Designation: F868 – 17

Standard Classification for Laminated Composite Gasket Materials[1]

This standard is issued under the fixed designation F868; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This classification covers a means for specifying or describing pertinent properties of commercial laminate composite gasket materials (LCGM). These structures are composed of two or more chemically different layers of material. These materials may be organic or inorganic, or combinations with various binders or impregnants. Gasket coatings are not covered since details thereof are intended to be given on engineering drawings, or as separate specifications. Commercial materials designated as enveloped gaskets are excluded from this classification; they are covered in Practice F336. This classification system does not cover multilayer steel (MLS) gaskets currently used for some automotive exhaust and head gaskets. MLS gaskets are classified under Classification F2325.

1.2 Since all of the properties that contribute to gasket performance are not included, use of this classification as a basis for selecting LCGM is limited.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A109/A109M Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled

D2000 Classification System for Rubber Products in Automotive Applications

F104 Classification System for Nonmetallic Gasket Materials

F146 Test Methods for Fluid Resistance of Gasket Materials

F336 Practice for Design and Construction of Nonmetallic Enveloped Gaskets for Corrosive Service

F433 Practice for Evaluating Thermal Conductivity of Gasket Materials

F1276 Test Method for Creep Relaxation of Laminated Composite Gasket Materials

F2325 Classification for Multi-Layer Steel (MLS) and Other Metal Layer Gaskets for Transportation Applications

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *board*—the term board is used in the context of a thick (generally greater than 1.52 mm (0.060 in.)) and rigid nonmetallic material often purchased in sheet or strip form.

3.1.2 *composite gasket material*—a gasket structure composed of two or more different materials joined together in flat, parallel layers.

4. Significance and Use

4.1 This classification is intended to encourage uniformity in reporting properties; to provide a common language for communications between producers and users; to guide engineers and designers in the use, construction, and properties of commercially available materials; and to be versatile enough to cover new materials and test methods as they are introduced.

5. Basis of Classification

5.1 This classification is based on the principle that LCGM should be described, insofar as possible, in terms of use, composition, combining method, and specific physical and mechanical characteristics. Thus, users of gasket materials can, by selecting different combinations of materials and properties, define various parts. Suppliers, likewise, can report uses, composition, and properties of available products.

[1] This classification is under the jurisdiction of ASTM Committee F03 on Gaskets and is the direct responsibility of Subcommittee F03.30 on Classification.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

6. Numbering System

6.1 To permit line call-out of the description mentioned in 5.1, this classification establishes letter or number symbols to describe use, composition, and physical properties and performance levels of certain properties.

6.2 In specifying or describing gasket materials, each line call-out shall include the number of this system and a number and letter series describing the use, composition, and combining method plus suffix call-out, as shown in Table 1.

6.3 To further specify or describe gasket materials, each line call-out may include one or more suffix letter-numeral symbols, as listed in Table 2.

7. Physical and Mechanical Properties

7.1 Gasket materials identified by this classification shall have a number and letter call-out for end-use and construction indicated in Table 1 and additional properties by a letter-numeral call-out shown in Table 2.

8. Thickness Requirements

8.1 Gasket materials identified by this classification shall conform to the thickness specified on the gasket drawing or on the order.

8.2 The thickness of individual components of the composite may be specified on the drawing, where necessary, and where components can be measured.

9. Sampling

9.1 Specimens shall be selected from finished gaskets or sheets of suitable size, whichever is the more practicable. If finished gaskets are used, the dimensions of sample and any variations from method must be reported.

9.2 Sufficient specimens shall be selected to provide a minimum of three determinations for each test specified. The average of the determinations shall be considered as the result.

10. Conditioning

10.1 Prior to all tests, specimens shall be conditioned as follows:

10.1.1 When all Classification F104 layers of the composite are of the same "type," condition per that type.

10.1.2 When the layers of the composite are of different Classification F104 "types," the composite shall be conditioned 22 h in a controlled humidity room, or in a closed chamber containing air at 21 to 30°C (70 to 86°F) and 50 to 55 % relative humidity.

10.1.3 Other conditioning may be used as agreed upon between producer and user.

11. Test Methods

11.1 The test methods are indicated in Table 2 under each suffix symbol when appropriate. Results must be reported as specified in each test method used.

12. Keywords

12.1 classification; composite; gasket materials; laminated

TABLE 1 Basis of Classification

First digit Typical end-use	Letter group Composition (Component material)	Second digit Combining method
0. Not specified	N. Not specified	0. Not specified
1. Carburetor, engine	B. Board	1. Tanged perforation
2. Intake manifold, engine	M. Metal	2. Chemical bond
3. Exhaust manifold, engine	F. Classification F 104 material	3. Tanged perforation plus chemical bond
4. Cylinder head, engine	R. Rubber Classification D 2000	4. Grommets
5. Transmission, engine	P. Plastics	5. Overlap
6. Ducts and piping	T. Textiles	6. Bonded and vulcanized
7. Compressors	S. As specified	9. As specified
9. As specified		
	Suffix designation Any specific test requirement Letters represent types of tests Numbers represent values	

NOTE—This classification is intended to be open-ended with a two-digit plus letter group call-out. The letters in the group for a given composite gasket material will be those representing the layers in order.

Example: 4 FMF1; F = F112440; M = Specification A 109

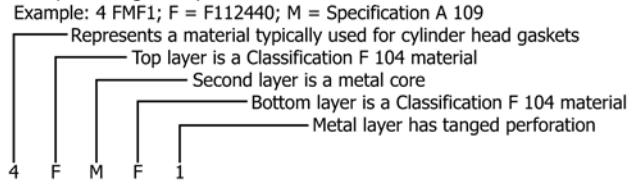

TABLE 2 Supplementary Physical and Mechanical Characteristics

Suffix Symbol	Supplementary Characteristics
A9	*Sealability* characteristics determined as agreed upon between supplier and user.
C9	*Compressibility* characteristics as agreed upon between producer and user.
D9	*Release* characteristics determined as agreed upon between supplier and user.
E00 through E99	*Weight and thickness change after immersion in ASTM Fuel B* shall be determined in accordance with Test Methods F146. *Weight increase* shall not exceed the standard rating number indicated by the *first* numeral of the two-digit number of the E-/symbol. *Thickness increase* shall not exceed the standard rating indicated by the *second* numeral of the E-/symbol. Percent Weight Increase (first numeral) / Percent Thickness Increase (second numeral) E0_ = not specified; E_0 = not specified E1_ = 10; E_1 = 0–5 E2_ = 15; E_2 = 0–10 E3_ = 20; E_3 = 0–15 E4_ = 30; E_4 = 5–20 E5_ = 40; E_5 = 10–25 E6_ = 50; E_6 = 15–35 E7_ = 60; E_7 = 25–45 E8_ = 100; E_8 = 30–60 E9_ = as specified; E_9 = as specified
G00 through G99	*Weight and thickness change after immersion in ASTM #3 Oil* shall be determined in accordance with Test Methods F146. *Weight increase* shall not exceed the standard rating number indicated by *first* numeral of the two-digit number of the G-/symbol. Thickness increase shall not exceed the standard rating number indicated by the *second* numeral of the G-/symbol. Percent Weight Increase (first numeral) / Percent Thickness Increase (second numeral) G0_ = not specified; G_0 = not specified G1_ = 10, max; G_1 = 0–15 G2_ = 15, max; G_2 = 5–20 G3_ = 20, max; G_3 = 10–25 G4_ = 30, max; G_4 = 15–30 G5_ = 40, max; G_5 = 20–40 G6_ = 60, max; G_6 = 30–50 G7_ = 80, max; G_7 = 40–60 G8_ = 100, max; G_8 = 50–70 G9_ = as specified; G_9 = as specified
H1 through H9	*Creep relaxation* characteristics shall be determined in accordance with Test Method F1276. Loss of stress at the end of the test shall not exceed the amount indicated by the numeral of the H-/symbol. H1 = 10 %; H5 = 30 % H2 = 15 %; H6 = 40 % H3 = 20 %; H7 = 50 % H4 = 25 %; H9 = as specified
K0 through K9	*Thermal conductivity* characteristics shall be determined in accordance with Practice F433. The K-factor obtained in W/m·K (Btu·in./h·ft^2·°F), shall fall within the ranges indicated by the numeral of a K-/symbol. K1 = 0. to 0.09 (0 to 0.65) K2 = 0.07 to 0.17 (0.50 to 1.15) K3 = 0.14 to 0.24 (1.00 to 1.65) K4 = 0.22 to 0.31 (1.50 to 2.15) K5 = 0.29 to 0.38 (2.00 to 2.65) K6 = 0.36 to 0.45 (2.50 to 3.15) K7 = 0.43 to 0.53 (3.00 to 3.65) K8 = 0.50 to 0.60 (3.50 to 4.15) K9 = as specified[A]
L9	*Laminated bond* characteristics as agreed upon between producer and user.
X9	*Crush-extrusion* resistance characteristics as agreed upon between producer and user.
Y9	*Coating(s)* per drawing details.
Z0 through Z9	Any other properties per drawing details.

[A] On engineering drawings or other supplements to this classification.