



Thermal Insulation Materials

1 Scope

This standard provides a system for defining thermal protective materials for shielding components from heat sources.

1.1 Material Description. Materials shall be identified by Types (see Table 1) according to temperature requirements and suffixes to identify material construction and properties.

1.2 Symbols. Not applicable.

1.3 Applicability. Typical applications include engine compartment, chassis and other locations/applications where heat needs to be deflected or dissipated.

1.4 Remarks. For applications where only acoustic insulation is required and heat is not a factor, ($\leq 175\text{ }^{\circ}\text{C}$), refer to GMW14194. For applications where sleeving is required, refer to GMW15608.

2 References

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

2.1 External Standards/Specifications.

ASTM D1117	FMVSS 302	ISO 2589	ISO 23529
ASTM D5034	ISO 188	ISO 8510-2	UL 94V-0
DIN EN 590			

2.2 GM Standards/Specifications.

9985074	GMW3259	GMW14444	GMW16387
GMW3059	GMW3356	GMW14700	GMW16444
GMW3182	GMW3420	GMW14729	GMW16853
GMW3205	GMW14124	GMW14914	GMW16955
GMW3221	GMW14177	GMW15516	
GMW3232	GMW14194	GMW15608	
GMW3235	GMW14333	GMW16072	

2.3 Additional References. None.

3 Requirements

3.1 Temperature Requirements. Temperature ranges are identified as types according to Table 1.

3.1.1. Assembled thermal components shall be functional after exposure to the specified hours at the maximum temperature specified in Table 1. Suppliers must show compliance of their component to meet those temperature requirements.

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 Thermal Materials and Approximate Thermal Conductivities. Thermal materials are identified by use of suffixes as specified in Table 2.

Table 1: Temperature Ranges

Type	Temperature Range	Excursion Temperature (72 h $\pm$ 2 h)	Long Term Heat Resistance (3024 h $\pm$ 8 h)
5	40 °C to 175 °C	175 °C	150 °C
6	40 °C to 200 °C	200 °C	175 °C
7	40 °C to 250 °C	250 °C	200 °C
8	40 °C to 300 °C	300 °C	250 °C
9	40 °C to 350 °C	350 °C	300 °C
10	40 °C to 500 °C	500 °C	350 °C

Table 2: Thermal Materials

Suffix	Materials	Approximate K Values
A	Cotton Shoddy	~ 0.03 <i>Note 1</i>
B	Polyurethane Foams	~ 0.02 <i>Note 1</i>
C	Polyester Fibers	~ 0.06 <i>Note 2</i>
D	Fiberglass/Polyester Blends	~ 0.38 <i>Note 1</i>
E	Aramid Fibers and Blends	~ 0.05 <i>Note 2</i>
F	Fiberglass	~ 0.04 <i>Note 1</i>
G	Carbon Fibers	~ 1.70 <i>Note 1</i>
H	Ceramic Fibers	~ 0.03 <i>Note 3</i>
I	Basalt fibers	~ 0.35 <i>Note 4</i>
J	Aluminum Foil	~ 250.0 <i>Note 1</i>
K	Stainless Steel Foil	~ 16.0 <i>Note 1</i>
L	Silicas	~ 0.02 <i>Note 1</i>
M	Aerogels	~ 0.02 <i>Note 1</i>
N	Melamine Foam	~ 0.25 <i>Note 5</i>
O	Scrim or Facing (GMW15516)	Not applicable

Note 1: Engineering Toolbox; http://www.engineeringtoolbox.com/thermal-conductivity-d_429.html.

Note 2: Estimated.

Note 3: Thermal Conductivity, Theory, Properties and Applications by Terry M. Tritt.

Note 4: <http://basalt-alf.narod.ru>.

Note 5: Polymer Technologies Inc. (Polydamp).

3.3.1 Requirements on Test Specimens. All materials and material constructions tested to this specification shall be conditioned for 24 h according to GMW3221 Code A.

3.3.2 Product Characteristics. Mass per unit area, per GMW3182, and thickness, per ISO 2589, of all material and material constructions for this specification shall be called out on the engineering drawing or the math files.

3.3.3 Fibrous Materials Only.

3.3.3.1 Tear. Per ASTM D1117, Trapezoid Method. 125 N/cm² minimum (machine and across machine direction).