GM	WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW14168

Elastomeric Seals for Glass Sealing – Flocked or Coated

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 for elastomeric sealing profiles, mainly used in the area with movable glass panes. These seals can be flocked or coated.

1.2 Applicability. Typical applications include the following: sealing profiles in areas with movable glass, such as door glass run channels, insulators, and belt strips.

1.3 Remarks.

1.3.1 Material Description. The sealing portion of the weatherstrips shall be made from Ethylene Propylene Diene Monomer (EPDM) rubber or Thermoplastic Elastomer (TPE). The specifications for the carrier shall be specified on the engineering part drawing and 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. Joint offsets in visible and sealed areas must be < 0.25 mm. Visible areas of joints must be straight, with no mold to extrusion material bleed on the visible surfaces. See Appendix A, Figures A1 thru A6.

1.3.2 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.

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	ISO 121031
ISO 188	ISO 3865	ISO 9513	SAE J2527

2.2 GM Standards/Specifications.

GMW3059	GMW14170	GMW14712	GMW15683
GMW3205	GMW14650	GMW15381	GMW15692
GMW3235	GMW14685	GMW15382	GMW15693
GMW14125	GMW14698	GMW15564	GMW16317
GMW14162	GMW14711	GMW15634	GMW16774

2.3 Additional References.

- CG1019: Weatherstrip Component Technical Specification.
- Component drawings.
- 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. (ID)
- Powder Technology Incorporate, 14331 Ewing Avenue South, Burnsville, MN 55306 - (952) 894-8737.
- Statement of Requirements (SOR) Appendix F7.

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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. 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 Test Machine. The test machine shall fulfill the following requirements:

- The force-measuring device of the test machine shall c**orrespond 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.

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

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.

3.1.4 Test Time. Reference the specified lab test procedures in Section 2 for test time.

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

3.4 Instructions. Reference the specified lab test procedures in Section 2 for test instructions.

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 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.

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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. 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 the Geometric Dimensioning and Tolerancing (GD&T) Templates in Appendix F7 of the Statement of Requirements (SOR) shall apply. 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 free from voids, bubbles, tears, waves, pushes, and puckers which may impair the performance or appearance. The parts shall be free of mold release, bloom, or any other defects which may be deleterious to the appearance or sealing function. Coatings and flock shall be non-abrasive and uniform in color and finish over the specified area.

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

4.1.2 Blemish Requirements. All weatherstrips shall meet the engineering drawing and 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).

4.2 Performance Requirements (See Tables 1 thru 5). If a seal consists of several sections/profiles (i.e., 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 the 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.

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Table 1: Material Requirements for Sheet Stock and Finished Components

Property	Test Method	Unit	Value
4.2.1.1 Hardness			
EPDM	ISO 48 Method M	IRHD	See part drawing
TPE	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/minute ± 20 mm/minute	%	200 Minimum
4.2.1.3 Tensile Strength			
All Types	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	MPa	6 Minimum Note 1
4.2.1.4 Age Resistance (Heat Aging)			
All Types	ISO 188 Method B, 168 h (+2 h/-0 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 (+2 h/-0 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 2			
All Types	ISO 3865, Method A, 24 h (+2 h/-0 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.
4.2.1.7 Cold Flexibility			
All Types	ISO 23529, -40 °C ± 3 °C; 22 h (+2 h/-0 h), Condition test piece and mandrel. Test piece: length 100 mm ± 1 mm, width 4 mm ± 1 mm, thickness 1 mm to 2 mm. Bend 180° around radius of 1 mm Visual Examination		No cracks. No loss of adhesion of flock.
4.2.1.8 Volume Resistivity Note 3			
All Types	GMW14711	Ω cm	10^4 Minimum
4.2.1.9 Bloom			

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Property	Test Method	Unit	Value
All Types Design Validation (DV) testing	GMW16317 Method B Visual Examination		No adverse changes, no whitening.
All Types Product Validation (PV) testing	GMW16317 Method C1 or Method C2 Visual Examination		No adverse changes, no whitening.

Note: IRHD = International Rubber Hardness Degree
Note 1: For TPE see, respective material data sheet.
Note 2: Painted panels must be stored at -30 °C ± 3 °C until usage.
Note 3: See Weatherstrip Component Technical Specification (CG1019) for resistivity requirements by part.

Table 2: Component Requirements

Property	Test Method	Unit	Value
4.2.2 Compression Load Deflection			
All Types	GMW14685-2B2 Compression Load Deflection (CLD) is determined at +23 °C ± 2 °C. Target CLD for outer belt and outer lips of Glass Run Channel (GRC) at nominal compression. Target CLD for inner belt, inner lips of GRC, and both lips of symmetric isolator at nominal compression.	 N/100 mm N/100 mm	See curve in Corporate Managed Solution (CMS) drawing file; Entire curve shall be submitted to GM Engineering 6.0 ± 2.0 8.0 ± 2.5
4.2.3 Long Term Load Loss Set			
All Types	GMW15564 Load Loss Set (LLS) after 360 h (+2 h/-0 h) at +80 °C ± 2 °C at nominal glass position	N/100 mm	2.1 Minimum
4.2.4 Permanent Set			
All glass run channels, isolators, and belt strips	Test piece supported and deflected in production representative manner. Test assembly stored for 72 h (+2 h/-0 h) at +100 °C ± 3 °C, removed from the heat source, constraint removed and allowed to cool for 30 minutes ± 1 minute. Glass run channels and isolators – maximum gap. Outer Belt strips – minimum recovery Inner Belt Strips – minimum recovery	 mm mm mm	 1.0 Less than the test pane thickness (i.e., for 4 mm glass thickness, maximum gap allowable is 3.0 mm). Nominal Deflection +1.25 mm Nominal Deflection +2.00 mm
4.2.5 Sliding Resistance Note 1			
All Types	GMW15683 Conditions of test see, Appendix B, Table B2 Sliding Resistance.	 N/100 mm	 3.5 Maximum
4.2.6 Heated Backlight Element Compatibility Note 2			
Seals on moveable	GMW15381		No reaction with the silver

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