

Testing Zinc-Coated (Galvanized) Barbed Wire, Woven Wire, Chain Link Fabric, Tension Wire, Hardware and Post

SC T 136

1. Scope

The test is to check materials to see if they meet specifications.

2. Referenced Documents

2.1 AASHTO

- M 181 Chain-Link Fence
- M 279 Metallic-Coated Steel Woven Wire Fence Fabric
- M 280 Metallic-Coated (Carbon) Steel Barbed Wire
- T 65 Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
- T 68 Tension Testing of Metallic Materials
- T 218 Weight of Coating on Aluminum-Coated Iron or Steel Articles

2.2 ASTM

- A 90 Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
- A 116 Specification for Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric
- A 121 Specification for Zinc-Coated (Galvanized) Steel Barbed Wire
- E 8 Test Methods for Tension Testing of Metallic Materials
- E 376 Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods

2.3 SCDOT Standards

Drawing Nos. 805-1 & 2

2.4 Other Standards

Diameter to gauge chart.

3. Apparatus

3.1 Ruler

3.2 Micrometer

3.3 Materials and test procedure to perform AASHTO T 65 or T 213

3.4 Magnetic gauge per ASTM E 376

4. Test Specimen

- 4.1 Barbed wire - 3 feet; tension wire, six pieces at 24", different rolls if possible; woven wire - three feet, total height; chain link fabric, one foot, full height.
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5. Procedure

5.1 Barbed Wire

- 5.1.1 Determine nominal diameter of individual wires and convert to gauge.
- 5.1.2 Determine nominal diameter of wire for barbs and convert to gauge.
- 5.1.3 Determine number of barbs.
- 5.1.4 Determine nominal spacing of barbs by measuring 20 inches and dividing by the number of spaces.
- 5.1.5 Perform AASHTO T 65 or T 213 as applicable and determine weight of coating.
- 5.1.6 Determine if results meet AASHTO M 280 specifications.

5.2 Woven Wire

- 5.2.1 Determine number of horizontal wires.
- 5.2.2 Determine height of fabric, center to center of top and bottom wires.
- 5.2.3 Determine spacing of stay wires.
- 5.2.4 Determine average diameter of top and bottom wires and convert to gauge.
- 5.2.5 Determine average diameter of horizontal and stay wires and determine gauges.
- 5.2.6 Perform AASHTO T 65 or T 213 as applicable and calculate the weight of the coatings of the following:
 - 5.2.6.1 One specimen of top or bottom wire.
 - 5.2.6.2 Three specimens of horizontal (line) wire (other than top or bottom).
 - 5.2.6.3 Two specimens of vertical (stay) wire.
- 5.2.7 Determine minimum breaking strength of line wire. One of top or bottom wires and three line wires other than top or bottom.
- 5.2.8 From information taken from Section 5.2.1 through 5.2.5, a determination of the type and grade will be made which is used to determine the specifications of the sample. The results of testing are then compared to the required specifications on determined grade and type.

5.3 Chain Link Fabric

- 5.3.1 Determine average diameter (.148 in) of the wire with coating and convert to gauge (9).
- 5.3.2 Determine the size of the mesh by measuring the minimum clear distance between the wires forming the parallel size of the mesh.
- 5.3.3 Determine height of fabric without tension.
- 5.3.4 Perform AASHTO T 65 and determine if individual sample has a minimum of 1.8 oz./ft.² of zinc and all samples average a minimum 2.0 oz./ft.².

5.4 Tension Wire

- 5.4.1 Determine average diameter of coated wire. (0.177 in \pm 0.005 Gauge 7).
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- 5.4.2 Test 3 sections of the sample for ultimate strength to determine if the minimum load is 1950 lbf or a maximum load of 3,200 lbf by AASHTO T 68.
 - 5.4.3 Test 3 sections of the sample for zinc coating if wire is a Type 1. (See Section 5.3.4).
 - 5.4.4 Test 3 sections of the sample for aluminum coating if wire is a Type II in accordance with AASHTO T 213 to determine if the average aluminum coating is not less than 0.4 oz/ft².
 - 5.5 Post-Line
 - 5.5.1 Alt. No. 1 H Post-Line
 - 5.5.1.1 Determine weight per linear foot by weighing section, measuring length and dividing weight by length. (Weight 2.72 lbs/ft. \pm 5% for Grade 1.)
 - 5.5.1.2 Measure height and width to see if dimensions are 2.25 in. X 1.7 in. \pm 5%.
 - 5.5.1.3 Determine coating thickness with magnetic gauge and convert to lbs/ft² to see if minimum for any reading is 1.6 oz/ft² and averages 1.8 oz/ft² or greater.
 - 5.5.2 Alt. No. 2 C-Post-Line
 - 5.5.2.1 Determine weight per linear foot by weighing section, measure length and dividing weight by length (weight 2.28 lbs/ft² \pm 5% for Grade 1).
 - 5.5.2.2 Measure dimensions \pm 5%: Metal thickness 0.121"; Top and Bottom 1.625"; Back 1.875"; Opening 0.750"
 - 5.5.2.3 Determine coating thickness with magnetic gauge and convert to oz/ft² to see if minimum for any reading is 1.6 oz/ft² and averages 1.8 oz/ft² or greater.
 - 5.5.3 Alt. No. 3 Tubular Post-Line
 - 5.5.3.1 Determine weight per linear foot by weighing section, measuring length and dividing weight by length. (Weight 3.65 lbs/ft \pm 5% for Grade 1 and 3.12 lbs/ft \pm 5% for Grade 2).
 - 5.5.3.2 Measure dimension \pm 5% - outside diameter 2.275", inside diameter 2".
 - 5.5.3.3 Same as Section 5.5.2.3.
 - 5.6 Post-Corner or Pull
 - 5.6.1 Determine weight per linear foot by weighing section, measuring length and dividing weight by length (Type 1, 5.79 lbs/ft \pm 5% or Type 2, 4.64 lbs/ft \pm 5%).
 - 5.6.2 Measure dimensions \pm 5% - Outside diameter 2.875"; Inside diameter 2.50".
 - 5.6.3 Same as Section 5.5.2.3
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- 5.7 Tubular Brace Bar
 - 5.7.1 Determine weight in pounds per foot.
 - 5.7.2 Measure dimensions $\pm 5\%$ - outside diameter 1.66 inches, inside diameter 1.25 inches.
 - 5.7.3 Same as Section 5.5.2.3
- 5.8 Hardware, miscellaneous fitting, and bolts
 - 5.8.1 Check materials to see if dimensions fit post, etc.
 - 5.8.2 Determined coating thickness with magnetic gauge on item that can be checked. (1.6 oz/ft² minimum on individual items)

6. Calculations

- 6.1 Weight in pounds per foot.
 $32.85 \text{ lbs} \div 12 \text{ ft.} = 2.74 \text{ lbs/ft}$
 $2.72 \text{ lbs} \times .05 = 0.14$
 $2.72 + 0.14 = 2.86 \text{ lbs/ft}; 2.72 - 0.14 = 2.58 \text{ lb/ft}$
- 6.2 Galvanizing in oz. per sq. ft.
 $\text{Mil reading} \div 1.7 \text{ (Factor)} = \text{oz/ft}^2$
 $3.06 \text{ mil} \div 1.7 = 1.8 \text{ oz/ft}^2$

7. Report

- 7.1 Barbed Wire: Does or does not meet specifications.
- 7.2 Woven Wire: Design dumber - type - does or does not meet specifications.
- 7.3 Chain Link Fabric: Gauge - size of mesh - height - Does or does not meet specifications.
- 7.4 Tension Wire: Does or does not meet specifications.
- 7.5 Post Line:
 - 7.5.1 H Post - Does or does not meet specifications.
 - 7.5.2 C Post - Does or does not meet specifications.
 - 7.5.3 Tubular Post - Does or does not meet specifications.
- 7.6 Brace Bar :
 - 7.6.1 Grade.
 - 7.6.2 Does or does not meet specifications.
- 7.7 Hardware, etc: Product does or does not meet specifications.

Test results are reported on Lab Forms 920 and 921. Data and calculations are recorded on worksheet 920W and 921W.
