



Vibration Damping Heat Fusible Pads

1 Scope

This specification details the material and performance requirements for heat-fusible (bakeable) and self-adhesive, bitumen-based, vibration damping sheets. These heat-fusible sheets are intended for application in the assembly plant paint shop to provide local vibration and sound damping effects to the body. These sheets are intended to be applied over metal with cured electrocoat (e-coat) and baked in at least one (1) paint shop oven. The materials are intended for use on horizontal, vertical, or negative horizontal (inverted) surfaces.

1.1 Material Description. Heat-fusible damping sheets consist primarily of a bitumen-based damping mat. The sheets may be supplied as a single layer or as a multilayer composite. When multiple layers are involved, the following descriptions are typical (see Table 1).

Adhesion to the substrate may be obtained through the use of a hot-melt adhesive or a heat-fusible film, applied to the bottom surface of the damping sheet and activated by the baking process. Prior to the bake, adhesion to the substrate may be enhanced with a magnetic filler in the bitumen-based mat or with a pressure sensitive adhesive (PSA) applied to the bottom surface of the sheet. Additional layers may be applied to the top surface of the first mat to provide anti-blocking or stiffening.

Only the complete system that has been validated as meeting the performance requirements of this standard shall be allowed.

Table 1: Damping Mat Types

Standard Paint Shop Process	Non-Compressed Integrated Paint Shop Process	Damping Mat Description	Green-State Adhesion (Before Bake)
Type 1	Type 1A	Standard bitumen with a heat-activated (hot melt) adhesive that can be applied in the paint shop	None
Type 2	Type 2A	Magnetic bitumen with a heat-activated adhesive (hot melt) that can be applied in the paint shop with magnetic strength ≥ 18 mT	Magnetic
Type 3	Type 3A	Standard bitumen with a pressure-sensitive adhesive on the attaching surface to enhance adhesion for difficult to bond areas	Pressure sensitive adhesive
Type 4	Type 4A	Same as Type 1 or Type 2 except with an epoxy restraining layer to induce stiffening	Same as Type 1 or Type 2
Type 5	Type 5A	Standard bitumen with a pressure-sensitive adhesive on the attaching surface to enhance adhesion for difficult to bond areas and magnetic bitumen	Magnetic plus PSA

1.1.1 Heat-Fusible Dampers for Standard Paint Shop Process (see Table 1, Type 1 thru Type 5). Materials designated as Type 1, Type 2, Type 3 and Type 4 (see Table 1) are intended for use in GM paint shops utilizing standard low or high bake primer surfacer paints (solvent-based, water-based or powder). The damping sheets are intended for application on the sealer line over metal substrates with cured **e-coat** and baked in the primer surfacer and topcoat ovens. All performance requirements must be achieved after the first oven and shall not be negatively impacted by subsequent ovens including topcoat reprocess.

1.1.2 Heat-Fusible Dampers for Non-compressed Integrated Paint Shop Process (see Table 1, Type 1A thru Type 5A). These materials correspond with Type 1 thru Type 5 (see Table 1) described in 1.1.1, but are intended for use in GM paint shops utilizing a non-baked primer process (non-compressed integrated, waterborne (WB)). In the non-compressed integrated process, the damping sheets are intended for application on the sealer line over metal substrates with cured **e-coat**. In a non-compressed integrated process, the damping mat is baked in a short sealer oven, followed by a waterborne (WB) primer, heated flash and then basecoat, one (1) component (1K) or two (2) component (2K) clearcoat and topcoat oven. All performance requirements must be achieved after the first oven and shall not be negatively impacted by subsequent ovens including topcoat reprocess.

1.2 Symbols. Not applicable.

1.3 Applicability. See Table 2.

Table 2: Typical Applications for Heat Fusible Materials

Type	Panel Position	Forms for Part Setting in Place (Before Oven)	Examples of Application
1/1A	Horizontal or specific area (tunnel transmission)	No adhesion	Floor, tunnel transmission
2/2A	Vertical or negative horizontal	Magnetic	Doors, roof, dash
3/3A	Vertical or negative horizontal	Pressure sensitive adhesive	Doors, roof, dash
4/4A	Vertical or negative horizontal	Type 1 or Type 2 (see Table 1) with restraining layer	Doors, roof, dash
5/5A	Negative horizontal	Pressure sensitive adhesive plus magnetic	Roof

1.4 Remarks. These materials are not intended to be applied in the body shop (over oily metal) or in general assembly without a bake (except Type 3/3A and Type 5/5A (see Table 1)). The materials specified are not intended for use in areas subject to excessive heat such as directly above exhaust components.

2 References

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

2.1 External Standards/Specifications.

ASTM D903	DIN 1544	EN 10140	SAE J1637
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2.2 GM Standards/Specifications.

GMW8	GMW3205	GMW14124	GMW15634
GMW3008	GMW3221	GMW14270	GMW15635
GMW3010	GMW3232	GMW14690	GMW16546
GMW3059	GMW3235	GMW14691	GMW16656
GMW3154	GMW3259	GMW14692	
GMW3182	GMW4217	GMW15174	

2.3 Additional References.

Engineering Drawing

Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02

3 Requirements

Unless otherwise specified, the following requirements must be met. All tests shall be performed on materials representative of production processes.

3.1 Test Specimen Conditioning. Test specimens shall be conditioned per GMW3221, Code A.

3.2 Physical Requirements. Requirements refer to the unbaked material unless otherwise specified. Type 3 and Type 3A (see Table 1) materials shall be tested with the PSA release liner removed.

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Page 2 of 8

3.2.1 Weight, GMW3182. Weight shall be specified on the engineering drawing as weight per unit area and is determined with scales providing an accuracy of ± 1 g.

3.2.2 Thickness. Following the paint bake at the assembly plant, the thickness shall be as specified on the engineering drawing and measured with a caliper rule. The supplier shall report the minimum and maximum nominal thicknesses intended for approval. Average thickness of the tested product shall be reported to the nearest 0.1 mm.

3.2.2.1 The maximum thickness allowed for each composite loss factor material grade is specified in Table 3 and Table 4. Following paint bake at the assembly plant, thickness shall be 3.0 mm maximum or as specified on the engineering drawing and measured with caliper rule.

Table 3: Nonmagnetic

Composite Loss Factor Grades	Maximum Nominal Thickness Millimeter (mm)	Maximum Mass per Area Kilogram per Meter Squared (kg/m ²)
Level 1	2.0	3.0
Level 2	3.0	4.5
Level 3	4.0	5.5
Engineering Drawing Specified	Engineering Drawing Specified	Engineering Drawing Specified

Table 4: Magnetic and Magnetic plus PSA

Composite Loss Factor Grades	Maximum Nominal Thickness (mm)	Maximum Mass per Area (kg/m ²)
Level 1	2.0	4.0
Level 2	3.0	6.0
Level 3	4.0	7.5
Engineering Drawing Specified	Engineering Drawing Specified	Engineering Drawing Specified

3.2.3 Surface Density (Mass per Area), GMW3182. Surface density shall be measured per GMW3182. Test with samples of minimum and maximum thickness, as reported in 3.2.2. In deviation to GMW3182, the average mass per area shall be reported to the nearest 0.1 kg/m². The maximum mass per area allowed for each composite loss factor material grade is specified in Table 3 and Table 4.

3.2.4 Tensile Strength, GMW3010. Tensile strength shall be measured per GMW3010 in machine direction (MD) and perpendicular to machine direction which is the transverse direction (TD). Test material dimensions shall be according to GMW3010, Code K for deadeners, except thickness which shall be per the minimum and maximum thickness reported in 3.2.2. Tensile strength shall be 0.5 MPa minimum for both MD and TD.

3.2.5 Flexibility, GMW3154. Flexibility shall be evaluated per GMW3154 using a 100 mm diameter mandrel. Test material dimensions shall be 150 mm x 150 mm minimum. Sample thickness shall be per the minimum and maximum thickness reported in 3.2.2. In deviation to GMW3154, omit the metal panel and use uncured conditioned material. There shall be no evidence of cracking.

3.2.6 Mold Resistance, GMW3259. There shall be no mildew growth. Mildew resistance shall be evaluated per GMW3259 using unbaked and maximum baked samples per Table 5 Bake Conditions.

3.2.7 Blocking Resistance. Ten (10) layers of the material must separate cleanly with no evidence of sticking when tested as follows: Samples with dimensions 50 mm x 50 mm and maximum thickness per 3.2.2 shall be stacked and exposed at 50 °C for 16 h under a 3.5 kPa load. Allow cooling to room temperature before separating.

3.2.8 Magnetic Force (Magnetic Materials Only). A 400 mm x 200 mm size test piece shall be prepared extracting it from a magnetic part. A quarter of a test piece shall be fixed by magnetic force to an electrocoated