SPECIFICATION NUMBER

SPECIFICATION EDEN-515

SPECIFICATION

FOR

STATIC CAST

PRESTRESSED CONCRETE POLES

TYPE I, II, IV

LAKELAND ELECTRIC
DELIVERY ENGINEERING
LAKELAND, FL

SPECIFICATION

1 SCOPE

1.1 This specification and drawings are to establish quality standards and dimensional requirements for static cast concrete poles for use on an electric distribution and lighting system.

1.2 This specification and drawings are to establish quality and types of static cast concrete poles as used by Lakeland Electric. Modifications to this specification may be included in supplementary conditions to the specification

2 GENERAL REQUIREMENTS

2.1 The successful bidder must be an established company which has produced poles of a similar type and height within the last two years, or has been prequalified by Lakeland Electric Delivery Engineering prior to bidding. All pole design structural calculations must be prepared by a registered engineer experienced in prestressed concrete design.

2.2 The concrete poles furnished under these specifications shall be manufactured in accordance with requirements and/or recommendations of the American Concrete Institute Standard “Building Code Requirements for Reinforced Concrete” (ACI 318-Latest Edition), unless otherwise specified.

2.3 Poles shall be designed in accordance with the PCI’s (Prestressed Concrete Institute) Guide for Design of Prestressed Concrete Poles.

3 PHYSICAL CHARACTERISTICS

3.1 All poles shall be static cast prestressed concrete and suitable for direct embedment into the ground without special foundations.

3.2 Poles shall be square in cross-section, with chamfered corners, and shall have a standard taper of 0.162 inch per foot. Cross-sectional dimensions shall not deviate by more than 1/4 inch. The allowable tolerance shall be +1 inch and -0 inches in the overall length.

3.3 The pole shall contain a void of design consistent with strength requirements and weight reduction. This void shall not be obstructed by “Bulkheads” where expandable tubes change size. All mandrel holes are to be plugged at the base.

3.4 The pole shall have a smooth uncolored finish with no cracks. Immediately after the screening has been completed, the top surface of the pole in the form shall be troweled smooth and the edges shall be tooled. The top surface of each pole shall be troweled until all projections, depressions, and irregularities have been removed and the entire surface has a smooth texture and neat lines. Square corners and sharp edges shall be tooled to form smooth, chamfered corners.

3.5 All small cavities caused by air bubbles, honeycomb, or other small voids shall be cleaned, saturated with water and then carefully pointed with mortar. A small cavity is defined as one not larger than 1/2 inch in diameter nor deeper than 1/4 inch. Large cavities not exceeding 2 inches long shall be repaired by opening the cavity sides on a 1 to 1 slope with a mechanical grinder, cleaning thoroughly, and patching with an epoxy-aggregate mixture in accordance with the product manufacturer's specifications. Poles damaged with cavities larger than the foregoing shall be rejected.

3.6 The end of each steel reinforcing strand (in the top and butt) shall be burned back to a minimum depth of 1 inch. The holes left by the removal of the strand shall be thoroughly cleaned of any loose residue. The holes shall then be completely painted with marine type epoxy paint. After the epoxy paint has begun to set, the holes shall be filled with epoxy grout. After the epoxy grout has set, the patched holes shall be given a final coat of epoxy paint.

3.7 The reinforcing steel shall have a minimum cover of 1-1/2 inches of concrete to the outside face and to the inside void. The minimum cover of concrete between the reinforcing steel and the holes that are drilled at the time of the manufacture of the pole shall be 3/4 inch. The centerline axis along the four pole faces shall be clear of embedded steel so that a 3/4 inch diameter hole may be drilled in the future without interference from any steel and with a minimum of 1 inch cover remaining between the holes and the reinforcing steel.

3.8 Sweep is the deviation of a pole from straightness. Sweep will be allowed in one plane and one direction only. A straight line joining the edge of the pole at the butt and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 1/4 inch for each 10 feet of length between these points.

3.9 Poles shall be drilled in accordance with attached drawings. The location of holes shall not deviate by more than 3/8 inch. Holes drilled after removal from molds shall be drilled from both sides of the pole and shall be uniform in entrance and exit without concrete spilling of more than 1/4 the hole diameter at any one point. Holes drilled from opposing sides of the pole must be in the same plane and be centered on both faces.

4 MATERIALS

4.1 The chemical properties of materials used shall be free from chlorides and/or sulfates.

4.2 All inserts or attachments, if required, shall be non-corrosive material.

4.3 Concrete used in poles shall have compressive strength at transfer of not less than 4,000 PSI, and 28 day cylinder strength of not less than 6,000 PSI.

4.4 Steel tendons shall conform to ASTM A416 (latest revision) “Specifications for Uncoated Seven-Wired Stress-Relieved Strand for Prestressed Concrete” Grade 270.

5 STRENGTH REQUIREMENTS

5.1 All poles of each type, unless otherwise specified, shall be designed to withstand the rated design (cracking) and ultimate strength, shown in the following table, with modifications to accommodate allowances for handling transportation, and erection. The rated strength is that load, which if applied in a direction perpendicular to the pole axis 2 feet below the pole tip and with the bottom of the pole (ten percent of its length plus two feet from the butt) held firm, will produce the first sign of hairline cracks. The ultimate strength is the maximum design load, at which point failure occurs and shall be a minimum of one and one half times the rated strength.

LOAD CAPACITY AND DIMENSIONS BY TYPE

STRENGTH	MIN. BREAKING STRENGTH	MIN. CRACKING DIMENSIONS	MIN. TOP TAPER	TYPE
I	1200 LBS.	430 LBS	4” X 4”	0.162 in/ft.
II	2400 LBS.	900 LBS.	6” X 6”	0.162 in/ft.
IV	4500 LBS.	1800 LBS.	7.6” X 7.6”	0.162 in/ft.

5.2 All poles shall be capable of withstanding single point pickup from the horizontal position when lifting from a point 30% of the overall length down from the tip.

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6 GROUNDING DETAILS

6.1 A ground wire shall be cast in all poles as required by the included drawings.

7 MARKING

7.1 All poles shall have imprinted on one face a legible birthmark containing the manufacturer's name, the letters COL, year of manufacturer, length, and name or type located 10 feet from the butt on all type poles. In addition, all poles shall have the length legibly stenciled on the pole butt in a contrasting color.

7.2 The information listed below shall also be marked on the pole in legible, durable ink or paint or cast into the pole. These marks shall be kept small but conspicuous.

1.) Dunnage Points.

2.) Two-point pickup locations for handling the pole in a horizontal position.

3.) One-point pickup location for use in raising the pole to a vertical position and handling in setting operation.

8 DRAWING AND DESIGN INFORMATION

8.1 Upon request, the supplier shall furnish detailed design drawings and computations of the poles bid or supplied including but not limited to the following:

1. Total weight and center of gravity of each pole bid.
2. Calculations of cracking and ultimate moments at 5 foot intervals.
3. Dunnage and pickup points, including both one point and point pickup locations.
4. Detail of cross sections at all points where reinforcing changes.
5. Ultimate shear calculations at five foot intervals.
6. Calculations of maximum vertical loads, considering buckling, acting at the pole tips assuming an embedment length of 10% of pole height plus two feet.

8.2 The ultimate moment is the maximum designed moment, based on the ultimate strength specified, under which the pole can be used without failure. The ultimate shear moment is the maximum allowable shear calculated in accordance with the value "ϕ YN" defined in the appropriate chapter of the latest ACI 318, under which the pole can be used without creating shear cracks.

9 INSPECTION

9.1 Lakeland Delivery Engineering shall have access to the work at any time during the manufacturing process and the manufacturer shall provide proper facilities for such access and inspection without additional cost to the buyer. All materials will be subject to job site inspection. Material may be rejected at the time of the first inspection or at any time defects are found during the process of receiving at buyers designated receiving point, erection, or installation. Inspection or waiving of inspection by the City shall not relieve the manufacturer from the responsibility for furnishing products that conform to the requirements of this specification, nor invalidate any claim of the buyer because of defective or unsatisfactory material and workmanship.

10 DELIVERY

10.1 Delivery shall be made as specified on the Purchase Order. The City of Lakeland will unload the poles at the designated delivery point.