



## Standard Specification for Metal, Expanded, Steel<sup>1</sup>

This standard is issued under the fixed designation F 1267; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification covers expanded metal for shipboard use.

1.1.1 Expanded metal covered by this specification is intended for partition bulkheads (nonstructural), top side stowage baskets, floor gratings, and other uses.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only and may be approximate.

1.3 The following precautionary caveat pertains only to the test methods portion, Section 10, of this specification. *This standard does not purport to address all of the safety problems 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.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:

A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip<sup>2</sup>

A 568 Specification for Steel, Sheet, Carbon and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for<sup>2</sup>

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment<sup>3</sup>

#### 2.2 SAE Standard:

SAE J 1086 Metals and Alloys in the Unified Numbering System<sup>4</sup>

#### 2.3 Military Standards:<sup>5</sup>

MIL-C-16173 Corrosion Preventive Compound, Solvent Cutback, Cold-Application

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.19 on Steel Sheet and Strip.

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<sup>2</sup> Annual Book of ASTM Standards, Vol 01.03.

<sup>3</sup> Annual Book of ASTM Standards, Vol 01.05.

<sup>4</sup> Available from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

<sup>5</sup> Available from Standardization Documents, Order Desk, Building 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

MIL-STD-163 Steel Mill Products Preparation for Shipment and Storage

### 3. Classification

3.1 Expanded metal shall be of the following types, classes, and grades as specified (see 4.1.2).

#### 3.2 Type:

3.2.1 *Type I*—Expanded (see Fig. 1).

3.2.2 *Type II*—Expanded and flattened (see Fig. 2).

#### 3.3 Class:

3.3.1 *Class 1*—Uncoated.

3.3.2 *Class 2*—Hot-dip zinc-coated (galvanized).

3.3.3 *Class 3*—Corrosion-resisting steel.

#### 3.4 Grade:

3.4.1 *Grade A*—0.0025 in. (0.06 mm) minimum coating thickness.

3.4.2 *Grade B*—0.0012 in. (0.03 mm) minimum coating thickness.

### 4. Ordering Information

4.1 Orders for material under this specification shall include the following information, as required, to describe the material adequately:

4.1.1 ASTM designation,

4.1.2 Type, class, and grade of steel required (see 3.1),

4.1.3 Material required (see 5.1),

4.1.4 Direction of shear, if not as specified (see 5.2.1),

4.1.5 Length, width, and thickness of uncoated mesh, and weight per square foot uncoated (see Tables 1-4),

4.1.6 Size of sheet required, if other than sizes specified in 6.1,

4.1.7 Whether or not sheets from which samples have been selected for coating thickness test may be included as part of material shipped (see 9.1.2), and

4.1.8 Optional requirements, if any (see Supplementary Requirements S1 through S3).

### 5. Materials and Manufacture

5.1 Expanded metal shall be made from carbon steel sheets of Unified Numbering System (UNS) alloys G 10250 to G 10350 as specified in Specification A 568, or from corrosion-resisting sheet as specified in Specification A 167 (see 4.1.3).

5.2 Expanded metal shall be manufactured from sheet steel

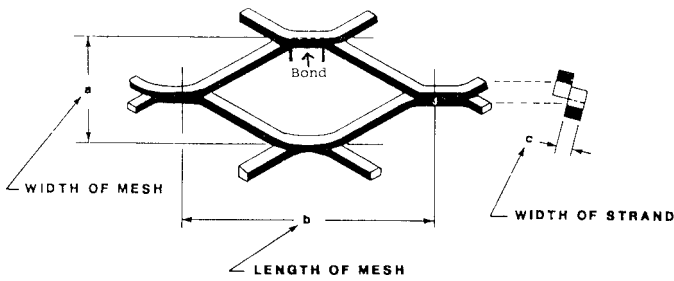


FIG. 1 Type I, Expanded

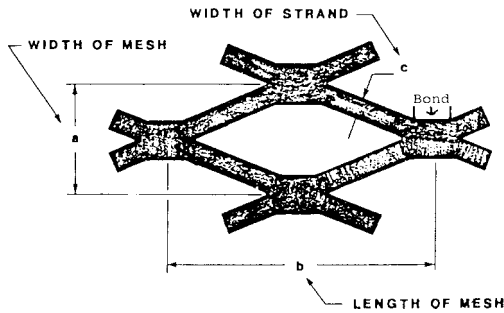


FIG. 2 Type II, Expanded and Flattened

TABLE 1 Carbon Steel Sizes, Strand Sizes, and Weight for Type I, Class 1 Metal<sup>A</sup>

Style Designation	Size of Mesh		Width of Strand, in. (See Fig. 1(c))	Weight per Square Foot Uncoated, lb <sup>C</sup>
	Dimensions Center to Center <sup>B</sup> of Bonds			
	Width, in. (See Fig. 1(a))	Length, in. (See Fig. 1(b))		
½ number 18	0.48	1.2	0.084–0.092	(0.70–0.77)
¾ number 13	0.92	2.0	0.090–0.100	0.80
¾ number 10	0.92	2.0	0.136–0.150	1.20
¾ number 9	0.92	2.0	0.136–0.150	1.80
	1.33	5.33	0.259–0.269	3.00
3 pound grating	1.44	5.00	0.232–0.242	3.00
4 pound grating	1.33	5.33	0.292–0.304	4.00
1½ number 13	1.33	3.0	0.100–0.116	0.60
1½ number 10	1.33	3.0	0.130–0.142	0.79
1½ number 9	1.33	3.0	0.130–0.142	1.20
1½ number 6	1.33	3.0	0.195–0.210	2.50
4.27 pound grating	1.412	4.0	0.292–0.304	4.27
3.14 pound grating	2.00	6.00	0.305–0.317	3.14

<sup>A</sup> 1 in. = 25.4 mm; 1 lb = 0.454 kg.

<sup>B</sup> A tolerance of ±10 % is permitted in dimensions, center to center.

<sup>C</sup> A variation in weight per square foot of ±5 % is permissible, based on the weight of any sheet or bundle.

in thicknesses corresponding to Tables 1-4 as specified (see 4.1.5).

5.2.1 Unless otherwise specified (see 4.1.4), the steel shall be sheared so that each sheet will be expanded into uniform diamond-shaped openings, the longer diagonals of which shall be parallel to the rolling direction of the sheet. The strands (c on Fig. 1 and Fig. 2) that form the sides of the openings shall be straight and shall be rectangular in cross-section. Each

TABLE 2 Carbon Steel Sizes, Strand Sizes, and Weight for Type II, Class 1 Metal<sup>A</sup>

Style Designation	Size of Mesh		Width of Strand, in. (See Fig. 2(c))	Weight per Square Foot Uncoated, lb <sup>C</sup>
	Dimensions Center to Center <sup>B</sup> of Bonds			
	Width, in. (See Fig. 2(a))	Length, in. (See Fig. 2(b))		
¼ number 18	0.25	1.031	0.080	1.80
½ number 40	0.462	1.26	0.065	0.38
½ number 18	0.462	1.26	0.100	0.70
½ number 16	0.462	1.26	0.089	0.80
½ number 13	0.462	1.26	0.111	1.40
¾ number 16	0.850	2.12	0.110	0.55
¾ number 13	0.923	2.12	0.137	0.76
¾ number 9	0.923	2.12	0.157	1.71
1 number 16	1.05	2.562	0.106	0.41
1½ number 16	1.33	3.20	0.127	0.38
1½ number 13	1.33	3.20	0.130	0.57
1½ number 9	1.33	3.20	0.165	1.14

<sup>A</sup> 1 in. = 25.4 mm; 1 lb = 0.454 kg.

<sup>B</sup> A tolerance of ±10 % is permitted in dimensions, center to center.

<sup>C</sup> A variation in weight per square foot of ±5 % is permissible, based on the weight of a bundle.

TABLE 3 Stainless Steel Styles, Weights, Dimensions, and Sheet Sizes for Type I, Class 3 Metal<sup>A</sup>

Style Designation	Weight per Square Foot, lb <sup>B</sup>	Size of Mesh <sup>C</sup>		Strand, in. <sup>C</sup> (See Fig. 1 (c))
		Width, in. (See Fig. 1 (a))	Length, in. (See Fig. 1 (b))	
		½ No. 18	0.73	
½ No. 16	0.91	0.480	1.20	0.085
¾ No. 18	0.47	0.900	2.00	0.100
¾ No. 16	0.60	0.900	2.00	0.100
¾ No. 13	0.91	0.900	2.00	0.100
¾ No. 9	2.05	0.900	2.00	0.150
1½ No. 16	0.43	1.33	3.00	0.115
1½ No. 13	0.68	1.33	3.00	0.115
1½ No. 9	1.37	1.33	3.00	0.155

<sup>A</sup> 1 lb = 0.454 kg; 1 in. = 25.4 mm.

<sup>B</sup> A variation in weight per square foot of ±5 % is permissible, based on the weight of any sheet or bundle.

<sup>C</sup> A tolerance of ±10 % is permitted in dimensions.

opening shall be integral with adjoining openings by means of unshared bonds (see Fig. 1 and Fig. 2) of the original sheet.

## 6. Dimensions, Mass, and Permissible Variations

6.1 Unless otherwise specified (see 4.1.6), Type I expanded metal shall be furnished in sheets 6 ft (1.8 m) wide by 8 ft (2.4 m) long, and Type II, flattened, expanded metal shall be furnished in sheets 4 ft (1.2 m) wide by 8 ft (2.4 m) long.

6.2 Types I and II expanded metal shall be furnished in accordance with the weights and dimensions as specified in Tables 1-4, respectively.

### 6.3 Tolerances for Type I sheets:

6.3.1 Strand width shall not vary in excess of ±10 % of the nominal width.

6.3.2 Sheet width shall be not less than ¼ in. (6 mm) below ordered width and shall not exceed ⅛ in./ft of sheet width (10 mm/m of sheet width).

**TABLE 4 Stainless Steel Styles, Weights, Dimensions, and Sheet Sizes for Type II, Class 3 Metal<sup>A</sup>**

Style Designation	Weight per Square Foot, lb <sup>B</sup>	Size of Mesh <sup>C</sup>		Strand, in. <sup>C</sup> (See Fig. 2 (c))
		Width, in. (See Fig. 2 (a))	Length, in. (See Fig. 2 (b))	
½ No. 18	0.70	0.475	1.24	0.100
½ No. 16	0.90	0.475	1.24	0.100
¾ No. 18	0.46	0.900	2.100	0.118
¾ No. 16	0.57	0.900	2.100	0.118
¾ No. 13	0.88	0.900	2.100	0.118
¾ No. 9	1.96	0.900	2.100	0.165
1½ No. 16	0.42	1.330	3.100	0.130
1½ No. 13	0.66	1.330	3.100	0.130
1½ No. 9	1.32	1.330	3.100	0.165

<sup>A</sup> 1 lb = 0.454 kg; 1 in. = 25.4 mm.

<sup>B</sup> A variation in weight per square foot of ±5 % is permissible, based on the weight of any sheet or bundle.

<sup>C</sup> A tolerance of ±10 % is permitted in dimensions.

6.3.3 Sheet length on 96-in. (2.4-m) length sheets shall not vary by an amount greater than plus ¾ in. (19 mm) or minus 0 in.

6.3.4 The greatest deviation of a side edge from a straight line shall not exceed ¼ in. (6 mm) in 96 in. (2.4 m).

6.3.5 Sheet edges shall not deviate from parallel by more than ⅜ in. (10 mm) in 96 in. (2.4 m).

6.3.6 Sheet edges shall be such that any intersecting side and edge shall not be out of square in excess of ⅛ in./ft (10 mm/m).

6.3.7 Sheets shall be free from waves or buckles that are in excess of ¾ in. (19 mm) from a plane surface.

6.3.8 Each sheet shall have at least one end with closed diamond openings and full length bonds.

6.4 *Tolerances for Type II sheets:*

6.4.1 Strand width shall not vary in excess of ±10 % of the nominal width.

6.4.2 Sheet thickness after flattening shall not be greater than 90 % and not less than 80 % of the nominal gage thickness specified for the steel sheet.

6.4.3 Sheet width after flattening shall not be less than ¼ in. (6 mm) below nominal width and shall not exceed ⅛ in./ft (10 mm/m) of nominal width.

6.4.4 Sheet length after flattening shall not vary from the nominal length by an amount greater than plus ¼ in. (6 mm) or minus 0 in.

6.4.5 The greatest deviation of a side edge from a straight line after flattening shall not exceed ¼ in. (6 mm) in 96 in. (2.4 m).

6.4.6 Sheet edges shall not deviate from parallel by more than ⅜ in. (10 mm) in 96 in. (2.4 m).

6.4.7 Ends of sheets, after shearing, shall not be more than ⅛ in./ft (5 mm/m) out of square, in relation to the side of the sheet used to gage the shearing.

6.4.8 Sheets shall be free from waves or buckles that are in excess of ⅜ in. (10 mm) from a plane surface.

6.4.9 After flattening, each sheet shall be sheared on one end as close as practicable to the centerline of a row of bonds.

**7. Workmanship, Finish, and Appearance**

7.1 *Workmanship:*

7.1.1 The strands shall be substantially uniform in width

and thickness and shall be smooth and free from sharp edges. Broken strands, weld-repaired strands, laminations, irregular-shaped openings, and any other defects that may affect serviceability shall not be acceptable.

7.1.2 Expanded metal shall be free from burrs and slivers. Type II expanded metal shall be deburred prior to zinc coating.

7.1.3 Type II flattened, expanded metal shall have the strands and bonds in the same plane as a result of passing through flattening rolls.

7.2 *Zinc coating:*

7.2.1 Only carbon steels shall be zinc coated.

7.2.2 Class 2 expanded metal shall be completely and uniformly zinc coated by the hot-dip process, after shearing, expanding, and deburring, shall be free from excessive accumulations of zinc in the apexes of diamond openings, and shall be free from bare spots.

7.2.3 The zinc coated surface of the metal shall be uniformly smooth and free from dross, flux, and oxide residue or other discoloration producing material (see 10.2).

7.2.3.1 Yellow discoloration produced by sal ammoniac fumes shall not be cause for rejection.

7.2.3.2 Zinc “feathers” that may be removed as the result of normal handling, which does not result in exposure of the basis metal, shall not be cause for rejection.

7.2.4 Paint or paint-like material shall not be used to coat bare areas. Unless approved for each individual contract or order by the purchaser, heat-applied galvanizing repair compounds shall not be used to cover bare areas.

7.2.5 The thickness of the coating shall be 0.0025 in. (0.06 mm) minimum for Grade A expanded metal and 0.0012 in. (0.03 mm) minimum for Grade B expanded metal on all surfaces except at the edges (corners) of the strands when tested as specified in 10.2.

7.2.6 The requirements for thickness of coating using the microscopic test method specified in 10.3 shall be 0.0025 in. (0.06 mm) minimum average thickness for Grade A expanded metal and 0.0012 in. (0.03 mm) minimum average thickness for Grade B expanded metal.

**8. Sampling**

8.1 Expanded metal sheets of the same material, type, class, grade and dimensions, and manufactured under essentially the same conditions, shall be considered a lot for purposes of acceptance inspection and tests.

8.2 *Sampling for Coating Thickness Test*—A random sample of expanded metal sheets shall be selected from each inspection lot (see 8.1) of Class 2 material, in accordance with Table 5, and subjected to the zinc-coating thickness test specified in 10.2 and 10.3.

**TABLE 5 Sampling for Lot Acceptance**

Number of Expanded Metal Sheets in Inspection Lot	Number of Expanded Metal Sheets for Test
40 or under	1
41 to 300	2
301 to 1300	3
1301 and over	4