



Thermoplastic Elastomers - Polyolefinic, Fully Crosslinked, Exterior, EPDM Bondable, Weatherable

1 Scope

1.1 Material Description. This specification covers the properties of black, heat stabilized, weatherable, thermoplastic vulcanizates containing fully crosslinked ethylene propylene diene monomer (EPDM) elastomer particles dispersed in a continuous polypropylene (PP) matrix. These materials are formulated to bond to vulcanized EPDM rubber and can be processed by injection molding. These materials contain internal lubrication, reducing or eliminating the need for secondary coating processes.

Material types are delineated by hardness values. The types and corresponding hardnesses available are identified in Appendix A, Table A1.

1.2 Symbols. The material abbreviation according to ISO 18064 is >TPV-(EPDM + PP)<.

1.3 Applicability. Typical applications includes weatherstrip corner molds and end caps.

2 References

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

2.1 External Standards/Specifications.

ISO 34-1	ISO 812	ISO 1183	ISO 18064
ISO 37	ISO 815	ISO 1431-1	SAE J1976
ISO 188	ISO 868	ISO 4892-1/2	SAE J2527

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14650
GMW3059	GMW14270	

3 Requirements

3.1 Requirements on Test Specimens. Tests shall be conducted using the latest issue of the test methods indicated. Suitable precautions should be taken to ensure that applicable safe limits are not exceeded when conducting test procedures, processes, and/or handling the materials required by this specification.

3.1.1 Test specimens shall be die cut from fan gated injection molded plaques having a nominal thickness of 2.0 mm $\pm$ 0.2 mm. Die-cut specimens are to be tested with the long axis of the test specimen perpendicular to the direction of flow. Plaque dimensions must be sufficient to permit this.

3.1.2 Tests shall be conducted 40 h minimum after molding, and immediately following a conditioning period of 24 h minimum per GMW3221, Code A, unless otherwise specified. All tests shall be performed on unannealed specimens. In addition, tests specified at temperatures below or above +23 °C $\pm$ 2 °C shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

3.1.3 The minimum values specified in the property tables must be met by test specimens in natural, black, or in a standard sampled color if natural or black are not available. For colored grades where other pigment and additive systems (e.g., stabilizer) are used, the impact values shall not decrease more than 10% from the specified minimum value.

3.2 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

3.3 Requirements on Delivery. Important physical, mechanical, and thermal properties that characterize the material are summarized in Table 1.

For each product, the requirements to Table 1 shall be documented by Certification Statement according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

Materials approved to this specification shall meet the requirements of GMW3013, General Requirements for Handling of Technical Terms of Delivery for Plastics.

3.4 Compound Properties. See Table 1. A minimum of six (6) lots shall be tested to Table 1. The following are also required for full specification approval:

- Young's Modulus
- Poisson's Ratio
- Coefficient of Linear Thermal Expansion (CLTE)
- Stress-Strain Curve at +23 °C

Table 1: Compound Properties (Black)

Property	Test Method	Unit	Type					
			1	2	3	4	5	6
Shore A Hardness	ISO 868, 15 s delay	Shore A	40 ± 5	50 ± 5	55 ± 5	65 ± 5	70 ± 5	80 ± 5
Density	ISO 1183	g/cm ³	0.88 to 0.96					
Tensile Stress at Break	ISO 37, Type 1 dumbbell, 500 mm/minute	MPa	2.5 Minimum	2.5 Minimum	2.9 Minimum	4.3 Minimum	3.5 Minimum	6.8 Minimum
Elongation at Break	ISO 37, Type 1 dumbbell, 500 mm/minute	%	400 Minimum	450 Minimum	390 Minimum	460 Minimum	350 Minimum	500 Minimum
Tensile Stress at 100% Elongation	ISO 37, Type 1 dumbbell, 500 mm/minute	MPa	1.0 Minimum	1.0 Minimum	1.1 Minimum	1.5 Minimum	2.0 Minimum	2.9 Minimum
Compression Set	ISO 815, Type A, 22 h at +70 °C	%	60 maximum					
Tear Strength	ISO 34-1, Method B, angle die, 500 mm/minute	kN/m	11 Minimum	13 Minimum	17 Minimum	20 Minimum	19 Minimum	25 Minimum
Low Temperature Brittleness	ISO 812, Type B	°C	-54 Maximum					
Properties After Long Term Heat Aging	ISO 188, 1000 h at +100 °C in an air-circulating oven followed by indicated property testing at +23 °C. Test methods are the same as for original mechanical property testing.	Change in Property	No objectionable color change or tackiness					
Tensile Strength		%	70 Retention minimum					
Elongation at Break		%	70 Retention minimum					
Ozone Resistance	ISO 1431-1, Procedure A, 100 pphm, +40 °C	Rating	Zero Rating					
Accelerated Weathering	SAE J2527 with Extended ultraviolet (UV) Filters, 2500 kJ/m ² or ISO 4892-1/2, 3000 kJ/m ² (GMW14650 Class 3)	ΔE	< 3.0 No objectionable defects allowed					
Solar Weathering ^{Note 1}	2 years exposure to natural weathering in Arizona and Florida per SAE J1976, Procedure A	ΔE	< 3.0 No objectionable defects allowed					

Note 1: In case of conflict between accelerated weathering and natural weathering, natural weathering takes precedent.