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Standard Specification for Metal, Expanded, Steel[1]

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 (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This specification covers expanded metal.

1.1.1 Expanded metal covered by this specification is intended for a variety of applications.

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:* [2]

A 123/A 123M Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A 176 Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip

A 240/A 240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A 666 Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment

A 1008/A 1008M Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

A 1011/A 1011M Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

2.2 *SAE Standard:*[3]

SAE J 1086 Metals and Alloys in the Unified Numbering System

2.3 *Military Standards:*[4]

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

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

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.

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[1] This specification is under the jurisdiction of ASTM Committee A01 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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[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, http://www.sae.org.

[4] Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, http://www.mss-hq.com.

***A Summary of Changes section appears at the end of this standard.**

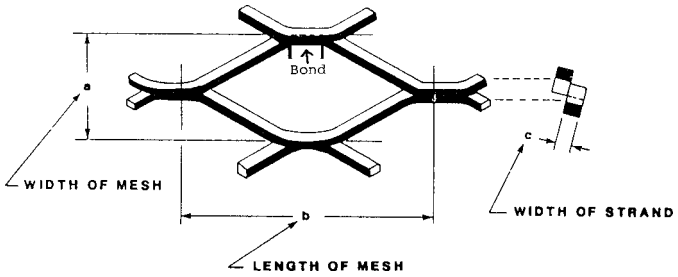

FIG. 1 Type I, Expanded

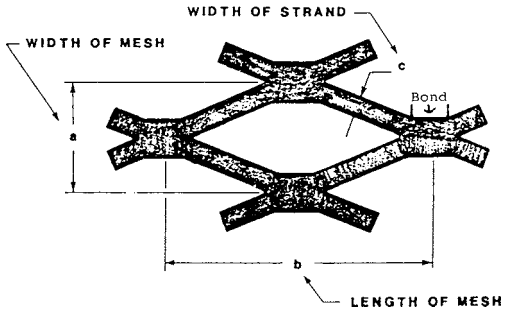

FIG. 2 Type II, Expanded and Flattened

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 Commercial Steel (CS Type B) carbon steel sheets as specified in Specifications A 1008/A 1008M or A 1011/A 1011M or from stainless steel sheets as specified in Specifications A 167, A 176, A 240/A 240M or A 666.

5.2 Expanded metal shall be manufactured from sheet steel 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 opening shall be integral with adjoining openings by means of unsheared 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 4 ft (1.2 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 1 Carbon Steel Dimensions, Strand Sizes, and Weight for Type I, Class 1 Metal[A]

Style	Lbs per CSF[B]	Design Size[C]		Opening Size[C]		Strand Size				Approximate Values for Information Only	
						Width		Thickness			
		SWD	LWD	SWO	LWO	Min.	Max	Min.	Max	Overall Thickness	Percent Open Area
¼ 20	84	0.250	1.000	0.125	0.718	0.065	0.079	0.0329	0.0389	0.135	42 %
¼ 18	112	0.250	1.000	0.110	0.718	0.065	0.079	0.0428	0.0528	0.147	42 %
½ 20	42	0.500	1.200	0.438	0.938	0.065	0.079	0.0329	0.0389	0.140	71 %
½ 18	69	0.500	1.200	0.438	0.938	0.079	0.097	0.0428	0.0528	0.172	65 %
½ 16	85	0.500	1.200	0.375	0.938	0.178	0.096	0.0538	0.0658	0.175	65 %
½ 13	141	0.500	1.200	0.312	0.938	0.086	0.106	0.0827	0.0967	0.204	62 %
½ 13.188	306	0.500	1.200	0.250	0.800	0.188	0.230	0.0827	0.0967	0.275	16 %
¾ 16	53	0.923	2.000	0.813	1.750	0.091	0.111	0.0538	0.0658	0.210	78 %
¾ 13	76	0.923	2.000	0.750	1.688	0.086	0.106	0.0827	0.0967	0.205	79 %
¾ 10 13	114	0.923	2.000	0.750	1.625	0.130	0.158	0.0827	0.0967	0.290	69 %
¾ 9	178	0.923	2.000	0.688	1.562	0.135	0.165	0.1265	0.1425	0.312	67 %
1 16	42	1.000	2.400	0.938	2.000	0.078	0.096	0.0538	0.0658	0.192	83 %
1 14	74	1.000	2.400	0.875	1.563	0.110	0.134	0.0677	0.0817	0.225	76 %
1 12	93	1.000	2.400	0.907	1.563	0.098	0.120	0.0966	0.1126	0.225	78 %
1 10L	171	1.000	2.400	0.750	1.563	0.140	0.172	0.1265	0.1425	0.375	69 %
1 10H	198	1.000	2.400	0.750	1.563	0.162	0.198	0.1265	0.1425	0.390	64 %
1 7	403	1.000	2.400	0.576	1.563	0.248	0.303	0.1713	0.1873	0.550	45 %
1½ 18	20	1.330	3.000	1.313	2.625	0.061	0.075	0.0428	0.0528	0.140	90 %
1½ 16	40	1.330	3.000	1.250	2.625	0.097	0.119	0.0538	0.0658	0.230	84 %
1½ 13	58	1.330	3.000	1.888	2.500	0.095	0.116	0.0827	0.0967	0.242	84 %
1½ 10 13	76	1.330	3.000	1.888	2.500	0.124	0.152	0.0827	0.0967	0.284	79 %
1½ 12	70	1.330	3.000	1.112	2.375	0.098	0.120	0.0966	0.1126	0.225	84 %
1½ 10L	165	1.330	3.000	1.000	2.375	0.180	0.220	0.1265	0.1425	0.380	70 %
1½ 10H	198	1.330	3.000	0.830	2.375	0.216	0.264	0.1265	0.1425	0.460	64 %
1½ 9	119	1.330	3.000	1.125	2.375	0.130	0.158	0.1265	0.1425	0.312	78 %
~~1½ 6~~	~~242~~	~~1.330~~	~~3.000~~	~~1.110~~	~~2.313~~	~~0.183~~	~~0.223~~	~~0.1853~~	~~0.2033~~	~~0.433~~	~~69 %~~
1½ 6	250	1.330	3.000	1.110	2.313	0.183	0.223	0.1853	0.2033	0.433	69 %
2 10 13	65	1.850	4.000	1.625	3.438	0.148	0.180	0.0827	0.0967	0.327	82 %
2 9	88	1.850	4.000	1.563	3.375	0.134	0.164	0.1265	0.1425	0.312	84 %

[A] 1 in. = 25.4 mm; 1 lb = 0.454 kg.
[B] A variation in weight per square foot of ±5 % is permissible, based on the weight of any sheet or bundle.
[C] A tolerance of ±10 % is permitted in dimensions, center to center.

TABLE 1 Grating—Carbon Steel Dimensions, Strand Sizes, and Weight for Type I, Class I Metal[A] *(continued)*

Style	Lbs per ft^2[B]	Design Size[C]		Opening Size[C]		Strand Size				Approximate Values for Information Only			
						Width		Thickness		Overall Thickness	Designs per ft		Percent Open Area
		SWD	LWD	SWO	LWO	Min.	Max	Min.	Max		SWD	LWD	
2 lb	2.000	1.330	5.330	1.000	3.600	0.223	0.247	0.127	0.142	0.460	9.000	2.250	65 %
3 lb	3.000	1.330	5.330	0.940	3.440	0.251	0.277	0.171	0.187	0.540	9.000	2.250	60 %
3.14 lb	3.140	2.000	6.000	1.625	4.880	0.296	0.328	0.238	0.266	0.656	6.000	2.000	69 %
4 lb	4.000	1.330	5.330	0.940	3.440	0.285	0.315	0.204	0.226	0.618	9.000	2.250	55 %
4.27 lb	4.270	1.410	4.000	1.000	2.880	0.285	0.315	0.238	0.266	0.625	8.500	3.000	57 %
5 lb	5.000	1.330	5.330	0.813	3.380	0.314	0.348	0.238	0.266	0.655	9.000	2.250	50 %
6.25 lb	6.250	1.410	5.330	0.813	3.380	0.333	0.638	0.293	0.328	0.715	8.500	2.250	50 %
7 lb	7.000	1.410	5.330	0.813	3.380	0.371	0.411	0.293	0.328	0.740	8.500	2.250	45 %
10 lb	10.000	1.410	5.330	0.533	3.200	0.532	0.588	0.293	0.328	0.855	8.500	2.250	21 %

[A] 1 in. = 25.4 mm; 1 lb = 0.454 kg.
[B] A variation in weight per square foot of ±5 % is permissible, based on the weight of any sheet or bundle.
[C] A tolerance of ±10 % is permitted in dimensions, center to center.

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 closed diamond openings and full length bonds on all sides.

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.

TABLE 2 Carbon Steel Dimensions, Strand Sizes, and Weight for Type II, Class 1 Metal[A]

Style	Lbs per CSF[B]	Design Size[C]		Opening Size[C]		Strand Size				Approximate Values for Information Only	
						Width		Thickness			
		SWD	LWD	SWO	LWO	Min.	Max	Min.	Max	Overall Thickness	Percent Open Area
¼ 20F	77	0.250	1.050	0.084	0.715	0.071	0.087	0.027	0.033	0.030	37 %
¼ 18F	104	0.250	1.050	0.075	0.715	0.072	0.888	0.036	0.044	0.040	36 %
½ 20F	37	0.500	1.250	0.375	1.000	0.071	0.087	0.026	0.032	0.029	68 %
½ 18F	62	0.500	1.250	0.325	0.960	0.087	0.107	0.035	0.043	0.039	61 %
½ 16F	78	0.500	1.250	0.325	0.920	0.086	0.106	0.045	0.055	0.050	62 %
½ 13F	122	0.500	1.250	0.302	0.920	0.096	0.118	0.063	0.077	0.070	57 %
¾ 16F	47	0.923	2.100	0.750	1.750	0.100	0.122	0.043	0.053	0.048	76 %
¾ 13F	66	0.923	2.100	0.688	1.781	0.095	0.117	0.063	0.077	0.070	77 %
¾ 10 13F	99	0.923	2.100	0.637	1.755	0.144	0.176	0.063	0.077	0.040	65 %
¾ 9F	175	0.923	2.100	0.563	1.688	0.149	0.182	0.108	0.132	0.120	64 %
1 16F	40	1.000	2.500	0.813	2.250	0.088	0.108	0.045	0.055	0.050	80 %
1 14F	71	1.000	2.500	0.813	2.000	0.113	0.138	0.068	0.077	0.060	75 %
1 12F	108	1.000	2.500	0.813	2.000	0.140	0.172	0.077	0.094	0.085	69 %
1 10L F	144	1.000	2.500	0.750	1.900	0.144	0.176	0.099	0.121	0.110	68 %
1½ 16F	35	1.330	3.200	1.062	2.750	0.107	0.131	0.043	0.053	0.048	82 %
1½ 13F	50	1.330	3.200	1.062	2.750	0.104	0.128	0.063	0.077	0.070	83 %
1½ 12F	57	1.410	3.200	1.296	2.625	0.104	0.128	0.077	0.094	0.085	84 %
1½ 10L F	127	1.330	3.200	0.900	2.563	0.169	0.207	0.099	0.121	0.110	72 %
1½ 9F	107	1.330	3.200	1.000	2.563	0.142	0.174	0.099	0.121	0.110	76 %
~~1½ 6F~~	~~360~~	~~1.000~~	~~2.563~~	~~1.330~~	~~3.200~~	~~0.230~~	~~0.281~~	~~0.156~~	~~0.190~~	~~0.173~~	~~49 %~~
1½ 6F	238	1.000	2.563	1.330	3.200	0.230	0.281	0.156	0.190	0.173	49 %

[A] 1 in. = 25.4 mm; 1 lb = 0.454 kg.
[B] A variation in weight per square foot of ±5 % is permissible, based on the weight of a bundle.
[C] A tolerance of ±10 % is permitted in dimensions, center to center.

TABLE 3 Stainless Steel Styles, Weights, Dimensions, and Sheet Sizes for Type I, Class 3 Metal[A]

Style Designation	Weight per Square Foot, lb[B]	Size of Mesh[C]		Strand, in.[C] (See Fig. 1 (c))
		Width, in. (See Fig. 1 (a))	Length, in. (See Fig. 1 (b))	
½ No. 18	0.73	0.480	1.20	0.085
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

[A] 1 lb = 0.454 kg; 1 in. = 25.4 mm.
[B] A variation in weight per square foot of ±5 % is permissible, based on the weight of any sheet or bundle.
[C] A tolerance of ±10 % is permitted in dimensions.

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 1/16 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.

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.

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 Expanded metal coated with zinc (hot-dipped galvanized) shall comply with Specification A 123/A 123M.