



Polyurethane Foams for Acoustic Applications

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 specification identifies polyester and polyether urethane types of sound absorbing foams used in General Motors vehicles. This specification will include both molded and flat stock foams.

1.2 Applicability. This specification shall encompass polyurethane foams used for acoustical applications throughout the vehicle. These polyurethane foams may be used for vibration damping, noise and shock isolation, and spacers for part retention with acoustical requirements.

1.3 Remarks. Products qualified to this specification shall be identified by compression force deflection ranges per ISO 3386 at 40% compression as follows:

- Type 1: 2 kPa to 25 kPa, see 1.3.1
- Type 2: 25 kPa to 50 kPa, see 1.3.2
- Type 3: 50 kPa to 99 kPa, see 1.3.3
- Type 4: 100 kPa to 175 kPa, see 1.3.4
- Type 5: 175 kPa to 450 kPa, see 1.3.5
- Type 6: 450 kPa to 850 kPa, see 1.3.6
- Type 7: See 1.3.7

1.3.1 Type 1. This is a low modulus (soft cellular) foam which can be easily compressed and used for sound absorption, isolation and air and dust seals.

1.3.2 Type 2. This is a low modulus with a slightly higher tensile strength than Type 1. This type may also be used for sound absorption, isolation and air and dust seals.

1.3.3 Type 3. This is a slightly firmer foam which are recommended for sound absorption, noise and shock isolation, air and dust seals.

1.3.4 Type 4. This is a firm but compressible foam material and is recommended for sound absorption, noise and shock isolation, air and dust seals.

1.3.5 Type 5. This is a firmer foam than Type 4 foam yet with yielding higher compression. This type can be used for sound absorption, noise and shock isolation, spacers for part retention and air and dust seals.

1.3.6 Type 6. This is a very firm foam with high compression. This type can be used for sound absorption, noise and shock isolation, spacers for part retention and air and dust seals.

1.3.7 Type 7. Foams for this type will also be used for sound absorption, isolation, and air and dust seals, but will have unique properties which will distinguish them from the other foam types. Compression Force Deflection, Density and any other unique properties pertinent to the performance of the foam, for its specific application shall be called out on the print or the math file.

2 References

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

2.1 External Standards/Specifications.

ISO 1856

ISO 1923

ISO 2589

ISO 3386

2.2 GM Standards/Specifications.

GMW3059
GMW3182
GMW3221

GMW3232
GMW3259

GMW14177
GMW14444

GMW15725
GMW16853

2.3 Additional References. None.**3 Requirements**

3.1 Requirements on Test Specimens. Reference GMW3221. All materials tested to this specification shall be conditioned for 24 h according to GMW3221, Code A.

3.2 Emissions Testing of Interior Materials and Parts. For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

3.3 Mass and Thickness.

3.3.1 Mass per unit area, per GMW3182.

3.3.2 Thickness for Types 1, 2 and 3 per ISO 1923. Compressive force of foot to be $0.5 \text{ kPa} \pm 5\%$ and a $50 \text{ mm} \pm 0.1 \text{ mm}$ diameter pressure. All readings to be taken after the pressure foot has been in contact with the material for at least 5 s.

3.3.3 Thickness for Types 4, 5, 6 and 7 per ISO 2589.

3.3.4 Mass and thickness of all materials for this specification shall be called out on the engineering drawing or the math files.

3.4 Flammability (GMW3232). Must comply with FMVSS 302, test to GMW3232.

Note: If the material is a composite or is to be used in a composite, the composite must meet this requirement.

3.5 Mildew (GMW3259). Required only if natural fibers are present in the construction. There shall be no visible growth or odor of mildew.

3.6 Acoustical Performance. Suppliers shall provide to GM random incidence absorption data of their cellular materials per GMW14177. To be classified in a specific Level, all data points from 500 Hz to 5000 Hz must meet or exceed the minimum Levels identified in Table 1.

Table 1: Acoustic Performance

Procedure	Acoustic Pads		
	GMW14177		
	Average Absorption Coefficient		
Requirement			
Frequency (Hertz (Hz))	Level A Lower Limit	Level B Lower Limit	Level C Lower Limit
500	0.53	0.38	0.18
630	0.64	0.50	0.29
800	0.76	0.60	0.39
1000	0.86	0.69	0.50
1250	0.93	0.76	0.58
1600	0.97	0.81	0.64
2000	0.99	0.86	0.69
2500	0.99	0.89	0.72
3150	0.99	0.91	0.75
4000	0.99	0.92	0.77
5000	0.99	0.92	0.78