional cost to GM. The supplier will be responsible for the Squeak and Rattle performance of their subsystem.

3.2.1.8.2 Objective Measurement. All configurations and operating positions of the Overhead Consoles shall have an Instationary Zwicker Loudness of less than or equal to three (3) sones N10 when evaluated in the vertical, fore-aft, and lateral directions per the test procedure GMW14011 Subsystem/Component Squeak and Rattle Test using the vibration input frequencies and amplitudes defined in Table 3. This subsystem must also meet GMW14011 with a measurement of three (3) sones N10 or less after being subjected to 25% of GMW14188 degradation profile.

Table 3: Overhead Console Vibration Input Frequencies and Amplitudes

Overhead Console Vertical Acceleration		Overhead Console Fore-aft Acceleration		Overhead Console Lateral Acceleration	
Frequency (Hertz)	Acceleration ((m/s ²) ² /Hz)	Frequency (Hertz)	Acceleration ((m/s ²) ² /Hz)	Frequency (Hertz)	Acceleration ((m/s ²) ² /Hz)
8	0.16599	8	0.08333	8	0.25561
11	1.04536	11	0.87711	10	0.51494
21	0.11826	14	0.35816	12	0.58321
34	0.18290	18	0.36575	23	0.13719
41	0.22629	26	0.04060	38	0.06653
58	0.15900	36	0.08272	56	0.03428
73	0.04505	57	0.04109	73	0.01906
87	0.01344	73	0.01320	100	0.00018
100	0.00100	100	0.00014	m/s ² RMS	2.80
m/s ² RMS	3.69	m/s ² RMS	2.77		

3.2.1.8.3 Subjective Rating (Except United States Only Programs). The subjective rating of the S and R performance of the Overhead Consoles contains:

3.2.1.8.3.1 Rate Squeak and Rattle performance of the subsystem/component in all configurations and conditions according to GMW7293.

3.2.1.8.3.2 Rate Squeak and Rattle performance during adjusting/operating subsystem/component according to GMW8518.

3.2.1.8.3.3 Rate Squeak and Rattle performance during hand impacts, hand flexures and passenger motion where the customer would normally interface with the subsystem/component, and in a manner consistent with expected average customer behavior.

3.2.1.8.3.4 The minimum subjective rating under all conditions for any individual complaint and the overall rating for the subsystem determined according to GMW7294 is 8.0.

3.2.1.8.4 Subsystem in the Integration Environment (Interfaces). The requirement for this program is to have absolutely no customer annoyance due to squeaks and rattles. The final authority for the determination of whether a noise is objectionable lies with the Buyer Lead Engineer and/or the Squeak and Rattle (S and R) Engineer. Squeaks and rattles include, but are not limited to all the noises described in the Squeak and Rattle Noise Glossary.

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3.2.1.8.4.1 The supplier is to accept full responsibility to produce squeak and rattle free, as delivered, subsystems and/or components, as defined by functional requirements in the Subsystem and/or Component Technical Specifications. The supplier shall also cooperate with the buyer and/or other supplier's to assure that no squeak and rattle annoyance occurs at the interface of their subsystem/component to the body, chassis or other subsystem/component. If an objectionable noise is found during any phase of the program, it will be the supplier's responsibility, with Buyer cooperation, to eliminate the noise and demonstrate resolution in a vehicle prior to exiting the program phase. If the noise is found in pilot or production, the supplier will be responsible to develop a containment plan (and fix), as well a short and long term solutions, as appropriate. Any issue raised during these processes, which is demonstrated to be the responsibility of the supplier, shall be corrected with urgency at no additional cost to GM. The supplier will be responsible for the Squeak and Rattle performance of their subsystem.

3.2.1.9 Component Positional/Structural Integrity. The positional/structural integrity and operation of all Overhead Console components shall be achieved without perceived deflection of the components or subsystem. The Overhead Console and its components shall not allow deflection of more than 3.0 mm when a 50 N force is applied normal to the surface at any location on the component or subsystem. Additionally, a 6.0 mm when a 100 N force is applied normal to the surface at any location on the component or subsystem. Push-Push mechanisms do not meet the deflection requirement at their activation locations.

3.2.1.10 Adhesion. For any Overhead Console component utilizing bonding or adherents, the components shall meet the adhesion testing requirements.

3.2.1.10.1 Test procedure according to GMW14892. Run the test as received, and within 60 s after removal from each of the environments in GMW14124 Test Cycle M, two (2) cycles – eight (8) peels, one as received, and one after each environmental condition.

3.2.1.10.2 For all parts requiring both adhesion testing per GMW14892 and Environmental Cycling (Dimensional Stability Testing) per GMW14124, the initial peels from GMW14892 shall be run and evaluated for approval prior to the beginning of Environmental Cycling. Any non-conforming peel data shall be reviewed and either corrected or approval will be granted by the GM Subsystem Validation Engineer (SVE)/Design Release Engineer (DRE)/BFO for continuation of peel and environmental testing. Any unapproved testing will not be paid for by GM and will be the sole responsibility of the supplier.

3.2.1.11 Environmental Cycling and Heat Aging. The Overhead Console Assembly, as installed in a vehicle or roof, shall undergo two environmental cycle tests:

3.2.1.11.1 Environmental Cycling. All components of the Overhead Console System, as installed in a vehicle (this can be tested in a fixture, in vehicle position), shall undergo the environmental cycle tests as called out in GMW14124 (Test Cycle M). Two cycles, run consecutively.

3.2.1.11.2 Heat Soak. A heat soak cycle of 168 h at 85 °C shall be performed on the same part that environmental cycles were run on.

3.2.1.11.3 Environmental Cycling and Heat Ageing Evaluation.

3.2.1.11.3.1 The Overhead Console Assembly shall not exhibit delamination, odor, staining, color, gloss or other visual appearance changes or dimensional variance, unless otherwise specified after being subjected to the environmental cycles and heat aging.

3.2.1.11.3.2 All components of the Overhead Console Assembly shall perform as specified prior to and after being subjected to the environmental cycles and heat aging.

3.2.1.12 Interior Emissions. Evaluate the Overhead Console Assembly for Interior Emissions as specified in GMW14444, with consideration of any regional variations on this test for all countries of sale, including TS-INT-001 (China), etc.

3.2.1.13 Force and Load Testing. Testing is to be completed on three parts per test. In those instances where there is a durability call out, the part is required to meet the cycle call outs, which represent one life, while demonstrating the reliability requirements of a subsystem at R97.8/C50. When the functional performance of components is being tested, there shall be no signs of fracturing or loosening of attachments and parts shall remain functional.

3.2.1.13.1 Validation Requirements for an Overhead Console Storage Bin.

- a. Storage bins in the Overhead Console must fulfill the requirements detailed below. Any modification to the test requirement values shall be noted in SOR Appendix C2.

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- b. Rotating bin compartments shall contain 0.25 kg weight during all phases of open and close durability.
- c. Measurement of closing forces and latching forces shall be measured at a speed of 50 cm/minute.
- d. When introducing the test force, the points of force application with the different versions of storage compartments in the ceiling consoles shall be selected according to design function.
- e. Release force and closing force will be measured at three temperatures: $-30\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$, $+25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and $+80\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ once the part has soaked at the appropriate temperature for at least one (1) h.

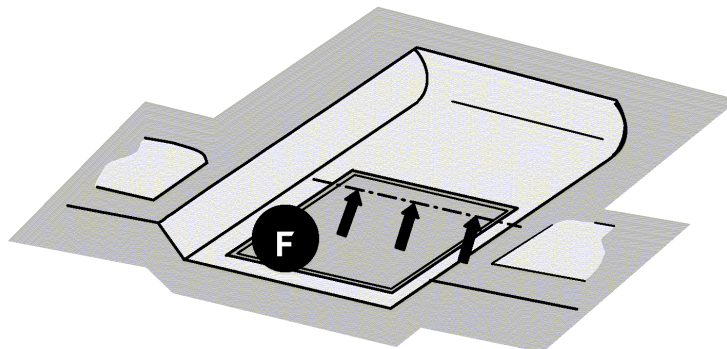
3.2.1.13.2 Release Force on Self-Opening Systems (See Figure 2, Force F1). Release force shall be per compartment size per Table 4.

Table 4: Force Per Compartment Size

Compartment Size	Force
Small 200 mm x 150 mm	$7.5\text{ N} \pm 2.5\text{ N}$
Medium 200 mm x 300 mm	$12\text{ N} \pm 5\text{ N}$
Self-Opening Tip Systems and Systems with Release Button (Figure 3, Force F1)	$7.5\text{ N} \pm 2.5\text{ N}$

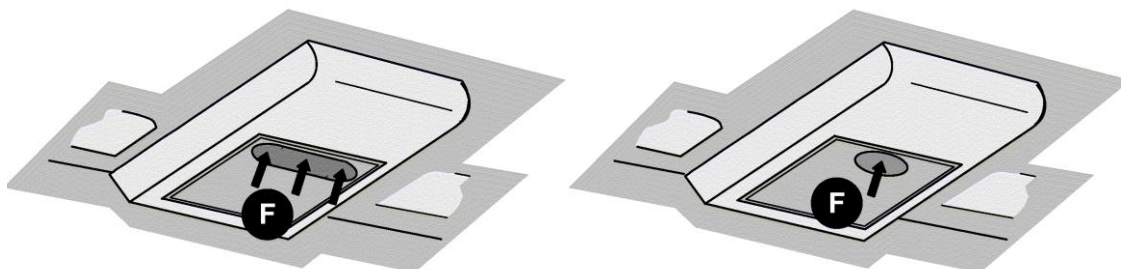
- a. **Without Actuation Marking.** The force is applied at a maximum distance to the axis of the cover. The rim of the piston of the tensile/compression gauge should touch the edge of the cover. The measurement is performed in the center and in the outer left and right edges. The connection of these three measurement points leads to form the force application line (see Figure 1).

Figure 1: Force Application Line on Systems without Actuation Marking



- b. **Actuation Marking; Width > 50 mm.** The force is applied directly on the marking in the center, as well as 10 mm before the end of the marking (see Figure 2).
- c. **Actuation Marking; Width < 50 mm.** The force is applied in the center of the marking (see Figure 2).

Figure 2: Force Application Points on Systems with Actuation Marking



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