

SPECIFICATIONS

PRESTRESSED SPUN CONCRETE POLES



These specifications apply to the manufacturing of centrifugally cast, prestressed reinforced concrete poles ("spun concrete poles"). All spun concrete pole designs and wind loading calculations shall be prepared by an experienced licensed engineer. The manufacturer shall have a minimum of 70 years' experience in the design and production of spun concrete poles.

CERTIFICATION, DESIGN AND MANUFACTURING SPECIFICATIONS

The design and manufacturing of spun concrete poles shall meet the following standards and specifications:

- The manufacturing company shall be certified by Canadian Standards Association (CSA) to CSA-A14 (latest revision);
- Poles shall be designed to AASHTO-LTS (latest revision) to withstand a 3 second gust wind speed that is determined by geographical area utilizing the AASHTO wind map;
- Poles shall be designed/manufactured in accordance to:
 - CSA-A14: Concrete Poles (latest revision);
 - ANSI-C136.36B: Roadway and Area Lighting Equipment - Concrete Lighting Poles (latest revision);
 - ASTM-C1089: Standard Specification for Spun Cast Prestressed Concrete Poles (latest revision);
 - The Guide Specification for Prestressed Concrete Poles, issue of the Journal of the Prestressed Concrete Institute.

RAW MATERIALS

Coarse Aggregate

Shall be clean washed limestone or granite with a maximum size of $\frac{1}{2}$ ", graded as to achieve optimum quality in the finished product and shall conform to ASTM-C33.

Fine Aggregate

Shall be clean washed concrete grade sand, free of clay and other deleterious matter and shall conform to ASTM-C33.

Cement

Shall be equal to ASTM C-150, Type I/II and CSA Type 10 or Type 30.

Admixtures

Water reducers, retarders or accelerating admixtures shall conform to ASTM-C494. Air entrainment and efflorescence control shall also be used.

Water

Shall be free of acids, alkalis and organic materials.

Color Pigments

Where used shall be non-fade iron or chromium oxides.

Steel

- Prestressing steel reinforcement shall be uncoated 7-wire strand and shall conform to ASTM A416 and CSA G279.
- Deformed reinforcing bars shall conform to ASTM A615, and CSA G30.12.
- Helical reinforcing wire shall conform to ASTM A82 and when applicable have a hot dipped galvanized coating as per ASTM A641, Class 3.

MANUFACTURING

Internal Steel Reinforcement

- Skeleton: Rings increasing in diameter are welded to a continuous longitudinal steel bar. A bare copper wire is bonded to the continuous longitudinal steel bar and exiting the hand hole box. The taper of the skeleton is equal to the taper of the pole to ensure proper concrete coverage.
- The required stress wires and/or rebar are tied to the skeleton. Size and quantity will vary based upon pole length and class.
- Plastic spacers are used to ensure a minimum concrete cover of $\frac{3}{4}$ " on all longitudinal reinforcing steel.
- The skeleton and longitudinal reinforcing steel cage shall be wrapped in both directions with galvanized steel helical reinforcement. The pitch shall not be greater than 3.5" or the radius of the pole, whichever is less. Diameter of helical reinforcement is determined by pole class.
- Ornamental poles shall have additional reinforcing rings at large bell locations for added durability.

Mold Set Up

The mold is set up to include all through holes, hand hole boxes, apertures, etc. per customer specifications. The steel cage is placed into the mold and centered with precision drilled end plates and spools. To further center the cage within the mold, the bottom cables are pre-stressed to remove any slack in the cable.

Concrete Batching:

- A fully automated batching system is to be used for all concrete batches. These batches are to be recorded and kept for a minimum of 7 years.
- A concrete cylinder test shall be performed for each 52 cubic yards (40 cubic meters) of concrete poured. Air entrainment and slump tests are performed at the same time.
- The concrete used shall achieve a minimum 28-day compressive strength of 8,000 psi (55 Mpa).
- Air entrainment admixture shall be used to produce 5-8% air content in the static cast cylinder.

Stressing

- Prestressing steel reinforcement shall be stressed to a maximum of 70% of their ultimate capacity.
- Elongation is to be measured on all strands.

Spinning

Molds are to be spun at 300 – 350 rpm for a duration of 6-15 minutes.

Curing

- Steam is not to be introduced for a minimum of 45 minutes after the spinning process is complete.
- Concrete temperature not to exceed 140 degrees Fahrenheit (60 degrees Celsius).

Demolding

- Prestressing strand shall not be released until a minimum concrete compressive strength of 3,500 psi (25 Mpa) is achieved.

Finishing

- Per customer specification, poles are to be finished in one of the three options:
 1. Mold finish, standard gray
 2. Etched finish
 3. Polished finish
- Coating options included silane, acrylic or anti-graffiti.

QUALITY CONTROL

- A production drawing shall be provided for each type of pole manufactured.
- A quality control technician shall approve each stage of manufacturing before proceeding to the next.
- All quality control procedures shall be mandated in a written manual and be available for review.

STANDARD ACCESSORIES

- All lighting poles shall be provided with a fish wire to facilitate cable installation.
- A #6 copper ground wire shall be supplied inside the hand hole, bonded to the pole's internal steel cage.
- Hand holes shall be box type, rugged high density cast zinc and shall be supplied with a close fitting inset cover of the same material. Cover plate shall be mounted to the hand hole box with stainless steel screws. Metallic hand hole boxes shall be electrically grounded.
- Wiring apertures, giving access to the raceway of the pole, shall be free from any sharp edges or debris.
- Standard through hole sizes include $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" diameter.
- Standard threaded inserts shall be diecast zinc or hot dipped galvanized in sizes ranging from $\frac{1}{4}$ " - UNC to $\frac{3}{4}$ " - UNC.

OPTIONAL ACCESSORIES

- Decorative aluminum fin caps.
- Silane sealer, an invisible protective coating, for use in high roadside corrosive environments.
- GFI electrical receptacles.
- Steps and safety cables.
- Banner arms, ladder rests and flag holders.
- Base plate mounted poles shall be supplied with one template drawing indicating the bolt circle.
- Base plate covers and nut covers.
- Lightning rod.
- Other accessories available upon request.

WARRANTY

Manufacturer shall provide a limited lifetime warranty for its spun concrete pole products to be free from defects in materials and workmanship for the intended lifetime of the product.