Designation: A741 – 11 (Reapproved 2016)

Standard Specification for Metallic-Coated Steel Wire Rope and Fittings for Highway Guardrail[1]

This standard is issued under the fixed designation A741; 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 ¾ and 1-in. (19 and 25-mm) metallic-coated steel wire rope and fittings for use in the construction of highway guardrail.

1.2 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.

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

B6 Specification for Zinc

B750 Specification for GALFAN

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-5 % Aluminum-Mischmetal 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: ¾-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– .

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 or Zinc-5 % Aluminum-Mischmetal Alloy when used for the coating shall be any grade of zinc conforming to Specification B6 for Zinc coatings or Specification B750 for Zinc-5 % Aluminum-Mischmetal Alloy coatings.

5.3 *Coating Bath Analysis*—The bath metal used in continuous hot-dip Zn-5 Al-MM alloy-coated wire shall meet the chemical composition limits specified in Specification B750.

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-5 % Aluminum-Mischmetal Alloy*—The class of metallic coating weight shall

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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.

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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		
in.	mm	Class A Coating	Class B Coating	Class C Coating	Class A Coating	Class B Coating	Class C Coating
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-5 % Aluminum-Mischmetal Alloy

Nominal Diameter of Coated Wire		Weight of Zinc-5 % Aluminum-Mischmetal Alloy Coating, min					
		oz/ft^2 of Uncoated Wire Surface			g/m^2 of Uncoated Wire Surface		
in.	mm	Class A Coating	Class B Coating	Class 1 Coating	Class A Coating	Class B Coating	Class 1 Coating
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

†Class A Coating Weight (oz/ft^2) in the 0.120 to 0.142, incl range was editorially corrected.

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.

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-5 % Aluminum-Mischmetal Alloy can be removed by rubbing with bare fingers. Loosening or detachment during the adherence test of superficial small particles of zinc or Zinc-5 % Aluminum-Mischmetal Alloy formed by mechanical polishing of the surface of metallic-coated wire shall not be considered cause for rejection.

6.6 *Appearance*—The individual wires shall be cylindrical in form, of uniform quality, and free of imperfections not consistent with good commercial practice. The coating shall be continuous and reasonably uniform.

7. Wire Rope

7.1 The wire rope shall be right regular lay, preformed, and of the type of construction shown in Table 3. A right lay is defined as a clockwise twist away from the observer. The type of construction shall be specified by the purchaser.

8. Joints and Splices

8.1 *Individual Wires*—The distance between joints in any two individual wires in a strand shall be not less than 18 in. (460 mm). Joints in individual wires shall be either butt-welded or brazed-lap type. Joints made by butt welding shall have all flash removed. When the brazed-lap type of joint is used, the

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