IS 876 (1992): Wood Poles for Overhead Power And Telecommunication Lines [CED 9: Timber and Timber Stores]

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IS 876 : 1992
(Reaffirmed 2003)

भारतीय मानक

शिरोपरि पावर और दूरसंचार के लिए लकड़ी के खम्भे — विशिष्टि

(तीसरा पुनरीक्षण)

Indian Standard

WOOD POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES — SPECIFICATION

(Third Revision)

UDC 621·315·66 - 035·3

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 3

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Timber Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in 1957 and subsequently revised in 1961 and 1970. In this revision among other changes made, a number of species of timber found suitable for wood poles have been included in Annex A.

Supports made of steel have been largely used in this country for overhead power transmission and distribution lines and for telecommunication lines. Wood poles single or jointed are often more economical than steel supports, particularly for distribution and telecommunication lines. This standard has been prepared with a view to make the best possible use of available indegeneous materials and ensuring possible reduction in the ultimate cost of power and communication facilities to the people of this country.

The main considerations governing the use of the wood poles are:

a) the suitability (its strength and durability) of the species;

b) the size and strength of the pole for the particular purpose; and

c) the selection, seasoning and treatment of the pole.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

WOOD POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES — SPECIFICATION

(Third Revision)

1 SCOPE

This standard covers wood poles made of both broad leaved and coniferous species of timber and suitable for carrying overhead electric power transmission lines, telephone and telegraph circuits.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
401 : 1982	Code of practice for preservation of timber (*third revision*)
707 : 1976	Glossary of terms applicable to timber technology and utilization (*second revision*)
1708 : 1986	Method of testing of small clear specimens of timber (*second revision*)
1900 : 1974	Method of tests for wood poles (*first revision*)
3364 (Part 1) : 1976	Methods of measurement and evaluation of defects in timber : Part 1 Logs (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 707 : 1976 shall apply.

4 SPECIES OF TIMBER

4.1 The species of timber suitable for wood poles are categorized into three groups, as indicated below, based on the modulus of rupture of small clear specimens (*see* IS 1708 : 1986) tested in the green state, that is, more than 25 percent moisture content:

Group A Very strong timber having a modulus of rupture in bending of 85 N/mm² and over, represented by sal (*Shorea robusta*)

Group B Strong timber having a modulus of rupture in bending of 65 to 85 N/mm², represented by teak (*Tectona grandis*)

Group C Moderately strong timber having a modulus of rupture in bending of 45 to 65 N/mm², represented by chir (*Pinus roxburghii*).

4.2 The species of timber recommended for wood poles categorized into the three groups are given in Annex A.

5 CLASSIFICATION

5.1 The wood poles shall be classified in seven classes based on strength (*see* Note). The dimensions of different classes categorized into three groups (*see* **4.1**) are given in Table 1.

NOTE — Class 1 Ultimate breaking load not less than 13 500 N

Class 2 Ultimate breaking load not less than 11 000 N and not more than 13 500 N

Class 3 Ultimate breaking load not less than 8 500 N and not more than 11 000 N

Class 4 Ultimate breaking load not less than 7 000 N and not more than 8 500 N

Class 5 Ultimate breaking load not less than 5 500 N and not more than 7 000 N

Class 6 Ultimate breaking load not less than 4 000 N and not more than 5 500 N

Class 7 Ultimate breaking load not less than 3 000 N and not more than 4 000 N.

These loads are applied in full size poles in accordance with the method described in IS 1900 : 1974.

5.1.1 Poles with one short crook (*see* **10.3.11**) are to be classified one class lower, which otherwise would be in a higher class according to classification; for example, a pole in Class 3 acceptable from the point of view of other requirements shall be considered as Class 4 if a short crook is present.

5.1.2 For poles of intermediate length in Table 1, the circumferences given for the next larger pole shall be used.

6 GENERAL REQUIREMENTS

After the poles are felled, their butts shall be sawn square. The bark shall be completely

Table 1 Classes of Wood Pole

(*Clauses* 5.1, 5.1.2 *and* 9.2)

Full Length of Pole	Ground Line Position from Butt End	Minimum Circumference at Ground Line Position Indicated in Col 2																				
		Class 1, Group			Class 2, Group			Class 3, Group			Class 4, Group			Class 5, Group			Class 6, Group			Class 7, Group		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
m	m	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
(1)	(2)	(3)	(4)	(5)	(6)	7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
6·0	1·2	600	630	700	550	580	650	500	530	600	480	500	550	440	460	510	430	450	500	400	410	450
7·0	1·2	630	670	740	600	630	700	550	570	640	510	530	600	470	500	550	460	480	530	420	440	490
7·5 & 8·0	1·5	660	700	780	630	660	730	570	600	670	540	560	630	490	520	570	480	500	560	440	460	510
9·0	1·5	700	740	820	660	700	760	600	630	700	560	590	660	520	540	600	500	530	590	460	480	530
10·0	1·8	730	760	840	680	720	780	620	650	720	580	610	680	640	560	620	520	550	610	480	500	530
12·0	1·8	780	820	920	730	760	850	670	700	780	630	660	720	580	610	660	560	590	650	510	540	590
14·0	2·0	830	870	960	780	810	900	710	750	830	670	700	780	620	650	710	600	630	690	540	570	630
Minimum Circumference at Top for All Heights in mm		500	520	570	430	460	510	410	430	480	360	380	420	300	320	350	290	310	340	260	280	300

removed and all the branch shall be dressed down flush with the stem. The tops shall be levelled in the shape of an inverted 'V' for length equal to top diameter on 100 mm whichever is less.

7 PRELIMINARY TREATMENT

Poles prepared as in 6 shall be given as soon as possible, a prophylactic treatment specified in IS 401 : 1982 to prevent insect attack and fungal damage. The treated poles shall be stacked on creosoted or otherwise treated crossers at least 150 mm clear off the ground, until they are sufficiently seasoned and ready for preservative treatment. The ground under and around the stacks shall be properly drained and kept free from wood shavings, bark and other wood refuse.

8 PRESERVATIVE TREATMENT

The poles shall be treated with a preservative so as to impregnate completely the sapwood and as much of heartwood of non-durable species (*see* Annex A) as possible. The pressure and the preservative treatment shall be as given in IS 401 : 1982.

9 MEASUREMENT

9.1 Length

The length shall be measured between the extreme ends of poles. Poles shall be not more than 50 mm shorter or more than 100 mm longer than the specified length.

9.2 Circumference

Circumference of pole shall be measured at the top and at the mark representing ground level and shall be as given in Table 1.

9.3 Curvature

Curvature in a pole shall be measured as indicated in Fig. 1 (*see* **10.3.11**).

10 DEFECTS

10.1 The prohibited and permissible defects shall be as indicated in **10.2** and **10.3**. The measurement of defect shall be done as given in IS 3364 (Part 1) : 1976.

10.2 Defects Totally Prohibited

The following defects shall be totally prohibited:

a) Decay,

b) Hollows in the top,

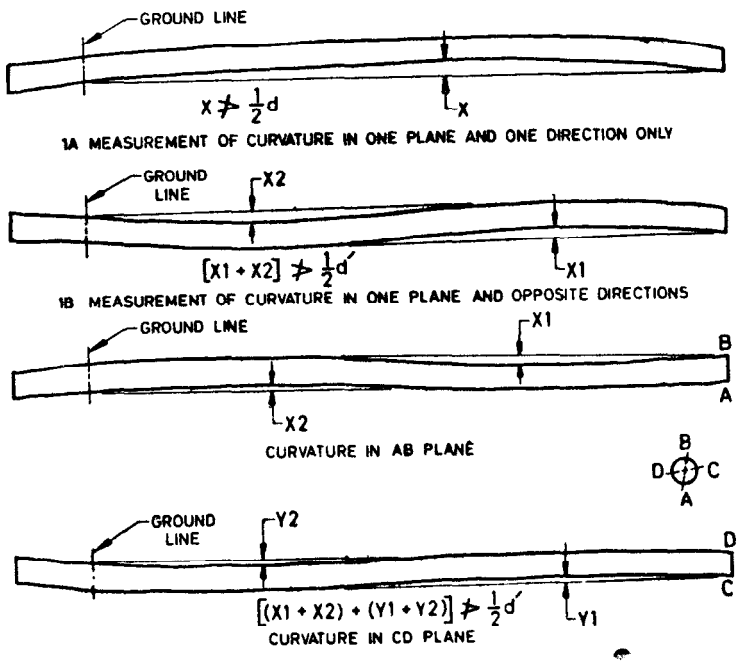
c) Cross breaks, and

d) Large holes.

10.3 Defects Permitted to a Limited Extent

10.3.1 *Splits*

No pole shall have splits extending from one point on the periphery to another point on the periphery and more than 600 mm in length.



NOTE — Where x, x_1, x_2, y_1 and y_2 are maximum deviations in the pole, d is the diameter at the maximum deviation 'x', in Fig. 1A and 'd' is the mean diameter of the pole.

FIG. 1 MEASUREMENT OF CURVATURE

10.3.2 *Checks*

Checks shall be allowed not more than 600 mm in length.

10.3.3 *Hollow Heart*

No pole shall have hollow heart, the diameter of which exceeds one-third the butt diameter or the depth of which exceeds 600 mm. The depth of hollow heart shall be measured from the butt surface.

10.3.4 *Rot*

Rot in pith may be permitted in the butt surface provided the aggregate of rot and hollow heart does not exceed 30 percent of the entire butt surface.

10.3.5 *Ring Shake*

Complete ring shakes on the butt surface may be permitted provided the diameter of the ring which they follow is not more than one-third of the diameter of the butt.

10.3.6 *Grain*

Irrespective of the diameter no pole shall have more than one complete twist of grain or spiral in any 5 m of length or of proportionate twist for other length.

10.3.7 *Insect Damage*

Poles shall be free from insect damage except that pin holes to the extent of 100 in every 1 000 cm^2 may be permitted and the concentration of the pin holes shall not be greater than 10 in any 25 cm^2.

10.3.8 *Knots*

10.3.8.1 *Unsound knot*

Poles shall be free from unsound knots over 20 mm in diameter.

10.3.8.2 *Sound knots*

The diameter of any single sound knot or the sum of the diameters of all sound knots in any portion of the pole 500 mm in length, shall not exceed the following limits:

a) Maximum diameter of any single sound knot 150 mm, provided in that cross section it is not more than 25 percent of the circumference, and

b) Sum of maximum diameters of all sound knots 300 mm, provided if all the knots occurring in one cross section their sum does not exceed 25 percent of the circumference.

NOTE — Knots and knot cavities of diameter 10 mm and under shall be ignored in applying the limitations for the sum of diameters.

10.3.9 *Scars*

No part of a scar shall appear on the upper one-fifth of the length of a pole or within 1·0 m above ground line.

10.3.9.1 Scars may be permitted elsewhere provided the width of the scar at its widest point is not more than one-fifth of the circumference of the pole at that point, subject to a maximum of 125 mm.

10.3.10 *Shape and Straightness*

Poles shall be reasonably straight. Curvature (*see* **9.3**) may be allowed subject to limitation given in **10.3.10.1** to **10.3.10.3**.

10.3.10.1 Where curvature is in one plane and one direction only, no point on the concave surface of the section shall be farther than half the diameter at that point, from the straight line joining the ground line and the top point on the concave side (*see* Fig. 1A).

10.3.10.2 Where there are two curvatures in one plane but in the opposite directions the sum of the maximum deviations from the tangents drawn as under shall not exceed the half of the mean diameter of the pole (*see* Fig. 1B) :

a) From top of the pole to the lower convex side of the pole, and

b) From the grouud line to the upper convex side of the pole.

10.3.10.3 Where there are curvatures in two planes (that is, double curvature) the sum of maximum deviations from the tangents drawn at the two curvatures occurring in the two planes when measured as under shall not exceed half the mean diameter of the pole (*see* Fig. 1C):

a) Plane AB — From top of the pole to the bottom convex side of the pole and from the ground line to the upper convex side of pole (that is, $X_1 + X_2$).

b) Plane CD — From top of the pole to the bottom convex side of the pole and from the ground line to the upper convex side of the pole (that is, $Y_1 + Y_2$).

NOTES

1 *AB* and *CD* planes need not necessary be perpendicular. These are in two planes in which curvatures occur.

2 Plane *AB* means plane of the *AB* axis along the entire length of the pole. Similarly plain *CD* means plane of the *CD* axis along the entire length of the pole.

10.3.11 *Short Crook* (*see* **5.1.1**)

Only one short crook in a pole is permissible provided the inclination is not more than the

diameter of the crooked section of the pole and the same is classified one class lower.

11 MARKING

11.1 Each pole shall be marked legibly and indelibly with the following information at a distance of 3 m from the butt of the pole:

a) Class of pole,

b) Species of timber by symbol (*see* Annex A), and

c) Year of preservative treatment.

11.1.1 The butt end of the each pole shall be marked with the class and length for identification of poles, whenever required by the purchaser.

11.2 Each pole may also be marked with the Standard Mark.

ANNEX A

(*Foreword*, *Clauses* 4.2 *and* 8)

SPECIES OF TIMBER FOR WOOD POLES

Sl No.	*Botanical Name*	*Trade Name*	*Symbol*	*Average Mass at 12 Percent Moisture Cotnent*
(1)	(2)	(3)	(4)	(5)
		GROUP A		Kg/m³
1	*Anogeissus latifolia*	axlewood	AXL	900
2	*Bruguiera* spp.[1)]	bruguiera	BRU	890
3	*Hopea parviflora*	hopea	HOP	1 000
4	*Kayea assamica*[1)]	kayea	KAY	800
5	*Mesua ferrea*	mesua	MES	1 000
6	*Poeciloneuron indicum*[1)]	ballagi	BAL	1 140
7	*Shorea robusta*	sal	SAL	820
		GROUP B		
8	*Acrocarpus fraxinifolius*[1)]	mindani	MUN	690
9	*Calophyllum tomentosam*[1)]	poon	POO	660
10	*Calophyllum wightianum*[1)]	poon	PON	680
11	*Casuarina equisetifolia*[1)]	casuarina	CAS	850
12	*Dalbergia sissoo*	sissoo	SIS	770
13	*Dipterocarpus grandiflorus*[1)]	gurjan	GUR	780
14	*Dipterocarpus indicus*[1)]	gurjan	GUR	780
15	*Dipterocarpus macrocarpus*[1)]	hollong	HOLL	740
16	*Dipterocarpus turbinatus*[1)]	gurjan	GUR	780
17	*Eucalyptus camaldulensis*	River-red gum	RGU	720
18	*Eucalyptus globulus*	blue gum	BGO	850
19	*Eucalyptus tereticornis*	Mysore gum	MGU	670
20	*Fraxinus* spp.	ash	ASH	680
21	*Hardwickia pinnata*	piney	PIN	640
22	*Heritiera minor*[1)]	sundri	SUN	1 040
23	*Lagerstroemia lanceolata*	benteak	BEN	610
24	*Lagerstroemia*[1)] *parviflora*	lendi	LEN	760
25	*Palaquium polyanthum*	tali	TAI	730
26	*Pterocarpus marsupium*	bijasal	BIJ	800
27	*Quercus griffithic*	Indian oak	IOA	740
28	*Robinia pseud-acacia*	black locust	BLO	700
29	*Tectona grandis*	teak	TEA	620
30	*Terminalia bialata*[1)]	white chuglum	WCM	700
31	*Terminalia manii*[1)]	black chuglum	BCM	800
32	*Terminalia paniculata*[1)]	kindal	KIN	800
33	*Terminalia tomentosa*[1)]	laurel	LAU	850
34	*Xylia xylocarpa*	irul	IRU	850

GROUP C

35	*Borassus flabellifer*[1)]	tad (palmyra)	TAD	829
36	*Cedrus deodara*	deodar	DEO	840
37	*Cupressus torulosa*	cypress	CYP	490
38	*Garuga pinnata*[1)]	garuga	GAU	610
39	*Lagerstroemia flosreginae*[1)]	jarul	JAR	620
40	*Lagerstroemia hypoleuca*	pyinma	PYI	610
41	*Leucaena leucocephala*	su-babul	—	670
42	*Pinus roxburghii*[1)]	chir	CHR	580
43	*Shorea assamica*[1)]	makai	MAK	580
44	*Terminalia arjuna*[1)]	arjun	ARJ	820
45	*Terminalia myriocarpa*[1)]	hollock	HOL	610
46	*Terminalia procera*[1)]	white bombwe	WBO	610

[1)] These are non-durable species.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

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Regional Offices :	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{331 01 31 331 13 75
Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola CALCUTTA 700054	{37 84 99, 37 85 61, 37 86 26, 37 86 62
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