



Elastomeric Microcellular Polyurethane Foam

1 Scope

This specification describes an elastomeric microcellular polyurethane foam for use on shock absorber and/or strut damper bumpers, suspension insulators, shock absorbers and spring assists.

1.1 Material Description. This specification covers two (2) types of microcellular polyurethane foam. The foams are differentiated based on basic chemistry and performance.

1.1.1 Type I. Naphthalene di-isocyanate (NDI) based foam.

1.1.2 Type II. Methylene di-isocyanate (MDI) based foam has enhanced low temperature flexibility and hydrolytic stability. If no type is specified on drawing, it shall be Type I. All testing parameters shall apply to both Type I and Type II, unless specified.

1.1.3 Limitations. Not to be used continuously at temperatures above 80 °C.

1.1.4 Recycling Guidelines. Materials developed to this specification shall be optimized to provide maximum end-of-life cycle value utilizing GMW3116, **Recyclability/Recoverability** guidelines.

1.2 Symbols. Not applicable.

1.3 Applicability. Shock absorber and/or strut damper bumpers, suspension insulators, shock absorbers and spring assists.

2 References

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

2.1 External Standards/Specifications.

ASTM D471

ASTM D573

ASTM D3574

ASTM E1356

2.2 GM Standards/Specifications.

GMW3059

GMW3116

GMW14270

3 Requirements

3.1 Requirements on Test Specimens. The material shall conform to all applicable drawing specifications. Unless otherwise specified, the material shall be tested under standard conditions, 22 °C ± 3 °C and 50% ± 5% relative humidity (RH).

3.2 Molded parts supplied to this specification may not be of sufficient size to permit testing for all the listed properties. All tests are to be run on a full part or on a section cut from a part or a molded slab, including a molded skin on at least one side.

Note: A nominal density must be specified on the engineering drawing for each part.

3.3 Physical properties will vary with varying density. Different spring rates may be achieved with this material by varying the density. For a given application, a force deflection curve should be included on the part drawing. Changes in physical properties, which accompany changes in density, are given in Table 1. All tests in Table 1 are per ASTM D3574.

3.4 Physical Properties. To be run off a flat molded sample approximately 150 mm × 150 mm × 12 mm.

3.5 Heat Aging - ASTM D573: 70 h at 100 °C.

3.5.1 Type I. Change in tensile strength and ultimate elongation to be within ± 15% of unaged material.

3.5.2 Type II. Change in tensile strength and ultimate elongation to be within ± 40% of unaged material. See Table 2.

Table 1: Type I Naphthalene di-isocyanate (NDI) Based Foam

Nominal Density Test A, kg/m ³	Tensile Strength Test E, kPa Minimum	Ultimate Elongation Test E, % Minimum	Tear Strength Test F, Nm Minimum	Compression Set at 70 °C Test D ^{Note 1} , % Maximum
350 ± 20	3000	360	6000	10.0
400 ± 20	3500	370	9000	7.5
450 ± 20	4000	370	12 000	7.5
550 ± 20	4500	400	14 000	8.0
550 ± 20	5500	400	16 000	8.0
600 ± 20	6500	400	18 000	9.0
650 ± 20	7000	400	20 000	9.0

Note 1: Compression set 50% deflection for 22 h at 70 °C.

Table 2: Physical Properties - Type II Methylene di-isocyanate (MDI) Based Foam

Nominal Density Test A, kg/m ³	Tensile Strength Test E, kPa Minimum	Ultimate Elongation Test E, % Minimum	Tear Strength Test F, Nm Minimum	Compression Set at 70 °C Test D ^{Note 1} , % Maximum
500 ± 20	4500	400	6 000	11.5
600 ± 20	6500	500	7500	10

Note 1: Compression set 50% deflection for 22 h at 70 °C.

3.6 Oil Aging - ASTM D471: 70 h at 100 °C, total immersion:

ASTM Oil Number 1.

- Tensile Change: -10% maximum
- Elongation Change: -10% maximum
- Length Change: ± 2% maximum

IRM 903 Oil.

- Tensile Change: -10% maximum
- Elongation Change: -10% maximum
- Length: ± 2% maximum