

*Indian Standard*

**CODE OF PRACTICE FOR  
SELECTION, HANDLING AND ERECTION OF  
CONCRETE POLES FOR OVERHEAD POWER  
AND TELECOMMUNICATION LINES**

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**BUREAU OF INDIAN STANDARDS  
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NEW DELHI 110002**

# Indian Standard

## CODE OF PRACTICE FOR SELECTION, HANDLING AND ERECTION OF CONCRETE POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES

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# *Indian Standard*

## CODE OF PRACTICE FOR SELECTION, HANDLING AND ERECTION OF CONCRETE POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 21 February 1974, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** A number of Indian Standards on reinforced concrete and prestressed concrete, lighting columns and poles for overhead power and telecommunication lines have been published. Notwithstanding the intrinsic quality of the concrete poles for which guidance has been given in the standard specifications, safe and efficient service from the concrete poles can be ensured only by proper selection, handling and erection of concrete poles for different purposes. The Sectional Committee has therefore decided to lay down certain guidelines for selection, handling and erection of different types of concrete poles. The recommendations given in the code will be found useful by the user as well as the manufacturer.

**0.3** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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### 1. SCOPE

**1.1** This standard lays down guidelines for selection, handling and erection of concrete poles for overhead power and telecommunication lines.

### 2. TERMINOLOGY

**2.0** For the purpose of this standard, the following definition shall apply.

**2.1 Major Axis** — Major axis of the pole is the geometrical axis of the cross section of the pole about which the pole has greatest resisting moment.

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\*Rules for rounding off numerical values ( revised ).

### **3. SELECTION**

**3.1** The reinforced cement concrete poles and prestressed cement concrete poles shall conform to IS : 785-1964\*, IS : 1678-1960†, IS : 1332-1959‡, and IS : 2193-1963§.

**3.2** The length of poles shall be determined depending upon the type of line, that is power transmission (high voltage) or power distribution (low voltage) lines, required clearance of conductors from ground level, expected sag (which depends upon spacing of poles and allowable tension in conductor), position of cross-arms and the planting depth. Guidance may be obtained from Rule 77 of the Indian Electricity Rules, read with amendment, if any, of the State Government under exercise of Rule 133 of the same rules; and the relevant Indian Standards.

**3.2.1** For poles to be used for 11 kV lines and medium or low tension lines, the length of the poles should normally be 8 m and 7.5 m.

**3.3** Keeping in view the strengths specified in the relevant Indian Standards, the poles shall be of required strength, to meet the loads that are expected to act on the support during normal working conditions, with specified factors of safety.

**3.4** Apart from length and strength requirements of the poles, it shall be ensured that:

- a) the dimensional tolerances and uprightness of the poles is as per requirements of relevant specifications;
- b) sufficient number of suitable holes have been provided in the poles for fixing of cross-arms, and other fittings;
- c) holes have been plugged with hard-wood or other suitable material for fixing of danger and number plates;
- d) lifting hooks have been provided for handling purposes;
- e) suitable earthing arrangement has been provided according to relevant standard specifications and the requirements of the engineer-in-charge;
- f) the poles are marked as specified in IS : 785-1964\* and IS : 1678-1960†; and
- g) the poles are free from cracks visible to the naked eye, honey combing and are of good finish.

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\*Specification for reinforced concrete poles for overhead power and telecommunication lines (revised).

†Specification for prestressed concrete poles for overhead power, traction and telecommunication lines.

‡Specification for reinforced concrete street lighting columns.

§Specification for prestressed concrete street lighting columns.

**3.5** It shall be ensured that the poles are from the lots from which samples have been approved according to requirements of IS : 785-1964\* and IS : 1678-1960†.

#### **4. HANDLING**

**4.1** Reinforced cement concrete poles and prestressed concrete poles are heavy items and their resistance to impact is low in comparison to that of metal poles. Sufficient care shall, therefore, be taken in handling and transport of these poles.

**4.2** The poles shall preferably be handled with major axis in horizontal position.

**4.3** The handling and lifting conditions shall be considered in design and indicated on the pole unless otherwise specified by the designer, poles shall be lifted from at least two points, one point being roughly at a distance of  $1/5$ th of length from bottom, and the other at a distance of  $1/4$ th of length from top. Poles having self weight more than 500 kg shall preferably be lifted at four points, the position of point of lift shall be  $1/6$ th of length and  $1/3$ rd of length from bottom and  $2/5$ th of length and  $1/5$ th of length from top. This system shall be followed both for mechanical and manual loading.

**4.3.1** Single point lifting through the midlength of the pole shall be avoided since this may cause concentration of stresses in only that particular section, thus producing cracks.

**4.3.2** In case of manual handling, the pole may be uniformly supported all over its lengths and not at its ends.

#### **4.4 Loading and Unloading**

**4.4.1** Poles shall preferably be loaded and unloaded by means of crane or other similar mechanical device. If mechanical loading and unloading is not practicable or economical, manual loading and unloading may be done, according to the procedure described in **4.4.2** to **4.4.4**.

**4.4.2** While poles are to be loaded into truck, wagon, trailer, etc, either wooden sleepers or steel rails of sufficient length shall be put in a gentle slope against body of the vehicle at 3 or 4 places. For loading, poles shall be dragged one by one, gently and uniformly on those supports by means of rope. As soon as pole comes on the floor of the vehicle, the same shall be carefully shifted by crow-bar or other suitable means to suitable position to avoid striking the next pole.

**4.4.3** Similar procedure shall be followed for unloading of the poles. It is desirable to put some sand filled sacks or similar material at ground

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\*Specification for reinforced concrete poles for overhead power and telecommunication lines ( revised ).

†Specification for prestressed concrete poles for overhead power, traction and telecommunication lines.

level in front of slanting sleepers/rails, so that after sliding down, the poles may sit on sand cushion without appreciable impact. Shifting of the unloaded poles shall be done simultaneously, so that no pole remains along the junction line of the slanting sleeper/rails and the ground.

**4.4.4** While loading and unloading, care shall be taken to avoid dropping, dropping with a jerk or striking of the poles against each other.

**4.4.5** Poles may be stacked in body of vehicle in multiple layers. Two uniform sized wooden battens of suitable cross section shall be put in between the layers of poles running across the length of the poles. The poles shall have complete bearing over these wooden battens.

## **4.5 Transport**

**4.5.1** The poles may be transported either by 8 wheeler wagons or trucks or trailers depending upon distance and convenience. These may also be carried by bullock cart for short distance.

**4.5.2** While transporting, the poles shall preferably be placed parallel to the direction of haulage and with major axis in horizontal position. Poles may be stacked in the body of the vehicle in multiple layers, as mentioned in 4.4.5. All the poles shall be tightly secured to the body of the vehicle.

**4.5.3** Where poles are longer than truck body by more than 3.5 m, they shall be placed in such a manner that there is balanced overhang at both the ends of truck. To ensure better security, four or more poles shall be bound together.

**4.5.4** For convenience of loading and unloading, the poles may be placed with minor axis vertical ( flat position ), on the vehicle, provided the poles are contained fully in the body of the carrier vehicle without any overhang. In that case, separate wooden battens ( between the layers ) shall be increased by 25 percent. Sufficient cushioning with materials, like straw and/or waste gunny should be provided between the layers.

**4.5.5** For transportation in bullock cart, the poles shall be hung from the bottom of bullock cart at least at four points as mentioned in 4.3, and at such a level that those do not touch ground at any part during transportation; alternatively, the poles may be stacked on the wooden body of the bullock cart, suitably balanced; or supported on wheels at suitable locations and pulled by bullock.

## **5. ERECTION**

**5.1** Concrete poles shall be erected and positioned in such a way that the major axis is in line with the direction of the power line.

**5.1.1** Jerking and swinging of poles caused by sudden lifting as well as striking of the poles with ground or other objects shall be avoided.

**5.2** Spacing ( conductor span ) of the poles shall be such as to maintain the loading conditions assumed in the design.

**5.3** The poles shall be buried in the ground at least up to the distance of minimum specified planting depth from bottom according to relevant Indian Standards.

**5.4** Foundation pit may be cut with suitable equipment such as earth auger. The size of the pit will depend upon the size of base plate required to be put under the pole and space required for working.

**5.5** As reinforced cement concrete poles are generally bigger in cross section, these may be erected without foundation, provided the soil at the bottom of pole is not of poor bearing capacity.

**5.5.1** However, where poles are likely to be subjected to gale, cyclonic storm and soil erosion due to rains and flood, or in soils of poor bearing capacity, concrete base plate shall be provided as per **5.6**.

**5.6** For prestressed concrete poles, a concrete base plate shall be provided at the bottom of trench, size of which will depend upon bearing capacity of soil. In normal soil condition, the size of concrete base plate shall be  $450 \times 450 \times 75$  mm. Alternatively, with the approval of the engineer-in-charge, one or two baulks of reinforced cement concrete or timber of size  $800 \times 300 \times 100$  mm may be provided.

**5.7** If the soil is non-cohesive, concreting shall be done right from bottom up to 150 mm above the planting depth to safeguard from overturning moments.

**5.8** The details of preparing foundations and erection are given in IS : 5613 ( Part I/Section 2 )-1971\*. The concrete poles are generally erected by direct pole method. Use of tractor-trailer unit, if available, may also be made in the direct pole method.

**5.8.1** Stays shall be provided wherever necessary before the conductors are given their working tension.

**5.9** Concrete base block and foundation concrete as required shall be prepared, cast and cured, as per IS : 456-1964†.

**5.10** Back fill of trench shall be well compacted. After first monsoon, the foundation shall be inspected and back filled if necessary.

**5.11** Stringing of the conductors shall be done as soon as foundation concrete has been cured and hardened and soil has been well compacted.

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\*Code of practice for design, installation and maintenance of overhead power lines: Part I Lines up to and including 11 kV, Section 2 Installation and maintenance.

†Code of practice for plain and reinforced concrete ( *second revision* ).

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