



Requirements for Expanded Elastomeric Body Seals

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 covers the requirements of expanded elastomeric rubber seals attached to a solid carrier used in sealing body openings.

1.1.1 Material Description. The bulb or sealing portion of the weatherstrips shall be made from expanded closed-cell ethylene propylene diene monomer (EPDM) rubber. For attachment purposes, weatherstrips require a dense base (carrier). This carrier shall be coextruded with the expanded cellular bulb. The carrier shall incorporate a metal insert if specified on the respective part drawing. The specifications for the dense base and the metal carrier shall be specified on the engineering part drawing or in the math data file.

Weatherstrip assemblies shall consist of continuous extruded sections or sections joined together. These sections shall be joined by either transfer or injection molded corners, or mitered corners securely attached with suitable adhesive. Joint and corner offsets in visible and sealed areas must be less than 0.25 mm.

1.1.2 Coatings. When applied, coatings shall be non-abrasive and uniform in color, finish, and texture. Coatings must meet the requirements of color and gloss as established by GM Appearance Engineering.

1.2 Applicability. Typical applications include: sealing profiles in the body area, e.g., on doors, tailgates, and trunk lids.

2 References

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

2.1 External Standards/Specifications.

AATCC 23	ISO 845	ISO 4892	SAE J2527
ISO 105-B06	ISO 1431-1	ISO 7500-1	
ISO 105-G02	ISO 2781	ISO 9513	
ISO 188	ISO 3865	ISO 23529	

2.2 GM Standards/Specifications.

GMW3059	GMW14170	GMW14757	GMW15634
GMW3205	GMW14650	GMW15379	GMW15681
GMW3235	GMW14685	GMW15381	GMW16317
GMW14125	GMW14711	GMW15382	GMW16321
GMW14162	GMW14712	GMW15564	

2.3 Additional References.

- CG1019 Weatherstrip Component Technical Specification – Statement of Requirements (SOR) Appendix C
- Component drawings
- Global Document Management (GDM) system (ID) - <https://documents.gm.com/gdm3/component/main>
- Global Subsystem Leadership Team (GSSLT) Deviation Form

- K-PAC MATBWS-3 - Weatherstrips – Rear Closures – Glass Sealing - Compatibility with Healed Backlight Element. Located in E2ks Technical Memory Best Practices system - <https://gmweb.gm.com/sites/E2ks/Pages/Home.aspx>
- Master Process Document (MPD)
- Statement of Requirements (SOR) Appendix F7
- Subsystem Technical Specifications (SSTS)

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

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. Facilities shall conform to the relevant test procedures.

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.

3.1.2 Equipment. Equipment shall conform to the relevant test procedures and to the test sketches on the part drawings.

3.1.2.1 Test Machine. The test machine shall fulfill the following requirements: the force measuring device of the test machine shall correspond to ISO 7500-1 Class 1; the deflection measuring device shall correspond to ISO 9513 Class 0.2. The test machine shall be such that the required test velocity can be maintained.

3.1.3 Test Vehicle/Test Piece. Unless otherwise specified, the shape, size and number of test pieces shall be in accordance with the relevant test procedure. For Design and Product Validation, test pieces shall be cut from at least three (3) finished parts, and for Routine Quality Control from at least one (1) finished part. See Appendix A, Table A1. The number of test pieces required is defined in the Weatherstrip Component Technical Specification (CG1019) Statement of Requirements (SOR) Appendix C.

3.1.4 Test Time. Not applicable.

3.1.5 Test Required Information. Not applicable.

3.1.6 Personnel/Skills. Per laboratory accreditation requirements.

3.2 Preparation. Not applicable.

3.3 Conditions.

3.3.1 Environmental Conditions. The minimum time between vulcanization and testing of elastomers shall be 72 h. The test pieces shall be maintained at a temperature of $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for at least 8 h prior to test and shall be free from strain during this period.

3.3.2 Test Conditions. Any deviations from the requirements of this standard shall have prior approval from the Weatherstrip Global Subsystem Leadership Team (GSSLT) and shall be documented on the GSSLT Deviation Form, found in the Global Document Management (GDM) system. Such requirements shall be specified on component drawings, test certificates, reports, etc.

3.4 Instructions. Not applicable.

3.5 Data. Not applicable.

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 (GM Product Engineering, Materials Engineering, Appearance Engineering, and/or Validation Engineering) 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 by the Weatherstrip GSSLT or GM Weatherstrip Engineer, 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. With reference to this specification, the test results shall be presented in a test report.

3.8 Dimensions and Tolerances. Dimensions and tolerances shall be specified on the engineering part drawing. If no tolerances are specified on the drawing, the tolerances and datums specified in Appendix F7 of the SOR shall apply. Geometric Dimensioning and Tolerancing (GD&T) Templates can be found on the Weatherstrip SharePoint Site, if they are not provided in Appendix F7 of the SOR.

3.9 Installation Properties. For handling and requirements, see relevant part drawing MPD.

4 Requirements and Procedure

4.1 Appearance. The surface of both the extruded and molded sections shall have a natural skin. Surfaces shall be smooth and free from voids, bubbles, and hard spots. The parts shall be free of mold release, bloom, or any other defects which may be deleterious to the appearance or sealing action.

4.1.1 Appearance Attributes. Appearance attributes, such as color, grain, and gloss, shall be as specified by GM Studio Color and Appearance.

4.1.2 Blemish Requirements. All weatherstrips shall meet the engineering drawing or math data file for the blemish requirements.

4.1.3 Carriers. Metal carriers/reinforcements must be hidden, either by coating or over molding. Molded joint offsets in visible areas and on seal surfaces must be ≤ 0.25 mm.

4.1.4 Flash. No flash permissible on show surfaces. All other flash must not affect fit, form or function of the part. Wafer joint offset must be ≤ 0.25 mm. See Appendix A, Figure A1 and Figure A2 for examples of **okay** and **not okay** flash.

4.2 Performance Requirements (Table 1 and Table 2). If a seal consists of several sections/profiles (extrusions and/or molds), the specified tests shall be conducted on each section (each extrusion section and each mold section). Unless otherwise stated, the tests and evaluations shall be performed at the temperature of $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

Table 1: Material and Part Requirements

Property	Test Procedure	Unit	Value
4.2.1 Density			
All Types	ISO 2781 Method A or ISO 845	g/cm ³	See value on part drawing
4.2.2 Compression Load Deflection			
All Types	GMW14685 (2B2) Compression Load Deflection (CLD) is determined at +23 °C ± 5 °C		See curve on part drawing or math data file
4.2.3 Long Term Load Loss Set			
Primary, Decklid, Liftgate, and Hood Seals	GMW15564, Load Loss Set (LLS) to be measured at minimum and maximum compression, CLD after 360 h (+0 h/-2 h) at +80 °C ± 3 °C LLS	N/100 mm %	1.5 minimum To be reported
Secondary and Auxiliary Seals	GMW15564, LLS to be measured at minimum and maximum compression CLD after 360 h (+0 h/-2 h) at +80 °C ± 3 °C LLS	N/100 mm %	0.2 minimum To be reported
4.2.4 Age Resistance			
All Types	Heat age per ISO 188 Method B, 72 h (+0 h/-2 h) at +80 °C ± 3 °C, Weatherstrip compressed to nominal compression		See curve on part drawing or math data file
4.2.5 Ozone Resistance			
All Types	ISO 1431-1, 100 pphm ± 10 pphm, +40 °C ± 2 °C, 72 h (+0 h/-2 h) bent around a mandrel having an outside diameter suitable to impart 20% strain, carrier attached and bulb side outward. The two (2) ends of the weatherstrip shall be tied where they cross one another with enameled copper or aluminum wire. Visual Examination, 2x magnification		No cracks
4.2.6 Paint Staining ^{Note 1}			
All Types	ISO 3865, Method A, 24 h (+0 h/-2 h) at +80 °C ± 3 °C, using production representative painted panels. Basecoat shall be white. To develop latent stain, the panels shall be exposed to ultraviolet (UV) following the heat exposure. Either: UV exposure 4 h ± 0.5 h at 13 W/m ² ± 2 W/m ² Or: GMW14162/B/4 MJ/m ² minimum For profiles with permanent contact to the body For profiles when contact area is visible		No migration stain permissible; Contact stain permissible. No staining permissible.
4.2.7 Cold Flexibility			
All Types	Condition per ISO 23529, -40 °C ± 3 °C 22 h -0 h, +2 h, then bend around mandrel. The sealing section shall be tested while attached to the carrier. It shall be tested with the sealing area on the outside of the assembly when bent over the mandrel, such that the elastomer is under maximum stress when bent 180 degrees around radius of 25 mm ± 1 mm. Visual Examination		No cracks