Designation: A121 – 13

Standard Specification for Metallic-Coated Carbon Steel Barbed Wire[1]

This standard is issued under the fixed designation A121; 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 metallic-coated steel barbed wire, consisting of a strand of two wires.

1.2 The barbed wire is available with aluminum, zinc, and zinc-5 % aluminum-mischmetal alloy coatings, with a number of coating weights, in a number of different constructions (designs), and in two grades. Not all designs are available in all coating types.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 The text of this specification references notes and footnotes that provide explanatory information. These notes and footnotes (excluding those in tables) 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

A428/A428M Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles

A641/A641M Specification for Zinc–Coated (Galvanized) Carbon Steel Wire

A700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment

A809 Specification for Aluminum-Coated (Aluminized) Carbon Steel Wire

A856/A856M Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Carbon Steel Wire

A902 Terminology Relating to Metallic Coated Steel Products

2.2 *Federal Standard:*

Fed. Std. No. 123 Marking for Shipments (Civil Agencies)[3]

2.3 *Military Standards:*

MIL-STD-129 Marking for Shipment and Storage[3]

MIL-STD-163 Steel Mill Products Preparation for Shipment and Storage[3]

3. Terminology

3.1 *Definitions*—For definitions of terms not specified in this specification, refer to Terminology A902.

4. Classification

4.1 The barbed wire covered by this specification is classified as described in this section.

4.2 *Design Number*— Numbers describing standard sizes and constructions, as listed in Table 1.

4.3 *Metallic Coating Type:*

4.3.1 *Coating Type A*— Made from aluminum-coated strand wire. See 6.3. (Only one coating weight for each wire size.)

4.3.2 *Coating Type Z*— Made from zinc-coated strand wire. See Table 2.

4.3.3 *Coating Type ZA*— Made from zinc-5 % aluminum-mischmetal alloy (Zn-5AL-MM) coated strand wire. See Table 3.

4.4 *Metallic Coating Class*—The specified amount of coating (coating weight (mass)) on the strand wire.

4.5 *Grades:*

4.5.1 *Standard Grade*— Barbs spaced on 4 or 5-in. (102 or 127-mm) centers as indicated in Table 1.

4.5.2 *High-Security Grade*—Barbs spaced on 3-in. (76-mm) centers with Coating Type A, Z, or ZA only.

NOTE 1—The design numbers are related to the characteristics of the construction of the barbed wire, with the number groups related, in order, to the steel wire gage of the strand wires, number of barb points, spacing of barbs, steel wire gage of the barbs, and a letter indicating the shape of the barbs.

[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

TABLE 1 Standard Sizes and Constructions for Barbed Wire

Design Number	Size, Steel Wire Gage	Nominal Diameter of Coated Wire, in. (mm)	Number of Barb Points	Spacing of Barbs, in. (mm)	Diameter of Barbs, Steel Wire Gage[A]	Shape of Barbs
			Metallic Coating Type A			
12-4-3-14R	12½	0.099 (2.51)	4	3 (76)	14	Round
12-4-5-14R	12½	0.099 (2.51)	4	5 (127)	14	Round
12-4-3-12R[B]	12½	0.099 (2.51)	4	3 (76)	12	Round
			Metallic Coating Type Z and Type ZA			
12-2-4-12F	12½	0.099 (2.51)	2	4 (102)	12½ [C]	Flat
12-2-4-13F	12½	0.099 (2.51)	2	4 (102)	13[C]	Flat
12-2-4-14R	12½	0.099 (2.51)	2	4 (102)	14	Round
12-2-5-12F	12½	0.099 (2.51)	2	5 (127)	12½ [C]	Flat
12-2-5-14R	12½	0.099 (2.51)	2	5 (127)	14	Round
12-4-5-14H	12½	0.099 (2.51)	4	5 (127)	14[C]	Half-round
12-4-5-14R	12½	0.099 (2.51)	4	5 (127)	14	Round
13-2-4-14R	13½	0.086 (2.18)	2	4 (102)	14	Round
13-4-5-14R	13½	0.086 (2.18)	4	5 (127)	14	Round
14-2-4-14F	14	0.080 (2.03)	2	4 (102)	14	Flat
14-2-5-14F	14	0.080 (2.03)	2	5 (127)	14	Flat
14-4-3-14F	14	0.080 (2.03)	4	3 (76)	14	Flat
14-4-5-14F	14	0.080 (2.03)	4	5 (127)	14	Flat
14-2-5-14R	14	0.080 (2.03)	2	5 (127)	14	Round
14-4-5-14R	14	0.080 (2.03)	4	5 (127)	14	Round
15-2-5-13F	15½	0.067 (1.70)	2	5 (127)	13¾ [C]	Flat
15-2-5-14R	15½	0.067 (1.70)	2	5 (127)	14	Round
15-4-5-16R	15½	0.067 (1.70)	4	5 (127)	16½	Round
15-4-3-16R	15½	0.067 (1.70)	4	3 (76)	16½	Round

[A]The nominal diameter of the wire used in making the barbs shall be as follows:
12½ gage 0.099 in. (2.51 mm)
13 gage 0.092 in. (2.34 mm)
13¾ gage 0.083 in. (2.11 mm)
14 gage 0.080 in. (2.03 mm)
16½ gage 0.058 in. (1.47 mm)
[B]Design Number 12–4–3–12R, Metallic Coated Type A, is High-Security Grade. All other design numbers are for standard grade.
[C]The gage of the half-round and flat barbs is designated by the gage of the round wire from which the barbs are rolled.

TABLE 2 Minimum Weight of Coating on Type Z Barbed Wire

Size, Steel Wire Gage	Nominal Diameter of Type Z		Minimum Weight of Coating of Uncoated Wire Surface, oz/ft² (g/m²)	
	in.	(mm)	Class 1	Class 3
12½	0.099	(2.51)	0.28 (85)	0.80 (245)
13	0.092	(2.34)	0.28 (85)	0.75 (230)
13½	0.086	(2.18)	0.25 (75)	0.70 (215)
13¾	0.083	(2.11)	[A]	0.70 (215)
14	0.080	(2.03)	0.25 (75)	0.70 (215)
15½	0.067	(1.70)	[A]	0.65 (200)
16½	0.058	(1.47)	[A]	0.60 (200)

[A]These sizes only furnished with Class 3 Coating (Section 8).

TABLE 3 Minimum Weight of Coating on Type ZA Barbed Wire

Size, Steel Wire Gage	Nominal Diameter of Type ZA		Minimum Weight of Coating of Uncoated Wire Surface, oz/ft² (g/m²) Class		
	in.	(mm)	Class 1	Class 3	Class 60
12½	0.099	(2.51)	0.28 (85)	0.80 (245)	0.60 (183)
13	0.092	(2.34)	0.28 (85)	0.75 (230)	0.60 (183)
13½	0.086	(2.18)	0.25 (75)	0.70 (215)	0.60 (183)
13¾	0.083	(2.11)	0.25 (75)	0.70 (215)	0.60 (183)
14	0.080	(2.03)	0.25 (75)	0.70 (215)	0.60 (183)
15½	0.067	(1.70)	0.20 (61)	0.65 (198)	n/a
16½	0.058	(1.47)	0.20 (61)	0.60 (183)	n/a

5. Ordering Information

5.1 Orders for material under this specification shall include the following information, as necessary to describe the desired product.

5.1.1 Name of material (steel barbed wire),

5.1.2 Quantity (number of spools and length of barbed wire on each, or total length) (see 7.5 for standard size of spools),

5.1.3 Metallic coating type (see 4.3),

5.1.4 Metallic coating class (for Types Z and ZA) (see Table 2 or Table 3),

5.1.5 Design Number (see Table 1),

5.1.6 For Coating Type A barbed wire, whether aluminum alloy barbs are required or prohibited (see 6.2.1). If not stated, the choice shall be at the manufacturer's option,

5.1.7 ASTM designation and year of issue, and

5.1.8 Certification or test report, or both, if required.

NOTE 2—A typical ordering description is as follows: Steel barbed wire, 20 spools of 80 rods each, Coating Type Z, Coating Class 3, Design Number 12-2-4-14R, to ASTM Specification A121-latest edition, with certification.

5.2 All spools of barbed wire accepted by the purchaser shall be billed on the basis of the original length of the spools before sampling, unless changed by contractual agreement.

6. Material

6.1 *Base Metal*—The base metal of the steel strand wires and steel barbs shall be of good commercial quality carbon steel, capable of meeting the breaking strength requirement in 7.7. The base metal for aluminum barbs (permitted with

metallic Coating Type A) shall be aluminum alloy wire conforming to Alloy 5000-H38, Alloy 6061-T94, or equal.

6.1.1 For Coating Type A barbed wire, the choice of whether aluminum-coated steel wire or aluminum alloy wire for the barbs shall be that of the manufacturer, unless otherwise specified by the purchaser. If aluminum alloy wire is used, the particular alloy shall be agreed upon between the manufacturer and the purchaser at the time the order is placed.

6.2 *Coating Materials*—The coating on the wire shall conform with the requirements of the following specifications:

6.2.1 *Coating Type A*— Aluminum-coated wire in accordance with Specification A809.

6.2.2 *Coating Type Z*— Zinc-coated wire in accordance with Specification A641/A641M.

6.2.3 *Coating Type ZA*— Zinc-5 % aluminum-mischmetal alloy (Zn-5Al-MM) coated wire in accordance with Specification A856/A856M.

6.3 *Coated Wire*— The steel wire shall be coated before fabrication.

6.3.1 *Weight of Coating Requirements for Strand Wires*—The strand wires for Types Z and ZA barbed wire, as represented by the test specimens, shall conform to the requirements of Tables 2 and 3 respectively for the minimum coating weight for the type and class ordered. The strand wires for Type A barbed wire, as represented by the test specimens, shall have a minimum coating weight of 0.30 oz/ft^2 (90 g/m^2) on the 12½ –gage wire.

6.3.2 *Weight of Coating Requirements for Barbs*—The wire for barbs for Types Z and ZA barbed wire, as represented by the test specimens, shall conform to the same coating class requirements as the strand wire. The steel wire for barbs for Type A barbed wire, as represented by the test specimens, shall have a minimum coating weight of 0.25 oz/ft^2 (75 g/m^2) on the 14–gage wire.

7. General Requirements

7.1 The sizes and constructions for barbed wire furnished under this specification shall be in accordance with the requirements of Table 1 for the Design Number specified in the order, within the tolerances stated in Section 8.

7.2 The barbs shall be sharp, well-formed, and tightly wrapped. The barb points shall be sharp and properly shaped.

7.3 The strand wires shall be twisted with a uniform length of lay. Type Z and Type ZA barbed wire shall have the twisting consistently in one direction (left or right) or alternating between the left and right directions. Type A barbed wire shall have the twisting consistently in either the left or right direction, with alternating of the twisting prohibited.

7.4 Splicing of individual wires by means of a wrap joint or an electric butt weld is permitted. Not more than three splices or joints shall exist in any spool of barbed wire. Such splices or joints shall be made in a workmanlike manner.

7.5 The barbed wire, for the various types, shall be packaged on spools in lengths as follows:

7.5.1 *Type A*—80 rods (1320 ft) (402 m) or 1000 ft (305 m).

7.6 *Types Z and ZA*— 80 rods (1320 ft) (402 m) or 80 rods plus additional increments of 10 rods (165 ft) (50 m).

7.7 *Breaking Strength*—The breaking strength of the stranded barbed wire, for all types, shall be not less than 950 lbf (4230 N). This breaking strength reflects that of both strand wires tested together as one unit.

8. Permissible Variations in Dimensions

8.1 *Diameter*—The permissible variation from the nominal diameter of the wire, for both line wires and barbs, for all types, shall be ±0.005 in. (0.13 mm)

8.1.1 Due to the mechanics of manufacture when forming the barbs, a certain amount of out-of-roundness is expected. The size and condition precludes barbs from being subjected to diameter checks.

8.2 *Barb Spacing*— The nominal spacing of the barbs shall be as noted in Table 1. The individual barb spacing shall be measured from the edge of one barb at the strand to the corresponding edge of the adjacent barb. Cumulative spacing is established by counting the total number of barbs in a 25-ft (7.6-m) length of barbed wire. Barbs are subject to relocation during fabrication and handling, potentially leading to rejections with rigid interpretation of the spacing requirement. Therefore, barb spacing shall be considered acceptable under the following conditions:

8.2.1 The sample has 93.5 % of the individual barb spacings conforming to the specified spacing ±¾ in. (19 mm), and

8.2.2 A sample length of 25 ft (7.6 m) of barbed wire contains:

8.2.2.1 A minimum of 86 barbs for 3-in. (76-mm) spacing,

8.2.2.2 A minimum of 69 barbs for 4-in. (102-mm) spacing, or

8.2.2.3 A minimum of 55 barbs for 5-in. (127-mm) spacing.

8.3 *Barb Length*—The barb length, measured from the center of the two strand wires, shall be ⅜ in. (9.5 mm) minimum (see Fig. 1). A barb is considered under length if any

FIG. 1 Example of a Complete Barb

of its barb points as specified in Table 1 does not meet this minimum length.

8.3.1 Within a 25-ft (7.6-m) length of sample, 95 % of the barbs shall meet the minimum barb length.

9. Sampling and Testing

9.1 *Sampling*—For the purpose of tests, select one spool at random from every 50 spools or fraction thereof in a lot, or a total of seven samples, whichever is less. A lot shall consist of all spools of a single construction (Design Number) of barbed wire offered for delivery at the same time.

9.2 *Test Specimens for Physical Tests*—Cut a 4-ft (1.2-m) length of barbed wire from the end of each spool for tests prescribed in Sections 6 and 7. Determine the breaking strength value by testing the twisted strand as composite. Test each strand wire individually for weight of coating.

9.3 *Testing for Weight of Coating* —Coating weight for Types Z and ZA shall be determined in accordance with Test Method A90/A90M. Coating weight for Type A shall be determined in accordance with Test Method A428/A428M. Perform testing either before or after fabrication for the strand wires and for Type A steel barbs. Perform testing prior to fabrication for Type Z and ZA barbs, and certify the test results.

9.4 *Pretesting of Wire*—Instead of testing wire for breaking strength and weight of coating from the completed barbed wire in accordance with 9.2, the manufacturer, at his election, shall establish compliance with the requirements in Sections 6 and 7 by tests made on wire prior to fabrication. If the manufacturer makes this election, the purchaser still has the right to test wire from the completed barbed wire for compliance. It is recognized that during fabrication the barb is mechanically deformed and scraped, and some differences are likely in coating weight results on barbs tested before and after fabrication.

9.5 *Inspection for General Workmanship* —For the purpose of inspection, a maximum of two spools from the lot, as described in 9.1, shall be subjected to observations for barb length and spacing, overall length, and workmanship.

9.5.1 Instead of inspecting for length by unrolling full spools, the purchaser and manufacturer have the option of agreeing on a weight per spool related to wire size or measuring tools employed during manufacturing. The purchaser still reserves the right to confirm the length by actual measurement.

9.5.2 Inspection for barb spacing and barb length is normally performed on the outer 25-ft (7.6-m) length of a spool, which permits repacking of the spool. Any other selection shall be as agreed upon between the manufacturer and the purchaser.

10. Retests

10.1 *Lot Size for Retests*—If one or more of the individual wire specimens fail the coating weight, or if a strand specimen fails the breaking strength test, the lot shall be subject to retest. For retest purposes, four additional spools of barbed wire for each 50 spools offered shall be sampled. The lot size then becomes 50 spools, except variation in lot size is permitted to accommodate pallet count when the barbed wire is palletized.

10.2 *Retesting for Coating Weight* —If more than two of the individual strand wires of the retest specimens fail to meet the requirements of 6.3, or if any of the retest specimens has less than 75 % of the specified coating weight, the entire lot represented by the retest shall be rejected.

10.3 *Retesting for Breaking Strength* —If any of the retest specimens fail to meet the minimum breaking strength value in 7.7, the entire lot represented by the specimens shall be rejected.

10.4 *Reinspection for Barb Spacing, Barb Length, and Overall Length*—If either of the sample spools fails to meet the requirements for these dimensions, within the tolerances in Section 8, two additional spools shall be selected for inspection. If either of these spools fails to meet the requirements, the lot shall be rejected.

11. Inspection

11.1 Unless otherwise specified in the purchase order or contract, the manufacturer is responsible for the performance of all inspection and test requirements specified in this specification. Except as otherwise specified in the purchase order or contract, the contractor shall use his own or any other suitable facilities for the performance of the inspection and test requirements unless disapproved by the purchaser at the time the order is placed. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification when such inspections and tests are deemed necessary to ensure that the material conforms to the prescribed requirements.

12. Rejection and Rehearing

12.1 Material that fails to conform to the requirements of this specification shall be rejected. Rejection shall be reported to the manufacturer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the manufacturer or supplier shall make claim for a rehearing.

12.2 Instead of rejecting the entire lot as provided in Section 10, the manufacturer has the option of testing specimens from every spool and rejecting only those spools failing the weight of coating or breaking strength requirements.

13. Certification

13.1 When specified in the purchase order or contract, a manufacturer's or supplier's certification stating that the material was manufactured, sampled, tested, and inspected in accordance with this specification and has been found to meet the requirements shall be furnished to the purchaser. When specified in the purchase order or contract, a report of the test results shall be furnished.

14. Packing and Package Marking

14.1 Unless otherwise specified, packaging, marking, and loading for shipment shall be in accordance with Practices A700.

14.2 When specified in the contract or order, and for direct shipment to the U.S. Government, when Level A is specified,

preservation, packaging, and packing shall be in accordance with Level A requirement of MIL-STD-163.

14.3 When specified in the contract or order, and for the direct procurement by or direct shipment to the U.S. Government, marking for shipment, in addition to the requirements specified in the contract or order, shall be in accordance with MIL-STD-129 for U.S. military agencies and in accordance with Fed. Std. No. 123 for U.S. Government civil agencies.

15. Keywords

15.1 barbed wire; carbon steel wire; metallic coated steel wire; steel barbed wire; wire