



Fibrous Sound Absorption Materials

1 Scope

This specification identifies all types of sound absorbing and/or sound dissipative materials used in vehicles.

1.1 Material Description. Products qualified to this specification shall be identified by their general composition and areas in a vehicle where they will yield their best acoustical performance.

1.2 Symbols. Not applicable.

1.3 Applicability. All materials qualified to this specification shall be listed by type and recommended areas of the vehicles to be used.

1.3.1 Classification.

1.3.1.1 Type 1: Textile Fibers (Non-wovens). These type materials will contain a blend of bio-based fibrous materials, such as wool or cotton, which may be bound together by needling or bonding.

1.3.1.1.1 Type 1a: Materials (e.g., cotton shoddy pads) are recommended for usage in the vehicle interiors or other areas where exposure to moisture and exterior exposure is very limited. For example, these materials can be used for under carpet applications. Non-molded parts. These materials can also withstand higher heat applications and can be used in the engine compartment.

1.3.1.1.2 Type 1b: These resonated molded material fibers can withstand higher heat applications and can be used in the engine compartment.

1.3.1.2 Type 2: Fiberglass. One hundred percent (100%) fiberglass, phenolic cured materials for underhood use only and not for interior applications.

Note: Type 2 materials are recommended for exterior or underhood locations where performance and exposure to chemicals will have an insignificant effect on performance. All fiberglass constructions shall have cut edges compressed around the entire circumference, and the components shall not have any extractable constituents being offensive, detrimental to health or causing malfunctions during assembly or vehicle operation.

1.3.1.3 Type 3: 100% Polypropylene Fibers. This material will be composed of 100% fibrous polypropylene.

Note: Type 3 materials are recommended for areas where exposure to moisture will have an insignificant effect on performance. Not recommended for front of dash applications.

1.3.1.4 Type 4: One Hundred Percent (100%) Polyester Fibers. These materials will be composed of 100% polyethylene terephthalate (PET) fibers.

Note: Type 4 materials are recommended for areas where exposure to moisture will have an insignificant effect on performance.

1.3.1.5 Type 5: Fiber Blends. Blends composed of synthetic fibers or synthetic and natural fibers.

1.3.1.5.1 Type 5a: Fiber blends made of synthetic fibers only (not natural or recycled content). For use in interiors or areas where exposure to moisture will have an insignificant effect on performance. These acoustic parts are not exposed to exterior elements such as water, dirt, sand, etc. (e.g., interior acoustic pads or wet side door absorption).

1.3.1.5.2 Type 5b: Fiber blends made of synthetic fibers only. For use in interiors or areas where exposure to moisture will have an insignificant effect on performance. These acoustic parts may have minimal exposure to exterior elements such as water, dirt, sand, etc. (e.g., fender insulators).

1.3.1.5.3 Type 5c: Fiber blends made of synthetic fibers blended with natural fibers used for molded interior applications (e.g., components such as dual layer dissipative dash inner insulators, floor trim insulators, inner wheel house insulators or single layer molded insulators such as fiber plugs, under seat insulators, etc.) Molded layers can be single or dual layers.

1.3.1.5.4 Type 5d: Fibers blends made of synthetic fibers blended with natural fibers. For use in interiors (e.g., acoustic pad behind garnish trim). Non-molded fiber pads.

1.3.1.6 Type 6: Blends of Fiberglass. These materials are blends of fiberglass with other natural and/or synthetic fibers. Not to be used for interior applications.

1.3.1.7 Type 7: Other Fibers. These materials may contain oxidized polyacrylonitrile fibers or other fibers or fiber blends which meet acoustic and/or thermal requirements for specific applications.

1.4 Remarks. Materials intended to be used in substrate applications must also meet the assembly performance requirements per GMW14444 as assembled.

2 References

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

2.1 External Standards/Specifications.

FMVSS 302	ISO 9073-2	ISO/IEC 17025	UL 94 V-0
ISO 8510-2			

2.2 GM Standards/Specifications.

GMW3059	GMW3232	GMW14177	GMW16535
GMW3182	GMW3235	GMW14444	GMW16853
GMW3205	GMW3259	GMW14695	GMW16998
GMW3221	GMW14124	GMW15634	

2.3 Additional References. None.

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

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.

3.2.1 Emissions (GMW16853).

3.2.2 Type 1 Textile Fibers.

3.2.2.1 Volatile Organic Compound (VOC) per GMW15634 $\leq 100 \mu\text{g/g}$.

3.2.2.2 Semi-volatile Organic Compound (SVOC) per GMW15634 $\leq 250 \mu\text{g/g}$.

3.2.2.3 Carbonyls per GMW16535.

- $\leq 8 \text{ mg/g}$ Formaldehyde
- $\leq 8 \text{ mg/g}$ Acetaldehyde
- $\leq 8 \text{ mg/g}$ Acrolein

3.2.2.3.1 Sum of carbonyls to be $\leq 20 \text{ mg/g}$.

3.2.3 Types 3, 4, 5 and 7 Fibers.

3.2.3.1 VOC per GMW15634 $\leq 50 \mu\text{g/g}$.

3.2.3.2 SVOC per GMW15634 $\leq 100 \mu\text{g/g}$.

3.2.3.3 Carbonyls per GMW16535.

- $\leq 8 \text{ mg/g}$ Formaldehyde
- $\leq 8 \text{ mg/g}$ Acetaldehyde
- $\leq 8 \text{ mg/g}$ Acrolein

3.2.3.3.1 Sum of carbonyls to be $\leq 20 \text{ mg/g}$.

3.3 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.

3.4 Lab Requirements. Lab testing shall be performed by a laboratory that meets requirements of ISO/IEC 17025 and is acceptable to the responsible GM Department. Test reports must conform to ISO/IEC 17025, 5.10.2 and 5.10.3. Supplier shall submit a letter of compliance.

3.4.1 All required information shall be reported on the Construction Specification Data Form (see Appendix A, Data Sheet A1). The form shall be submitted along with each acoustic material submitted for engineering approval.

3.5 Material Requirements.

3.5.1 All test specimens shall be conditioned to GMW3221, Code A for a minimum of 24 h, prior to testing, unless otherwise specified.

3.5.2 Mass per unit area, per GMW3182, and thickness, per ISO 9073-2, of all materials for this specification shall be called out on the engineering drawing or the math files.

All mass per unit area and thicknesses recorded for each part shall have a tolerance of $\pm 10\%$.

3.5.3 Internal Bond Strengths.

3.5.3.1 Internal bond strengths of needled or non-woven fibrous materials shall be no less than 20 N/100 cm² when tested to GMW14695.

3.5.3.2 Internal bond strength of resinated needled fibers to be at 30 N/100 cm² when tested to GMW14695.

3.5.3.3 Internal bond strength of molded fiberglass shall be no less than 15 N/100 cm² when tested to GMW14695.

3.5.3.4 Some melt-blown insulations without a scrim shall meet all requirements except internal bond strength requirements.

3.5.4 Acoustic Performance Requirements. Suppliers must provide to GM random incidence absorption data of their fibrous materials per GMW14177.

3.5.4.1 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 ^{Note 1}

	Acoustic Pad		
Procedure	GMW14177		
Requirement	Average Absorption Coefficient		
Frequency (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

Note 1: Material performance level can be different than vehicle performance level.