Designation: A 810 – 01

Standard Specification for Zinc-Coated (Galvanized) Steel Pipe Winding Mesh[1]

This standard is issued under the fixed designation A 810; 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 specification covers various designs of welded wire mesh or twisted (woven) hexagonal wire mesh, zinc coated before fabrication, to be used as reinforcement for the concrete applied in the manufacture of negative buoyancy pipe needed for laying pipe in marshes or in water. The mesh is also used as reinforcement for concrete applied to pipe as a bendable or nonbendable mechanical protective coating when laying pipe in a harsh environment.

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.

1.3 The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

2. Referenced Documents

2.1 *ASTM Standards:*

A 90/A 90M Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings[2]

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products[3]

A 641/A 641M Specification for Zinc-Coated (Galvanized) Carbon Steel Wire[2]

A 902 Terminology Relating to Metallic Coated Steel Products[2]

B 6 Specification for Zinc[4]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, see Terminology A 902.

4. Classification

4.1 The steel pipe winding mesh is classified by type, based on method of manufacture, and by design number, related to width, number of longitudinal wires, and wire sizes.

4.2 *Types of Fabric*:

4.2.1 *Type TW*—Fabric manufactured by twisting wires to form a mesh with a series of hexagonal openings, as shown in Fig. 1. One of the edges of the fabric includes a straight selvage wire. Additional longitudinal reinforcing wires are included when specified.

4.2.2 *Type WW*—Fabric manufactured by welding a series of longitudinal wires to transverse wires to form a mesh with rectangular openings.

4.2.2.1 *Type WW-C*—Type WW fabric having uniform spacing of longitudinal wires, with the longitudinal wires crimped as indicated in Fig. 2.

4.2.2.2 *Type WW-N*—Type WW fabric having nonuniform spacing of longitudinal wires, by having the space between the edge wire and adjacent longitudinal wire double the spacing of the intermediate longitudinal wires. All longitudinal wires are crimped as indicated in Fig. 3.

4.2.2.3 *Type WW-S*—Type WW fabric having straight longitudinal wires (without crimping), with uniform spacing as indicated in Fig. 4.

4.3 *Design Numbers*—The design number is in the form of A × B × C × D.

4.3.1 For Type TW fabric, where

A = nominal width of wire mesh fabric, in inches (millimetres),
B = number of straight reinforcing wires, not including the straight selvage wire,
C = nominal diameter of wire in hexagonal mesh and straight selvage wire, in inches (millimetres), and
D = nominal diameter of straight reinforcing wires, not including straight selvage wire, in inches (millimetres). (Example: 7.5 × 1 × 0.054 × 0.048.)

4.3.2 For Type WW fabric, where

A = nominal overall width of wire mesh fabric, in inches (millimetres),
B = number of longitudinal wires,
C = nominal diameter of longitudinal wires, in inches (millimetres), and
D = nominal diameter of transverse wires, in inches (millimetres). (Example: 7.5 × 8 × 0.063 × 0.063.)

5. Ordering Information

5.1 Orders for zinc-coated steel pipe winding mesh under this specification shall include the following information, as

[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] *Annual Book of ASTM Standards*, Vol 01.06.

[3] *Annual Book of ASTM Standards*, Vol 01.03.

[4] *Annual Book of ASTM Standards*, Vol 02.04.

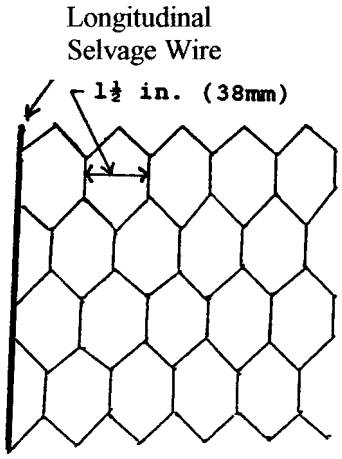

FIG. 1 Type TW—Twisted Hexagonal Mesh (Design Number 7.5 × 0 × 0.054 × 0)

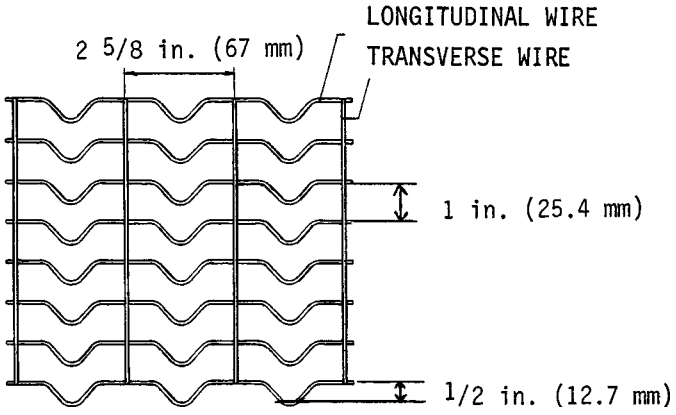

FIG. 2 Type WW-C—Crimped Welded Mesh with Uniform Longitudinal Wire Spacing

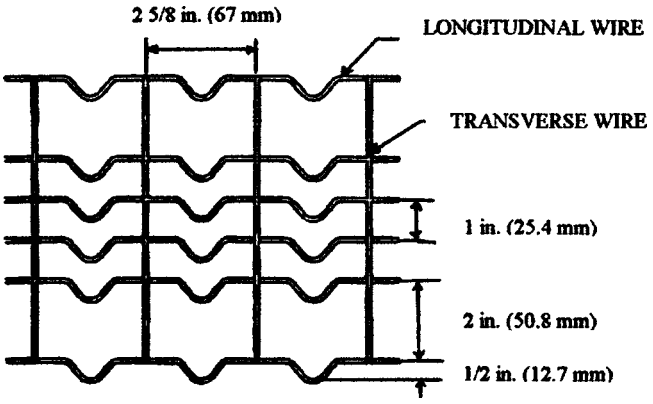

FIG. 3 Type WW-N—Crimped Welded Mesh with Non-Uniform Longitudinal Wire Spacing

necessary to adequately describe the desired product:

5.1.1 Name of material (steel pipe winding mesh),

5.1.2 ASTM designation and year of issue,

5.1.3 Type of fabric (see 4.2),

5.1.4 Design number (see 4.3 and Tables 1 and 2),

5.1.4.1 Mesh dimensions for welded mesh (see 9.3 and Table 3),

5.1.5 Zinc coating class (see 8.1),

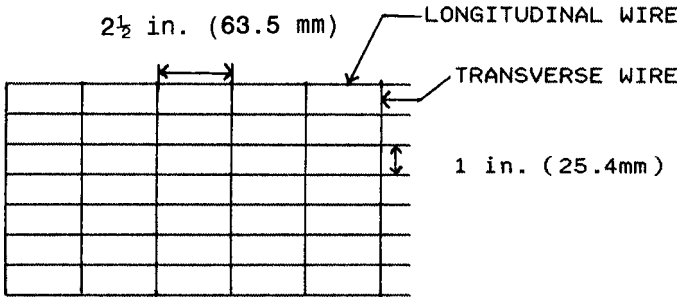

FIG. 4 Type WW-S—Welded Mesh with Straight Longitudinal Wires

5.1.6 Quantity (number of rolls),

5.1.7 Width of fabric and length of rolls, and

5.1.8 Packaging (see Section 14).

6. Materials

6.1 The steel from which the wire is produced shall be made by any commercially accepted steelmaking process.

6.1.1 The base metal shall be a steel having composition to permit drawing to a finished size and also to ensure freedom from zinc flaking during weaving or welding into mesh.

6.1.2 *Wire for Welded Mesh*—Before welding the galvanized wire shall have a minimum tensile strength of 70 000 psi (483 MPa),

6.1.3 *Wire for Hexagonal Woven Mesh*—Before weaving the galvanized wire shall have a maximum tensile strength of 75 000 psi (515 MPa),

6.2 Slab zinc used for the coating shall be any grade of zinc conforming to Specification B 6.

7. Manufacture

7.1 *Hexagonal Woven Mesh*—This fabric is manufactured by twisting wires to form a series of openings, hexagonal in shape, as specified in Table 1 and Fig. 1. One of the edges of the fabric shall be constructed to include a selvage wire. In addition to those specified in Table 1 and Fig. 1, other designs (width and other reinforcing wire configurations) are subject to agreement between the purchaser and manufacturer.

7.2 *Welded Mesh*—This fabric is manufactured by welding a series of parallel longitudinal wires to transverse wires to form rectangular openings. The longitudinal wires shall be crimped or not crimped as indicated for the type specified. Crimping shall be as indicated in Fig. 2. In addition to those specified in Table 2, and Figs. 2-4, other designs (width and longitudinal wire configurations) are subject to agreement between the purchaser and manufacturer.

8. Coating Requirements

8.1 The zinc coating shall be Class 1 coating, or shall be "regular coating", whichever is specified in the purchase order.

8.1.1 Class 1 zinc coating shall be as specified in Specification A 641/A 641M.

8.1.2 Zinc-coated wire produced as "regular coating" shall have the full surface covered with zinc, but there is no specified minimum weight of coating.

8.2 Slight burning of the zinc coating at welded intersections of welded mesh shall not be cause for rejection.

TABLE 1 Standard Sizes and Constructions for Type TW Woven Hexagonal Mesh

Design Numbers	Previous Design Numbers	Nominal Width, in. (mm)	Nominal Diameter of Zinc-Coated Wire, in. (mm)	Nominal Cross Sectional Area Per Nominal Width, $in.^2(mm^2)^A$	Nominal Cross Sectional Area Per Foot (Meter) of Width, $in.^2(mm^2)^{AB}$
7.5 × 0 × 0.054 × 0	107½ × 1½× 17	7½ (190)	0.054 (1.37)	0.0252 (16.26)	0.0430 (91.02)
7.5 × 1 × 0.054 × 0.048[C]	207½ × 1½ × 1718[C]	7½ (190)	0.054 (1.37)/0.048 (1.22)	0.0270 (17.42)	0.0489 (103.51)
7.5 × 2 × 0.054 × 0.048[D]	307½ × 1½ × 1718[D]	7½ (190)	0.054 (1.37)/0.048 (1.22)	0.0287 (18.52)	0.0519 (109.86)
7.5 × 4 × 0.054 × 0.048[E]	507½ × 1½ × 1718[E]	7½ (190)	0.054 (1.37)/0.048 (1.22)	0.0323 (20.84)	0.0580 (122.77)
14.25 × 4 × 0.054 × 0.048[F]	514¼ × 1½ × 1718[F]	14¼(362)	0.054 (1.37)/0.048 (1.22)	0.0529 (34.13)	0.0475 (100.55)

[A]Based on nominal diameter.
[B]Includes minimum ½-in. (12.70-mm) lap of mesh as applied.
[C]Plus 0.048 in. (1.22 mm) line wire placed 4½in. (114.30 mm) from selvage.
[D]Plus 0.048 in. (1.22 mm) line wires placed 3 in. (76.20 mm) and 6 in. (152.40 mm) from selvage.
[E]Plus 0.048 in. (1.22 mm) line wires placed 1½ in. (38.10 mm), 3 in. (76.20 mm), 4½ in. (114.30 mm), and 6 in. (152.40 mm) from selvage.
[F]Plus 0.048 in. (1.22 mm) line wires placed 3 in. (76.20 mm), 6 in. (152.40 mm), 9 in. (228.60 mm), and 12 in. (304.80 mm) from selvage.

TABLE 2 Standard Sizes and Constructions For Type WW Welded Wire Mesh

Design Numbers	Previous Design Numbers	Nominal Diameter of Zinc-Coated Wire, in. (mm)	Nominal Cross Sectional Area Per Nominal Width, $in.^2(mm^2)^A$	Nominal Cross Sectional Area per Foot (Metre) of Width, $in.^2(mm^2)^{AB}$
		Type WW-C—Uniform Spacing—Crimped		
7.5 × 8 × 0.059 × 0.059	1.50 × 1.50	0.059 (1.50)/0.059 (1.50)	0.0219 (14.13)	0.0373 (78.96)
7.5 × 8 × 0.063 × 0.063	1.60 × 1.60	0.063 (1.60)/0.063 (1.60)	0.0249 (16.06)	0.0426 (90.17)
7.5 × 8 × 0.079 × 0.063	2.00 × 1.60	0.079 (2.00)/0.063 (1.60)	0.0392 (25.29)	0.0669 (141.61)
7.5 × 8 × 0.079 × 0.079	2.00 × 2.00	0.079 (2.00)/0.079 (2.00)	0.0392 (25.29)	0.0669 (141.61)
7.5 × 8 × 0.098 × 0.079	2.50 × 2.00	0.098 (2.50)/0.079 (2.00)	0.0603 (38.90)	0.1030 (218.03)
7.5 × 8 × 0.118 × 0.079	3.00 × 2.00	0.118 (3.00)/0.079 (2.00)	0.0875 (56.45)	0.1493 (316.03)
		Type WW-N—Non-uniform Spacing—Crimped		
7.5 × 6 × 0.063 × 0.063	. . .	0.063 (1.60)/0.063 (1.60)	0.0187 (12.06)	0.0374 (79.16)
7.5 × 6 × 0.079 × 0.063	. . .	0.079 (2.00)/0.063 (1.60)	0.0294 (18.97)	0.0588 (124.46)
7.5 × 6 × 0.098 × 0.079	. . .	0.098 (2.50)/0.079 (2.00)	0.0453 (29.23)	0.0905 (191.56)
7.5 × 6 × 0.118 × 0.079	. . .	0.118 (3.00)/0.079 (2.00)	0.0656 (42.32)	0.1312 (277.71)
		Type WW-S—Uniform Spacing—Not Crimped		
8 × 9 × 0.079 × 0.079	14 × 14	0.079 (2.00)/0.079 (2.00)	0.0446 (28.80)	0.0685 (145.06)

[A]Based on nominal diameter.
[B]Includes minimum ½-in. (12.70-mm) lap of mesh for Types WW-C and WW-S, and 1-in. (25.4-mm) lap of mesh for Type WW-N, as applied.

TABLE 3 Welded Mesh Sizes and Tolerances

NOTE 1—Mesh sizes are measured from center to center and always indicated by two figures, $L \times S$, where L = the distance between the longitudinal wires, in. (mm).

NOTE 2—Crimp depth ½ in. (12.7 mm), tolerance ±⅛ in. (3.2 mm).

Nominal Mesh Size, $L \times S$, in. (mm)	Tolerance, $L \times S$, in. (mm)
Crimped mesh, where L = the distance between the transverse wires after crimping; with L = 1 in. (25.4 mm) for Type WW-C mesh, and 1 in. (25.4 mm) or 2 in. (50.8 mm) for Type WW-N mesh (as indicated in Fig. 3).	
$L \times 2\frac{5}{8}$ (67)	± 5/64 (2) × ± 13/64(5)
$L \times 3\frac{5}{8}$ (92)	± 5/64(2) × ± 13/64 (5)
Noncrimped Style, where S = the distance between the transverse wires, in. (mm)	
1 (25.4) × 2½ (63)	± 5/64 (2) × ± 13/64 (5)

9. Dimensions and Permissible Variations

9.1 *Width of Fabric*—Hexagonal mesh fabric is usually available in 7½-in. (190-mm) width. Welded mesh fabric, crimped, is usually available in 7-in. (178-mm) width having a maximum width of 7½ in. (190 mm) including crimp. Non-crimped welded mesh fabric is usually available in 8-in. (203-mm) width. Other widths of woven and welded fabrics are available. Nominal width of fabric shall be as agreed upon between the purchaser and manufacturer.

9.2 *Length of Roll*—Nominal length of rolls shall be as agreed upon between the purchaser and manufacturer.

9.3 Standard openings in Type TW mesh, between adjacent wires parallel to the selvage wire, is shown in Fig. 1. Standard spacing for longitudinal wires in Type WW-C, Type WW-N, and Type WW-S mesh is shown in Figs. 2-4, respectively. Standard spacing for transverse wires in Type WW fabrics is shown in Table 3. All measurements are center to center of wires. Spacing other than indicated are subject to agreement between the purchaser and manufacturer.

9.4 *Tolerances*:

9.4.1 *Width*:

9.4.1.1 *Hexagonal Mesh*—Actual width between outer wires shall not be more than ½in. (13 mm) under the specified width.

9.4.1.2 *Welded Mesh*—Actual width between outer wires shall not be more than 13⁄64in. (5 mm) under the specified width.

9.4.2 *Length*—Actual length shall be ordered length −0, +3 %.

9.4.3 *Mesh Size*:

9.4.3.1 For hexagonal mesh, the tolerance shall be ±⅛ in. (±3.2 mm).

9.4.3.2 Welded mesh size tolerances shall be in accordance with Table 3.

9.4.4 *Wire Size*:

9.4.4.1 Permissible variation of the nominal diameter of wire shall be as follows:

0.035 in. (0.89 mm) to under 0.076 in. (1.93 mm) ± 0.002 in. (0.05 mm)
0.076 in. (1.93 mm) and over ± 0.003 in. (0.08 mm)

10. Sampling and Testing

10.1 For test purposes, one sample shall be taken from one roll selected at random from each 200 rolls or fraction thereof.

10.1.1 Development of cross-sectional area data shall come from these samples.

10.1.2 Because of the distortion inherent in the manufacturing of the mesh, it is normal to test for coating weight and tensile compliance on samples of wire before fabrication. The number of test specimens will vary with the quality control procedures and facilities of each manufacturer.

10.2 Determine the weight of zinc coatings for wire specified to have a Class 1 coating, by the stripping test in accordance with Test Method A 90/A 90M. Inspect wire specified to have a "regular coating" to verify that the wire is completely coated (except for slight burning at welded intersections for wire inspected after fabrication).

10.2.1 For wire tested before fabrication, the minimum test specimen length shall be 24 in. (600 mm).

10.2.2 For wire tested after fabrication, cut short lengths of wire from between twists or welds, such that the total length equals at least 24 in. (600 mm).

10.3 Tensile testing shall be as described in Test Methods and Definitions A 370.

11. Retests and Rejection

11.1 If one or more of the samples fail to show compliance with any of the requirements of this specification, the lot shall be subjected to retest.

11.2 Retesting of the lot shall be on the basis of a sampling frequency of one sample for each 50 rolls. If any sample fails to show compliance with the requirements of this specification, the entire lot shall be rejected.

12. Inspection

12.1 The manufacturer shall afford the inspector representing the purchaser all reasonable facilities to satisfy the inspector that the material is being furnished in accordance with this specification. All tests and inspections shall be made at the place of manufacture before shipment, unless otherwise specified, and be conducted so as not to interfere unnecessarily with the operation of the works.

13. Certification

13.1 When specified in the purchase order or contract, the purchaser shall be furnished certification that the samples representing each lot have been either tested or inspected as directed in this specification and that the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

14. Packaging, Marking, and Loading

14.1 Packaging will be based on negotiations between the purchaser and the manufacturer. Banding or strapping with or without pallets represents a common form of package.

14.2 A tag shall be securely attached to each bundle and shall be marked with the type, design number, wire sizes, ASTM designation, and name or mark of the manufacturer.

15. Keywords

15.1 concrete reinforcement; mesh (for steel pipe/tube); steel wire; zinc-coated steel wire