



Designation: C1804 – 14

Standard Specification for Spun Cast Prestressed Concrete Bases for Tapered Steel Lighting Poles¹

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1. Scope

1.1 This specification covers spun cast prestressed concrete bases used in lighting structures.

1.2 *Units*—The values stated in SI units are to be regarded as standard.

2. Referenced Documents

2.1 *ASTM Standards*:²

A416/A416M Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

A421/A421M Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete

A615/A615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

A496/A496M Specification for Steel Wire, Deformed, for Concrete Reinforcement (Withdrawn 2013)³

A617/A617M Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement (Withdrawn 1999)³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

A722/A722M Specification for Uncoated High-Strength Steel Bars for Prestressing Concrete

A1064/A1064M Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

B86 Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings

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

C143 Test Method for Slump of Hydraulic-Cement Concrete

C150 Specification for Portland Cement

C172 Practice for Sampling Freshly Mixed Concrete

C192 Practice for Making and Curing Concrete Test Specimens in the Laboratory

C260 Specification for Air-Entraining Admixtures for Concrete

C289 Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)

C330 Specification for Lightweight Aggregates for Structural Concrete

C494 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

C989 Specification for Slag Cement for Use in Concrete and Mortars

C1064 Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

C1089 Specification for Spun Cast Prestressed Concrete Poles

C1157 Performance Specification for Hydraulic Cement

C1240 Specification for Silica Fume Used in Cementitious Mixtures

F593 Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

2.2 *AASHTO Standard*:

Specification for Structural Supports for Highway Signs, Luminaries and Traffic Signals (LTS-6)⁴

2.3 *ASCE7 Standard*:⁵

Minimum Design Loads for Buildings and Other Structures

¹ This test method 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 (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

⁵ Available from American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191, <http://www.asce.org>.

2.4 PCI Guides:

Guide for Design of Prestressed Concrete Poles
 Guide Specification for Prestressed Concrete Poles

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 base.

3.1.2 *cylindrical section*—lower portion of base designed to be buried in concrete backfill below ground line.

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

3.1.4 *tapered section*—upper portion of base, which has a taper designed to match overlapping steel pole taper.

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

4. Basis of Acceptance

4.1 Acceptability of spun prestressed concrete bases produced in accordance with this specification shall be determined by the test results of compressive strength tests of concrete cylinders and mill certificates for the reinforcing steel. The manufacturer shall certify that the cement, aggregates, admixtures, and steel shall conform to the applicable specification for each material. The manufacturer shall also certify adherence to tolerance on dimensions and mass. In addition to the acceptability of the bases, produced in accordance with this specification, shall be verified by the results of full scale bending tests. The purchaser shall specify the number and frequency of full-scale tests. Bases shall be accepted on the basis of producer certifications and historical test data of full-scale bending and tests on equal or larger bases.

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**. Performance cement for specific use shall conform to Specification **C1157**.

5.1.1 *Supplementary Cementitious Materials*—Fly ash shall conform to the requirements of Specification **C618**. Slag cement (ground granulated blast furnace slag) shall conform to the requirements of Specification **C989**. Silica fume shall conform to Specification **C1240**.

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 or reinforcing steel, 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**. Air-entraining admixtures shall conform to Specification **C260**. Admixtures shall not cause the chloride ion content of the concrete to exceed 0.06 % by mass of cementitious materials.

5.5 *Steel*—Prestressing steel shall conform to Specification **A416/A416M**, **A421/A421M**, or **A722/A722M**. Nontensioned longitudinal reinforcement shall conform to Specification **A615/A615M**, **A617/A617M**, or **A496/A496M**. Circumferential wire reinforcement shall conform to Specification **A1064/A1064M**, **A496/A496M**, or **A641/A641M**.

5.6 All inserts shall be made from zinc alloy in accordance with Specification **B86** or stainless steel in accordance with Specification **F593**. No aluminum inserts shall be allowed.

5.7 The top and bottom ends of the bases shall be sealed to prevent ground or rain water from wicking into the strand ends. The sealing compound shall be specified by the purchaser.

6. Requirements

6.1 General Requirements:

6.1.1 *Concrete Cover*—The minimum concrete cover over longitudinal reinforcing steel shall be $\frac{3}{4}$ in. (19 mm). The concrete cover can be reduced to $\frac{5}{8}$ in. (16 mm) minimum for portions of the base not exposed to soil or weather.

6.1.2 *Circumferential Wire*—Circumferential wire spacing shall be 3 in. (76 mm) nominal, except at the ends (measured from either the top or bottom to a distance of 1 ft (305 mm)) where the nominal spacing shall be 1 in. (25 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 released until the concrete strength has reached the greater of 4500 psi (31 MPa) or 1.67 times the maximum expected stress in the concrete due to the prestressing forces immediately after transfer and before losses occur.

6.1.6 The minimum 28-day compressive strength for concrete used in bases shall be 9000 psi (62 MPa) as determined using Test Method **C39/C39M** or **C42/C42M**, or as specified by the purchaser. The cylinders for compression tests shall be made in accordance with Practice **C31/C31M** and **C172**.

6.1.7 If required by the purchaser, air entrainment of concrete shall be in accordance to ACI 301.

6.2 Load Requirements:

6.2.1 Bases shall be designed to withstand ultimate load. Ultimate capacity of the base shall be determined in accordance with the PCI Guide for Design (2.4). Where local codes so require, seismic loads shall be considered in the design of bases. Bases shall be proportioned so that loads produced by the manufacturing process, transportation, and installation, as well as dead and live loads, will not be detrimental to the strength, serviceability requirements, and aesthetics of the structure.