



Door Trim Panel

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 specification establishes the test conditions and the requirements for testing a Door Trim Panel to show compliance of the Door Trim Panel to different performance criteria.

1.2 Applicability. All Door Trim Panels.

1.3 Remarks.

- Front door left/right.
- Rear door left/right.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3059	GMW14264	GMW16637
GMW8758	GMW15794	

2.3 Additional References.

- Engineering Work Order.
- Statement of Requirements (SOR) Appendix C2.
- Subsystem Technical Specification (SSTS).

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. Milford Proving Grounds, GM Opel Dudenhofen Proving Ground (Belgian block wave road, Rheinstraße) or equivalent proving ground.

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

3.1.1.2 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.

3.1.2 Equipment.

3.1.2.1 Apparatus as required by the appropriate test method.

3.1.2.2 Climatic chamber that is large enough to accommodate the test apparatus.

3.1.2.3 Tensile/compression gauge (measuring range 0 to 500 N) with the equipment required by the appropriate test method.

3.1.2.4 Torque wrench.

3.1.2.5 Tripod.

3.1.2.6 Thermometer.

3.1.2.7 Clinometer.

3.1.2.8 Gauges.

3.1.2.9 Device for clip/retainer tear out tests.

3.1.2.10 Fastener for side door.

3.1.2.11 Contour pen and attachment.

3.1.2.12 Door slam apparatus to open and close.

3.1.2.13 Counter.

3.1.2.14 Load cell.

3.1.2.15 Travel sensor.

3.1.2.16 Force sensor.

3.1.2.17 Test amplifier.

3.1.2.18 Computer for data acquisition.

3.1.2.19 Regulator for force, distance and speed of the drive unit.

3.1.3 Test Vehicle/Test Piece. Body or body section with completely built up doors including body side seals.

3.1.4 Test Time. Not applicable.

3.1.5 Test Required Information. Not applicable.

3.1.6 Personnel/Skills. Not applicable.

3.2 Preparation.

3.2.1 Test Samples. Door Trim Panels are installed in vehicle position. The Door Trim Panels shall be checked for conformance to the current development, drawing, and release status before each test. All fasteners shall be present, undamaged, and correctly installed. If this is not the case, the fasteners shall be replaced or corrected. Any modifications shall be noted.

3.3 Conditions.

3.3.1 Environmental Conditions. If not otherwise stated, all performance requirements shall be fulfilled in the following temperature ranges: -30 °C to +80 °C.

3.3.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

Tests that are to be performed "at temperature" (i.e., cold and hot) are to be conducted in the environmental chamber after an appropriate minimum soak time has been reached (refer to specific procedures for soak requirements). The tests are to be performed in the chamber at the temperature specified. Parts to be tested are not to be soaked and subsequently removed from the chamber for the duration of the test, (i.e., soaking the parts in the chamber and bringing them into an ambient temperature lab for the duration of the test is not permissible under this specification). If not otherwise stated, the tests on each part shall be conducted in the order shown in Table 1.

Table 1: Test Conditions

1	Thermal soak for 1 h at +80 °C ± 3 °C.
2	Conduct test at +80 °C ± 3 °C and record results.
3	Thermal soak for at least 1 h at +23 °C ± 5 °C.
4	Thermal soak for 1 h at -30 °C ± 3 °C.
5	Conduct test at -30 °C ± 3 °C and record results.
6	Thermal soak for at least 1 h at +23 °C ± 5 °C.
7	Conduct test at +23 °C ± 5 °C and record results.

3.4 Instructions. Not applicable.

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Documents
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3.5 Data. Required test report items are listed in Table A1. Test data is recorded on Data Sheets B1 thru G1.

3.6 Safety.

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

3.7 Documentation. Samples of components or material released to this standard shall be tested for conformity with the requirements of this standard and approved by the responsible GM department prior to the start of delivery of production level components or materials.

Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

If not otherwise agreed to, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.7.1 Test Results. Test values are given within the text. Deviations from these values will be defined in the appropriate documents (program specific Statement of Requirements (SOR) Appendix C2/part drawing/Engineering Work Order/Subsystem Technical Specification (SSTS)).

3.7.1.1 Subjective evaluation shall be performed according to GMW14264.

3.7.1.2 The test report should include the items listed in Table A1. Test results are recorded on the relevant data sheets (Appendices B thru G).

4 Requirements and Procedure

4.1 Appearance.

4.1.1 Gap Dimensions. Gap dimensions of the Door Trim Panel to the B-Pillar Trim Panel, Lower Trim and the Carpet Retainer Trim shall be measured at predefined points (Figure 1) and recorded on the Gap Dimensions Data Sheet B1. Conformance to drawing specifications for gap dimensions and fit shall be tested. The Gap Dimensions Data Sheet B1 should be included in the test reports.

4.1.2 Fit. The fit of the Door Trim Panel to the sheet metal and the fit of parts within the Door Trim Panel shall achieve a Rating ≥ 8 when evaluated according to GMW14264.

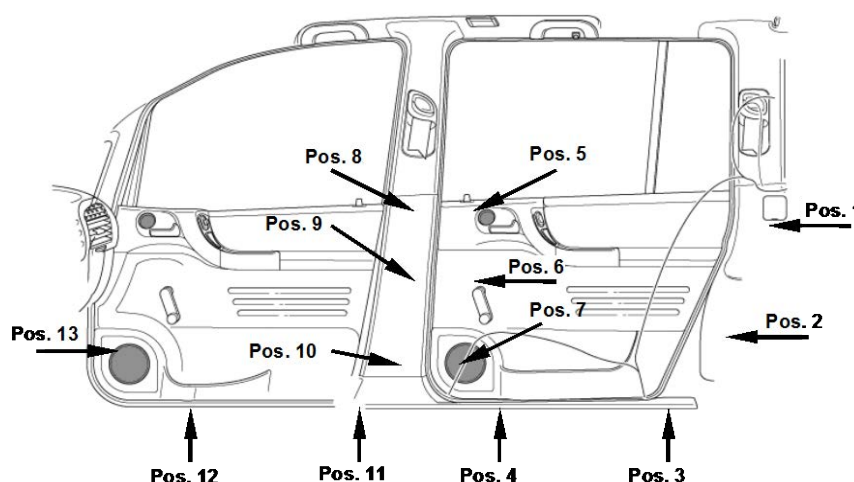


Figure 1: Measurement Points

4.1.3 Surface Appearance. The surface of the Door Trim Assembly shall be evaluated according to GMW14264.

4.1.3.1 Plastic parts shall not show any sink marks or burrs.

4.1.3.2 Covered components shall have a uniform surface appearance.

4.1.3.3 Overall surface appearance shall obtain Rating ≥ 8 upon evaluation.

4.2 Haptic. The surface condition and ergonomic characteristics of the Door Trim Assembly shall be tested and subjectively evaluated according to GMW14264. Required rating is as follows:

4.2.1 Grained Plastic Parts: Rating ≥ 6 .

4.2.2 Painted Plastic Parts: Rating ≥ 7 .

4.2.3 Covered Parts: Rating ≥ 8 .

4.3 Deformation Testing.

4.3.1 Closing Test of Door Pull Handle/Pull Cup. The door pull handle or pull cup shall comply with the requirements provided in Table 2.

Table 2: Door Pull Handle/Pull Cup Closing Test Requirements

General	
1	This test may be performed when the door is either in the open or closed position.
2	The pull direction and the direction of measurement are perpendicular to the Door Trim Panel.
3	A gauge shall be used for measuring the amount of deformation. The gauge shall be attached to a tripod fastened to the side of the door (Figure 2).
4	If the tripod is standing on the floor, the door shall be secured so that it cannot move when a load is applied. The final measurement shall not be influenced by movement of the door.
Measurement Point and Equipment	
Measurement Point and Equipment 360 Degree Pull Handle	
1	For a 360 degree Pull Handle, the test shall be performed by pulling on the center of the inboard surface of the Pull Handle with a 70 mm wide belt (Figure 3).
Measurement Point and Equipment Pull Cup	
2	The tensile/compression gauge with the 40 mm wide hook shown in Figure H1 shall be attached to the appropriate measuring point on the inner side of the Pull Cup.
3	For a Pull Cup style of handle, the measurement shall be performed at the upper edge of the handle (Figure 4).
Environmental Conditions	
1	The test is to be performed at $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.
Force Requirements and Deformation	
1	The test shall be performed with tension forces of 200 N.
2	Each force shall be applied three times.
3	At 200 N, the deformation shall be $\leq 5.7\text{ mm}$.
4	The amount of deformation shall be measured using the gauge (Figure 5).
Permanent Deformation	
1	Permanent deformation is not permitted.

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Further Requirements	
1	Function and appearance shall not be impaired by permanent deformations.
Data	
1	The measured values shall be documented in a test report. The Deformation Testing Data Sheet C1 should be included in the test report.

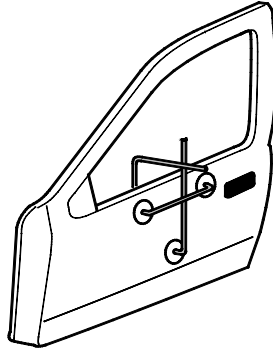


Figure 2: Tripod Fastened to the Side of the Door

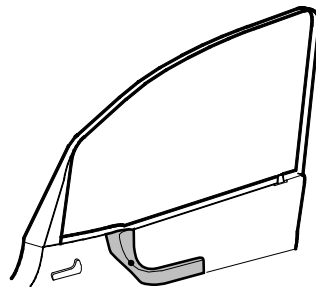


Figure 3: Measurement Location for Door Pull Handle

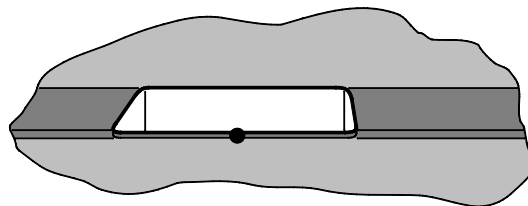


Figure 4: Measurement Location for Pull Cup Handle

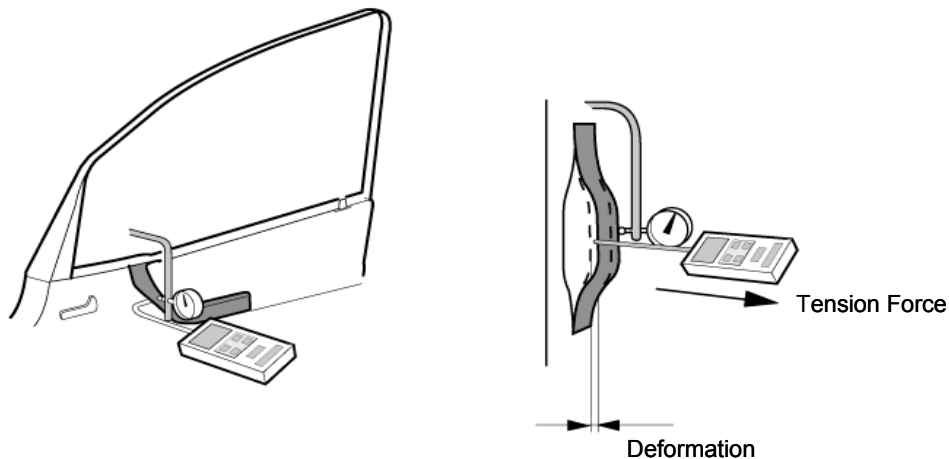


Figure 5: Measurement of Deformation for Door Pull Handle

4.3.2 Deformation of the Door Trim Panel. For global markets, testing points shall be defined among Design Release Engineer (DRE), Subsystem Validation Engineer (SVE) and Computer Aided Engineering (CAE) Engineers. Testing points must be located in a forward location from Safety Plane. The door trim panel shall comply with the test requirements provided in Table 3.

Table 3: Door Trim Panel Deformation Requirements

General	
1	This test may be performed when the door is either in the open or closed position.
2	A gauge shall be used for measuring the amount of deformation. The gauge shall be attached to a tripod fastened to the side of the door (Figure 2).
3	The gauge shall be located perpendicular to the Door Trim Panel and reset to zero.
4	If the tripod is standing on the floor, the door shall be secured so that it cannot move when a load is applied. The final measurement shall not be influenced by movement of the door.
Measurement Points and Equipment	
1	An example of the approximate position of force application is shown in Figure 6. Measurement points may vary depending on the Door Trim Panel and the vehicle. The decision should be made by the validation and release engineers.
2	The measuring points shall be located in the most flexible areas as shown in Figure 6.
3	A tensile/compression gauge with a 10 mm diameter piston (Figure H2) shall be used to apply the force.
4	The force shall be applied perpendicular on the surface of the Door Trim Panel substrate.
5	The force application point shall be located not more than 20 mm next to the deformation measurement point at the same height (Figure 6).
Environmental Conditions	
1	The test is to be performed at the test conditions of $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ only and record results.
Force Requirements and Deformation	
1	The test shall be performed with compressive forces of 100 N for all regions.
2	The amount of deformation of the Door Trim Panel shall be documented after each load.

3	Three readings shall be documented per load and measuring point.
4	At 100 N, the deformation shall be ≤ 3.0 mm.
Permanent Deformation	
1	Permanent deformation of the components after the test is not permitted.
Further Requirements	
1	Function and appearance shall not be impaired by permanent deformations.
Data	
1	The measured values shall be documented in a test report. The Deformation Testing Data Sheet C1 should be included in the test report.

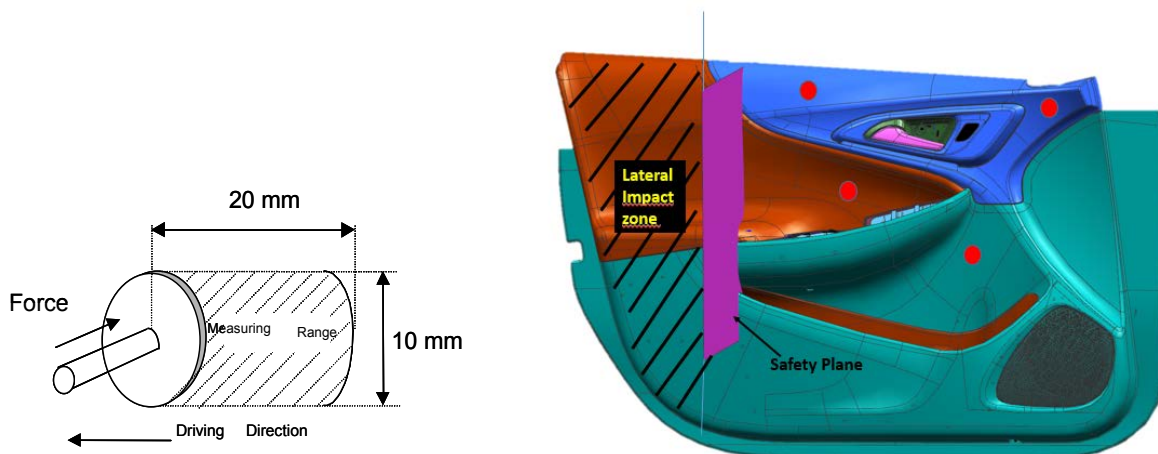


Figure 6: Example of Location of Measurement Points Forward of Safety Plane

4.3.3 Pull Off Force of Belt Line Attachment. The belt line attachment shall comply with the test requirements provided in Table 4.

Table 4: Belt Line Attachment Pull Off Force Requirements

General	
1	The test shall be performed with the doors shut and the windows opened.
Measurement Points and Equipment	
1	The three measurement points shall be located in the center and 10 cm from each end of the window frame (Figure 7).
Measurement Points and Equipment Door Panel without Integral Weather Strip	
2	A tensile/compression gauge with a 40 mm wide flat hook (Figure H1) shall be used to apply the force.
3	The tensile/compression gauges with flat hook shall be positioned above the measuring points located on the back side of the Door Trim Panel (Figure 8).
Measurement Points and Equipment	

Door Panel with Integral Weather Strip	
4	A tensile/compression gauge with an 8 mm diameter rod shall be used to engage a plate that measures 20 mm x 40 mm to apply the force.
5	10 mm diameter holes may be drilled through the trim panel (Figure 9).
6	The tensile/compression gauge with the rod shall be passed through the drilled hole to engage a plate located on the back side of the Door Trim Panel.
7	The top edge of the plate should be located 5 mm below the bottom edge of the weather strip.
Environmental Conditions	
1	The test is to be performed at the test conditions provided in 3.3.2.
Force Requirements and Deformation	
1	The Door Trim shall be loaded with a pull of force of 220 N applied perpendicular to the centerline of the vehicle.
2	The permissible pull off force shall be ≥ 220 N.
3	After reaching the pull off force, the deformation shall be measured.
4	The permissible total panel deflection under loading shall be < 5 mm.
Permanent Deformation	
1	After relieving the load, the permanent deformation shall be measured.
2	The permissible permanent deformation shall be < 1 mm.
Further Requirements	
1	The Door Trim Panel shall not be loosened in the Belt Line attachment area by any load ≤ 220 N.
2	Attachment features shall not show any damage visible to the customer.
Data	
1	The measured values shall be documented in a test report. The Deformation Testing Data Sheet C1 should be included in the test report.

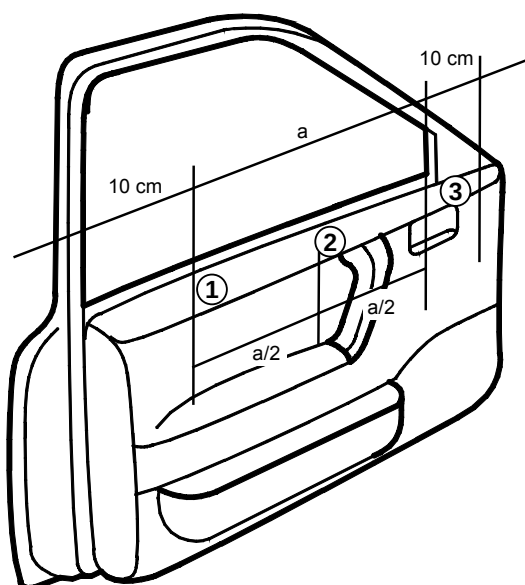


Figure 7: Test Setup Pull Off Force of Belt Line Attachment

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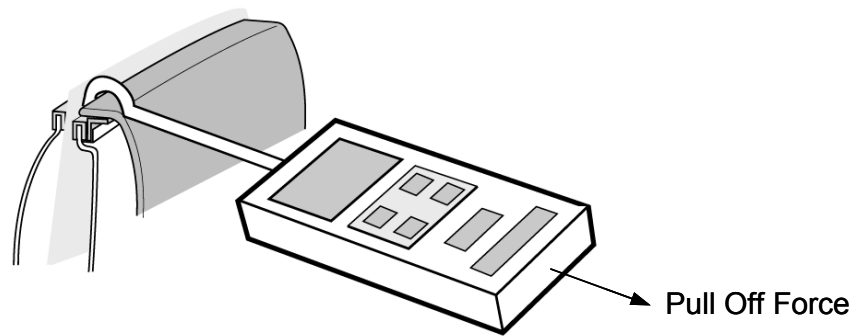


Figure 8: Test Setup for Measuring the Pull Off Force of the Belt Line Attachment for Vehicles without an Integral Weather Strip

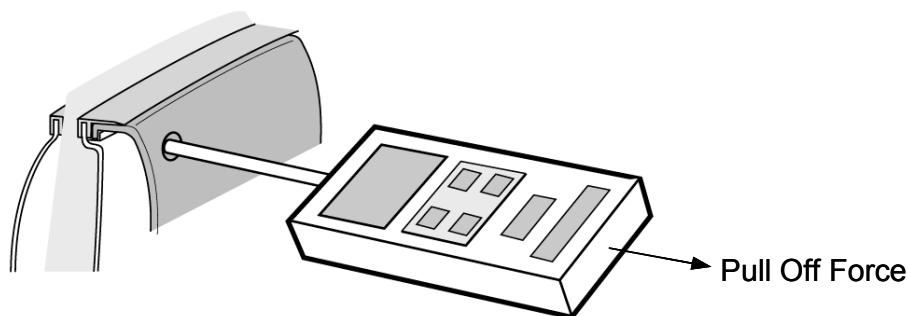


Figure 9: Test Setup for Measuring the Pull Off Force of the Belt Line Attachment for Vehicles with an Integral Weather Strip

4.3.4 Door Trim Top Edge Vertical Deformation. The top edge of the door trim panel shall comply with the test requirements provided in Table 5.

Table 5: Door Trim Top Edge Vertical Deformation Requirements

General	
1	The complete door assembly, including the door trim, is mounted on a vehicle.
Measurement Point and Equipment	
1	For the test, a tensile/compression gauge shall be used.
2	The force is applied on a depressor block of 300 mm x 25 mm. (Figure 10).
3	The load shall be applied at the weakest point along the top edge of the door and it shall be defined among Design Release Engineer (DRE), SVE and CAE Engineers. If weakest point cannot be determined, then use the midway point along the length of top edge at the window opening without considering the shark fin area. For rear door trim panels, do not apply the load beyond division post or at rear shark fin panel (Figure 10).
Environmental Conditions	
1	The test is to be performed at $+80\text{ }^{\circ}\text{C} \pm 3.0\text{ }^{\circ}\text{C}$.
Force Requirements and Deformation	

1	The top edge of the Door Trim shall withstand a vertical force of 150 N, applied for 60 s.
Permanent Deformation	
1	The Door Trim must not show any damage or permanent deformations after load application.
Further Requirements	
1	The Door Trim shall remain completely attached to the door and must not show any damage or permanent deformations.
Data	
1	The test results shall be documented in a test report. The Deformation Testing Data Sheet C1 should be included in the test report.

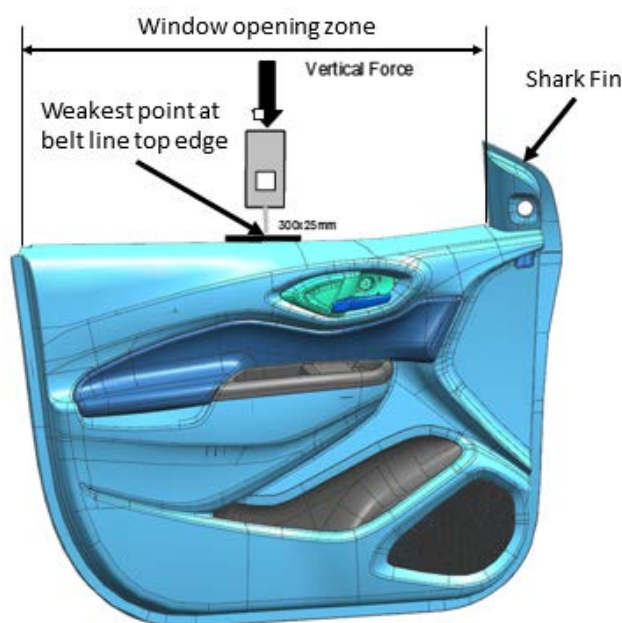


Figure 10: Top Edge Maximum Vertical Force

4.3.5 Armrest Indentation Test. The door trim armrest shall comply with the test requirements provided in Table 6.

Table 6: Armrest Indentation Requirements

General	
1	The complete door assembly, including the door trim, is mounted either in a fixture or on a vehicle.
Measurement Point and Equipment	
1	For the test, a tensile/compression gauge with a sphere of 38 mm diameter (Figure H3) shall be used.
2	The load should be applied at the weakest area on the horizontal plane of the armrest. If weakest point cannot be determined, then use the midway point along the length of and width of armrest. The load direction is vertical (Figure 11).
Environmental Conditions	

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1	The test is to be performed at $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.
Force Requirements and Deformation	
1	The maximum force should be applied according to the Figure 12 and reached in no $< 1\text{ s}$ and should stay applied for 5 s to 6 s.
2	No visual deformation is allowed to the system after a brisk hand rub of the armrest surface.
Permanent Deformation	
1	No permanent deformation is allowed to the system after 10 s of recovery and a brisk hand rub of the armrest surface.
Further Requirements	
1	No signs of degradation to the integrity of the armrest skin or substrate are permissible after the test.
Data	
1	The test results shall be documented in a test report. The Deformation Testing Data Sheet C1 should be included in the test report.

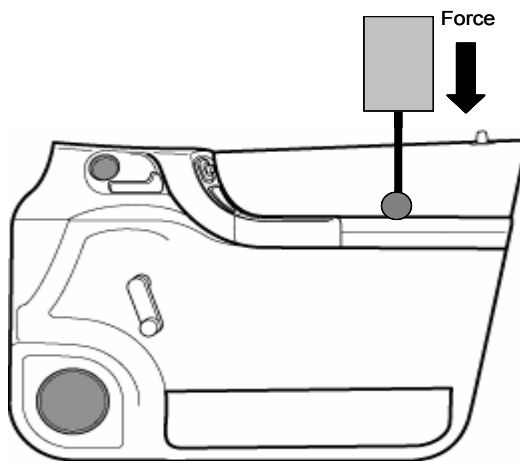


Figure 11: Armrest Indentation Test

All Markets/Brands	Skin/Fabric Covered No foam Bun	300			400			
	Skin/Fabric Covered No foam Bun							
	Molded in Color							
Emerging Market		300 N						
		Mini/Small	Passenger Car	Small SUV	Coupe	Large/FS SUV	Vans	Truck

Note: The values 300 and 400 in figure are in N.

FS Full Size
SUV Sport Utility Vehicle

Figure 12: Maximum Force Application

4.4 Component Retention Testing.

4.4.1 Retention Force of the Door Pull Handle Cover. The door pull handle cover shall comply with the test requirements provided in Table 7.

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Table 7: Door Pull Handle Cover Retention Requirements

General	
1	For the test, the tensile/compression gauges shall be used.
Measurement Points	
1	The direction of measurement is opposite to the attachment direction.
2	Depending on the type of cover, the number and position of the measurement points will be different.
Measurement Points Guidelines for Selection of Measurement Points	
3	Distance from the end of the cover to the measurement point should not exceed 10 mm. In cross-car view, it should be located on the up-down centerline of the cover.
4	Depending on the length of the cover, a measurement point on the fore-aft centerline (or middle) may be necessary.
5	The maximum distance between measurement points shall be < 100 mm.
Environmental Conditions	
1	The test is to be performed at the test conditions provided in 3.3.2.
Force Requirements	
1	The retention force of the pull handle cover shall be > 150 N (Figure 13).
Further Requirements	
1	Check if twisting and moving of the handle can remove the handle cover.
Data	
1	The location of the measurement points and the test results shall be documented in a test report. The Retention and Dimensional Stability Data Sheet D1 should be included in the test report.

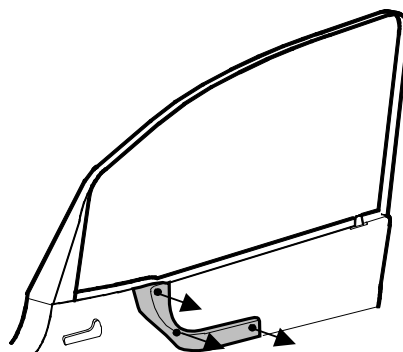


Figure 13: Measurement of the Force Required to Detach the Cover of the Door Pull Handle

4.4.2 Retention Force of Vertically Mounted Courtesy Lamp. The vertically mounted courtesy lamp, if present, shall comply with the test requirements provided in Table 8.

Table 8: Vertically Mounted Courtesy Lamp Retention Requirements

General	
1	For the test, a tensile/compression gauge with a hook shall be used.
2	If the door trim panel is not mounted to the sheet metal, the test may be done on a door trim panel with the force applied from the back side of the trim (push out test) with the same requirements.
3	If a hook cannot be used, an alternative device should be used to apply the load at the middle of the Courtesy Lamp, e.g., glue a hook to the lamp, use thin plates, etc. Be aware that the result is not influenced by the kind of device used to apply the load.
Measurement Point	
1	The load shall be applied at the center of the courtesy lamp (Figure 14).
Environmental Conditions	
1	The test is to be performed at the test conditions provided in 3.3.2.
Force Requirement	
1	Up to a load of 70 N, the Courtesy Lamp may not detach.
Further Requirements	
1	None.
Data	
1	The test results shall be documented in a test report. The Retention and Dimensional Stability Data Sheet D1 should be included in the test report.

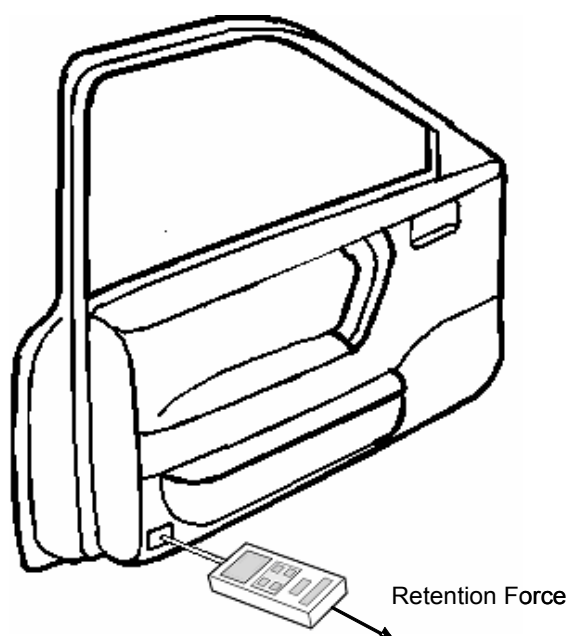


Figure 14: Retention Force of the Courtesy Lamp

4.4.3 Retention Force of Horizontally Mounted Courtesy Lamp. The horizontally mounted courtesy lamp, if present, shall comply with the test requirements provided in Table 9.