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Standard Specification for Spun Cast Prestressed Concrete Poles[1]

This standard is issued under the fixed designation C1089; 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 spun cast prestressed concrete poles for use as structural supports for ~~streetlights; traffic signals; and~~ electric transmission, distribution, and communication ~~lines.~~lines; streetlights; and traffic signals.

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]
A82/A82M Specification for Steel Wire, Plain, for Concrete Reinforcement
A416/A416M Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
A421/A421M Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete
A496/A496M Specification for Steel Wire, Deformed, for Concrete Reinforcement
A615/A615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
A617/A617M Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement (Withdrawn 1999)[3]
A641/A641M Specification for Zinc–Coated (Galvanized) Carbon Steel Wire
A706/A706M Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
A722/A722M Specification for Uncoated High-Strength Steel Bars for Prestressing Concrete
C31/C31M Practice for Making and Curing Concrete Test Specimens in the Field
C33 Specification for Concrete Aggregates
C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens
C42/C42M Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C150 Specification for Portland Cement
C172 Practice for Sampling Freshly Mixed Concrete
C260 Specification for Air-Entraining Admixtures for Concrete
C330 Specification for Lightweight Aggregates for Structural Concrete
C494/C494M Specification for Chemical Admixtures for Concrete
C595 Specification for Blended Hydraulic Cements
C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
2.2 *AASHTO Standard:*
Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals ~~(LTS-2)~~(LTS-5)[4]
2.3 *~~ANSI~~IEEE Standard:*
National Electrical Safety Code[5]

[1] This specification is under the jurisdiction of ASTM Committee C27 on Precast Concrete Products and is the direct responsibility of Subcommittee C27.20 on Architectural and Structural Products.

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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] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from American Association of State Highway and Transportation Officials, 444 N. Capitol Street, NW, Washington, DC 20001.

[5] Available from ~~American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.~~Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., Piscataway, NJ 08854, http://www.ieee.org.

2.4 *PCI Guides:*
Guide for Design of Prestressed Concrete Poles[6]
Guide Specification for Prestressed Concrete Poles[6]

3. Terminology

3.1 *Definitions:*

3.1.1 *cracking load*—a load which creates a bending moment of enough magnitude to produce a tensile stress greater than the sum of induced compression plus the tensile strength of the concrete resulting in tensile cracks on the tension face of the pole.

3.1.2 *spun pole*—a pole in which the concrete is distributed and compacted through centrifugal force.

3.1.3 *ultimate load*—maximum load the pole will carry in the specified direction, before the concrete or steel will reach its limiting state.

4. Basis of Acceptance

4.1 ~~The acceptability of the poles~~ Acceptability of spun prestressed concrete poles produced in accordance with this specification shall be determined by the results of ~~full-scale bending and torsional tests. Poles shall be accepted on the basis of producer certification and historical test data of full-scale bending and torsional tests on equal or larger poles. The purchaser shall specify the number and frequency of full-scale tests. Poles failing to meet the strength requirements specified by the purchaser or the tolerances specified herein shall be rejected.~~compressive strength tests of concrete cylinders and mill certificates for the reinforcing steel. A written statement, signed by the manufacturer, shall verify that the cement, aggregates, admixtures, and steel conform to the applicable specifications for the material. Concrete strength shall be determined by the compressive strength tests of cylinders. The manufacturer's statement shall also certify adherence to tolerance on dimensions and mass. Acceptability of the poles produced in accordance with this specification may also be determined by the results of full-scale bending tests.

5. Materials

5.1 *Cement*—Portland cement shall conform to the requirements of Specification C150 or shall be portland blast-furnace slag cement or portland-pozzolan cement conforming to the requirements of Specification C595.

5.2 *Aggregate*—Aggregates shall conform to Specification C33 except that the requirements for grading shall not apply. If a producer can demonstrate that aggregates conforming to Specification C330 could be used to manufacture an acceptable product, those aggregates may be used.

5.3 *Water*—Water used for mixing concrete shall be free of oils, organic matter, and other substances in amounts that may be deleterious to concrete, and it shall not contain concentration of chloride ions in excess of 500 ppm or sulfate ions in excess of 1000 ppm.

5.4 *Admixture*—Chemical admixtures shall conform to Specification C494/C494M. Air-entraining admixtures shall conform to Specification C260. Fly ash or other pozzolanic admixtures shall conform to the requirements of Specification C618. Admixtures shall not cause the chloride ion content of the concrete to exceed 0.06 % by mass of cement.

5.5 *Steel*—Prestressing steel shall conform to Specifications A416/A416M, A421/A421M, or A722/A722M. Non-tensioned longitudinal reinforcement shall conform to Specifications A615/A615M, A617/A617M, A706/A706M, or A496/A496M. Circumferential wire reinforcement shall conform to Specification A82/A82M, A496/A496M, or A641/A641M. Base plates, anchor bolts and top mount couplings shall conform to the ASTM specifications designated on contract drawings.

5.6 All inserts shall be corrosion resistant and used according to the manufacturer's specifications. No aluminum inserts shall be allowed.

6. Requirements

6.1 *General Requirements:*

6.1.1 *Concrete Cover*—The minimum concrete cover over all reinforcing steel shall be ¾ in. (19 mm) unless specified otherwise by purchaser. For street lighting poles, cover can be reduced to ½ in. (13 mm).

6.1.2 *Circumferential Wire*—Circumferential wire center-to-center spacing shall be a maximum of 4 in. (102 mm), except at the ends (measured from either the top or bottom to a distance of 1 ft (305 mm)) where the maximum spacing will be ~~1~~1.25 in. (~~25~~(32 mm).

6.1.3 *Grounding*—The purchaser shall specify any grounding requirements needed.

6.1.4 *Exterior Surface Treatment*—Exterior concrete surface finish shall be as specified by the purchaser.

6.1.5 *Prestressing*—Initial prestress shall not be applied until the concrete strength has reached the greater of 3500 psi (24 MPa) or 1.67 times the maximum expected stress in the concrete due to the prestressing forces immediately after transfer and before losses occur.

[6] Available from Prestressed Concrete Institute, 209 West Jackson Blvd., Chicago, IL 60606.