



Designation: A741 – 23

Standard Specification for Metallic-Coated Steel Wire Rope and Fittings for Highway Guardrail¹

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1. Scope

1.1 This specification covers $\frac{3}{4}$ and 1-in. (19 and 25-mm) metallic-coated steel wire rope and fittings for use in the construction of highway guardrail.

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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
A123/A123M Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153/A153M Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A370 Test Methods and Definitions for Mechanical Testing of Steel Products
A902 Terminology Relating to Metallic Coated Steel Products

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.

B6 Specification for Zinc

B750 Specification for GALFAN (Zinc-5 % Aluminum-Mischmetal) Alloy in Ingot Form for Hot-Dip Coatings

B997 Specification for Zinc-Aluminum Alloys in Ingot Form for Hot-Dip Coatings

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology A902.

4. Ordering Information

4.1 Orders for wire rope guardrail material purchased to this specification shall include the following:

4.1.1 Diameter of wire rope,

4.1.2 Type of wire rope construction,

4.1.3 Class and Type of Metallic coating—Z for zinc (see Table 1), M for Zinc Aluminum Alloy (see Table 2),

4.1.4 Quantity of wire rope and length per reel, and

4.1.5 ASTM designation and year of issue.

NOTE 1—A typical ordering description is as follows: $\frac{3}{4}$ in. (19 mm) diameter, Metallic-Coated Wire Rope for Guardrail, Type 1 Construction, Class ZA Coating, 80 000 lineal ft (24 300 m) on forty 2000 ft (608 m) reels, ASTM A741– .

NOTE 2—The coating requirements for wire diameters not specified in Tables 1 and 2 shall be agreed upon between purchaser and producer.

5. Material

5.1 *Base Metal*—The base metal shall be steel made by any process and shall be of such quality that the finished wire rope and the individual metallic-coated wires shall have the properties as prescribed in this specification.

5.2 *Zinc*—The slab zinc, when used for the coating, shall be any grade of zinc conforming to Specification B6 for zinc coatings.

5.3 *Zinc-Aluminum Alloy*—The slab zinc-aluminum alloy, when used for the coating, shall conform to Specifications B750 or B997 at the discretion of the manufacturer.

5.4 *Coating Bath Analysis*—The bath metal used in continuous hot-dip zinc-aluminum alloy-coated wire shall meet the chemical composition limits specified in Specifications B750 or B997.

TABLE 1 Minimum Weight of Coating for Zinc

Nominal Diameter of Coated Wire		Weight of Zinc Coating, min					
		oz/ft ² of Uncoated Wire Surface			g/m ² of Uncoated Wire Surface		
		Class A Coating	Class B Coating	Class C Coating	Class A Coating	Class B Coating	Class C Coating
in.	mm						
0.040 to 0.061, incl	1.02 to 1.55, incl	0.40	0.80	1.20	122	244	366
0.062 to 0.079, incl	1.58 to 2.01, incl	0.50	1.00	1.50	152	305	458
0.080 to 0.092, incl	2.03 to 2.34, incl	0.60	1.20	1.80	183	366	549
0.093 to 0.103, incl	2.36 to 2.62, incl	0.70	1.40	2.10	214	427	640
0.104 to 0.119, incl	2.64 to 3.02, incl	0.80	1.60	2.40	244	488	732
0.120 to 0.142, incl	3.05 to 3.61, incl	0.85	1.70	2.55	259	518	778

TABLE 2 Minimum Weight of Coating for Zinc Aluminum Alloy

Nominal Diameter of Coated Wire		Weight of Zinc Aluminum Alloy Coating, min					
		oz/ft ² of Uncoated Wire Surface			g/m ² of Uncoated Wire Surface		
		Class A Coating	Class B Coating	Class 1 Coating	Class A Coating	Class B Coating	Class 1 Coating
in.	mm						
0.040 to 0.061, incl	1.02 to 1.55, incl	0.40	0.80	0.20	122	244	61
0.062 to 0.079, incl	1.58 to 2.01, incl	0.50	1.00	0.25	152	305	76
0.080 to 0.092, incl	2.03 to 2.34, incl	0.60	1.20	0.30	183	366	92
0.093 to 0.103, incl	2.36 to 2.62, incl	0.70	1.40	0.30	214	427	92
0.104 to 0.119, incl	2.64 to 3.02, incl	0.80	1.60	0.40	244	488	122
0.120 to 0.142, incl	3.05 to 3.61, incl	0.85	1.70	0.40	259	518	122

6. Mechanical Requirements

6.1 Breaking Strength—The metallic-coated steel wire rope shall conform to the mechanical properties in [Table 3](#) when tested in accordance with Test Methods and Definitions [A370](#) and employing a suitable gripping device as covered in Supplement VII of Test Methods and Definitions [A370](#).

6.2 Construction—The metallic-coated wire rope and individual wires shall conform to the dimension and construction requirements of [Table 3](#).

6.3 Ductility of Steel—The individual metallic-coated wires shall be capable of being wrapped two turns in a close helix at a rate not exceeding 15 turns per minute around a cylindrical steel mandrel equal to three times the nominal diameter of the wire under test without cracking or breaking of the wire.

6.4 Weight of Zinc Coating or Zinc Aluminum Alloy—The class of metallic coating weight shall be specified by the purchaser. The weight of the metallic coating on the individual

wires for the specified class and appropriate wire size shall not be less than that specified in [Table 1](#) or [Table 2](#) when tested in accordance with the stripping test of Test Method [A90/A90M](#).

6.5 Adherence of Coating—The individual metallic-coated wires shall be capable of being wrapped two turns in a close helix at a rate not exceeding 15 turns per minute around a cylindrical steel mandrel equal to three times the nominal diameter of the wire under test without the coating cracking or flaking to such an extent that any zinc or Zinc Aluminum Alloy can be removed by rubbing with bare fingers. Loosening or detachment during the adherence test of superficial small particles of zinc or Zinc Aluminum Alloy formed by mechanical polishing of the surface of metallic-coated wire shall not be considered cause for rejection.

TABLE 3 Guard Cable Requirements

Type	Diameter, min, in. (mm)	Construction (No. of Strands × No. of Wires per Strand)	Breaking Strength, min, lbf (kN)	Length of Lay of Strand, max, in. (mm)	Length of Lay of Wires in Strand, max, in. (mm)	Diameter of Coated Wires in Strand, in. (mm)
I	¾ (19)	3 by 7	25 000 (110)	7.5 (190)	4.5 (114)	0.117 to 0.124 (2.97 to 3.15)
II	¾ (19)	6 by 19 ^A IWRC ^B	42 800 (190)	^C	^C	variable
II(a)	¾ (19)	6 by 19 ^A wire strand core	42 800 (190)	^C	^C	variable
III	1 (25)	7 by 7	45 000 (200)	10 (254)	4.5 (114)	0.105 to 0.116 (2.67 to 2.84)

^A 6 by 19 classification may have from 15 to 26 wires per strand.

^B IWRC = independent wire rope core.

^C Length of lay as specified by the manufacturer.