Designation: F1267 – 15

Standard Specification for Metal, Expanded, Steel[1]

This standard is issued under the fixed designation F1267; 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 U.S. 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 11, 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]

A123/A123M Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A240/A240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A653/A653M Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

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

A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

A1008/A1008M Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

A1011/A1011M 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. Terminology

3.1 *Expanded Metal Terminology:*

3.1.1 *bond, n*—the solid intersection of two strands.

3.1.2 *camber, n*—the bow of a side or edge from end to end from a straight line.

3.1.3 *diamonds, n*—open area of metal after expanding. Most expanded metal open area or patterns are uniform diamond shaped, but may also be hexagonal, louvered, asymmetric, square, or other shapes, or combinations thereof.

3.1.4 *edge configuration, n*—refers to the edge condition of a sheet may they be closed diamonds (bonded), or open diamonds (random) produced by shearing.

3.1.5 *expanded metal, n*—a rigid sheet of metal that is simultaneously been slit and stretched creating an open diamond pattern.

3.1.6 *flattened, v (F)*—expanded metal that has been cold-rolled after expansion.

3.1.7 *flattening, adv*—the process of producing flattened expanded metal.

3.1.8 *grating, n*—expanded metal that is produced from heavier sheet.

[1] This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloysand is the direct responsibility of Subcommittee A01.19 on Steel Sheet and Strip.

Current edition approved Nov. 1, 2015. Published December 2015. Originally approved in 1989. Last previous edition approved in 2012 as F1267 – 12. DOI: 10.1520/F1267-15.

[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**

3.1.9 *levelness, n*—(flatness of sheet), sheets shall be free from waves or buckets that are in excess of 1–1/2 in. from a plane surface.

3.1.10 *LWD, n*—nominal dimension, Long Way of the Diamond.

3.1.11 *LWO, n*—Long Way of the Opening.

3.1.12 *regular-raised-standard, n*—(R) expanded metal as it comes from the press. The strands and bonds are set at a uniform angle to the plane of the sheet.

3.1.13 *SWD, n*—nominal dimension, Short Way of the Diamond.

3.1.14 *SWO, n*—Short Way of the Opening.

3.1.15 *shearing, n*—cutting the sheet to a specific size or tolerance.

3.1.16 *squareness, n*—the dimensional variance a side and edge are out of square.

3.1.17 *strand thickness, n*—thickness of the base metal

3.1.18 *strand thickness, n, and strand width, n*—can be varied to create different expanded metal products for different applications.

3.1.19 *strand width, n*—amount of material fed through top and bottom dies to produce one strand.

3.1.20 *taper, n*—edges of a sheet that deviates from parallel.

4. Classification

4.1 Expanded metal shall be of the following types, classes, and grades as specified (see 5.1.2).

4.2 *Type:*
4.2.1 *Type I*—Expanded (see Fig. 1).
4.2.2 *Type II*—Expanded and flattened (see Fig. 2).

4.3 *Class:*
4.3.1 *Class 1*—Uncoated.
4.3.2 *Class 2*—Hot-dip zinc-coated (galvanized or galvannealed).
4.3.3 *Class 3*—Corrosion-resisting steel.

4.4 *Grade*—Pertains only to post-galvanized or galvannealed coating.
4.4.1 *Grade A*—0.0025 in. (0.06 mm) minimum coating thickness.
4.4.2 *Grade B*—0.0012 in. (0.03 mm) minimum coating thickness.

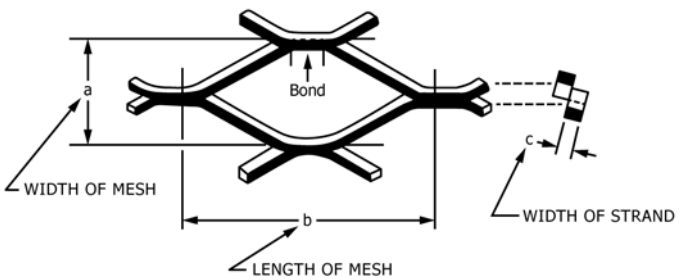

FIG. 1 Type I, Expanded and Raised

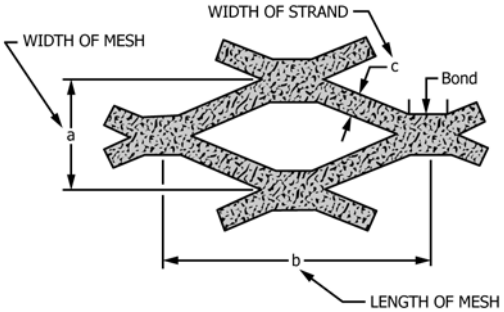

FIG. 2 Type II, Expanded and Flattened

5. Ordering Information

5.1 Orders for material under this specification shall include the following information, as required, to describe the material adequately:
5.1.1 ASTM designation,
5.1.2 Type, class, and grade of steel required (see 4.1),
5.1.3 Material required (see 6.1),
5.1.4 Direction of shear, if not as specified (see 6.2.1),
5.1.5 Length, width, and thickness of uncoated mesh, and weight per square ft. uncoated (see Tables 1-6),
5.1.6 Size of sheet required, if other than sizes specified in 7.1,
5.1.7 Whether or not sheets from which samples have been selected for coating thickness test may be included as part of material shipped (see 10.1.2), and
5.1.8 Optional requirements, if any (see Supplementary Requirements S1 through S3).

6. Materials and Manufacture

6.1 Expanded metal shall be made from Commercial Steel (CS Type B) carbon steel sheets as specified in Specifications A1008/A1008M or A1011/A1011M or from stainless steel sheets as specified in Specifications A240/A240M or A666.

6.2 Expanded metal shall be manufactured from sheet steel in thicknesses corresponding to Tables 1-6 as specified (see 5.1.5).
6.2.1 Each opening shall be integral with adjoining openings by means of unsheared bonds (see Fig. 1 and Fig. 2) of the original sheet.

7. Dimensions, Mass, and Permissible Variations

7.1 Unless otherwise specified (see 5.1.6), 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.

7.2 Types I and II expanded metal shall be furnished in accordance with the weights and dimensions as specified in Tables 1-6, respectively.

7.3 *Tolerances for Type I (raised expanded metal) sheets:*
7.3.1 Strand width shall not vary in excess of ±10 % of the nominal width.
7.3.2 Sheet width shall not exceed 1/4 in. per ft. of SWD dimension. (Example: factory run stock sheet 48 in. could be 49 in. wide.)

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

Style	Minimum[B] Thickness	Nominal Weight per CSF[C]	Design Size[D]		Opening Size[D]		Strand Size		Overall Thickness	Diamond per ft.		Percent Open Area
			SWD	LWD	SWO	LWO	Width	Thickness		SWD	LWD	
¼ 20	0.032	85	0.250	1.000	0.125	0.718	0.072	0.036	0.135	48	12	42 %
¼ 18	0.042	113	0.250	1.000	0.110	0.718	0.072	0.048	0.147	48	12	42 %
½ 20	0.032	42	0.500	1.200	0.438	0.938	0.072	0.036	0.140	24	10	71 %
½ 18	0.042	69	0.500	1.200	0.438	0.938	0.088	0.048	0.172	24	10	65 %
½ 16	0.053	85	0.500	1.200	0.375	0.938	0.087	0.060	0.175	24	10	65 %
½ 13	0.083	144	0.500	1.200	0.312	0.938	0.096	0.092	0.204	24	10	62 %
¾ 16	0.053	54	0.923	2.000	0.813	1.750	0.101	0.060	0.210	13	6	78 %
¾ 13	0.083	78	0.923	2.000	0.750	1.688	0.096	0.092	0.205	13	6	79 %
¾ 10	0.083	117	0.923	2.000	0.750	1.625	0.144	0.092	0.290	13	6	69 %
¾ 9	0.127	178	0.923	2.000	0.688	1.562	0.150	0.134	0.312	13	6	67 %
1 16	0.053	43	1.000	2.400	0.938	2.062	0.078	0.060	0.192	12	5	83 %
1½ 18	0.042	20	1.330	3.000	1.313	2.625	0.068	0.048	0.140	9	4	90 %
1½ 16	0.053	40	1.330	3.000	1.250	2.625	0.108	0.060	0.230	9	4	84 %
1½ 13	0.083	59	1.330	3.000	1.188	2.500	0.105	0.092	0.242	9	4	84 %
1½ 10	0.083	78	1.330	3.000	1.188	2.500	0.138	0.092	0.284	9	4	79 %
1½ 9	0.127	119	1.330	3.000	1.125	2.375	0.144	0.134	0.312	9	4	78 %
1½ 6	0.184	247	1.330	3.000	1.110	2.313	0.203	0.198	0.433	9	4	69 %
2 10	0.083	67	1.850	4.000	1.625	3.438	0.164	0.092	0.327	6.5	3	82 %
2 9	0.127	88	1.850	4.000	1.563	3.375	0.149	0.134	0.312	6.5	3	84 %

[A] 1 in. = 25.4 mm; 1 lb = 0.454 kg.
[B] The minimum thickness is absolute, not subject to minus variation.
[C] A variation in weight per square ft. of ±10 % is permissible, based on the weight of any sheet or bundle.
[D] A tolerance of ±10 % is permitted in dimensions, center to center.

TABLE 2 Grating—Carbon Steel Dimensions, Strand Sizes, and Weight for Type I (Raised), Class I Metal[A]

Style	Nominal Weight per CSF[B]	Design Size in.[C]		Opening Size in.[C]		Strand Size in.		Overall Thickness	Diamond per ft		Percent Open Area
		SWD	LWD	SWO	LWO	Width	Thickness		SWD	LWD	
2.0 lb	2.00	1.33	5.33	1.000	3.60	0.235	0.135	0.460	9.0	2.25	77 %
3.0 lb	3.00	1.33	5.33	0.940	3.44	0.264	0.183	0.540	9.0	2.25	60 %
3.14 lb	3.14	2.00	6.00	1.625	4.88	0.412	0.250	0.656	6.0	2.00	69 %
4.0 lb	4.00	1.33	5.33	0.940	3.44	0.300	0.215	0.618	9.0	2.25	55 %
4.27 lb	4.27	1.41	4.00	1.000	2.88	0.300	0.250	0.625	8.5	3.00	58 %
5.0 lb	5.00	1.33	5.33	0.813	3.38	0.331	0.250	0.655	9.0	2.25	50 %
6.25 lb	6.25	1.41	5.33	0.813	3.38	0.350	0.312	0.715	8.5	2.25	50 %
7.0 lb	7.00	1.41	5.33	0.813	3.38	0.391	0.318	0.740	8.5	2.25	45 %

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

TABLE 3 Grating—Stainless Steel Dimensions, Strand Sizes, and Weights for Type 1 (Raised), Class 1 Metal[A]

Style	Nominal Weight per CSF[B]	Design Size, in.[C]		Opening Size, in.[C]		Strand Size, in.		Overall Thickness	Diamond per ft. per ft.		Percent Open Area
		SWD	LWD	SWO	LWO	Width	Thickness		SWD	LWD	
3.3 lb.	3.32	2.00	6.0	1.625	4.880	0.312	0.250	0.656	6	2	69 %
4.5 lb.	4.25	1.41	4.0	1.000	2.880	0.300	0.250	0.625	8.5	3	58 %

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

7.3.3 Sheet length shall not exceed 1/4 in. per ft. of LWD dimension. (Example: factory run stock sheet 96 in. could be 98 in. long.)

7.3.4 Camber shall not exceed 3/32 in. per ft. of dimension.

7.3.5 Taper shall not exceed 1/16 in. per ft. of dimension, or 1/4 in. overall.

7.3.6 Squareness of ends of sheets shall not exceed 1/8 in. per ft. out of square or 1/2 in. of overall length.

7.3.7 Levelness of sheets shall be free from waves or buckles that are in excess of 1-1/2 in. from a plane surface.

7.3.8 Each sheet shall have closed diamond openings on all sides of the sheet unless ordered differently.

TABLE 4 Carbon Steel Dimensions, Strand Sizes, and Weight for Type II (Flattened), Class 1 Metal[A]

Style	Minimum[B] Thickness	Nominal Weight per CSF[C]	Design Size[D]		Opening Size[D]		Strand Size		Overall Thickness	Diamond per ft.		Percent Open Area
			SWD	LWD	SWO	LWO	Width	Thickness		SWD	LWD	
¼ 20	0.026	74	0.250	1.050	0.084	0.715	0.079	0.029	0.029	48	11.6	37 %
¼ 18	0.034	100	0.250	1.050	0.075	0.715	0.080	0.038	0.038	48	11.6	36 %
½ 20	0.026	37	500	1.250	0.375	1.000	0.079	0.029	0.029	24	9.5	68 %
½ 18	0.034	61	0.500	1.250	0.312	1.000	0.097	0.038	0.038	24	9.5	61 %
½ 16	0.043	75	0.500	1.250	0.312	1.000	0.096	0.048	0.048	24	9.5	61 %
½ 13	0.066	126	0.500	1.250	0.265	1.000	0.107	0.072	0.072	24	9.5	57 %
¾ 16	0.043	47	0.923	2.100	0.750	1.750	0.111	0.048	0.048	13	5.7	76 %
¾ 14	0.054	56	0.923	2.100	0.688	1.813	0.105	0.060	0.060	13	5.7	77 %
¾ 13	0.066	67	0.923	2.100	0.688	1.781	0.106	0.072	0.072	13	5.7	77 %
¾ 10	0.066	102	0.923	2.100	0.637	1.755	0.160	0.072	0.072	13	5.7	65 %
¾ 9	0.101	157	0.928	2.100	0.563	1.688	0.165	0.108	0.108	13	5.7	64 %
1 16	0.043	38	1.000	2.500	0.813	2.250	0.098	0.048	0.048	12	4.68	80 %
1½ 16	0.043	35	1.330	3.200	1.062	2.750	0.119	0.048	0.048	9	3.75	82 %
1½ 14	0.054	43	1.330	3.200	1.062	2.750	0.116	0.060	0.060	9	3.75	83 %
1½ 13	0.066	51	1.330	3.200	1.062	2.750	0.116	0.072	0.072	9	3.75	83 %
1½ 9	0.101	105	1.330	3.200	1.000	2.653	0.158	0.108	0.108	9	3.75	76 %

[A] 1 in. = 25.4 mm; 1 lb = 0.454 kg.
[B] The minimum thickness is absolute, not subject to minus variation.
[C] A variation in weight per square ft. of ±10 % is permissible, based on the weight of any sheet or bundle.
[D] A tolerance of ±10 % is permitted in dimensions, center to center.

TABLE 5 Stainless Steel Styles, Weights, Dimensions, and Sheet Sizes for Type I (Raised), Class 3 Metal[A]

Style	Minimum Thickness[D]	Nominal Weight per CSF[B]	Design Size[C]		Opening Size[C]		Strand Size[C]		Overall Thickness	Diamond per ft.		Percent Open Area
			SWD	LWD	SWO	LWO	Width	Thickness		SWD	LWD	
½ 18	0.044	69	0.500	1.200	0.437	0.937	0.087	0.048	0.164	24	10	65 %
½ 16	0.055	87	0.500	1.200	0.437	0.937	0.087	0.060	0.164	24	10	65 %
½ 13	0.085	148	0.500	1.200	0.325	0.875	0.119	0.090	0.225	24	10	60 %
¾ 18	0.044	46	0.923	2.000	0.812	1.750	0.106	0.048	0.202	13	6	77 %
¾ 16	0.055	57	0.923	2.000	0.812	1.750	0.106	0.060	0.202	13	6	77 %
¾ 13	0.085	87	0.923	2.000	0.750	1.687	0.107	0.090	0.202	13	6	77 %
¾ 9	0.128	194	0.923	2.000	0.687	1.582	0.160	0.135	0.300	13	6	65 %
1½ 16	0.055	43	1.330	3.000	1.250	2.750	0.115	0.060	0.222	9	4	83 %
1½ 13	0.085	65	1.330	3.000	1.250	2.750	0.115	0.090	0.222	9	4	83 %
1½ 9	0.128	130	1.330	3.000	1.125	2.500	0.155	0.135	0.280	9	4	77 %

[A] 1 lb = 0.454 kg; 1 in. = 25.4 mm.
[B] A variation in weight per square ft. of ±10 % is permissible, based on the weight of any sheet or bundle.
[C] A tolerance of ±10 % is permitted in dimensions.
[D] The minimum thickness is absolute, not subject to minus variation.

TABLE 6 Stainless Steel Styles, Weights, Dimensions, and Sheet Sizes for Type II (Flattened), Class 3 Metal[A]

Style	Minimum Thickness[D]	Nominal Weight per CSF[B]	Design Size[C]		Opening Size[C]		Strand Size		Overall Thickness	Diamond per ft.		Percent Open Area
			SWD	LWD	SWO	LWO	Width	Thickness		SWD	LWD	
½ 18	0.037	66	0.500	1.260	0.312	1.000	0.098	0.041	0.041	24	9.5	61 %
½ 16	0.047	84	0.500	1.260	0.312	1.000	0.099	0.051	0.051	24	9.5	60 %
½ 13	0.072	168	0.500	1.260	0.240	0.915	0.132	0.076	0.076	24	9.5	47 %
¾ 18	0.037	43	0.923	2.100	0.750	1.812	0.118	0.041	0.041	13	5.7	74 %
¾ 16	0.047	54	0.923	2.100	0.750	1.812	0.118	0.051	0.051	13	5.7	74 %
¾ 13	0.072	83	0.923	2.100	0.625	1.750	0.120	0.076	0.076	13	5.7	74 %
¾ 9	0.108	170	0.923	2.100	0.562	1.687	0.165	0.114	0.114	13	5.7	64 %
1½ 16	0.047	41	1.330	3.150	1.062	2.750	0.128	0.051	0.051	9	3.8	81 %
1½ 13	0.072	62	1.330	3.150	1.000	2.625	0.130	0.076	0.076	9	3.8	80 %
1½ 9	0.108	132	1.330	3.150	0.037	2.625	0.165	0.114	0.114	9	3.8	72 %

[A] 1 lb = 0.454 kg; 1 in. = 25.4 mm.
[B] A variation in weight per square ft. of ±10 % is permissible, based on the weight of any sheet or bundle.
[C] A tolerance of ±10 % is permitted in dimensions.
[D] The minimum thickness is absolute, not subject to minus variation.

7.3.8.1 Generally, all stock or machine run sheets will have closed diamonds on all four sides.

7.4 *Tolerances for Type II (expanded and flattened metal) sheets:*

7.4.1 The thickness of Type II, flattened expanded metal, shall not be less than 80 % of the minimum thickness of the corresponding Type I, raised expanded metal thickness.

7.4.2 Sheet width after flattening shall not exceed 1/4 in. per ft. of SWD dimension.

7.4.3 Sheet length after flattening shall not exceed 1/4 in. per ft. of LWD dimension.

7.4.4 Camber after flattening, the greatest deviation of a side from a straight line after flattening shall not exceed 3/32 in. per ft. of dimension.

7.4.5 Taper after flattening, sheet edges shall not deviate from parallel greater than 1/8 in. per ft. of dimension to a maximum of 3/8 in. overall.

7.4.6 Squareness of ends of sheets shall not exceed 1/8 in. per ft. out of square or 1/2 in. of overall length.

7.4.7 Levelness of sheets shall be free from waves or buckles that are in excess of 1-1/2 in. from a plane surface.

7.5 Expanded metal grating stock/machine run sheets dimension tolerances.

7.5.1 SWD shall not vary from the nominal dimension more than 1/4 in. per ft. of width.

7.5.2 LWD shall not vary greater than -0 +1/2 diamond size.

7.6 Random sheared tolerance for regular and flattened expanded metal and expanded metal grating.

7.6.1 Random sheared across one side SWD and one end LWD.

7.6.1.1 Expanded metal—±1/4 in. causing open diamonds on one side and one end.

7.6.1.2 Expanded metal grating shall vary in dimension ±1/2 in.

7.6.2 Random sheared across both SWD ends.

7.6.2.1 SWD has same tolerance as stock/machine run tolerance.

7.6.2.2 Expanded metal—±1/8 in. causing open diamonds on both SWD ends.

7.6.2.3 Expanded metal grating shall vary in dimension ±1/4 in.

7.6.3 Random shared all four sides.

7.6.3.1 Expanded metal—±1/8 in. causing open diamonds on all four sides.

7.6.3.2 Expanded metal grating shall vary in dimension ±1/4 in.

7.6.4 Random shared along the LWD on both sides.

7.6.4.1 SWD ends ±1/2 diamond size.

7.6.4.2 Expanded metal—±1/8 in. causing open diamonds on both LWD sides.

7.6.4.3 Expanded metal grating shall vary in dimension ±1/4 in.

8. Workmanship, Finish, and Appearance

8.1 *Workmanship:*

8.1.1 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.

8.1.2 Expanded metal shall be free from burrs and slivers.

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

8.2 Expanded metal coated with zinc (hot-dipped galvanized or galvannealed) shall comply with Specification A123/A123M or A653/A653M.

9. Sampling

9.1 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.

9.2 *Sampling for Coating Thickness Test*—A random sample of expanded metal sheets shall be selected from each inspection lot (see 9.1) of Class 2 material, in accordance with Table 5, and subjected to the zinc-coating thickness test specified in 11.2 and 11.3. All specimen test methods specified herein pertain to —post expanding‖ zinc coated materials and are not intended for expanded metal sheets produced from pre-galvanized coil or sheets.

10. Specimen Preparation

10.1 *Coating Thickness Test Specimens*— Three test specimens in the form of single strands having a length of one or more sides of diamond openings shall be selected from each sample sheet at or near diagonally opposite corners and at the center of the sheet.

10.1.1 The specimen strands shall be selected on the basis of visual appearance to represent the minimum coating thickness in the specified location.

10.1.2 When specified (see 5.1.7), each sample sheet from which strands have been removed may be included in the lot to be shipped, provided they meet the requirements of this specification. Such sheets shall be distinctly tagged to indicate that they shall be used for construction requiring less than a full size sheet.

10.2 *Microscopic Thickness Test Specimens*—The test specimens representing lots failing to meet the thickness of coating requirements using the test method of 11.2 shall be prepared for microscopic measurement of coating thickness.

10.2.1 The strand specimens shall be cut so that the cross section surfaces are exposed at approximately the midpoint of the strand length.

10.2.2 The specimens shall be prepared using acceptable metallographic methods and the coating thickness measured microscopically at a suitable magnification (see 11.3).

11. Test Methods

11.1 *Testing of Sample Expanded Metal Sheets for Lot Acceptance:*

11.1.1 Each of the sample expanded metal sheets selected in accordance with Table 7 shall be thickness tested in accordance with 10.1 and 11.2 to verify compliance with the zinc coating requirement of this specification.

11.1.1.1 Any sample expanded metal sheet that does not meet the requirement for zinc coating thickness as determined by the microscopic test method of 11.3 shall be cause for rejection of the lot represented by the sample.

TABLE 7 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

11.2 *Coating Thickness Test Method for Lot Acceptance:*

11.2.1 Each single strand test specimen shall be visually inspected, and that surface of the strand observed to have the most nearly uniform coating shall be the tension surface when the strand is subject to bending.

11.2.2 Each specimen shall be deformed by bending so that the zinc coating is separated from the base metal at the approximate midpoint of the strand. The separated zinc coating may be further stripped from the base metal by means of a knife or similar instrument until a flake of convenient size is obtained.

11.2.3 The thickness of the zinc coating particle shall be determined in at least four locations by measurement with micrometer calipers of which the spindle and anvil are flat or conical in shape and the ends are ground to 1⁄16 in. (2 mm) maximum radius.

11.2.3.1 If the zinc coating particle is not of sufficient size to permit four measurements, an additional particle may be removed from the strand in the same area and the thickness determined.

11.2.4 If all measurements on each sample specimen conform to the minimum thickness requirement for the particular grade represented, the lot shall be considered satisfactory.

11.2.5 If any measurement fails to conform to the minimum thickness requirement for the particular grade it represents, an equal number of sample strands, similar in appearance and selected adjacent to the original sample strands, shall be sent to a laboratory designated by the purchaser for the microscopic measurement test method of coating thickness (see 11.3).

11.3 *Microscopic Test Method:*

11.3.1 The coating thickness shall be measured microscopically at a suitable magnification. The minimum and maximum coating thicknesses shall be measured on each of the four exposed surfaces, but not at the corners.

11.3.2 The average coating thickness of each specimen shall be computed and compared with the requirement. If any average thickness value is less than the specified thickness, the lot represented by the specimen shall be rejected.

12. Inspection

12.1 Unless otherwise specified in the contract or purchaser order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the purchaser.

12.1.1 The purchaser reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure that supplies and services conform to prescribed requirements.

12.1.2 The absence of any inspection requirements in the specification shall not relieve the supplier of the responsibility of ensuring that all products or supplies submitted to the purchaser for acceptance comply with all requirements of the contract.

13. Packaging

13.1 Expanded metal shall be preserved and packed for shipment in accordance with Practices A700.

13.2 Packaging shall be supplier's commercial practice and sufficient to afford adequate protection against deterioration and physical damage during shipment from the supply source to the using activity and until early usage.

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall apply only when specified by the purchaser in the contract or purchase order (see 5.1.8).

S1. Referenced Documents

S1.1 The following documents shall apply only when one or more of the requirements of S2 or S3 are specified in the contract or purchase order (see 5.1.8): Military Specification MIL-C-16173 and Military Standards MIL-STD-105.

S2. Preparation for Delivery

S2.1 *Packaging:*

S2.1.1 Class 1 expanded metal shall be coated with a preservative compound in accordance with Grade 3 of MIL-C-16173. Class 3, corrosion-resisting steel shall not be coated with preservative compound.

S2.1.2 Expanded metal, separated for size, class, type, and grade shall be packed for shipment in secured lifts on nominal 2 by 4 in. (51 by 102 mm) skids. Skidding, strapping, and maximum permissible weight of the lifts shall be in accordance with manufacturer's standard practice unless otherwise required by the contact documents.

S2.1.3 In addition to any special marking required by the contract or order (see 5.1.8), marking for shipment shall be in accordance with manufacturer's standard practice.

S2.2 *Examination of Preparation for Delivery:*

S2.2.1 An examination shall be made to determine that preservation, packaging, packing, and marking requirements of the applicable contract or order are complied with. Defects shall be scored in accordance with Table S2.1.

S2.2.2 The lot size shall be the number of shipping containers fully prepared for delivery, with the exception that containers need not be sealed or closed, and noninterior containers or case liners need not be sealed (if applicable).

TABLE S2.1 Examination of Preparation for Delivery

Examine	Defects
Marking (interior package or container and exterior container as applicable)	Omitted, incorrect, illegible, improper size, location, sequence, or method of application.
Materials	Component missing, damaged, defective, or not as specified.
Workmanship (as applicable)	Inadequate or improper packaging or packing, such as closure of interior packages or containers, closure of case liners or container flaps, taping of seams, corners, and manufacturer's joint, closure of alternate containers; base strapping or tape banding; inadequate stapling, bulging, or distortion of containers.
Contents (interior and exterior container as applicable)	Number per container not as specified
Weight (exterior containers)	Weight per container not as specified
Preservation (as applicable)	Preservation missing, improperly applied or incorrect type

S2.2.3 Examination shall be made in two phases: (*1*) an interior examination made prior to the sealing of the container and (*2*) an examination of containers fully prepared for delivery. The sample unit for each phase shall be one container fully prepared for delivery.

S2.2.3.1 The inspection level shall be S-2 in accordance with MIL-STD-105, with an Acceptable Quality Level (AQL) of 4.0 defects per 100 units.

S2.3 *Inspection of Packaging:*

S2.3.1 Sample packages and packs and the inspection of the preservation-packaging, packing, and marking for shipment and storage shall be in accordance with Supplementary Requirement S2 and the documents specified therein.

S3. Special Government Requirements

S3.1 For Naval shipboard applications of Class 2, galvanized expanded metal, Grade A thickness of coating should be ordered.

S3.2 *Sampling Procedures for Visual and Dimensional Inspection* (see S3.3)—Plans A, B, or C shall be used as specified by the purchaser (see 5.1.8). When no plan is specified, Plan C shall be invoked.

S3.2.1 *Plan A, Inspection at Time and Place of Manufacture*—The inspection shall include measuring any dimensions of the product that are not controlled by automatic devices attached to the process machinery, as well as checking the controlled dimension(s) by examination of at least one-fifth of the number of sample pieces as specified in Table S3.1.

S3.2.1.1 If this production inspection shows that objectionable defects are present or that one or more dimensions are outside the specification limits, the entire production lot shall be inspected for those defects under the warehouse procedures specified in S3.2.2.

S3.2.2 *Plan B*—When Plan B is specified, inspection of manufacture's finished stock and inspection at a warehouse shall be completed by the purchaser. A random sample of expanded metal sheets shall be selected from each inspection lot in accordance with Table 5 for the inspection specified in S3.3.

S3.2.3 *Plan C*—When Plan C is specified, material shall be inspected in conformance with MIL-STD-105, Inspection Level II, Acceptable Quality Level (AQL) of 1.5 %, unless otherwise specified.

S3.3 *Visual and Dimensional Inspection:*

S3.3.1 Each of the sample expanded metal sheets selected in accordance with Table S3.1 shall be visually and dimensionally inspected to verify compliance with this specification.

S3.3.2 Any expanded metal sheet in the sample containing one or more visual or dimensional defects shall be rejected, and if the number of defective expanded metal sheets in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

TABLE S3.1 Sampling for Visual and Dimensional Inspection AQL (Approximate) = 1.5 % Defective

Number of Expanded Metal Sheets in Inspection Lot	Number of Expanded Metal Sheets in Sample	Acceptance Number (Defectives)	Rejection Number (Defectives)
15 and under	5	0	1
16 to 40	7	0	1
41 to 110	10	0	1
111 to 300	15	0	1
301 to 500	25	1	2
501 to 800	35	1	2
801 to 1300	50	2	3
1301 and over	75	3	4

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (F1267 – 12) that may impact the use of this standard. (Approved Nov. 1, 2015.)

(1) Values in tables that were incorrect or did not reflect current values found in expanded metal material were corrected.
(2) References were revised to correct inaccurate out-of date-standards.
(3) Tolerances were updated.
(4) Terminology was corrected