GM	WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW14169

Requirements for Dense 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 dense 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 ethylene propylene diene monomer (EPDM) or thermoplastic elastomer (TPE). The specifications for the 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 joints, or mitered joints securely attached with suitable adhesive. Joint offsets in visible and sealed areas shall 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., rocker seals, cutline seals.

2 References

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

2.1 External Standards/Specifications.

ISO 37	ISO 868	ISO 4892	ISO 23529
ISO 48	ISO 1431-1	ISO 7500-1	SAE J2527
ISO 188	ISO 3865	ISO 9513	

2.2 GM Standards/Specifications.

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

2.3 Additional References.

- CG1019 Weatherstrip Component Technical Specification.
- Global Document Management (GDM) system (ID) - https://documents.gm.com/gdm3/component/main.
- 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.

© Copyright 2016 General Motors Company All Rights Reserved

Documents
Document Sharing Hub
Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW14169 2016

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. Reference Appendix A, Table A1. If straight test pieces cannot be obtained from the finished parts in appropriate length, straight samples from the same manufacturing batch shall be delivered unsolicited.

The number of test pieces required for material and component approval is defined in the Weatherstrip Component Technical Specification (CG1019).

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 °C ± 5 °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.

© Copyright 2016 General Motors Company All Rights Reserved

Documents
Document Sharing Hub
Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW14169 2016

If not otherwise agreed to by the Weatherstrip Global Subsystem Leadership Team (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 standard, 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 Statement of Requirements (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 or Master Process Document (MPD).

4 Requirements and Procedure

4.1 Appearance. 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 specified on the drawing and in the math data file. Carriers must not be visible (i.e., must be coated or over molded).

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 ≤ 0.25mm. See Appendix A, Figure A1 and Figure A2, for examples of Okay and Not Okay flash.

4.2 Performance Requirements (See 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 °C ± 5 °C.

4.2.1 Prior to submission of finished parts, the supplier shall submit required test data for material approval on sheet stock tested to Table 1 with the required number of samples per the Weatherstrip Component Technical Specification (CG1019). Samples are to be taken from finished parts for all tests other than material approval and release.

© Copyright 2016 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW14169 2016

Table 1: Material Requirements for Sheet Stock and Finished Components

Property	Test Procedure	Unit	Value
4.2.1.1 Hardness			
EPDM	ISO 48 Method M	IRHD	See part drawing
TPE and Poly Vinyl Chloride (PVC)	ISO 868, 15 s delay	Shore A	See part drawing
4.2.1.2 Elongation at Break			
All Types	ISO 37, Type 2 or Type 4 dumbbell, 200 mm ± 20 mm/minute	%	200 minimum
4.2.1.3 Tensile Strength			
Dense materials with volume resistivity $<10^6$ Ω cm minimum	ISO 37, Type 2 or Type 4 dumbbell, 200 mm ± 20 mm/minute	MPa	6 minimum
Dense materials with volume resistivity $>10^6$ Ω cm minimum	ISO 37, Type 2 or Type 4 dumbbell, 200 mm ± 20 mm/minute	MPa	5 minimum
4.2.1.4 Age Resistance (Heat Aging)			
All Types	ISO 188 Method B, 168 h (+0 h/-2 h) at +100 °C ± 3 °C Change of hardness Change in tensile strength Change in elongation at break	 IRHD/Shore A % %	 +10 maximum ± 30 maximum -50 maximum
4.2.1.5 Ozone Resistance			
All Types	ISO 1431-1, 100 pphm ± 10 pphm, straight sample, 20% strain, +40 °C ± 2 °C, 72 h (+0 h/-2 h) Test piece: length 100 mm ± 1 mm, width 4 mm ± 1 mm, thickness 1 mm to 2 mm. Visual Examination, 2x magnification.		No cracks
4.2.1.6 Paint Staining Note 1			
All elastomers in contact with painted substrate	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 ± 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
4.2.1.7 Cold Flexibility			
All Types	Condition per ISO 23529, -40 °C ± 3 °C; 22 h (-0 h/+2 h), then bend around mandrel. Test piece: length 100 mm ± 1 mm, width 4 mm ± 1 mm, thickness 1 mm to 2 mm. Bend 180 degrees radius of 1 mm. Visual Examination.		No cracks
4.2.1.8 Volume Resistivity Note 2			
All dense elastomeric parts in contact to painted steel	GMW14711	Ω cm	10^6 minimum

© Copyright 2016 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW14169 2016