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ISI-CERTIFIED PSCC POLES ARE THE CORNERSTONE OF UNWAVERING POWER DISTRIBUTION EXCELLENCE

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Abstract:
In the ever-evolving arena of power distribution, the selection of materials reigns supreme in safeguarding the robustness and safety of structures. ISI-certified PSCC (Prestressed Cement Concrete) Poles in India shine as the epitome of quality, embodying an unwavering commitment to excellence. Let us embark on a journey to uncover the compelling reasons why ISI-certified PSCC Poles are indispensable in the domain of power distribution.

IndexTerms: PSCC Poles, ISI Certified, Quality, Standards, Safety Power Distribution

INTRODUCTION:

In the dynamic landscape of power distribution, the selection of robust and durable materials is paramount. ISI-certified PSCC (Prestressed Concrete Concrete) poles in India have emerged as the gold standard, symbolizing unwavering commitment to quality and safety.

1. ISI Advantage: Setting the Benchmark

The esteemed ISI certification, bestowed by the Bureau of Indian Standards (BIS), signifies a dedication to rigorous quality standards. For PSCC Poles, this certification serves as a beacon of trust, affirming that manufacturing processes align with stringent criteria. It assures that these poles are crafted from superior materials, promising durability and reliability.

2. Why Choose ISI-Certified PSCC Poles?

2.1 **Durability and Strength:** Engineered to endure harsh environmental conditions and significant loads, these poles are perfectly suited for overhead power transmission, railway traction systems, and telecommunication networks.
2.2 **Safety and Reliability:** With meticulous testing and quality control, these poles meet stringent safety standards, minimizing the risk of failure and ensuring dependable performance throughout their lifespan.
2.3 **Compliance with Standards:** Abiding by IS 1678:1998—which details design, material selection, and performance criteria—ensures these poles can withstand operational stresses with grace.
2.4 **Versatility:** From rural electrification to urban power grids, these poles adapt seamlessly to various environments, making them a flexible choice for diverse infrastructure endeavors.
2.5 **Economic Viability:** Utilizing high-strength concrete and steel, these poles present a cost-effective solution for long-term infrastructural investments.
2.6 **Enhanced Product Credibility:** This BIS certification enhances the credibility of the product, making it a preferred choice for utilities and contractors.
2.7 **Increased Customer Trust:** Customers are more likely to trust BIS-certified poles, knowing they conform to stringent quality standards.

3. A brief about the IS 1678:1998:

IS 1678:1998 is an Indian Standard that provides specifications for prestressed cement concrete poles used in overhead power transmission, traction, and telecommunication lines: Prestressed concrete poles for overhead power, traction. This standard ensures that the poles meet specific requirements for design, materials, and performance to ensure safety and reliability: Prestressed concrete poles for overhead power, traction.

Key Aspects of IS 1678:1998

3.1 Design Requirements: The standard outlines the design criteria for different types of prestressed concrete poles, ensuring they can withstand operational stresses
3.2 Material Specifications: It specifies the types of materials to be used, including high-strength concrete and prestressed steel strands

3.3 Manufacturing Process: The standard details the manufacturing process, including prestressing techniques and quality control measures

3.4 Testing and Inspection: It includes guidelines for testing the poles' load-bearing capacity, dimensional accuracy, and other critical parameters.

3.5 Installation and Maintenance: The standard also covers the proper handling, installation, and maintenance of the poles to ensure their long-term performance.

INDIAN STANDARD FOR PRESTRESSED CONCRETE POLES FOR OVERHEAD POWER TRACTION AND TELECOMMUNICATION LINES - SPECIFICATION – A UNDERSTANDING

IS 1678:1998 is an Indian Standard that provides comprehensive specifications for prestressed concrete poles used in overhead power, traction, and telecommunication lines. Here's a detailed technical summary of the key aspects covered by the standard:

Table 1 Minimum Depth of Planting of Reinforced Concrete Poles in the Ground

Length of Pole	Minimum Depth of Planting in Ground
m	m
(1)	(2)
6.0 to 7.0	1.20
7.5 to 9.0	1.50
9.5 to 11.0	1.80
11.5 to 13.0	2.00
13.5 to 14.5	2.20
15.0 to 16.5	2.30
17.0	2.40

1. **Scope:** This standard covers prestressed concrete poles suitable for use in overhead power transmission, traction, and telecommunication lines.
2. **References:** The Indian Standards listed in Annex A are referenced in this text and form a part of this standard. All standards are subject to revision, and it is encouraged to use the most recent editions of the referenced standards.
3. **Terminology**
   - **3.1 Average Permanent Load:** The fraction of the working load considered of long duration over a period of one year.
   - **3.2 Load Factor:** The ratio of ultimate transverse load to the transverse load at first crack.
   - **3.3 Transverse:** The direction bisecting the angle contained by the conductor at the pole, normal to the run of the pole in straight runs.
   - **3.4 Transverse Load at First Crack:** The transverse load at first crack is not less than the working load.
   - **3.5 Ultimate Failure:** The condition when the pole ceases to sustain load increments due to concrete crushing, prestressing tendon snapping, or permanent steel stretching.
   - **3.6 Ultimate Transverse Load:** The load causing failure when applied 600 mm below the top, perpendicular to the axis of the pole along the transverse direction with the butt end planted.
   - **3.7 Working Load:** The maximum transverse load likely to occur, including wind pressure on the pole, assumed at 600 mm below the top with the butt end planted.
4. **Overall Length of Pole**
   - **4.1 Minimum Length:** 6 meters, with subsequent lengths in 0.5-meter increments.
   - **4.2 Tolerances:**
     - **4.2.1 Overall length:** ±15 mm
     - **4.2.2 Cross-sectional dimensions:** ±5 mm
     - **4.2.3 Uprightness or straightness:** 0.5%
   - **4.3 Measurement of Uprightness or Straightness:** Poles should be placed lengthwise on a rigid surface to measure deviation using a steel scale. Measurements should be taken at least twice in each meter length of the pole. The largest deviation determines the uprightness.

5 Materials

The cement used in the manufacture of prestressed concrete poles shall be any of the following:

- **5.1 Cement:**
  - **5.1.1** Portland slag cement (IS 455) with ≤ 50% slag content
  - **5.1.2** Rapid hardening Portland cement (IS 8041)
  - **5.1.3** 43 grade ordinary Portland cement (IS 8112)
  - **5.1.4** 53 grade ordinary Portland cement (IS 12269)
- **5.2 Aggregates:** Conforming to IS 383, with samples submitted for approval if required.
- **5.3 Prestressing Steel:**
  - **5.3.1** Plain hard drawn steel wire (IS 1785 Part 1 or 2)
  - **5.3.2** Cold drawn indented wire (IS 6003)
  - **5.3.3** Uncoated stress relieved strand (IS 6006 or IS 14268)
  - **5.3.4** High tensile steel bar (IS 2090)
  - **5.3.5** Free from defects and visible pitting.
- **5.4 Reinforcement:** Conforming to IS 432 (Part 1 or 2) or IS 1786.
- **5.5 Concrete:** Minimum grade M 40.
- **5.6 Admixture:** Allowed with approval, conforming to IS 9103, but must be chloride-free.

6 Design

6.1 Poles must not fail due to concrete compression failure.

6.2 Maximum wind pressure as specified by the state or IS 875 (Part 3).

6.3 Depth of Planting: Defined by Table 1 for varying pole lengths.

6.4 Transverse Strength at Failure: Adequate to handle wind load on wires and poles, with load factors as per specified standards.

6.5 Load Factor: Minimum 2.5 for prestressed concrete poles, which may be reduced to 2.0 for power transmission lines by state governments.

6.6 Checking for Transverse Cracking:

6.6.1 Design transverse load at first crack considered at 600 mm from the top.

6.6.2 Flexural tensile strength of concrete per IS 1343.

6.6.3 Permissible Design Stress: As per IS 1343, with specific values for concrete and steel under loads.

7 Manufacture

7.1 Placement of Reinforcement and Ducts

7.1.1 All reinforcement and ducts must be accurately placed and maintained during manufacturing.

7.1.2 Grouping of high tensile wires is permitted if the wire diameters are between 3 mm and 5 mm.

7.2 Prestressed Pretensioned System

7.2.1 All wires must be accurately stretched with uniform prestress in each wire.

7.2.2 Each wire or group of wires must be positively anchored during casting, ensuring the anchorages do not yield before the concrete attains necessary strengths.

7.3 Post-Tensioned Poles: The relative position of wires in a cable, whether curved or straight, must be accurately maintained to ensure the free flow of grout.

7.4 Grouting: All post-tensioned ducts must be grouted using suitable techniques as per IS 1343.

7.5 Cover: In pre-tensioned work, the concrete cover from the prestressing tendon should be at least 30 mm or the size of the cable or bar, whichever is larger.

7.6 Spacing

7.6.1 Single Wire Pretensioned System: Minimum clear spacing should not be less than three times the wire diameter or one and one-third times the maximum aggregate size.

7.6.2 Cables or Large Bars: Minimum clear spacing should not be less than 40 mm, the maximum size of the cable or bar, or 5 mm plus maximum aggregate size.

7.7 Welding and Lapping of Reinforcement: High tensile steel wire or bar should be continuous over the tendon length. Welding is not permitted. Jointing or coupling in bars and indented or crimped wires is allowed if the joint strength equals the individual bar or wire strength.

7.8 Compacting: Concrete must be compacted using mechanical means such as vibrating or shocking. Hand compaction is not permitted.

7.9 Curing

7.9.1 Concrete should be covered with absorbent material (e.g., sacking, canvas, hessian) and kept wet until it reaches minimum required strength. Steam curing is permitted.

7.9.2 Daily tests on concrete cubes must be conducted until required strength is achieved. Results must be supplied to the purchaser when requested.

7.10 Earthing

7.10.1 Method A: Embed a 25 x 3 mm copper strip or equivalent, or 4 mm galvanized iron wire in concrete, with ends projecting from the pole.

7.10.2 Method B: Provide two holes to enable a copper strip or equivalent to be taken from the top hole to the bottom through the central hole.

7.11 Attachment of Equipment: Sufficient holes must be provided in the poles for cross arms and other equipment. Fig. 1 shows a typical hole arrangement.

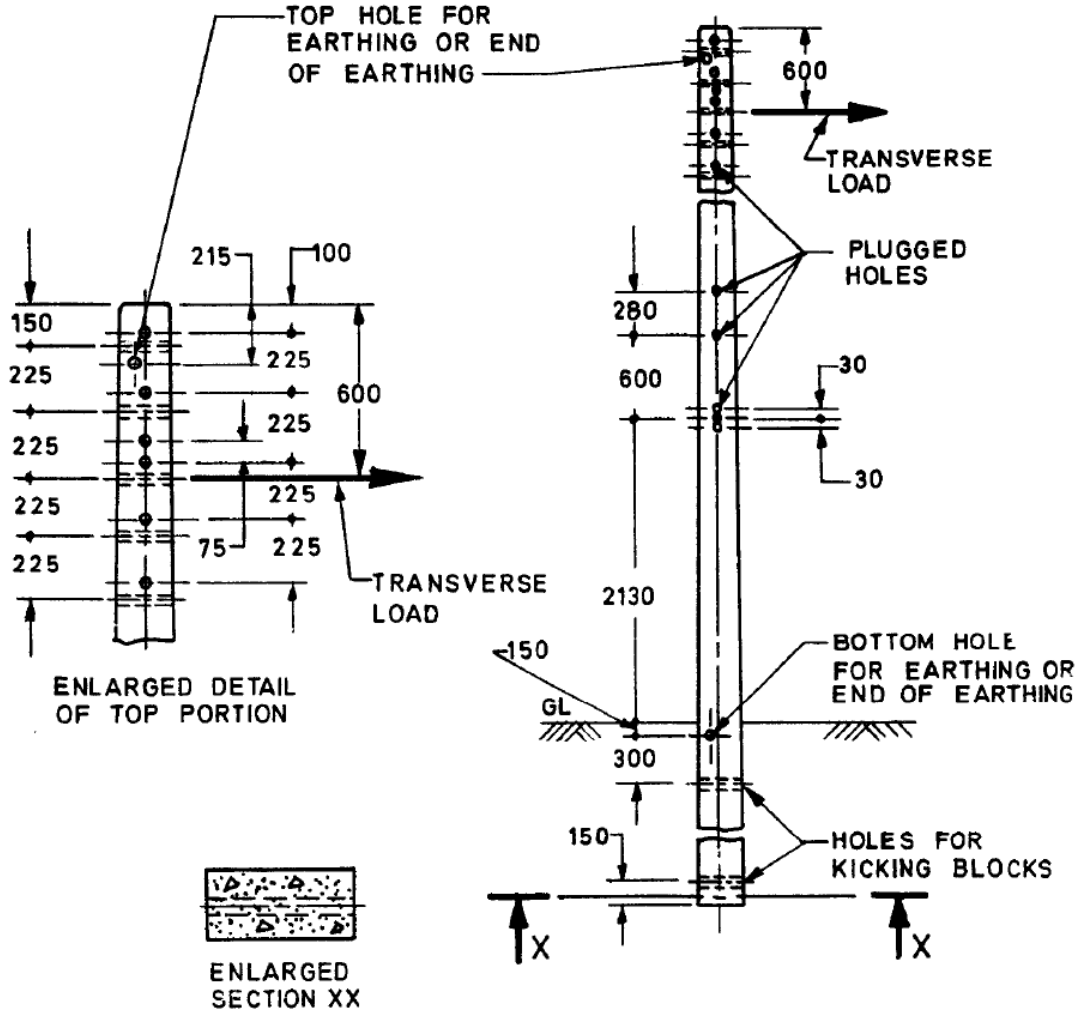
7.12 Handling During Transport and Erection: An eyehook may be provided in each pole at 100 mm below ground level to facilitate handling.

8 Tests

8.1 Concrete Tests: Conducted during manufacture as detailed in section 7.9.

8.2 Transverse Strength Test:

8.2.1 Conducted per IS 2905. Poles fail if cracks wider than 0.1 mm appear before applying the design transverse load at first crack.



NOTES

1 All holes except where otherwise specified shall be of 20 mm diameter.

2 For details of earthing, *see* **7.10**.

3 Plugged holes are provided for fixing danger plate and number plate. These may be plugged with hard wood or other suitable material.

All dimensions in millimetres.

FIG. 1 PROVISION OF HOLES

9 Sampling and Inspection

9.1 Scale of Sampling

9.1.1 Lot Definition: A lot consists of 500 poles or a part thereof with the same dimensions and batch.

9.1.2 Sampling: Number of poles to be tested depends on the lot size, as per Table 2.

9.2 Tests and Criteria for Conformity

9.2.1 Dimensional Testing: All selected poles must be tested for dimensions and uprightness. A lot is accepted if the number of defective poles is within acceptable limits.

9.2.2 Transverse Strength Testing: Additional poles from the satisfactory lot must be tested for transverse strength. If failures occur, double the original sample size is tested.

Table 2 Scale of Sampling and Permissible Number of Defectives

(*Clauses* 9.1.3, 9.2.1 *and* 9.2.2)

No. of Poles in the Lot	Sample Size	Dimensional Requirements Acceptance Number	Transverse Strength Test	Transverse Strength Ultimate
(1)	(2)	(3)	(4)	(5)
Up to 100	10	1	2	1
101 to 200	15	1	3	1
201 to 300	20	2	4	1
301 to 500	30	3	5	2

10 Marking

10.1 Marking Requirements

10.1.1 Poles must be clearly and indelibly marked with:

10.1.1.1 Manufacturer's source

10.1.1.2 Month and year of manufacture

10.1.1.3 Serial number

10.1.1.4 Position of the center

10.2 BIS Certification Mark

10.2.1 The product may also be marked with the BIS Standard Mark.

Manchukonda's Commitment

At Manchukonda Prakasham Industries India Pvt Ltd, we strictly comply with IS 1678:1998 standards in our manufacturing practices. This adherence ensures that our products are of the highest quality and meet the stringent requirements for safety and durability.

Conclusion

By adhering to IS 1678:1998, prestressed concrete poles ensure high quality, durability, and reliability for various infrastructure applications in power distribution, railway electrification, and telecommunications. And an ISI-certified PSCC Poles stand as the cornerstone of unwavering power distribution excellence. Their unmatched quality, durability, and adherence to rigorous standards render them an essential choice for any infrastructure project. By selecting ISI-certified PSCC Poles, you embrace the safety, reliability, and longevity of your power distribution systems.

Prestressed concrete poles play an important role in the setup and laying of overhead power and telecommunication lines. Certification by BIS under specification IS 1678:1998 promises the highest safety, durability, and performance of such poles; therefore, these poles must be an essential ingredient in infrastructure projects across India.

Manchukonda Prakasham Industries India Pvt Ltd (MPIIPL) leads the way as the world's largest manufacturer of PSCC Poles and the only BIS-certified firm in India to produce ISI-certified PSCC Poles. We stand ready to empower power discoms with our high-quality prestressed concrete poles, meticulously crafted to meet the stringent requirements of IS 1678:1998. In an era of rising demand for reliable power and communication, our BIS-certified products play a vital role in building robust infrastructure and enhancing market trust.

REFERENCES

1) Indian Standards Is 1678 : 1998 (Reaffirmed 2003) Prestressed Concrete Poles for Overhead Power Traction and Telecommunication Lines - Specification (Second Revision)
2) Quarterly Publication No.1/2008 of Consumer Educators Network (CENET) of CREAT
3) Prestressed Concrete Poles: Indian Standards and International Considerations by Manchukonda Prakasham Industries India Private Limited