



Instrument Panel Trim Technical Specification

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 requirements for Instrument Panel (IP) trim used in GM vehicles. All requirements in this standard apply to each unique IP subsystem or component design and interface. The required functions, performance, appearance, design constraints, and validation of the subsystem and their components are defined by this document.

Certain information is broad in scope as this document must cover many different constructions, design concepts, and content levels to meet the needs for the full range of GM vehicles. The user must follow the specific Vehicle Technical Specification (VTS) when developing the actual specification. Those portions of this template that are not applicable because of the preceding described variations are to be identified or revised in the Statement of Requirements (SOR) Appendix C2 to fit the exact needs for the instrument panel, including Emerging Market specifications.

The IP performance, appearance, and human interface determine customer perception of the vehicle.

1.2 Applicability. IP trim used in GM vehicles.

1.3 Remarks. Deviations from the requirements of this Subsystem Technical Specification (SSTS) shall have been agreed upon and granted in writing by the Bill of Material (BOM) Leader and provided to the Global Subsystem Leadership Team (GSSLT) and/or BOM Family Owner (BFO). A program deviation shall have been agreed upon with the responsible BFO, and granted through a Program Team approved Engineering Work Order (EWO). Such requirements shall be specified on component drawing, test certificates, reports, etc.

2 References

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

2.1 External Standards/Specifications.

2000/53/EC	FMVSS 101	JNCAP	SAE J839
CARB OBD II 1968.2	FMVSS 103	KMVSS 88	SAE J1100
CCC Chapter I	FMVSS 114	KMVSS 95	SAE J1962
CMVSS 114	FMVSS 201	KMVSS 102	TRIAS 18-J023-01
ECE R21	FMVSS 208	KMVSS 111-3	49 CFR Part 575.1
ECE R94	FMVSS 302	SAE 920104	U.S. NCAP
ECE TRANS/WP.29	ISO 4040	SAE J287	
EURO NCAP	ISO 22628	SAE J563	

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December 2014

Page 1 of 44

2.2 GM Standards/Specifications.

GMW3059	GMW14011	GMW14325	GMW15424
GMW3070	GMW14056	GMW14334	GMW15434
GMW3112	GMW14057	GMW14444	GMW15443
GMW3116	GMW14058	GMW14573	GMW15607
GMW3232	GMW14089	GMW14574	GMW15753
GMW3425	GMW14118	GMW14575	GMW15862
GMW3431	GMW14149	GMW14576	GMW15987
GMW7294	GMW14188	GMW14578	GMW16334
GMW7879	GMW14233	GMW14729	GMW16586
GMW8477	GMW14234	GMW15272	GMW16610
GMW8518	GMW14264	GMW15395	GMW17000

2.3 Additional References.

(ID) = This standard is limited to internal distribution within General Motors and shall not be distributed outside this company. Contact the GM Lead Engineer for further instructions.

Best Practice = The supplier shall work with the GM Design Release Engineer to comprehend and achieve the requirements.

- Air Conditioning/Vent (Air) Outlet and Defroster Grilles Technical Specification
- Alliance of Automotive Manufacturer (AAM) "Statement of Principles, Criteria and Verification Procedures on Driver Interactions with Advanced In-Vehicle Information and Communication Systems"
- Automotive Foot Control Design Objectives through Technical Memory Best Practice in Enterprise Engineering Knowledge System (E2KS) Auros (ID)
- Best Practice to meet California Air Resources Board On-Board Diagnostic Two (CARB OBD II) Regulation 1968.2
- Best Practices for IP, Heating, Ventilation and Air Conditioning (HVAC), Human Vehicle Interface, Squeak and Rattle, and other Vehicle Integration Areas through Socrates > Intranet > E2KS > E2KS Technical Memory Best Practices > AUROS > CoP > Interior > Instrument Panel Trim (ID)
- Design Attachments per GM Best Practice (ID)
- Dimension Procedures (ID)
- Dimensional Technical Specification (DTS) (ID)
- Emerging Market Specifications
- General Arrangement Drawings (ID)
- GM1411 Production Part Approval Process (PPAP) Worksheet
- GM Global Legal Database (ID)
- Governmental Regulations List (ID)
- Hand Impact Test (GMW3112)
- Human Factors Design Objectives (HFDO) (ID)
- Human Vehicle Integrations per GM Best Practices (ID)
- Interior Lighting Best Practices (ID)
- IP Criteria Layout or file (ID)
- IP Knowledge Sets/Squeak and Rattle Best Practices in Enterprise Engineering Knowledge System (E2KS) Auros (ID)
- Bolster Guidelines: Knee Bolster Guidelines at Enterprise Engineering Knowledge System (E2KS) Knowledge-PAC (KPAC) Safety Interior (SAFINT-22) (ID)
- Material Compatibility Matrix per GM Best Practices (ID)

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December 2014

Page 2 of 44

- Material Isolation Guide per GM Best Practices (ID)
- Noise and Vibration Integration web site, Resource Center (Integration Driven Subsystem Requirement database) (ID)
- Official Site of the European New Car Assessment Program (EURO NCAP) at web site <http://www.euroncap.com/tests.aspx>
- Owner's Manual
- Part Reuse GM Best Practices (ID)
- Preferred Material Catalog per GM Best Practices (ID)
- Program Storage Tracker or Storage Allocation List (SAL) per GM Best Practices (ID)
- Reliability Test Method Options (ID)
- SOR Appendix A
- SOR Appendix B
- SOR Appendix C2
- SOR Appendix F3
- SOR Appendix F4
- SOR Appendix F5
- SOR Appendix F10
- SOR Appendix F11
- SOR Appendix F12
- SOR Appendix G2
- SOR Appendix H
- SOR Appendix O
- Squeak and Rattle Checklist (ID)
- Vehicle Synthesis Analysis Simulation (VSAS) procedure 40-01-017 (ID)
- Vehicle Technical Specification (VTS) (ID)
- Vision Guidelines at Global Document Management (GDM) Link to Vision Files: <https://documents.naeng.gm.com/gdm3/drl/objectId/0b0163bc80b066b2> (ID)

3 Requirements

3.1 System/Subsystem/Component/Part Definition. The IP subsystems is used to position and support components of other vehicle subsystems for the comfort, convenience, and protection of vehicle occupants.

3.1.1 Assignment of Requirements to Components. Table 1 assigns requirements in this standard to the IP trim subsystem and their components.

Table 1: Assignment of Requirements to Components

Requirement Description	Requirement	Part (see legend at end of table)														
		A	BC	D	E	EF	FG	GH	HJ	I	JL	KM	LN	MP	N	P
Appearance	3.1.2	X				X	X	X	X	X		X	X	X	X	X
Physical Content	3.1.3	X			X	X	X	X	X	X	X	X	X	X	X	X
Operational Temperature	3.1.4	X			X	X	X	X	X	X	X	X	X	X	X	X
Interfaces	3.1.5	X			X	X	X	X	X	X	X	X	X	X	X	X

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December 2014

Page 3 of 44



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Requirement Description	Requirement	Part (see legend at end of table)														
		A	BC	D	E	EF	FG	GH	HJ	I	JL	KM	LN	MP	N	P
Design Guidelines	3.2.1.1	X			X	X	X	X	X	X	X	X	X	X	X	X
Government Regulations	3.2.1.2	X			X	X	X	X	X	X	X	X	X	X	X	X
Column Stroke Zone	3.2.1.3.1									X	X	X		X		X
Head Impact	3.2.1.3.2	X			X	X	X	X		X	X	X	X	X	X	X
Function After Crash at Threshold Speed	3.2.1.3.3	X				X	X	X		X		X	X	X	X	X
Occupant Femur Load Limits	3.2.1.3.4							X		X	X	X				X
Human Vehicle Interface	3.2.1.4				X					X	X					
IP Configuration	3.2.1.4.1				X					X	X					
Controls, Display, and Feature Location	3.2.1.4.2				X					X	X					
Visual, Audible, and Tactile Information	3.2.1.4.3	X				X		X		X				X		
Visibility	3.2.1.5									X	X				X	
Control and Display Visibility	3.2.1.5.1				X					X	X					
Veiling Glare	3.2.1.5.2									X	X		X		X	
Reflections	3.2.1.5.3	X								X	X		X	X	X	
General Requirements for All Parts	3.2.1.6.1	X			X	X	X	X	X	X	X	X	X	X	X	X
Miscellaneous Requirements	3.2.1.6.1.1	X				X	X	X	X	X		X		X	X	X
Fit	3.2.1.6.1.2	X			X	X	X	X	X	X	X	X	X	X	X	X
Storage	3.2.1.6.1.3	X				X		X		X						
Assembly	3.2.1.6.1.4	X			X	X	X	X	X	X	X	X	X	X	X	X

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December 2014

Page 4 of 44

Requirement Description	Requirement	Part (see legend at end of table)														
		A	BC	D	E	EF	FG	GH	HJ	I	JL	KM	LN	MP	N	P
Air Flow Requirements	3.2.1.6.1.6				X					X	X					
Airbag Requirements on IP Components	3.2.1.6.2.1	X				X		X		X	X	X	X	X	X	
Requirements for Components with Airbag Doors	3.2.1.6.2.2							X		X	X	X	X			
Requirements for the IP Specific to the Passenger Airbag (PAB)	3.2.1.6.2.3									X	X		X			
Integrated IP Airbag Door Tear Seam Manufacturing Margin Evaluation	3.2.1.6.2.4									X			X			
Documentation for Parts with Airbag Doors	3.2.1.6.2.5							X		X		X	X			
Airbag Process Parameters	3.2.1.6.2.5.2									X			X			
IP Glove Box or Any Compartment ≥ 1 L	3.2.1.6.3				X			X		X	X					
All Air Outlets	3.2.1.6.4				X					X			X			
Hush Panel	3.2.1.6.5								X		X					
Steering Column Covers	3.2.1.6.6										X					X
Ashtray or Any Compartment < 1 L	3.2.1.6.7	X			X						X					
Cup Holder	3.2.1.6.8				X	X					X					
Fuse, Electrical, or Relay Center	3.2.1.6.9						X				X					

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December 2014

Page 5 of 44

Requirement Description	Requirement	Part (see legend at end of table)														
		A	BC	D	E	EF	FG	GH	HJ	I	JL	KM	LN	MP	N	P
IP Mounted Shift Boot or Shifter Mechanism	3.2.1.6.10													X		
Parts Mounting Features or Functions	3.2.1.6.11	X				X		X	X	X		X		X	X	X
Squeak and Rattle Avoidance Vehicle	3.2.1.7.1									X						
Squeak and Rattle Avoidance	3.2.1.7.2	X				X	X	X	X	X	X	X	X	X	X	X
Noise, Vibration, and Harshness	3.2.1.8	X				X	X	X	X	X	X	X		X	X	X
Mass Properties	3.2.2.1									X						
Reliability	3.2.3	X				X	X	X	X	X		X	X	X	X	X
Serviceability	3.2.4	X			X	X	X	X	X	X	X	X	X	X	X	X
Owner's Manual Information	3.2.5	X				X	X	X	X	X		X	X	X	X	X
Materials	3.3.1	X				X	X	X	X	X		X	X	X	X	X
Modularity	3.3.3	X			X	X	X	X	X	X	X	X	X	X	X	X
Fastening and Joining	3.3.4	X			X	X	X	X	X	X	X	X	X	X	X	X
Identification and Marking	3.3.6	X				X	X	X	X	X		X	X	X	X	X
Labels	3.3.7	X				X	X	X	X	X		X	X	X	X	X
Documentation	3.4	X			X	X	X	X	X	X	X	X	X	X	X	X
Validation	4	X				X	X	X	X	X		X	X	X	X	X
Shipping	5	X				X	X	X	X	X		X	X	X	X	X
A = Ashtray and Small Compartment		F = Fuse, Electrical or Relay Center							K = Driver Knee Bolster							
B = Not used		G = Glove Box and Large Compartment							L = Airbag Door							
C = Not used		H = Hush Panel							M = Trim Plate							
D = Not used		I = IP Upper, Lower, and Assembly							N = Windshield Valence Panel or Closeout							
E = Cup Holder		J = IP Packaging							P = Steering Column Cover							

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December 2014

Page 6 of 44

3.1.2 Appearance. SOR Appendix F4 and Appendix F5 define the program grain, color, and gloss requirements.

3.1.3 Physical Content. See the vehicle specific VTS for included content and SOR Appendix B for a detailed list of the new and carryover components.

3.1.4 Operational Temperature. The IP subsystem, components design, and performance shall meet the operational temperature ranges identified in Table 2.

For some performance requirements, other condition levels can be appropriate, based on 95th percentile historic data for a given component within the subsystem. These variants shall be noted in the specific component content/requirements in the SOR Appendix C2.

Table 2: Operational Temperature Ranges

Element	Low	Normal	High
IP Top Surface: Temperature Tinted Glass	-30 °C	Not applicable	+110 °C
IP Top Surface: Absorbing Glass	-30 °C	Not applicable	+102 °C
IP Vertical Surface: Tinted/Absorbing Glass	-30 °C	Not applicable	+85 °C
Relative Humidity (RH) ^{Note 1}	0%	10% to 80%	100%

Note 1: RH percentage varies with temperature.

3.1.5 Interfaces. The IP subsystem interfaces with the following Vehicle Part Partitioning Systems (VPPS):

- Powertrain Driver Interface (15.02)
- Steering Column (20.01)
- Brakes (20.04)
- Front and Rear Heating, Ventilation, Air Conditioning (HVAC) Airflow (30.02, 30.03)
- Garnish Trim (40.03.01)
- Door Trim (40.03.02)
- Floor Trim (40.03.04)
- Interior Lighting (40.04)
- Acoustic Treatments (40.05)
- Airbags (40.07)
- Decorative (Deco) Trim (40.38)
- Side Closures (55.01)
- Rearview Mirrors (55.04)
- Body Structures (50)
- Windows (55.01, 60.01)
- Information and Controls (70)
- Electrical Function (80)

3.1.5.1 Environmental operating conditions, occupants, governmental regulations, and the ability to manufacture, assemble, and service, define the requirements for the IP subsystem, their components, and the interfaces that locate, mount, and clear other subsystems or components. These interfaces are numerous, and vary from vehicle to vehicle. The party shown in SOR Appendix A is responsible to ensure that all interfaces are identified, developed, documented, agreed to, and validated for the specific vehicle.

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December 2014

Page 7 of 44



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3.2 Product Characteristics.

3.2.1 Performance Requirements.

3.2.1.1 Design Guidelines. Use the following guidelines to design the IP subsystem and/or components:

- Automotive Foot Control Design Objectives through Technical Memory Best Practice.
- Best Practices for IP, Heating, Ventilation, Air Conditioning (HVAC), Human Vehicle Interface, Squeak and Rattle, and other Vehicle Integration Areas through Socrates > Intranet > E2KS > E2KS Technical Memory Best Practices > AUROS > CoP > Interior > Instrument Panel Trim.
- Human Vehicle Integrations per GM Best Practices
- Bolster Guidelines: Knee Bolster Guidelines at Enterprise Engineering Knowledge System (E2KS) Knowledge-PAC (KPAC) Safety Interior (SAFINT-22)
- Vision Guidelines at Global Document Management (GDM) Link to Vision Files: <https://documents.naeng.gm.com/gdm3/drl/objectId/0b0163bc80b066b2>
- Human Factors Design Objectives (HFDO)
- Preferred Material Catalog per GM Best Practices

3.2.1.2 Governmental Regulations and Consumer Metric Crash Tests.

3.2.1.2.1 Governmental Regulations List. The IP trim subsystem, and components must comply with the latest government regulations in the country of sale listed in the GM Global Legal Database and in SOR Appendix C2.

Note: All IP subsystems and components must comply with European governmental regulation Economic Commission for Europe (ECE) R21, Interior Fittings ECE TRANS/WP.29. These regulations can be found by going to Socrates > A-Z List > Global Legal Database > by Regulatory Subject > Subjects > D-VPPS > 40.01 Instrument Panel & Console & Steering Wheel > U > UNECE Regulations (1958 Agreement).

Note: The GM Global Legal database supersedes all regulation information within Appendix C2.

3.2.1.2.2 Consumer Metric Requirements. Unless otherwise stated, performance requirements to meet consumer metric crash tests, i.e., New Car Assessment Programs (NCAP) and Lateral Impact New Car Assessment Programs (LINCAP) e.g., Japan JNCAP, Korea TRIAS 18-J023-01, United States (U.S.) U.S. NCAP and Europe (EURO) EURO NCAP, are full vehicle requirements. The IP subsystem and component designs must meet values for the consumer metric crash test requirements from 3.2.1.2.2 in the program specific VTS that are shown in SOR Appendix C2.

Although subsystem analysis predicts performance, both full vehicle analysis and testing determines the actual performance. All modeling, subsystem, and full vehicle, must comply with the GM Vehicle Synthesis Analysis Simulation (VSAS) modeling standards per SOR Appendix O. The VSAS group, GM Safety Performance Integration Team (PIT) Leader, and Design Engineer must approve the entire modeling process and results to be an acceptable model and predictor of performance.

3.2.1.3 Occupant Impact Protection.

3.2.1.3.1 Column Stroke Zone. The IP trim shall be designed to provide a column stroke zone that accommodates full travel of the steering column energy absorbing components. Any brackets or components that attach to the IP structure or trim shall be packaged outside of this stroke zone. The packaging space must also clear the column stroke zone for the deformation of these parts.

3.2.1.3.2 Head Impact. The IP trim subsystem, within the head impact zone, is to be designed for a head deceleration 20% (includes intended margin) less than the requirement within the selling country for regulations such as Federal Motor Vehicle Safety Standard (FMVSS) 201, ECE R21 and Korean Motor Vehicle Safety Standards (KMVSS) 88. Head deceleration 7% less than the requirement requires improvement and approval from the GM Validation Engineer.

3.2.1.3.3 Part Function after Crash at Threshold Speed. Parts impacted by a belted driver or passenger at or below the frontal airbag deployment threshold speed shall function properly and show no visible damage after impact.

3.2.1.3.4 Occupant Femur Load Limits. The occupant femur loads in Table 3 are target values to fulfill the legal requirements with an intended margin. The duration time and deflection over which the loads are applied are determined by balancing occupant kinematics for the vehicle pulse which typically varies for each vehicle.

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December 2014

Page 8 of 44

The IP trim components in the knee impact zones and the IP structure are responsible for making the IP subsystem meet these requirements.

The knee protection system shall provide occupant femur loads within the following limits to assure compliance. If provided in SOR Appendix C2, the knee protection system shall meet the force versus time and force versus deflection curves.

Table 3: Femur Load Limits by Occupant Size

Percentile Occupant	FMVSS 208 (kN/Knee)	EURO NCAP (kN/Knee)
5 th	< 5.1	Not applicable
50 th	< 7.5	< 3.8
95 th	< 9.5	< 3.8 (if knee mapping)

Note: Additional regulations such as ECE R94 and KMVSS 102 (article) shall be considered as listed in SOR Appendix C2.

3.2.1.4 Human Vehicle Interface (HVI). The IP subsystem is to be designed so that the adult 5th percentile female through the 95th percentile male, unless otherwise noted in the VTS, can see and use the displays, controls, and features in an effective manner while in their normal seated positions. IP components and interfaces shall comply with the HFDO specified in Table 4. Use the efforts defined in the HFDOs only if there is not a corresponding effort defined within this document.

Table 4: Human Factors Design Objectives Relative to IP Trim

Component/Subsystem	Section in HFDO	Includes (but not limited to)
Ashtray	Interior Section H – IP	Hand clearances to trim, reach curve, efforts, grasp widths, etc.
Assist Handle	Interior Section I – Roof and Headers	Hand clearances to trim, grasp widths, etc.
Auxiliary Power Outlet	Interior Section H – IP	Fingertip clearance, grasp height, efforts, etc.
Cigar/Cigarette Lighter	Interior Section H – IP	Finger clearances, efforts, grasp height, etc.
Coin Holder	Interior Section H – IP	Reach curve, efforts, grasp surfaces, etc.
Cup Holders	Interior Section H – IP and Console	Hand clearances, size, spacing, grasp width, efforts, reach curve, etc.
Decklid Release	Controls Section P – Remote Releases	Hand clearances to trim, reach curve, efforts, grasp widths, etc.
Drive Controls	Controls Section O – Drive	Hand clearances to trim, reach curve, efforts, grasp widths, etc.
Driver Information Controls	Controls Section R – Driver Information Controls	Hand clearances to trim, control sizes, efforts, etc.
Fuse/Access Doors	Controls Section T – Miscellaneous Controls	Hand clearances to trim, control sizes, efforts, etc.
General Hand Controls	Controls Section U – Remote Releases	Hand clearances to trim, control sizes, efforts, etc.

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December 2014

Page 9 of 44

Component/Subsystem	Section in HFDO	Includes (but not limited to)
General Hand Size	Controls Section U – Anthropometry of the Hand	Hand dimensions for 5 th percentile female to 95 th percentile male, gloved hand, etc.
Glove Box and Glove Box Release	Interior Section H – IP	Finger clearances, reach curve, efforts, grasp widths, knee clearance, opening size, etc.
Hood Release	Controls Section P – Remote Releases	Hand clearances to trim, reach curve, efforts, grasp widths, etc.
HVAC Vent Shutoff and Vane Adjustment Controls	Controls Section Q – HVAC	Hand clearances to trim, control sizes, efforts, etc.
Ignition Cylinder	Controls Section T – Miscellaneous	Hand clearances to trim, etc.
Remote Releases	Controls Section P – Remote Release Controls	Hand clearances to trim, control sizes, efforts, etc.
Tambour Door	Interior Section H – IP	Hand clearances to trim, control sizes, efforts, etc.

3.2.1.4.1 Instrument Panel Configuration. The overall design and configuration of the IP.

- Shall locate, attach and clear primary and secondary vehicle displays and controls.
- Shall avoid shapes and contours causing interference, obstruction, or obscuration of controls, displays, and features.
- Shall locate, attach, and clear comfort and convenience items so as not to cause interference, obstruction, or obscuration in any usable position with controls, displays, and other features.
- Subsystem dimensions, tolerances, and capacities shall be defined on the General Arrangement drawings or files.

3.2.1.4.1.1 Instrument Panel Specific Configuration.

- The IP shall not interfere with entry, egress, or the vehicle front occupant seating positions.
- Lower IP surfaces should be a minimum of 25 mm forward of the Driver Shin Knee Contour defined in Dimension Procedures and SAE J1100 to avoid contacting the IP during entry and egress.
- The IP shall not interfere with the driver or passenger's ability to see out of the vehicle.
- The IP shape should be low and forward conforming to the spaciousness according to GM Best Practice.
- All parts along the bottom of the IP must not interfere with using the foot controls and clear the occupant's feet as described in the Automotive Foot Control Design Objectives.
- Knee bolsters shall be packaged as described in the Knee Bolster Guidelines.
- Other required clearances shall be shown in the IP Criteria Layout or file.
- Use the knee cones developed by the Safety Center for developing clearances.
- The Heads-Up Display (HUD) and cover shall not interfere with the driver's vision as defined in the Vision Guidelines.

3.2.1.4.2 Instrument Panel Controls, Display and Feature Location.

- Controls shall be positioned within the operational arm reach of the driver and intended users of the vehicle as defined in SAE J287 and appropriate HFDOs.
- All displays should be located within the driver's field of vision.
- All controls and displays shall be located and mounted to be seen under all ambient light conditions.
- Components should be logically grouped according to criticality, frequency of use, and customer importance as described in 3.2.5 of the VTS.

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December 2014

Page 10 of 44



Documents

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- e. Functionally associated controls and displays shall be grouped in adjacent proximity.
- f. Provide clearance for the 95th percentile male hand and the 5th percentile female hand depth to access stored items.
- g. Provide clearance for the 95th percentile gloved male hand to effectively operate controls.

3.2.1.4.3 Visual, Audible and Tactile Information.

- a. The labels, telltales, and nomenclature shall be visible to the occupant when necessary.
- b. Use International Organization for Standardization (ISO) or GM approved symbols.
- c. Inform occupants with audible and tactile feedback to convey successful actuation when operating:
 - 1. A covered storage compartment.
 - 2. An ashtray.
 - 3. A lighter.
 - 4. A fuse, electrical, or relay center cover.
- d. For vehicles with an electronic Brake/Transmission Shift Interlock (BTSI), a BTSI label shall be provided in close proximity to the transmission shift lever on the IP or in close proximity to the Park, Reverse, Neutral, Drive, Low (PRNDL) indicator in the cluster in the IP.
- e. The PRNDL label should be permanently displayed when the ignition is in the on, off, or start position.
- f. The PRNDL label should be directly adjacent to the shift lever, with visual feedback of the PRNDL selection provided to correspond with the shift level control movement.

3.2.1.5 Visibility. The forward down vision angle to the IP shall be at $\geq 5^\circ$ as defined in the Vision Guidelines.

3.2.1.5.1 Control and Display Visibility. The subsystem regulatory display and control visibility requirements are:

- a. Primary and secondary displays and controls shall meet vision requirements as defined in the regulation(s) for the country(ies) of sale.
- b. Advanced information, navigation, and communication systems in vehicles sold in North America are to comply with Section 1 of the Alliance of Automotive Manufacturer (AAM) "Statement of Principles, Criteria, and Verification Procedures on Driver Interactions with Advanced In-Vehicle Information and Communication Systems."
- c. The radio location for vehicles sold in North America is to comply with Section 1.4 of the AAM "Statement of Principles, Criteria, and Verification Procedures on Driver Interactions with Advanced In-Vehicle Information and Communication Systems."
- d. Table 5 and Table 6 define the target requirements for cluster and telltales, if provided.
- e. Forward field of vision as regulated in the country of sale.

Table 5: Cluster Visibility Targets (Reference ISO 4040)

Speedometer	Display area visible without drivers head movement.
Fuel	The identification (label) and display area for $\frac{1}{4}$ of a tank or less shall be visible without driver's head movement. The remaining display shall be visible with head movement permitted.
Oil Pressure Engine Temperature Tachometer (Manual only)	The identification (label) and those parts of the display that indicate a critical condition shall be visible without driver's head movement. The remaining display shall be visible with head movement permitted.
Battery Charging IP Mounted PRNDL	The identification (label) shall be visible without driver's head movement. The remaining display shall be visible with head movement permitted.

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December 2014

Page 11 of 44



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Table 6: Telltale Visibility Targets (Reference ISO 4040)

CATEGORY 1 ^{Note 1} Hi Beam Brake System Park Brake Turn Signal Low Oil Level Engine Temperature Oil Pressure Battery	The identification and at least 18 mm ² illuminated zone of these telltales shall be visible without driver's head movement. The remaining portion of the display should be visible within the constraints of the 8 cm (3 in) allowable head movement per FMVSS 101.
CATEGORY 2 ^{Note 1} All remaining telltales	At least 18 mm ² illuminated zone of these telltales should be visible without driver's head movement. The remaining portion of the display should be visible within the constraints of the 8 cm (3 in) allowable head movement per FMVSS 101.

Note 1: The specific telltale order within the preceding two categories does not indicate importance or priority. Additional telltales must be evaluated on an individual basis to determine their category.

3.2.1.5.2 Veiling Glare.

- The top surface colors and gloss shall be such that the calculated rating per SAE 920104 is ≥ 8 according to GMW14264.
- A shallow grain for the IP top surface is preferred to diffuse light reflections.
- Design the relationship between the windshield, IP shape, and occupant seating position to minimize veiling glare.

3.2.1.5.3 Reflections.

- Package lighted components such that light emitted from them does not reflect in the driver's forward, side mirror, or rear mirror fields of vision.
- Package components, panel breakups, and openings such that reflections are not in the driver's forward, side or rear mirror fields of vision.
- The IP trim shape shall shield primary vehicle displays from reflections and glare from external light sources.
- Design openings and panel breaks as small and defined as possible.
- Avoid color changes on top surface of the IP.

3.2.1.6 Part Requirements.

3.2.1.6.1 General Requirements for All Parts.

3.2.1.6.1.1 Miscellaneous Requirements.

- Parts near an airbag must be securely fastened and must not become projectiles.
- The stiffness of the IP, driver knee bolster, and glove box (passenger knee bolster) shall be tuned to act in accordance with the requirements needed for the knee protection systems, head impact, and to balance occupant kinematics.
- Stationary and moving parts in close proximity to wiring harnesses must not have sharp edges to prevent chafing.
- Wire harness routing shall be designed to account for part and vehicle motion.
- Provide adequate access to all connections for assembly and service.
- Parts must:
 - 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.
 - Withstand environmental conditions and forces encountered in transportation or handling.

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3. Remain secured throughout the temperature ranges specified in Table 2 at the 99.8 percentile customer usages and still meet all SOR requirements.
- 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. If the key chain can contact hard plastic with the key in the ignition, use a key bump pad of an ultraviolet radiation stable polyolefin elastomer or equivalent.
- l. Light leaks are not permitted through or between components of the subsystem that may be seen by front or rear seat occupants.
- m. Lighting mounted on components must be shielded or diffused to avoid being directly in driver's field of vision.
- n. The ignition key cylinder must be retained at 300 N and break away freely at 400 N under lateral and normal loads applied to the center with the key in position for IP mounted ignition switches. Validate by testing two parts with the ignition cylinder installed. The requirement must be met throughout the temperature extremes identified in Table 2.
- o. Local stiffness for areas that have snap fit or mechanical clip attachment slots to be < 2.0 mm deflection per 72 N force.
- p. 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 pull).
- q. The Vehicle Identification Number (VIN) plate must not be obscured by any part and meet GMW14574.

3.2.1.6.1.2 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. IP steady state part monitoring shall be required per GMW15434. Any exceptions will be listed within SOR Appendix C2.
- c. Conceal part gaps and misalignment from the line of sight with panel breakups and joint designs.
- d. Design all components with features to align with adjacent parts.
- e. Use tolerance stacks, root sum square, and/or Variation Analysis (this applies to Three Dimensional (3D) analysis as well as One Dimensional (1D)) for designing and manufacturing the parts to achieve the DTS.
- f. 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.

3.2.1.6.1.3 Storage.

- a. Compartment doors must follow the requirements listed in 3.2.1.6.2.1a, 3.2.1.6.3.1e and 3.2.1.6.3.1f.
- 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 and KMVSS 111-3) with the following inertial loads and/or specific regional requirements as calculated per SAE J839:
 1. 10G load in the horizontal lateral direction.
 2. 10G load in the vertical direction.
 3. 30G load in the horizontal longitudinal direction.
 4. For vehicles sold in Europe, compartment doors must stay closed during type approval crash test.
- 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. The door closing sound shall meet a ≥ 8 rating per GMW14264 when evaluated per GMW14233 for metallic/clack, rattles, multiple impacts, loudness, solid, overall satisfaction.
- d. Flocking or its color shall not transfer onto storage compartment contents.

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December 2014

Page 13 of 44



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- e. The IP storage bins/features must be able to accommodate the items identified in the HVI Program Storage Tracker. The Program Storage Tracker or Storage Allocation List (SAL) per GM Best Practices includes the following information:
 - 1. List of items to be accommodated in each storage space.
 - 2. Dimensions of items to be accommodated.
 - 3. Location of individual or dedicated storage features (e.g., pencil, cell phone, or tissue holders).
 - 4. Reconfigurable and/or versatile storage space requirements.
 - 5. Storage space retention requirements.
 - 6. Brand specific storage requirements.
 - 7. Locking requirements.
- f. Maximize the usable storage space of all IP storage while balancing its appearance.
 - 1. Rectangular shaped bins are more usable than complex shaped bins.
 - 2. Storage bin and door surfaces should be flat with minimal intrusions into the bin.
 - 3. Areas inside the bin should not trap small items.
 - 4. The bin and door should be approximately the same size (cross vehicle dimension).
- g. All IP storage spaces shall be easily used.
 - 1. Storage space must allow contents to be easily seen and accessed.
 - 2. Other components are not to block access into the storage space.
 - 3. If storage space is low on the IP, a door mounted bin improves access.
 - 4. Orient the storage bin to see the entire depth.
 - 5. The open storage door is not to obstruct accessing the bin.
 - 6. An open storage door is not to intrude on the occupant.
 - 7. The storage bin contents must not escape and compromise the storage actuation device (i.e., pivot, latch, damper) causing an inoperable condition.

3.2.1.6.1.4 Assembly.

- a. Individual part designs and assembly processes will be reviewed and assessed according to GMW14234 for the safety of the production operator.
- b. Part surfaces that interface with the operator are to be free from ridges, points or sharp edges.
- c. Parts must not require hammers or rubber mallets for installation.
- d. Parts shall be designed to stay in position on their own while being secured (third-hand feature).
- e. Parts shall not require overhead assembly.
- f. Parts must be visible to the operators during assembly (no blind operations).
- g. Parts should not require lubricating in the general assembly plant.
- h. Bright colors should be used on hidden fasteners to easily locate them for assembly.
- i. Part assembly must not require any special tools or training.
- j. All steps needed to assemble a part must be contained within the assembly plant cycle time.
- k. Different variants must be designed for the same assembly sequence and cycle time.
- l. The assembled IP Trim parts must not be affected by tilting the vehicle in the overhead conveyor ± 90 degrees.
- m. All new parts must be designed to use common methods, and tools as with the future programs to be produced in the targeted assembly plant.
- n. All fasteners must comply with the Global Fastening Catalog (GMW17000).
- o. All torque values shall be appropriate for the joint, and approved by the Fastening Engineer.
- p. Design parts to accommodate the assembler wearing gloves.

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December 2014

Page 14 of 44



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