



Instrument Panel PAB Tear Seam Break Out Force and PAB Chute Interfaces Evaluation

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. To provide a common procedure to aid in the design, development, and proof of quality conformance of the instrument panel (IP) to passenger airbag (PAB) subsystem or interface before the supplier ships parts until steady state part monitoring requirements from Supplier Quality apply. This procedure provides a common method for evaluating tear seam weakening patterns (i.e., laser scoring, milling, hot/cold knife, etc.) and determining the lowest break out force that meets the Subsystem Technical Specification (SSTS) airbag requirements. This procedure also provides a common procedure for documenting the airbag chute weld parameters and variables which influence vibration weld quality and separation strength. In addition to the chute weld, this procedure will also provide test requirements to evaluate the PAB module chute retention tabs to PAB module strength integrity.

This test measures forces for previously mentioned design feature for "U" and "H" shape patterns. Related procedures are:

- GMW16609 for interior compartment doors.
- GMW14416 Occupant Protection Interior Impact Instrument Panel.
- GMW14412 for seatback tests.

1.1.1 This test measures weld separation strength forces for the airbag chute to the instrument panel trim along with the PAB chute retention tabs to PAB module.

1.2 Applicability. This test applies to instrument panels equipped with PAB module systems.

2 References

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

2.1 External Standards/Specifications.

ISO 8256

2.2 GM Standards/Specifications.

GMW3010	GMW14117	GMW14416	GMW16609
GMW3112	GMW14412	GMW14892	

2.3 Additional References.

- American National Standard for Calibration, Calibration Laboratories and Measuring and Test Equipment - General Requirements.
- Assembly drawing.
- Best Practice IPTRIM-67, Design Criteria for Documenting Instrument Panel Passenger Airbag Door Tear Seam Geometry Pattern and Supplier Quality Engineer Verification. The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement.
- Laboratory Test Report.
- Subsystem Technical Specifications (SSTS).

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- Tear Seam Documentation Report.

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.1.3 GM Test Laboratory or other comparable facility.

3.2 Equipment. The following equipment or equivalent is required. All equipment must be calibrated in accordance with American National Standard for Calibration, Calibration Laboratories and Measuring and Test Equipment – General Requirements. All instrumentation is to be calibrated as required; record instrumentation details and date of calibration on Data Sheet A1 in Appendix A unless the information is otherwise preserved in the testing facility records.

3.2.1 Bedplate or table.

3.2.2 Equipment for Tear Seam, Chute Weld, and Chute Separation Testing.

3.2.2.1 Tensile force machine to measure forces up to 10 000 N or equivalent device.

3.2.2.2 Rigid fixture.

3.2.2.3 Actuation device that also switches on the measuring equipment.

3.2.2.4 Approved Data Acquisition System to measure force (newtons) and displacement (millimeters).

3.2.2.5 Identification labels (with test number).

3.3 Test Vehicle/Test Piece.

Note: A "lot" is defined as a group of parts manufactured using the same equipment, same process settings, and same setup without change until Manufacturing Margin Evaluation (MME) has been completed according to SSTS GMW14117. After MME approval, a "lot" is defined as the steady state part monitoring requirement from Supplier Quality. Data shall be collected for each "lot" to establish the production steady state part monitoring requirement. The same procedure must be used for all evaluations.

3.3.1 Test Vehicle/Test Piece for Tear Seam. Fabricate assemblies and document processing parameters for each "lot" of parts. The tear seam test does not require the welded PAB chute. The evaluation for Bi-Laminate, Foam in Place, and Cut and Sew only considers the processed skins.

3.3.2 Test Vehicle/Test Piece for Chute Weld. Fabricate assemblies and document processing parameters for each "lot" of parts. The chute weld test requires instrument panel uppers with PAB chute cut to fit into fixture. Test parts must have a minimum 4 h cure time at room temperature to permit complete setting of the vibration weld interface before being subjected to testing.

3.3.3 Test/Vehicle/Test Piece for Appearance. Fabricate assemblies and document processing parameters for each "lot" of parts. Test parts must have a 4 h cure time at room temperature to permit complete setting of the vibration weld interface before being subjected to testing.

3.3.4 Test Vehicle/Test Piece for PAB to Chute Separation. Fabricate assemblies and document processing parameters for each "lot" of IP panel parts (with chute). The PAB module to chute retention feature test requires the acquisition of simulated canister that is the same as the production part for test. The test does not require the canister to include the inflatable bag, inflator or wiring.

3.4 Test Time.

Calendar time: 4 days

Test hours: 8 h

Coordination hours: 17 h

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3.5 Test Required Information.

3.5.1 Tear Seam Test Required Information.

- Documentation of the weakening pattern parameters shall be provided by supplier and submitted with completed test results (see Appendix A, Example A2: Tear Seam Documentation Report). The documentation shall be provided to the GM Release Engineer and the GM Validation Engineer.
- A laboratory report for the tear seam evaluation shall also contain photographic evidence of test setup before and after test, Force vs. Time graphs for all test specimens and test data. See Appendix A, Example A1: Laboratory Test Report. Specimen "lot" and unit number to be identified on each part.
- Conditioning temperature and ambient temperature in test cell is to be documented.
- The tear seam maximum force is to be recorded for each location. A force/time curve is also recorded for each location.

3.5.2 PAB Chute Weld Test Required Information.

Note: 3.5.2 only applies to PAB systems with a welded chute to instrument panel upper.

- Documentation of PAB chute weld parameters shall be provided by supplier and submitted with completed test results (see Appendix A, Example A3). The documentation shall be provided to the GM Release Engineer and the GM Validation Engineer. The Product Design Release Engineer (with the production supplier) is to establish, and document the optimum welding process parameters (melt down depth distance, weld time to achieve melt depth, amplitude, frequency, weld pressure, dwell hold time, hold pressure, measured melt depth, resultant pull separation force).
- A laboratory report for PAB chute to instrument panel upper weld integrity shall also contain photographic evidence of test setup before and after test, force (newtons) vs. displacement (millimeters) graphs for all test specimens. See Example A1.
- Conditioning temperature and ambient temperature in test cell is to be documented.
- PAB chute weld force is measured and a force/distance curve is produced showing the weld force.

3.5.3 Appearance Test Required Information.

- Conditioning temperature and ambient temperature in test cell is to be documented.
- Pictures of before and after test from the same camera angle are to be documented.

3.5.4 PAB Module to Chute Separation Test Required Information.

- Documentation of PAB module and chute retention feature failure force shall be provided by supplier and submitted with completed test results (see Example A3: PAB Chute Weld Strength (Flange/Door) and Module Separation Report). The documentation shall be provided to the GM Release Engineer and the GM Validation Engineer.
- A laboratory report for PAB chute retention feature strength shall also contain photographic evidence of test setup before and after test, force (newtons) vs. displacement (millimeters) graphs for all test specimens. See Example A3.
- Conditioning temperature and ambient temperature in test cell is to be documented.
- PAB chute minimum breakage force is measured and a force/distance curve is produced showing the minimum force.

3.6 Personnel/Skills.

3.6.1 Testers must be able to read drawings for determination of laser score seam location.

3.6.2 Testers must be capable of operating the equipment including the instrumentation for data acquisition.

4 Procedure

The following evaluation shall be conducted to prove part conformance to subsystem requirements prior to any system or subsystem testing (i.e., static deployments, knee impact/occupant performance, noise, vibration and harshness (NVH), stiffness, etc.) Refer to Table 1 for the test order for each material construction. The part must successfully pass each step in order to proceed to the next for items 1 thru 4 only.

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Table 1: Test Order

Test	Hard	Bi-Laminate	Foam in Place	Cut and Sew
1. Skin Adhesion	N/A	Yes	Yes	Yes
2. Tear Seam	Yes	Yes	Yes	Yes
3. Chute Weld	Yes	Yes	N/A	Yes
4. Appearance	Yes	Yes	Yes	Yes
5. Housing to Chute Separation	Yes	Yes	Yes	Yes

N/A = Not applicable.

4.1 Preparation.

4.1.1 Preparation for Tear Seam Test.

4.1.1.1 Condition components to ambient temperature as specified in Table 3: Environmental Conditions.

4.1.1.2 Determine the required tensile bar specimen size required using Table 2.

Table 2: Tear Seam Test Method

Test Method	Specimen Size	Test Speed	Applicable Construction			
			Hard	Bi-Laminate	Foam in Place	Cut and Sew
Method 1	ISO 8256 Type 3	50 mm/minute	Yes	No	No	No
Method 2	GMW3010 Code B	100 mm/minute	No	Yes	Yes	Yes

4.1.1.3 Determine the quantity and location of each specimen using Figure 1 and Figure 2. Cut the required specimens from the part. All specimens are to be centered in the zone and about the tear seam. All specimens are to be labeled with the appropriate location they were cut to assist with an accurate final report.

Note: The final number and location of the specimens shall have been agreed upon with the GM Release Engineer and GM Validation Engineer prior to testing. The information in Figure 1 and Figure 2 is a starting point only and is subject to change based on the part specifications.

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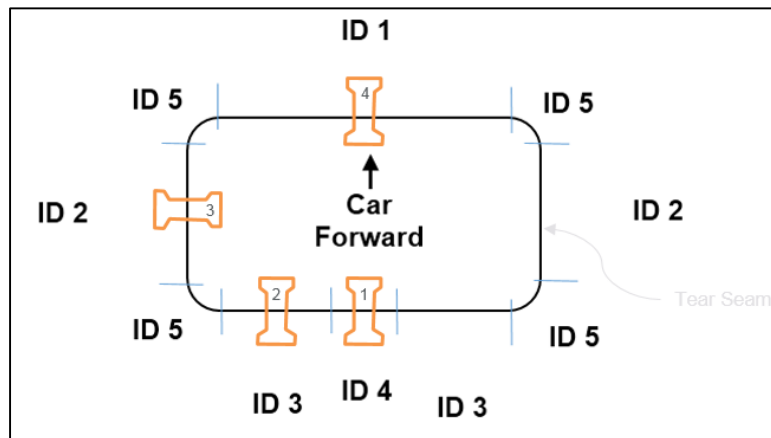
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ID Identification

Figure 1: Method 1 Sample Location

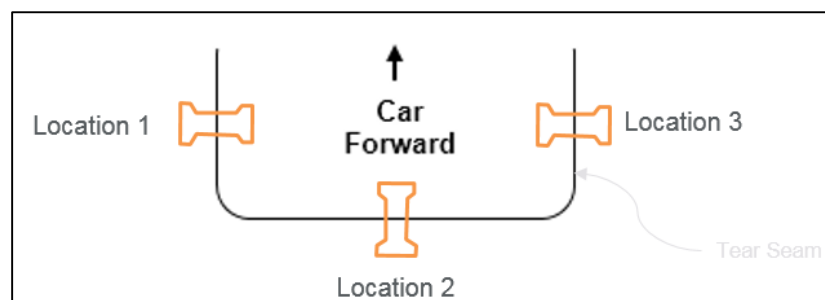


Figure 2: Method 2 Sample Location

4.1.1.4 Carefully place each specimen in the tensile force machine and apply a load to the part at the speed specified in Table 2.

4.1.1.5 Perform visual inspection of each test sample and record observation. Any noted discrepancies shall be documented and reported to the responsible GM Release and Validation Engineers. Pictures of before and after test for each component assembly Door/Cover shall be documented with test report.

4.1.2 Preparation for Adhesion Test.

4.1.2.1 Perform the adhesion testing using the procedure outlined in GMW14892, Peel Adhesion 3.1.5.1, Adhesion Requirements of Bonded Interior Assemblies. Testing is only required for as-received parts. This test shall be performed with the PAB chute welded to instrument panel upper. Adhesion must be checked at the tear seam and vibration weld flange as shown in Figure 3. Samples 1, 3, 5, and 6 must be centered the within the chute door. Samples 2 and 4 must be centered between sample 3 and the tangent of the tear seam. See Example A4: Instrument Panel Upper Adhesion Report.

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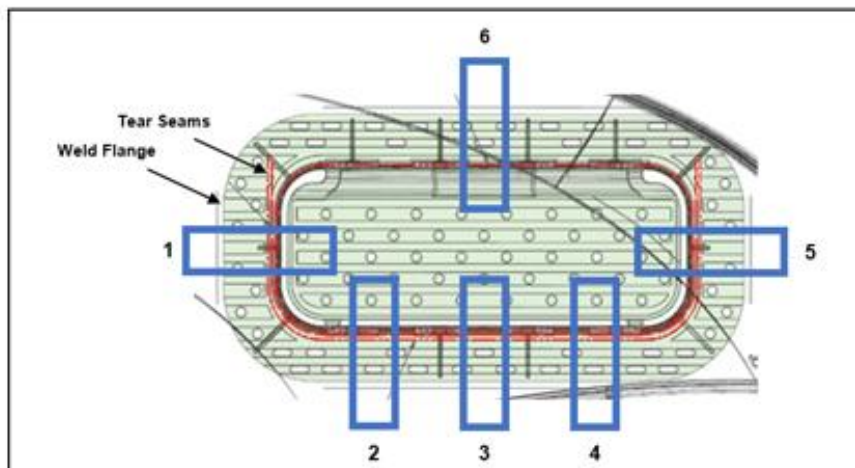


Figure 3: Adhesion Diagram

4.1.2.2 Retain component assembly Door/Cover for inspection as directed by the responsible GM Release and Validation Engineers.

4.1.3 Preparation for PAB Chute Weld Test.

4.1.3.1 Condition components to ambient temperature as specified in Table 3: Environmental Conditions.

4.1.3.2 Prepare part by removing only the material needed to allow for clamping part into holding fixture leaving minimum of 50 mm around PAB chute attachment flange. Cut the chute below the hinge between the outer most tabs and at the vertical edges of the outer most tabs as indicated in Figure 4. Ensure the hinge is not damaged during this operation and the fingers remain attached to the welded door. Cut the door to flange connector tabs. Cut the chute flange in the center of the car forward long flange as shown in Figure 5. Peel 25 mm of the flange on the inboard side to allow for clamping.

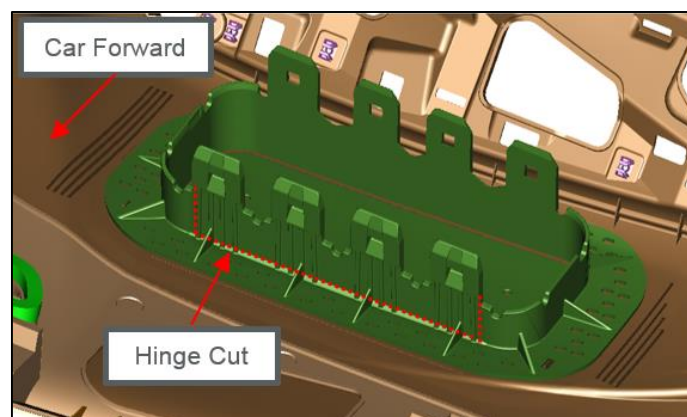


Figure 4: PAB Chute Hinge Cut

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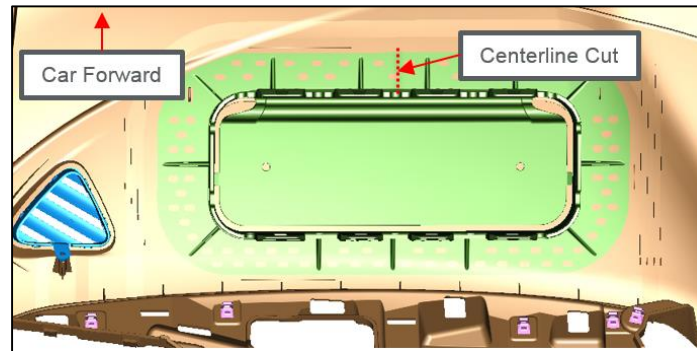


Figure 5: PAB Chute Flange Cut

4.1.3.3 Part is placed A-surface downward on the holding fixture and rigidly clamped in place per Figure 6. Ensure the remaining instrument panel material is clamped sufficiently around the PAB chute perimeter. Note additional fixture may be required (not shown) during the door pull test.

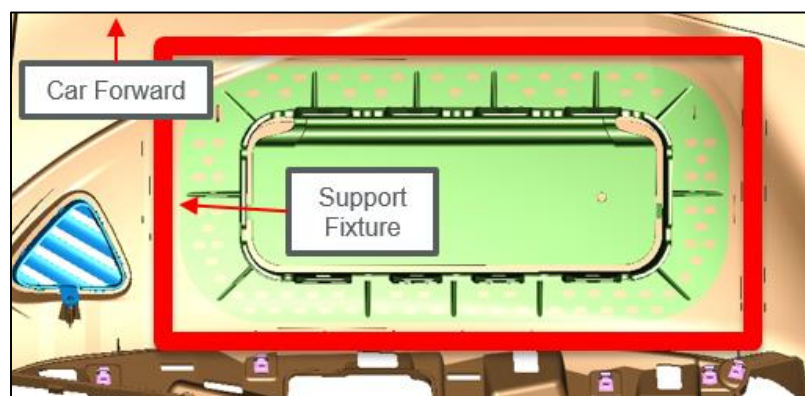


Figure 6: IP Panel Fixture

4.1.3.4 Place holding fixture with test part on bedplate with tensile force machine. Place the fixture so the center-point of the part aligns with the centerline of the tensile force machine. Reference Figure 7 and Figure 8 for the centerline definition.

4.1.3.5 Clamp the entire pull flange in the test machine. Apply load to the part at a rate of 50 mm/minute. The force should be applied normal to the part surface at the centerline. Refer to Figure 7 for detail.

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