Designation: F2325 – 14

Standard Classification for Multi-Layer Steel (MLS) and Other Metal Layer Gaskets for Transportation Applications[1]

This standard is issued under the fixed designation F2325; 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 Multi-Layer Steel (MLS) and other Metal Layer Gaskets for Transportation Applications by application and construction. These structures are composed of one or more steel or metal layers of material, which may have coatings or embossments. Commercial materials designated as composite or enveloped gaskets are excluded from this classification and are covered by Classification F868 and Practice F336, respectively.

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

1.3 *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 requirements prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

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

A666 Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

D1418 Practice for Rubber and Rubber Latices—Nomenclature

D2000 Classification System for Rubber Products in Automotive Applications

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

F868 Classification for Laminated Composite Gasket Materials

2.2 *SAE Standard:*

SAE AE-13 Gasket and Joint Design Manual for Engine and Transmission Systems[3]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *active layer(s)*—an embossed layer(s) used to provide the primary sealing function.

3.1.2 *embossment (emboss)*—a raised area of a steel or metal layer in relief from the rest of the layer with a defined geometry typically used at the sealing interface. Embossments may also be used to shift load to areas, which require better sealing performance.[4]

3.1.3 *exterior coating*—a supplemental coating applied to the exterior of the gasket for anti-fret, anti-blocking, or sealing enhancement.

3.1.4 *inactive layer(s)*—the flat or non-embossed layer(s) used for spacing or other purposes within the gasket.

3.1.5 *load stop (stopper)*—a device used to control compression on Single Layer Steel (SLS) or between layers in an MLS or Metal Layer gasket.

4. Significance and Use

4.1 This classification is intended to encourage uniformity in reporting properties of MLS and Metal Layer gaskets, to provide a common language for communications between producers and users, and to guide engineers and designers in the application and construction of commercially available gaskets.

4.2 Suffix Table 2 is provided to allow hardness designation for Active, Inactive, or Load Stoppers.

4.2.1 If suffixes are not to be used, only the basic callout from Table 1 is required. If a suffix is used for 1 layer, it must be specified for all layers, even if a "0" is used. It cannot be assumed that hardnesses of like layers are the same; if used, all layers must be specified separately. The first layer specified

[1] This classification is under the jurisdiction of ASTM Committee F03 on Gaskets and is the direct responsibility of Subcommittee F03.10 on Composite Gaskets.

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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.

[3] Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001.

[4] Load shifting reference from SAE AE-13, "Gasket and Joint Design Manual for Engine and Transmission Systems."

TABLE 1 Basis of Classification[A]

1st Letter	1st Digit	2nd Digit	2nd Letter	3rd Letter	4th Letter	5th Letter	3rd Digit	4th Digit
Application	Total Number Steel/Metal Layers	Number of Active Layers	Steel/Metal[B] Active Layers	Coating Type[C] Active Layers	Steel/Metal[B] Inactive Layers	Coating Type[C] Inactive Layers	Load Stop (Stopper)	Exterior Coating
A–Head Gasket B–Exhaust Gasket C–Intake System D–Engine Oil System E–Transmission Oil System F–Coolant System G–Fuel System X–As Specified Y–Not Specified Z–Not Applicable	1–one layer 2–two layers 3–three layers 4–four layers 5–five layers 6–six layers 7–seven layers 8–eight layers 9–As Specified	0–none 1–one layer 2–two layers 3–three layers 4–four layers 5–five layers 6–six layers 7–seven layers 8–eight layers 9–As Specified	A–301SS B–304SS C–420SS D-309SS E-441SS F–201SS H-High Temp Alloy X–As Specified Y–Not Specified Z–Not Applicable	B-Boronitride N–NBR F–FKM M-MoS2 S-Sinter Brass W–none X–As Specified Y–Not Specified Z–Not Applicable	A–301SS B–304SS C–420SS D–LCS E–Aluminum X–As Specified Y–Not Specified Z–Not Applicable	B-Boronitride N–NBR F–FKM M-MoS2 S-Sinter Brass W–none X–As Specified Y–Not Specified Z–Not Applicable	0–Not Specified 1–Yes 2–No 3–External stopper feature (that is, groove in flange)	0–Not Specified 1–Yes 2–No 3–Both Exterior Sides 4–1 Exterior side[D]
		Example: ASTM F2325, A32ANBW11 A–Represents an MLS or Metal Layer gasket used in a head gasket application. 3–Total number of Steel/Metal Layers is three. 2–Total number for Active Layers is two. A–Active Layers are made of 301 stainless steel. N–Active Layers are coated with NBR (Acrylonitrile-butadiene). B–Inactive Layers are made of 304 stainless steel. W–Inactive Layers are not coated. 1–A Load Stop (Stopper) is used. 1–An Exterior Coating is used (unspecified if it is on one or both exterior sides).						

[A] This classification may also be used to classify Single Layer Steel (SLS) Gaskets.
[B] Refer to Specification A666 or Specification A109/A109M for Stainless Steel and Low Carbon Steel, respectively. Other metals not referenced in the table or not covered by Specification A666 or Specification A109/A109M must be defined by the producer/user (that is, H – High Temperature Alloy).
[C] Refer to Practice D1418 for general information regarding rubber coating types and use Classification D2000 to define the physical properties of the rubber. This physical property information is typically specified on the gasket drawing or the customer specification, or both.
[D] Coated side as specified on part drawing.

TABLE 2 Suffix Additions for Specifyng Layer Hardness

0	Not Specified
1	Annealed
2	¼ Hard
3	½ Hard
4	¾ Hard
5	Full Hard
6	Extra Hard
9	As Specified

must be indicated on the part drawing. To use a hardness call-out, at the end of the base callout leave a space followed by the "HR" suffix with a series of suffix numbers to specify the hardnesses for each layer.

4.2.1.1 *Example: ASTM F2325, A32ANBW11 HR252*—Example from Table 1 modified to add hardness requirement for the three metal layers. Active layers 1 and 3 are designated to be the same, ¼ hard steel. Stopper layer 2 is designated to be full hard steel.

5. Basis of Classification

5.1 This classification is based on the principle that MLS and Metal Layer gaskets should be described, in terms of the transportation application and construction. Thus, users of MLS and Metal Layer gaskets can, by selecting different combinations, define various parts needed for specific applications. Likewise, producers can report applications and construction of available products.

6. Numbering System

6.1 To permit a line call-out of the description mentioned in 5.1, this classification establishes letter or number symbols to describe application and construction of MLS and Metal Layer gaskets.

6.2 In specifying or describing MLS and Metal Layer gaskets, each line call-out shall include the ASTM classification number of this standard, and a nine character number and letter series describing the application and construction, as shown in Table 1.

7. Physical and Mechanical Properties

7.1 MLS and Metal Layer gaskets identified by this classification shall have a number and letter call-out for the transportation application and construction as indicated in Table 1.

8. Thickness Requirements

8.1 MLS and Metal Layer gaskets identified by this classification shall conform to the free state or compressed thickness as specified on the gasket drawing, or customer specification, or both.

8.2 The thickness of individual components of the MLS and Metal Layer gaskets may be specified on the drawing, where necessary, and where components can be measured.

9. Sampling

9.1 Sampling methods are not applicable to this standard.

10. Conditioning

10.1 Conditioning methods are not applicable to this standard.

11. Test Methods

11.1 The test methods are not applicable to this standard.

12. Keywords

12.1 classification; gaskets; load stop (stopper); metal gaskets; metal layer gaskets; MLS gaskets; multi-layer steel (MLS) gaskets; single layer steel (SLS) gaskets; steel