GM WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW3115

Side Impact Airbag Modules

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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 document details the requirements for a seat-mounted Side Impact Airbag Module component (hereinafter referred to as the Module) to be considered for air bag subsystems used on vehicles produced by General Motors Worldwide (GMW). As defined by the responsible Vehicle Engineering Center (hereinafter referred to as VEC), the Module consists of:

- Side Impact Airbag Modules (SIAB) as designated by its location in the vehicle.
- Front Side Impact Airbag (FSIAB), located in the outboard front seat.
- Center Side Impact Airbag (CSIAB), located in the Inboard side of the front seat (s).
- Rear Side Impact Airbag (RSIAB), located in the Outboard rear seat/ bolster.

Any vehicle level and Module interface requirements contained herein shall be addressed by the VEC. The Module Supplier shall work cooperatively with the responsible VEC and any other component Suppliers in resolving any identified interface, design or function issues. The responsible VEC shall be the final arbiter of any vehicle level and interface requirements.

1.2 Applicability. This document applies to all Side Airbag modules including Outboard and Center Side airbags.

1.3 Remarks. The Module supplements the protection offered by the vehicle structure, Roof Rail Airbag, seat belt system, and interior trim for side impact collisions. The Module is intended to reduce injury potential in those side impact accidents where there is a significant risk that the occupant might otherwise be seriously injured, meet applicable regulations, and address GM Worldwide performance goals.

The Airbag Modules are components of the airbag subsystem. As defined by the responsible Vehicle Engineering Center (VEC), the airbag subsystem consists of:

- A specified combination of Airbag Modules,
- Sensing and Diagnostic Module (SDM),
- Vehicle wiring,
- Side Impact Sensors (SIS) and/or
- Automatic Occupant Sensing (AOS).

Airbag Module Requirements consist of three parts:

Part 1: GMW3109 Frontal Airbag Modules

Part 2: GMW3115 Side Impact Airbag Modules

Part 3: GMW3121 Roof Rail Airbag Modules

Airbag Module Verification (Validation) consists of seven parts (two of which have no documents assigned to them):

Part 1: GMW3112 Verification of Requirements for Frontal Airbag Modules

Part 2: GMW3118 Verification of Requirements for Side Impact/Roof Rail Airbag Modules

Part 3: No Part 3 exists

Part 4: SAE/USCAR-24 USCAR-Inflator Technical Requirements and Validation

Part 5: No Part 5 exists

Part 6: SAE/USCAR-28 Initiator Technical Requirements and Validation

Part 7: GMW3133 Verification of Cover/Door Subcomponent for Frontal/Side/Roof Rail Airbag Modules

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2 References

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

2.1 External Standards/Specifications.

78/632 EEC	EU 2000/53/EC	IEC 60068-2-38	SAE J1794
CMVSS 101	EU 2007/23/EC	ISO 1431-1	SAE/USCAR-21
CMVSS 107	FMVSS 101	ISO 20433	SAE/USCAR-24
CMVSS 201	FMVSS 107	KMVSS 95	SAE/USCAR-28
CMVSS 214	FMVSS 201	SAE J1128	TRIAS 48
CMVSS 302	FMVSS 214	SAE J1344	UN R21
EN 10204	FMVSS 302	SAE J1351	UN R95

2.2 GM Standards/Specifications.

GMW3059	GMW3176	GMW14089	GMW15010
GMW3091	GMW3191	GMW14124	GMW15432
GMW3097	GMW3205	GMW14130	GMW15443
GMW3103	GMW3208	GMW14162	GMW15520
GMW3109	GMW3232	GMW14334	GMW15567
GMW3112	GMW3235	GMW14444	GMW15626
GMW3116	GMW3286	GMW14573	GMW15862
GMW3118	GMW3402	GMW14688	GMW16323
GMW3121	GMW3417	GMW14797	GMW17261
GMW3133	GMW8518	GMW14864	
GMW3172	GMW14011	GMW14892	

2.3 Additional References.

- Approved Paint on Plastic System (APOPS)
- Armorall (PN 1042911)
- Armorall (PN 12345002)
- CG1952 Validation Cross Reference Index (VCRI) Statement of Requirements (SOR) Appendix G3 template for SIAB
- CG2503 Bar Code Content and Format Validation Form
- CG3378 Airbag Lot Acceptance Matrix (provided with this GMW)
- CG5095 Acceptance Criteria for Airbag MME Testing (provided with this GMW)
- GM Materials Approved Source List
- GM PN 88861407 or equivalent
- Module layout drawing
- Program Specific Statement of Requirements (SOR)
- Squeak and Rattle Noise Glossary

3 Requirements

This section, inclusive of all subparts, defines the requirements for the Module. Specific validation procedures for each subsection are listed in Appendix G3 of the program specific Statement of Requirements (SOR) (CG1952 Validation Cross Reference Index (VCRI) template) (see 4.2) (The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement). The companion verification documents contain validation tests, procedures and documentation protocol. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.

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The use of **shall** in this document denotes a binding provision that must be met unless a deviation is granted by the responsible VEC. Deviations to **shall** requirements will only be considered and, if approved, granted by the responsible VEC after evaluating appropriate available technologies and balancing all Module and restraint system performance considerations.

Should denotes a preference, or desired conformance that must be tested and, if not met, must be documented and disclosed by the Supplier and approved by the responsible VEC. **Should** requirements must be met unless non-compliance has been approved by the responsible VEC.

Unless otherwise noted, all requirements apply over the environments (see 3.1.3) and the Module target life (see 3.2.3.1). If requirements stated herein are not objectively defined, the responsible VEC shall be the final arbiter of these requirements.

3.1 System/Subsystem/Component/Part Definition. The Side Impact Airbag Module (s) provides supplemental restraint for the vehicle's outboard occupant in side impact collisions as described herein by deploying a cushion when commanded by the Sensing and Diagnostic Module, from here on referred to as SDM unit.

In this document, the term "visible cover" refers to a subcomponent of the Module and is characterized by a Class A show surface. Any reference to or requirement associated with a visible cover is not applicable to a Module that deploys through the seat seam.

3.1.1 Appearance. Not applicable.

3.1.2 Content.

3.1.2.1 Physical Content. Program and VEC specific Module content and interface requirements shall be defined in a program specific SOR. All Module baseline and optional content shall be subject to the requirements stated within this document.

3.1.2.2 Functional Content. The Module shall provide the following functions:

a. The Side Impact Airbag/Subsystem sensors will be in a constant state of readiness and will determine if the vehicle is in crash scenario status or in standby status.

b. If the vehicle is in a crash scenario, the sensor will send a signal to the SDM to deploy the SIAB.

c. Upon a signal from the sensor, the SDM will activate the Module inflation device and cause the inflation of the air bag.

d. When the Module inflation device is activated, the air bag shall deploy and inflate between the vehicle side structure and the outboard occupant for the outboard mounted Modules or between the center console and the outboard occupant for the inboard mounted Module.

The Side Impact Airbag Module Functional Context diagram follows in Figure 1.

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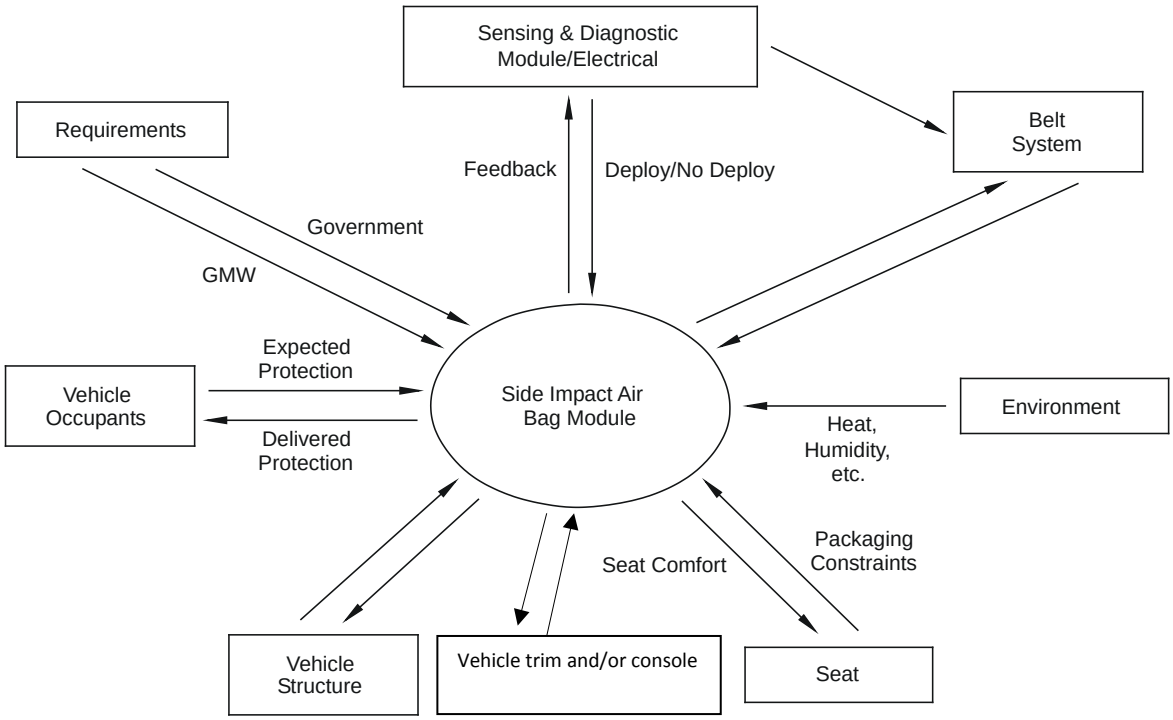
Figure 1: Side Impact Airbag Module Functional Context Diagram



G633(6/00)

3.1.3 Ambient Environment. The Module shall be exposed to varying environmental conditions. Environmental elements which may impact the appearance, function and/or performance of the Module include, but are not necessarily limited to:

- altitude differentials,
- humidity,
- temperature,
- solar exposure,
- dust,
- ozone,
- salt spray,
- sulfur dioxide,
- perspiration,
- manufacturing contaminants,
- cleaning contaminants,
- vibrations,
- dynamic shock,
- electromagnetic interference,
- coffee,
- tea,
- cola,
- ketchup,
- milk chocolate,

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- isopropyl alcohol and
- paint thinner.

Evaluation to these environments are through static deployments, durability vehicles, sled and barrier testing.

3.1.4 Interfaces. Figure 2 and Figure 3 show the block diagram for the Module and interfaces prior to deployment.

Figure 2: Module (with Visible Cover) Interfaces - Pre-Deployment

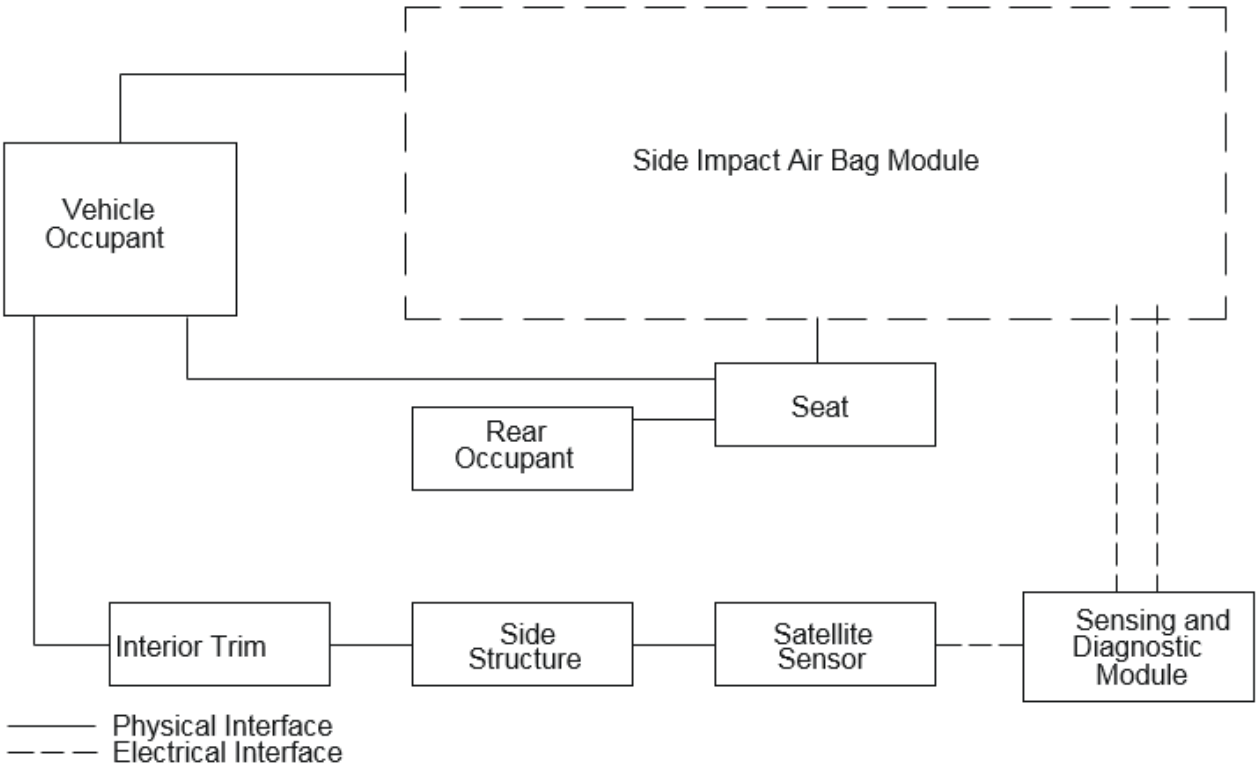

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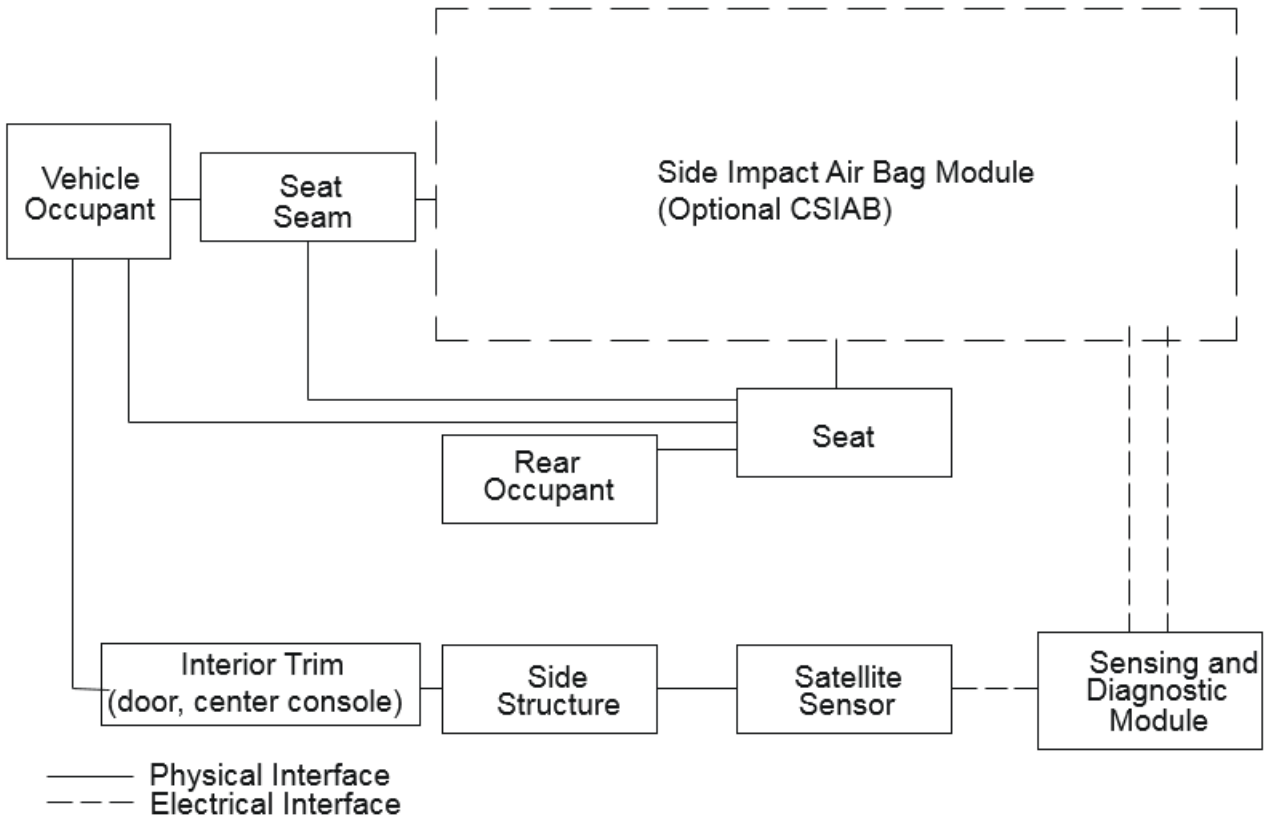
Figure 3: Module (without Visible Cover) Interfaces - Pre-Deployment



3.1.4.1 Mechanical Interface. Module interface development to meet the following requirements shall be jointly done on a systems basis by the responsible VEC, the Seat Supplier, and the Module Supplier. The responsible VEC and Module Supplier shall cooperate to resolve all design and functional interface issues.

The Module shall be compatible with the seat attachment structure.

3.1.4.1.1 Material Interface/Compatibility. This requirement applies to material interfaces/compatibility for the Module and its subcomponents as well as for the Module and mating subsystem/component interfaces. The physical properties of all subcomponents of the Module shall be compatible so as not to adversely affect the requirements stated herein. All production Module visible cover colors shall be evaluated.

Module subcomponents and interface subsystems/components:

a. Shall not adhere to other Module subcomponents or interface subsystems/components.

b. Shall not chemically react with other Module subcomponents.

c. Shall not be adversely affected by other Module subcomponents in any way.

The material expansion/contraction characteristics of the Module and the mating subsystems/components shall be compatible throughout the conditioning temperature ranges defined in 3.2.1.5.1 "Temperature".

The Module Supplier shall cooperate with the responsible VEC to optimize Module-to-mating subsystem fit and compatibility over all conditioning temperatures. The responsible VEC shall judge and be the final arbiter of Module level fit and compatibility over all conditioning temperatures.

3.1.4.1.1.1 Material Transfer to Interior Components. The Module should not transfer materials by off-gassing or other means to vehicle windows and other interior components.

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The aluminum foil sample shall be < 2 mg mass increase when tested according to GMW14444 (fogging GMW3235).

The responsible VEC shall be the final arbiter of material transfer.

3.1.4.1.2 Attachment. The Module shall be secured to the seat structure in a manner that meets or exceeds all fit, vibration, deployment and life cycle requirements of this specification. All attachments shall be qualified per the Module layout drawing prior to usage. The number of fasteners and attachment points shall be two unless additional fasteners are required for a specific application. Fasteners smaller than M5 should not be used when assembled outside GM. Loose washers shall not be used. The clamp power of every screw joint shall be managed without follow-up draft. All screw joints shall be capable of being installed with standard tools. The Module should be self-located by separate guide elements and by integrated guiding-in fasteners.

The Module should be compatible with a "design for assembly" philosophy. Mounting locations shall be jointly determined by the responsible VEC, the Module Supplier, and the Seat Supplier. The Module shall not be placed in the region of seat adjuster mechanisms (e.g., lumbar support, etc.) The responsible VEC shall be the final arbiter for mounting locations and attachment schemes.

The Module's chosen reference points should directly meet those elements that give the part its position in the vehicle and should be placed in one installation direction. A Module should only fit one position without adjustments or incorrect positioning possibilities.

There shall not be discernible movement of the Module and/or visible cover relative to the seat after the Module is installed in the seat and while the vehicle is being used in its intended function.

The responsible VEC shall be the final arbiter for all Module attachment/movement requirements.

3.1.4.1.2.1 Bolt-in Side Airbag Attachment.

The torque required to insert and seat the Side airbag Module into the seat, shall not exceed 9 Nm. The force required to remove the Module during service should not exceed 12 Nm. No damage that affects the fit or function of the Module, seat and/or fastening elements shall occur during installation and removal. Removal shall be easily accomplished using standard servicing techniques.

The Module design shall accommodate a total of five insertion/removal cycles.

The responsible VEC shall be the final arbiter for all Module related insertion/removal requirements.

3.1.4.1.3 Interface with the Seat and Attached Components. The Module shall not pinch, cut or abrade any electrical wires when installed in the seat. The Module Supplier shall assess Module fit before deployment and shall verify compatibility between the Module and the seat. If the SIAB is a protruding visible Module it shall be able to with stand seat load test GMW15567.

The responsible VEC shall be the final arbiter for all Module and seat/seat component interfaces.

3.1.4.2 Deployment Interface. In this section, the term **deployment system** encompasses the Module, and also includes but is not limited to the Module subcomponents (e.g., fasteners/clamps, inflator bracket) and all interfacing seat trim, seat subcomponents (e.g., structure, recliner handles, ccc plastics), door trim, and all interfacing interior trim that provides a path for deployment or potential interaction with the SIAB deployment path (e.g., console, vehicle structure, seatbelts).

During deployment, with or without occupant loading, the deployment system shall not provide any sharp or rough surfaces for the cushion and/or the occupant to contact. The cushion shall not receive tears or cuts from the deployment system or from other vehicle interior components (e.g., the side door window, door trim, console, and B-pillar trim), which could result in impaired occupant restraint.

The cushion shall not cause any interior components (e.g., B-pillar trim, door trim, console) to fragment or separate from the vehicle other than those designed to separate in a controlled manner. This requirement shall not relieve the interior component suppliers of the requirement to provide robust designs that shall withstand Airbag (AB) deployment.

During deployment, with or without occupant loading, the deployment system shall not fragment or separate in any manner that could result in impaired occupant restraint or injury. The deployment system should not fracture or damage the side door window.

Through film analysis of the deployment and occupant interaction as well as with post deployment inspections, the Supplier shall demonstrate that no cushion tears or interfaces which would impair occupant restraint are created as a result of the deployment interfaces, the seat/subcomponents, and/or the vehicle structure.

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