Designation: A 740 – 98 (Reapproved 2008)

Standard Specification for Hardware Cloth (Woven or Welded Galvanized Steel Wire Fabric)[1]

This standard is issued under the fixed designation A 740; 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 woven or welded galvanized steel wire fabric commercially known as hardware cloth. It is customarily used for window and screen door guards, tree guards, industrial machine guards, sand screens, and grain bins. It serves as a protective screen against rodents and is used for many other home, farm, and industrial purposes.

1.2 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 90/A 90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

B 6 Specification for Zinc

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *Military Standards:*[3]

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-147 Palletized and Containerized Unit Loads 40 Inch × 48 Inch Pallets, Skids, Runners, or Pallet Type Base

MIL-STD-1188 Commercial Packaging of Supplies and Equipment

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *hardware cloth—as used in this specification,* designates a material composed of cold-drawn steel wires which have been fabricated into fabric (or so-called "mesh"), formed by the process of weaving or electrical welding, and subsequently galvanized (zinc coated) by the hot-dip process. The finished material consists essentially of a series of longitudinal (warp) and transverse (filler) wires arranged substantially at right angles to each other.

3.1.2 *mesh size*—as it pertains to cloth, is the dimensional center-to-center distance between warp wires and filler wires in that order. Measurements include the width of one opening plus the thickness of one parallel zinc-coated wire. Examples are 1 by 2 in., ½ by 1 in., etc. Thus, a 1 by 2-in. mesh denotes that the warp and filler wires are spaced on 1-in. [25.4-mm] and 2-in. [50.8-mm] centers respectively. For fabric with a square mesh the mesh size is indicated by a single value.

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

4.1.1 Quantity (number of rolls),

4.1.2 Name of material (1.1),

4.1.3 Mesh size (Table 1),

4.1.4 Wire size (Table 1),

4.1.5 Width (5.7.1),

4.1.6 Roll length (5.7.2),

4.1.7 Woven or welded, if necessary (Table 1), and

4.1.8 ASTM designation and year of issue.

NOTE 1—A typical ordering description is as follows: "ten 100-ft Rolls of ¼-in. Hardware Cloth, Wire Size 0.0258 in., 24 in. wide, to ASTM A 740 – ____."

5. Manufacture

5.1 *Base Metal*—The base metal of hardware cloth shall be of good commercial quality carbon steel wire.

5.2 *Zinc for Coating*— The zinc used in the galvanizing process shall be any grade of zinc conforming to Specification B 6.

[1] This specification is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.12 on Wire Specifications.

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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 Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, http://www.dodssp.daps.mil.

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TABLE 1 Mesh Size, Wire Size, and Weight[A]

Mesh Size, in. [mm]	Construction	Diameter of Wire After Galvanizing, in. [mm]	Approximate Weight, lb/100 ft² [kg/m²]
1 by ½ [25.4 by 12.7]	Welded	0.062 [1.57]	38 [1.86]
1 by ½ [25.4 by 12.7]	Welded	0.057 [1.45]	34 [1.66]
¾ [19.0]	Welded	0.062 [1.57]	38 [1.86]
¾ [19.0]	welded	0.057 [1.45]	36 [1.77]
¾ [19.0]	Welded	0.041 [1.04]	13 [0.65]
⅝ [15.9]	Welded	0.047 [1.20]	25 [1.21]
½ by 1 [12.7 by 25.4]	Welded	0.062 [1.57]	38 [1.86]
½ by 1 [12.7 by 25.4]	Welded	0.057 [1.45]	34 [1.66]
½ by 1 [12.7 by 25.4]	Welded	0.041 [1.04]	16 [0.78]
½ [12.7]	Welded	0.062 [1.57]	52 [2.54]
½ [12.7]	Welded	0.041 [1.04]	25 [1.22]
½ [12.7]	Woven	0.041 [1.04]	27 [1.32]
½ [12.7]	Welded	0.0317 [0.805]	14 [0.70]
½ [12.7]	Welded	0.0258 [0.655]	10 [0.47]
5⁄12 [10.6]	Welded	0.0354 [0.899]	23 [1.11]
⅓ [8.5]	Welded	0.0317 [0.805]	23 [1.11]
⅓ [8.5]	Woven	0.0317 [0.805]	26 [1.27]
¼ [6.4]	Woven	0.0258 [0.655]	25 [1.22]
¼ [6.4]	Welded	0.0217 [0.551]	14 [0.69]
⅛ [3.2]	Woven	0.0173 [0.439]	22 [1.07]

[A]First dimension of rectangular meshes is spacing of warp wires (see 3.2).

5.3 *Fabrication*— Hardware cloth shall be of wire woven or welded into squares or rectangles and then galvanized by the hot-dip process. The mesh size and wire size after galvanizing shall conform to Table 1. Approximate weights for the product are also shown in Table 1.

5.4 *Mesh Count*—The mesh size in inches shall be determined by counting the meshes for any interval of one continuous linear foot, in the direction of either the warp or filler wires and finding the mesh size in Table 2.

5.5 *Wire Diameter*— All wire diameter designations in this specification for hardware cloth are finished sizes after galvanizing. Wire diameter for the warp and filler wires shall be determined separately by checking the average measured diameters of not less than ten warp wires and the same number of filler wires, taken at random from a single roll of finished hardware cloth.

5.6 *Weight of Coating*:

5.6.1 The weight of zinc coating shall be determined on a sample of cloth approximately 25 in.^{2} [161 cm ^{2}] in area. The coating shall be tested for weight by a stripping test in accordance with Test Method A 90/A 90M. Wire diameter for calculating purposes shall be the average measured diameters, after stripping, of at least five warp wires and an equal number of filler wires.

TABLE 2 Mesh Count Versus Mesh Size

Mesh Count in 1 ft [305 mm]	Mesh Size, in. [mm]
96	⅛ [3.2]
48	¼ [6.4]
36	⅓ [8.5]
29	5⁄12 [10.6]
24	½ [12.7]
19	⅝ [15.9]
16	¾ [19.0]
12	1 [25.4]

5.6.2 As the fabric is galvanized after welding/weaving the coating weight will be much higher than the present specification and we suggest the following with the addition of Table 3.

5.6.3 Coating weight thus determined shall be to the minimums shown in Table 3. The values are a minimum as determined by the rounding method in Practice E 29.

5.7 *Width and Length*:

5.7.1 Stock widths of all standard sizes of hardware cloth are 24, 30, 36, and 48 in. [610, 762, 914, and 1219 mm].

5.7.2 Unless otherwise specified, hardware cloth shall be furnished in standard stock rolls of 50 linear ft [15.2 m] or 100 linear ft [30.5 m] in length. No standard stock roll shall contain more than two pieces, and no single piece shall be less than 10 linear ft [3.0 m] in length.

5.8 *Splices*—Splices not more than 1½ in. [38 mm] long, and with no projecting ends (tails), shall be permitted at any point of any individual wire if the number of splices does not exceed 30 in any roll, or two in any square foot [0.093 m^2].

5.9 *Edges*—Both edges of woven cloth shall be selvaged. Edges, either woven or welded, shall be so formed as to prevent raveling.

6. Permissible Variations

6.1 For specified wire diameters 0.0317 in. [0.805 mm] or larger, the average diameter as determined in 5.5 for either the warp or filler wires shall not be more than 0.0015 in. [0.038 mm] below the diameter specified. For specified diameters smaller than 0.0317 in., the average value as determined in 5.5 shall not be more than 0.001 in. [0.025 mm] below the specified diameter.

6.2 The average diameter of the stripped wire as determined in 5.6.1 shall not be below the specified diameter more than 0.0025 in. [0.064 mm] for sizes 0.0317 in. [0.805 mm] or larger, or more than 0.002 in. [0.051 mm] for sizes smaller than 0.0317 in.

NOTE 2—For purposes of determining conformance with this specification, the specified tolerance limits are absolute limits as defined in Practice E 29.

6.3 *Tolerance on Mesh*—The tolerance on the mesh sizes shall comply with Table 4.

6.4 *Tolerance on Fabric Width*—The tolerance on the fabric width shall comply with Table 5.

6.5 The measured length of the roll shall not be more than 4 in. [102 mm] under the specified length.

7. Workmanship

7.1 Hardware cloth shall have smooth edges and shall be free of tears and projecting tails. The coating shall be continuous and reasonably uniform.

TABLE 3 Mesh Size and Minimum Coating Weight—Surface Area

Mesh Size, in. [mm][A]	Coating Weight, min, oz/ft²[g/m²]
mesh size ≤ ½ [12.7]	1.3 [400]
½ [12.7] < mesh size ≤ ¾ [19]	1.2 [375]
¾ [19] < mesh size ≤ 1 [25.4]	1.1 [335]

[A]When the distance between warp and filler wires is different, the minimum distance is taken.

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TABLE 4 Tolerance on Mesh

Mesh Size, in. [mm]	Tolerance, in. [mm]
mesh size ≤ ½ [12.7]	±0.031 [±0.79]
½ [12.7] < mesh size ≤ ¾ [19.0]	±0.042 [±1.07]
¾ [19.0] < mesh size ≤ 1 [25.4]	±0.063 [±1.60]

TABLE 5 Tolerance on Fabric Width

Fabric Width, in. [mm]	Tolerance, in. [mm]
width ≤ 24 [610]	±0.125 [±3.17]
24 [610] < width ≤ 36 [914]	±0.187 [±4.75]
36 [914] < width ≤ 48 [1219]	±0.250 [±6.35]

8. Sampling

8.1 For purposes of tests, one roll from each of 50 rolls of hardware cloth or fraction thereof in a shipment shall be selected as a sample. When the rolls are palletized for shipment, the pallet containing the selected sample roll shall first be inspected for conformance to 10.2 and 10.3.

8.2 The roll shall be inspected for length (5.7.2), the number and condition of splices (5.8), the condition of the edges (5.9), general workmanship (7.1), and conformance to prescribed packaging, marking, and loading requirements (Section 10).

8.3 The sample shall be subjected to tests for width, wire diameter, and mesh count in accordance with 5.4, 5.5, and 5.7.1.

8.4 A sample shall be cut from near the end of the roll and tested for weight of zinc coating in accordance with 5.6.

9. Retests and Rejection

9.1 Should the hardware cloth in the sample roll fail to pass inspection or fail on one or more of the tests (8.2, 8.3, and 8.4) the roll shall be rejected. Four additional rolls in the lot shall be similarly checked. If any of these four fail, the lot shall be rejected.

9.2 Rejected lots may be screened and subsequently resubmitted for inspection.

10. Packaging, Marking, and Loading

10.1 Each roll of hardware cloth shall be tightly rolled and firmly tied. Each roll shall carry a tag showing the mesh size, wire size, width, length, ASTM designation A 740, and the name or mark of the manufacturer.

10.2 Packaging for U.S. government-procured hardware cloth shall be designated as either Level A or Commercial. When Level A packaging is specified, the hardware cloth, packaged as specified in 10.1, shall be palletized in accordance with MIL-STD-147, Load Type XIII. Commercial packaging shall be as specified in 10.1 and MIL-STD-1188.

10.3 Marking for Level A U.S. government shipments shall be in accordance with MIL-STD-129. Marking for commercial U.S. government shipments shall be in accordance with MIL-STD-1188. Other marking shall be as specified in the contract or order.

11. Inspection

11.1 Unless otherwise specified in the contract or purchase order the manufacturer is responsible for the performance of all inspection requirements as specified herein. The purchaser, however, reserves the right subsequently to perform any of the inspections set forth to verify that the material is in accordance with this specification.

11.2 When the contract or purchase order stipulates that inspection and tests are to be made by the purchaser's inspector prior to shipment the manufacturer shall afford the purchaser's inspector all reasonable facilities necessary to satisfy him that the material being furnished is in accordance with this specification. Mill inspection by the purchaser shall not interfere unnecessarily with the manufacturer's operations. All tests and inspections shall be made at the place of manufacture, unless otherwise agreed to.

12. Certification

12.1 When specified in the purchase order or contract, the manufacturer's or supplier's certification shall be furnished to the purchaser stating that samples representing each lot have been manufactured, tested, and inspected in accordance with this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

13. Keywords

13.1 galvanized steel fabric; hardware cloth; steel wire-zinc coated; zinc-coatings-steel wire products

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