



Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire¹

This standard is issued under the fixed designation A641/A641M; 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 soft, medium, and hard temper zinc-coated (galvanized) carbon steel wire in coils for general use.

1.2 The supplementary requirements of this specification cover zinc-coated weights [masses] for nails, staples, and wire from which nails and staples are cut and formed.

1.3 This specification is applicable to orders in either inch-pound units (as A641) or SI units (as A641M). Values stated in either inch-pound units or SI units are to be regarded separately as the standard. Within the text, the SI units are shown in brackets. The values stated in the two systems are not exact equivalents; therefore, each system shall be used independent of the other, without combining values in any way.

1.4 This specification and some referenced specifications are expressed in both inch-pound and SI units. If the order specifies the applicable “M” specification designation, the product shall be furnished to SI units.

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

2. Referenced Documents

2.1 ASTM Standards:²

[A90/A90M Test Method for Weight \[Mass\] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings](#)
[A700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment](#) (Withdrawn 2014)³

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 The last approved version of this historical standard is referenced on www.astm.org.

[A902 Terminology Relating to Metallic Coated Steel Products](#)

[B6 Specification for Zinc](#)

[E8 Test Methods for Tension Testing of Metallic Materials](#)

[E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology [A902](#).

4. Classification

4.1 *Temper*—The wire is classified with regard to mechanical properties by temper, which is related to tensile strength and stiffness. The temper designations are soft, medium, and hard.

4.2 *Zinc Coating*—Zinc coating on the wire is classified in a number of classes (Class 1, 2, 3, or A, 4, B, 5, C (see [Table 1](#), [Table 2](#), [Table 3](#), and [Table S1.1](#))) and as “regular coating.”

NOTE 1—Class 2 coating has been eliminated since it is no longer generally specified by users except for nails, staples, and wire from which nails and staples are cut and formed, as presented in the Supplementary Requirements.

5. Ordering Information

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

5.1.1 Quantity (weight [mass]),

5.1.2 Coated wire diameter,

5.1.3 Intended use, when the wire is to be used for nails or staples (see Supplementary Requirement S1),

5.1.4 Class of coating (see [Table 1](#), [Table 2](#), or [Table 3](#) (or [Table S1.1](#) when applicable)),

5.1.5 Temper (soft, medium, or hard) ([Table 4](#) or [Table 5](#)), tensile strength-mechanical properties other than specified in [Table 4](#) or [Table 5](#) can be ordered upon agreement between the purchaser and producer,

5.1.6 ASTM designation and year of issue as A641-____ for inch-pound units, or A641M-____ for SI units.

5.1.7 Supplementary Requirements (if required).

NOTE 2—A typical ordering description (inch-pound units) is as follows: 50 000 lb, 0.120 in., zinc-coated wire, Class 1 coating, soft

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

TABLE 1 Minimum Weight [Mass] of Zinc per Unit Area of Uncoated Wire Surface (Inch-Pound Units)

Wire Diameter in. ^A	Class 1	Class 3 or A Coating, oz/ft ²	Class 4 Coating, oz/ft ²	Class B Coating, oz/ft ²	Class 5 Coating, oz/ft ²	Class C Coating, oz/ft ²
0.035	0.15	0.45	n/a	0.90	n/a	1.35
0.041	0.15	0.50	n/a	1.00	n/a	1.50
0.048	0.15	0.55	n/a	1.10	n/a	1.65
0.054	0.20	0.60	n/a	1.20	n/a	1.80
0.062	0.20	0.65	n/a	1.20	n/a	1.80
0.072	0.20	0.65	n/a	1.20	n/a	1.80
0.076	0.25	0.70	1.20	1.40	2.00	2.10
0.080	0.25	0.70	1.20	1.40	2.00	2.10
0.092	0.28	0.75	1.20	1.50	2.00	2.25
0.099	0.28	0.80	1.20	1.60	2.00	2.40
0.106	0.30	0.80	1.20	1.60	2.00	2.40
0.120	0.30	0.85	1.20	1.70	2.00	2.55
0.135	0.30	0.85	1.20	1.70	2.00	2.55
0.148	0.35	0.90	1.20	1.80	2.00	2.70
0.162	0.35	0.90	1.20	1.80	2.00	2.70
0.177	0.44	0.90	1.20	1.80	2.00	2.70
0.192	0.50	1.00	1.20	2.00	2.00	3.00
0.207	0.53	1.00	1.20	2.00	2.00	3.00
and larger						

^ACoating weights [mass] for diameters other than those shown in Table 1 are the coating weights [mass] for the next smaller diameter.

TABLE 2 Minimum Weight [Mass] of Zinc per Unit Area of Uncoated Wire Surface (SI Units)

Wire Diameter, mm	Class 1 Coating, g/m ²
0.20 to under 0.25	20
0.25 to under 0.40	25
0.40 to under 0.50	30
0.50 to under 0.60	35
0.60 to under 0.80	40
0.80 to under 1.10	45
1.10 to under 1.50	55
1.50 to under 1.90	65
1.90 to under 2.30	75
2.30 to under 3.20	85
3.20 to under 4.00	100
4.00 to under 4.90	115
4.90 to under 5.90	150
5.90 and over	190

temper in 1500-lb coils on tubular carriers to ASTM A641—_____.

NOTE 3—A typical ordering description (SI units) is as follows: 50 000 kg, 3.00 mm., zinc-coated wire, Class 1 coating, soft temper in 1000-kg coils on tubular carriers to ASTM A641M—_____.

6. Materials and Manufacture

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

6.2 The slab zinc when used shall be any grade of zinc conforming to Specification B6.

7. Mechanical Properties

7.1 The zinc-coated wire, as represented by the test specimens tested in accordance with Test Methods E8, shall conform to the tensile strength requirements prescribed in Table 4 or Table 5. Tensile strength-mechanical properties other than specified in Table 4 or Table 5 can be ordered upon agreement between the purchaser and producer.

7.2 Test specimens found to contain a weld or obvious imperfections shall be discarded and another test specimen obtained to verify conformance to the tensile strength requirements.

8. Permissible Variations

8.1 The permissible variation in diameter of the zinc-coated wire as represented by the test specimens shall meet the requirements shown in Table 6 or Table 7.

9. Weight [Mass] of Coating

9.1 The zinc-coated wire, as represented by the test specimens tested in accordance with Section 12 and Test Method A90/A90M, shall conform to the requirements of Table 1, Table 2, or Table 3 for minimum weight [mass] of zinc coating of the class specified. Individual results not more than 10 % below the minimum values specified in Table 1, Table 2, or Table 3 are allowed, if the average of at least two samples from the same coil are equal to or greater than the minimum value specified in Table 1, Table 2, or Table 3.

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

10. Adherence of Coating

10.1 The zinc-coated wire as represented by the test specimens shall be capable of being wrapped in a close helix at a rate not exceeding 15 turns/min around a cylindrical steel mandrel having a diameter as prescribed in Table 8 or Table 9 without cracking or flaking the zinc coating to such an extent that any zinc can be removed by rubbing with the bare fingers. Loosening or detachment during the adhesion test of superficial, small particles of zinc formed by mechanical polishing of the surface of the zinc-coated wire shall not be considered cause for rejection.

11. Workmanship, Finish, and Appearance

11.1 The zinc-coated wire shall be free of slivers, scale, and other imperfections not consistent with good commercial practice. The coating shall be continuous and reasonably uniform. To ensure large continuous length coils, welds are permitted in the finished wire.