



Floor Trim Subsystem

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. This standard establishes the common technical requirements for Floor Trim Subsystems for a General Motors vehicle. The common functions, performance, design constraints, reliability, and validation required of the subsystem are defined in this document. This standard becomes Appendix C1 to a Statement of Requirements for a Floor Trim subsystem.

Program-specific requirements are captured in a separate Statement of Requirements Appendix C2 derived from a template titled Program Specific Floor Trim Requirements.

1.2 Applicability. This standard applies to all floor trim subsystem including carpeted and non-carpeted floor trim, floor mats and floor liners.

1.3 Remarks.

1.3.1 Mission/Theme. The Floor Trim is to provide an aesthetic, durable cover to all visible areas of the floor pan, cowl sides, and lower dash area not covered by other interior trim; it must have the appropriate structural integrity to hold its per-design shape to guarantee robustness of the interface to surrounding elements, while ensuring its design contributes to the prevention of pedal (accelerator, brake, clutch) entrapment. The Floor Trim is also to contribute to overall vehicle acoustic performance and withstand daily wear from passenger and cargo loads, environmental exposure, and occasional cleaning procedures. The system will provide these functions for the lifetime of the vehicle and under typical vehicle usages including but not limited to extreme ambient conditions. These requirements also apply to the Floor Mats if they are included in the system. The Floor Trim could feature carpeted or non-carpeted surfaces.

1.3.2 Classification. The Floor Trim has a visible decorative layer (carpeted or non-carpeted) and beneath it, acoustic insulating and/or barrier layers. The specific construction characteristics of the Floor Trim visible surface are to be directed and documented, for each Vehicle Program, in the Statement of Requirements. The different categories of the Floor Trim visible surface, available in the GM Global Floor Trim Carpet Construction Strategy and directed by GM Design Staff, GM Appearance and Materials Engineering groups as well as the Floor Trim GSSLT, may include the following:

1.3.3 Tufted carpet of typically Polyamide 6 or 66 Bulked Continuous Filament (BCF), with non-woven Tufting Scrim and appropriate materials to hold the tufted fibers to the scrim. Tufted and loop carpets need to meet the pullout resistance performance specified in GMW14148.

1.3.4 Non-woven carpet of typically polyester fiber construction with various moldable backing materials including moldable felt, moldable latex, Polyethylene (PE), or heavy layer.

1.3.5 Non-carpeted surfaces based on materials including thermoplastic olefins, ethylene vinyl acetate, and rubber. Vinyl may be used where there is an important commercial (cost) or performance requirement that only it can meet.

1.3.6 The floor trim insulation and/or barrier solution categories, directed by the acoustic and thermal performance requirements, may include the following:

1.3.6.1 Low mass, high acoustic property, primarily dissipative structures under a carpeted face with an air permeable primary backing and typically two fiber-based layers with different airflow resistances. Lightweight dissipative structures shall be considered as preferred insulation alternatives for new GM carpet programs, as long as the program-specific acoustic Vehicle Technical Specifications (VTS) are met. Dissipative carpet

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structures, however, are not available for non-carpeted trim surfaces. The dissipative floor trim supplier must ensure that all the appropriate layers (air permeable primary backing, fiber-based layers, etc.) are included in the design to guarantee in-vehicle performance (acoustics, structural integrity, etc.)

1.3.6.2 Heavy layer, primarily reactive systems commonly called "mass-backed" or "conventional" structures. "Mass-backed" carpet insulation structures consist typically of a heavy layer (i.e., ethylene vinyl acetate) and a decoupler layer (i.e., fiber based or PU foam) Heavy layer systems should be used under a carpeted trim surface where there is an important commercial or performance advantage.

1.3.6.3 ABA or "Absorber-Barrier-Absorber" structures. ABA structures are not available for non-carpeted trim surfaces.

1.3.7 The Floor Mats, when installed, shall protect the main Floor Trim from normal passenger foot traffic.

2 References

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

2.1 External Standards/Specifications.

CNCA-02C-023	ISO 1043-1	ISO 11629
CNCA-02C-060	ISO 1043-2	IATF 16949
GB 8410	ISO 11469	SAE J1344

2.2 GM Standards/Specifications.

GMW3026	GMW14129	GMW14561	GMW16214
GMW3059	GMW14148	GMW14722	GMW16331
GMW3116	GMW14171	GMW15015	GMW16348
GMW3208	GMW14194	GMW15058	GMW16596
GMW3232	GMW14196	GMW15272	GMW16653
GMW14122	GMW14223	GMW15757	GMW16692
GMW14124	GMW14444	GMW15847	GMW16865
GMW14125	GMW14453	GMW16015	

2.3 Additional References.

- CG1943 Floor Trim VCRI SOR Appendix G3 Template Manufacturing Requirements (General Assembly) KPAC in Auros system
- Color and Trim Design Appearance Requirement (CTDAR) Color and Trim Design Appearance Requirements
- Floor Trim Best Practices KPAC in Auros system
- Human Factors KPAC in Auros system GM Preferred Materials Catalog (Floor Trim Material Decision Tree) located in GDM Interiors folder "Floor Carpet System PMC" (<https://documents.gm.com/gdm3/drl/objectId/0b0163bc800032ff>).
- Parts drawings
- SOR Appendix C2 and G3
- Vehicle Technical Specification (VTS)

3 Requirements

3.1 System/Subsystem/Component/Part Definition. The Floor Trim shall cover the interior floor pan sheet metal surfaces, body hardware, and electrical wiring, while providing an aesthetic appearance of the vehicle interior. The Floor Trim shall be designed for occupant comfort, contribute to the insulation of heat and noise, and provide clearances for seats and occupant restraint systems attachments. If included in the system, the floor mats should contribute to protect the floor carpet; at the same time, the floor mats design and material selection must ensure appropriate clearances to the vehicle's pedals and friction to the floor pan, regardless of whether or not floor mat fixation/retaining features are available.

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3.1.1 Appearance. The Floor Trim System shall conform to the platform specifications. The Floor Trim Visible surface (carpeted or non-carpeted) must comply with the GM Global Floor Trim Carpet Construction Strategy (developed by the GM Design Staff, GM Appearance and Materials Engineering Groups, as well as the Floor Trim GSSLT). The Floor Trim shall reflect the design quality requirements regarding Touch, Appearance, and Color Harmony as specified in the VTS.

The following is a list of elements that make up the appearance attributes of the Floor Trim.

3.1.1.1 The Floor Trim subsystem (including components; i.e., mat retainers, vinyl surfaces, etc.) shall have colors as determined in the Program Color and Trim Design Appearance Requirement Documents (CTDAR).

3.1.1.2 Color appearance for the entire Floor Trim System, including any exposed molded trim edges and attached components, shall meet specified color masters approved by GM Appearance-Materials Engineering and Color and Trim Design Staff.

3.1.1.3 Grain and gloss of Floor Trim plastic components must meet program specific CTDAR requirements and comply with approved appearance masters.

3.1.1.4 Floor Trim interfaces and overlaps to surrounding components (i.e., console, garnish, seat attachments, etc.) must meet GM Perceived Quality fit guidelines and comply with the latest DTS (Dimensional Technical Specification) requirement.

3.1.1.5 The floor carpet nap shall follow the direction specified in the GM Design Best Practice (FLOORTTR-20) approved by the Design Staff and the Floor Trim GSSLT and be consistent within Floor Trim and Floor Mat carpet. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.1.1.6 Floor Trim overlap joint lines, when used, shall be uniform hidden as much as possible to the customers' eyes per GM Design Best Practice (FLOORTTR-7). The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.1.1.7 The Floor Trim design shall guarantee flat surfaces in the foot traffic area, in line with the GM Perceived Quality guidelines. Abrupt depressions, humps and stand-offs must be avoided, especially in all the foot well areas of the vehicle.

3.1.1.8 The floor mat design features (i.e., carpet pile, edge/perimeter finishing, retainers appearance, backing type, etc.) shall be specified for each program, in compliance with the Design Staff and Floor Trim GSSLT strategy.

3.1.2 Content.

3.1.2.1 Physical Content. The specific required physical content and attributes for the Floor Trim subsystem are identified in Appendix C2 (Program Specific Floor Trim Requirements, of the Statement of Requirements (SOR)).

The Floor Trim shall include the required content to provide an aesthetically appealing, durable cover to all visible areas of the floor pan, cowl sides, and lower dash area not covered by other interior trim.

The Floor Trim subsystem could include elements such as driver side foot rest injection molded cover, floor mats, floor mat retainers, floor carpet locators and attachments, vinyl pads (scuff, heel, dead pedal), injection molded bezels, crash pads, fillers and acoustic insulation elements. All floor trim fasteners shall be free of contamination on their finish and shall be approved by the GM Fastener Engineering group.

The Floor Trim is also to contribute to the overall vehicle acoustic performance and withstand daily wear from passenger and cargo loads, environmental exposure, and occasional cleaning procedures.

3.1.2.2 Functional Content. Not applicable.

3.1.3 Ambient Environment. The subsystem shall meet all ambient environment requirements of the Vehicle Technical Specification (VTS).

3.1.4 Interfaces.

3.1.4.1 Floor Trim to Interior Major Subsystem.

All Floor Trim to other subsystems shall meet GM design best practices documented in Auros system. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.1.4.1.1 Floor Trim to Instrument Panel. The Floor Trim shall meet the Instrument Panel's lower horizontal features and provide complete coverage of painted body sheet metal, maintaining the interior theme. Clearance

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shall be provided for all instrument panel mounting locations. The design shall allow the instrument panel to be serviced or replaced without removing the Floor Trim from the vehicle.

3.1.4.1.2 Floor Trim to Center Console. The Floor Trim shall be designed to guarantee that its interface to the Center Console and its close out panels meets the GM Perceived Quality fit expectations (i.e., no gaps). Floor Trim "B" side support and an interference between console plastic components. Floor trim clearance shall be provided for all console attachment locations.

3.1.4.1.2.1 The floor trim design should account for body sealing, electrical wiring harnesses and electrical trays. If unaccounted for, the floor trim system could be mis-installed (relative to its design position) and potentially induce excessive center console installation efforts.

3.1.4.1.2.2 Parameters such as floor trim overlap to the center console, insulation compression rate and thickness along the tunnel must be carefully selected to eliminate potential for carpet pull out from the center console. A molded filler (i.e., EPP foam block) embedded into the floor trim acoustic insulator along the tunnel may be considered to eliminate potential for carpet pull out from the center console.

3.1.4.1.3 Floor Trim to Dash Mat. Floor Trim shall interface with Dash Mat without objectionable gaps, according to the GM Design Best Practices (The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement). Interfaces between these subsystems shall result in no objectionable visible distortion or perceived void on the Floor Trim surface. Dash mat and floor trim material compatibility must be checked to ensure (1) no unwanted squeaks exist when the floor trim rubs against the dash mat and (2) the system permeability on dissipative systems is not impacted.

3.1.4.1.4 Floor Trim to Occupant Restraint Systems. Floor Trim shall not restrict seat belt or retractor operation. In addition, the floor trim shall provide clearance to restraint systems, including lap pretensioner exhaust area that shall have 25 mm of minimum clearance all around, in areas where the functional requirements of the restraint systems may be affected, or hardware must be fastened directly to floor pan sheet metal.

3.1.4.2 Floor Trim to interior Electrical Content (Wiring Harnesses, Electrical Power and Signal Distribution Systems, etc.)

3.1.4.2.1 Floor Trim access holes and/or slits shall allow power and signal distribution wiring and connectors, installed prior to the floor trim, to be routed through it.

3.1.4.2.2 The floor trim design ("A" and "B" side) shall provide clearance and service access, as required, for power and signal distribution modules, wiring harnesses routing, electrical trays/conduits and connectors.

3.1.4.2.3 The Floor Trim design team shall collaborate with the Electrical team to ensure the Power and Signal distribution components are designed and restrained in such a way that objectionable Floor trim distortion, due to misplaced electrical content, is prevented.

3.1.4.3 Floor Trim to Seats.

3.1.4.3.1 Floor Trim design shall permit seat hardware to be directly fastened to floor pan sheet metal providing appropriate clearance in the attachment area, in accordance with the GM Design Best Practices. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.1.4.3.2 Complete acoustic coverage of the floor structure shall be maintained at seat attachment points by the use of local Part of Assembly (POA) or non-POA covers, escutcheons or other means. The Floor Trim design shall provide enough overlap to the plastic escutcheons to prevent carpet pull outs at the seat attachment locations.

3.1.4.3.3 Floor Trim shall maintain required clearance to moveable seats.

3.1.4.3.4 Carpeted Floor Trim Tufting shall be penetrated or compressed by the bottom edge of the seat track covers according to GM design best practice. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.1.4.3.5 The floor trim design should account for body sealing, electrical wiring harnesses and electrical trays. If unaccounted for, the floor trim system could be mis-installed (relative to its design position) and potentially induce excessive seat covers installation efforts.

3.1.4.4 Floor Trim to Interior Trim (Garnish).

3.1.4.4.1 The floor trim shall interface with the garnish trim without objectionable gaps, according to the GM Design Best Practices Floor Trim "B" side support and enough interference between the garnish trim and the

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carpet pile need to be guaranteed to ensure a robust interface according to GM Design Best Practice. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.1.4.4.2 The floor trim design should account for body sealing, electrical wiring harnesses and electrical trays. If unaccounted for, the floor trim system could be mis-installed (relative to its design position) and potentially induce excessive garnish trim installation efforts.

3.1.4.4.3 Parameters such as floor trim overlap to the garnish trim, insulation compression rate and thickness along the rocker line must be carefully selected to eliminate potential for carpet pull out from the sill trim (garnish). A molded filler (i.e., EPP foam block) embedded into the floor trim acoustic insulator along the rocker line may be considered to eliminate potential for carpet pull out from the sill/garnish trim.

3.1.4.5 Floor Trim to Body Major Subsystem.

3.1.4.5.1 Floor Trim shall fit snugly to the floor pan with no gaps, excessive bridging or bulging. Areas with severe changes to vertical height, preventing flat surfaces, may require a molded spacer (i.e., EPP foam block) to maintain an even appearance at the "show" surface, in line with the GM Perceived Quality Guidelines.

3.1.4.5.2 The Floor Trim shall comprehend body build tolerances when designing clearance holes for other subsystems components, enabling easy installation.

3.1.4.5.3 The Floor Trim design shall comprehend Heater, Ventilation and Air Condition (HVAC) ducts, wiring harnesses and trays build tolerances to ensure proper floor pan fit and seamless installation.

3.1.4.5.4 Floor Trim Attachments and Locators. The floor trim's in-vehicle design position must be guaranteed during physical installation. Early architectural assessments must be conducted to determine if self-locating floor trim attributes are already available in the floor pan design (i.e., high tunnels, pronounced cross-car bars, seat pods, etc.) Particular architectural requirements may drive the implementation of additional mechanical attachments (i.e., fasteners, snap features, J-hooks, etc.) and locators to ensure the floor trim's positioning into the vehicle's floor pan following attachment and locator strategy per GM Design Best Practice. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

3.1.4.6 Squeak and Rattle Avoidance. The Squeak and Rattle requirement for the Floor Trim is defined in the Vehicle Technical Specification and will be validated at the vehicle level.

3.1.4.6.1 Floor Trim material compatibility to interfacing elements (i.e., dashmat) must be checked to ensure no unwanted squeaks exist when the floor trim rubs against them.

3.1.5 Usage Definition. Not applicable.

3.2 Product Characteristics. The required product characteristics for the Floor Trim are identified in this section (3.2). They may also be noted in the parts drawings.

3.2.1 Performance Requirements. Specific program wear, acoustic performance, cleaning, thermal and supplier warranty spill prevention requirements shall be captured in Appendix C2, Program Specific Floor Trim Requirements.

3.2.1.1 Floor Mat Movement. The floor mat system shall not, under any circumstances, influence the pedals operation. GMW15847 should be used to evaluate the floor mat interaction with the surrounding elements. The Floor mat shape, dimensions and clearances to the environment (including pedals when fully depressed) must meet the GM Best Practice guidelines (The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement). In addition, the floor mat backing material and design attributes must be selected to ensure friction requirements to the floor carpet are met, regardless of whether or not the vehicle is equipped with floor mat retainers. If floor mat retainers are available, the floor mat backing must be selected in such a way that the requirements according to 3.2.1.1.1 through 3.2.1.1.2 are met. If floor mat retainers are not available, the floor mat backing shall be selected to ensure requirements according to 3.2.1.1.1 and 3.2.1.1.2 are met.

3.2.1.1.1 When testing the driver and passenger side floor mats according to GMW16015 (Floor Mat Retention Specification), with the floor mat retainers disengaged and a 165 N fore/aft load is applied, using and 9 kg (20 lb) barbell-type weights (according to GMW16015), the floor mat friction capability shall be evaluated to ensure there is no interference with the pedals that would affect their operation and comply with the following acceptance criteria:

- a. For pedals attached to the floor, the floor mat shall not be in contact or interfere with the pedals (moving parts) after the friction test is completed and shall meet best practice BRK196 minimum clearance

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