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American Association State
Highway and Transportation Officials Standard
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Standard Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete[1]

This standard is issued under the fixed designation A 421/A 421M; 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 two types of uncoated stress-relieved round high-carbon steel wire commonly used in prestressed linear concrete construction, as follows:

1.1.1 *Type BA* wire is used for applications in which cold-end deformation is used for anchoring purposes (Button Anchorage), and

1.1.2 *Type WA* wire is used for application in which the ends are anchored by wedges, and no cold-end deformation of the wire is involved (Wedge Anchorage).

1.2 Supplement I describes low relaxation wire and relaxation testing for that product.

1.3 The values stated in either inch-pound or SI units are to be regarded as standard. Within the text, the inch-pound units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other, without combining values in any way.

2. Referenced Documents

2.1 *ASTM Standards:*

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products[2]

E 30 Test Methods for Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron[3]

E 328 Methods for Stess Relaxation Tests for Materials and Structures[4]

2.2 *Military Standards:*

MIL-STD-129 Marking for Shipment and Storage[5]

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage[5]

2.3 *Federal Standard:*

Fed. Std. No. 123 Marking for Shipments (Civil Agencies)[5]

3. Ordering Information

3.1 Orders for stress-relieved wire under this specification should include the following information:

3.1.1 Quantity (kg [lb]),

3.1.2 Diameter,

3.1.3 Type of anchorage (BA or WA),

3.1.4 Packaging,

3.1.5 ASTM designation and date of issue, and

3.1.6 Special requirements, if any.

NOTE 1—A typical ordering description is as follows: 10 000 kg of 6.35-mm diameter wire, Type BA in approximately 450 kg 1.5-m diameter coils to ASTM A 421/A 421M– _____(22 000 lb 0.250-in. diameter wire, Type BA in approximately 1000 lb 60-in. diameter coils to ASTM A 421/A 421M–_____).

4. Manufacture

4.1 *Process*—The steel shall be made by the basic-oxygen, open-hearth, or electric-furnace process.

4.2 *Internal Soundness*—A sufficient discard shall be made to ensure freedom from injurious piping and undue segregation.

4.3 *Wire*—The wire shall be cold-drawn to size and suitably stress relieved after cold drawing by a continuous heat treatment to produce the prescribed mechanical properties.

5. Physical Requirements

5.1 *Tensile Strength*—The tensile strength of Type BA wire and Type WA wire shall conform to the requirements prescribed in Table 1, and shall be determined as prescribed in Test Methods and Definitions A 370, including Annex A4.

5.2 *Yield Strength*:

5.2.1 The minimum yield strength for all wire, measured by the 1.0 % extension under load method, shall not be less than 85 % of the specified minimum breaking strength.

5.2.2 The extension under load shall be measured by an extensometer calibrated with the smallest division not larger than 0.0001 mm/mm (0.0001 in./in.) of gage length.

[1] This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys, and is the direct responsibility of Subcommittee A01.05 on Steel Reinforcement.

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[2] *Annual Book of ASTM Standards*, Vol 01.03.

[3] Discontinued. See *1995 Annual Book of ASTM Standards*, Vol 03.05.

[4] *Annual Book of ASTM Standards*, Vol 03.01.

[5] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.