



DRAFT EAST AFRICAN STANDARD

Wood poles, cross-arms and blocks for power and telecommunication lines — Specification

EAST AFRICAN COMMUNITY

Copyright notice

This EAC document is copyright-protected by EAC. While the reproduction of this document by participants in the EAC standards development process is permitted without prior permission from EAC, neither this document nor any extract from it may be reproduced, stored or transmitted in any form for any other purpose without prior written permission from EAC.

Requests for permission to reproduce this document for the purpose of selling it should be addressed as shown below or to EAC's member body in the country of the requester:

© East African Community 2022 — All rights reserved
East African Community
P.O. Box 1096,
Arusha
Tanzania
Tel: + 255 27 2162100
Fax: + 255 27 2162190
E-mail: eac@eachq.org
Web: www.eac-quality.net

Reproduction for sales purposes may be subject to royalty payments or a licensing agreement. Violators may be prosecuted.

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Felling	6
5 Materials requirements	6
5.1 Species	6
5.2 Grading	6
5.2.1 Prohibited defects	6
5.2.2 Permitted defects	7
5.2.3 Limited defects	7
6 Dimensions and permitted tolerances	14
6.1 Size of poles	14
6.2 Diameters	17
6.3 Length	17
6.4 Tolerances	17
6.5 Classification	18
7 Manufacturing requirements	18
7.1 General	18
7.2 Taper	18
7.3 Cut of ends	18
7.4 Trimming	18
7.5 Shaving	18
7.6 Drilling	18
8 Stacking and preparation of poles at depots	18
9 Moisture content	19
10 Poles preservation	19
11 Marking and labelling	19
11.2 sampling	21
Annex A (normative) Stay-blocks and brace blocks	23
A.1 Materials requirements	23
A.2 Dimensions and characteristics	23
A.3 Preservative treatment	23
Annex B (normative) Bending strength (MOR) for poles and cross-arms	26
B.1 Strength values for poles and cross-arms	26
B.2 Cantilever loading test for poles 6 m and longer	26
B.2.1 Apparatus	26
B.2.2 Procedure	26
B.2.3 Calculation	26
B.3 Midpoint loading test for poles and cross-arms shorter than 6 m	27
B.3.1 Apparatus	27
B.3.2 Procedure	27
B.3.3 Calculation	28
Bibliography	29

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 022, *Wood, timber and their products*, Subcommittee SC ##, *[name of subcommittee]*.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

This **second** edition cancels and replaces the **first** edition (EAS 322:2002), which has been technically revised.

Introduction

The design and economic use of wood poles, cross-arms and blocks for the support of aerial communication and power lines involves many factors including fibre strength, growth characteristics, freedom from decay and insect attack, seasoning and treatment.

The fibre strength is affected by the extent of seasoning the wood poles have receive, and their freedom from decay and other defects are of importance in the determination of the mechanical strength of the poles for assessing the safe loads in service.

In this respect, the attention of pole users is drawn to the difficulty of defining and working to precise requirements on all aspects of a natural product such as timber. Some properties have of necessity been specified in general terms only.

It is therefore important that the supervision of seasoning tests and of preservation processes and the acceptance of poles be assigned only to qualified and experienced inspectors.

Wood poles, cross-arms and blocks for power and telecommunication lines — Specification

1 Scope

This Draft East African Standard specifies materials and performance requirements for solid wood poles, cross-arms and blocks for power and telecommunication lines.

This standard applies to poles of simple cantilever members subject to transverse loads only.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 24, *Glossary of terms used in timber industry*

EAS 124, *Rounding off numerical values*

EAS 323, *Specification for wood preservation by means of pressure creosoting*

EAS 324, *Copper/chromium/arsenic compositions for timber preservations — Methods of timber treatment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EAS 24 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 simple cantilever

3.2 average net retention (assay/sapwood zone)

mass of all active components of a preservative compound retained in the zone of the treated pole and expressed in kilograms per cubic metre

3.3 average net retention (total volume)

mass of all active components of a preservative compound retained in the total volume of poles treated together in one charge, and expressed in kilograms per cubic metre

- 3.4**
batch
group of poles offered at one time
- 3.5**
boring
process of extracting core samples from wood pole using an increment borer or similar instrument
- 3.6**
brace block or kicking block
piece of treated wood buried in the ground to support erected wood pole(s)
- 3.7**
Theoretical Ground line (TGL)
1.5m (plus or minus 25mm) from the butt end of the pole (unless otherwise specified)
- 3.8**
butt
thick end of a pole
- 3.9**
charge
group of poles treated in one treating cycle
- 3.10**
check
lengthwise separation of the wood that usually extends across the rings of annual growth and commonly results from stresses set-up in wood during seasoning
- 3.11**
crook
natural curvature that extends over not more than 2m of the length of a pole
- 3.12**
dead streak
area, devoid (lacking) of bark resulting from progressive destruction of the growth cell of wood and bark at the edge of the streak. On a pole, a dead streak is characterized by a discolored weathered appearance and by lack of evidence of overgrowth along the edges of the deadened surface.
- 3.13**
debarking
process of removing bark from the wood
- 3.14**
decay
decomposition of wood substance by fungi or other microorganisms resulting in softening, progressive loss of mass and strength. Fungal fruiting bodies or mycelium are evidence of decay.
- 3.15**
defect
characteristics or attributes of a wood pole which reduce compliance to the requirement of the specification
- 3.16**
distribution of preservative/treatment chemical
degree of spread of preservative/treatment chemicals in the wood pole.

3.17**dressing**

process of preparing a wood pole to attain smoothness and uniform surface by removing barks and branches, among others

3.18**drilling**

process of boring holes through the wood pole prior to treatment for fixing pole headgears

3.19**drying**

process of reducing water content/moisture to the prescribed moisture content in the wood for effective preservative treatment.

3.20**elliptical**

oval shape

3.21**fibre strength**

ultimate stress of the wood fibres

3.22**fungal fruiting bodies/mycelium**

form of disfigurement caused by fungi which produce a powdery or wooly mycelial growth and masses of spores at the pole surface.

3.23**groundline**

one sixth of the pole length measured from the butt end

3.24**heartwood**

inner layer of the pole surrounded by the sapwood which in a living tree consists of dead cells and extractives and is generally darker than the sapwood in colour

3.25**hollow heart**

void in the heartwood caused by decay or insect attack

3.26**hollow pith**

small hole at the pith centre of the pole caused by disintegration of the pith

3.27**impregnation**

application of wood preservative into the pole by vacuum and pressure.

3.28**increment borer**

auger like instrument with a hollow bit, used to extract cores from wood.

3.29**inner bark**

physiologically active layer of bark tissues in the wood

3.30**inspection**

examination of a wood pole to ensure conformity to the requirement of the specification

3.31

isokeraunic level

average number of days per year when thunder can be heard in a given area.

3.32

kiln drying

drying of poles within a controlled environment by the use of heated air in compartment or progressive type kilns

3.33

knot

portion of a branch or limb that has become incorporated in a pole

3.34

mechanical damage

defect caused to a pole by mechanical means

3.35

minor/major axis

shortest/longest diameter, respectively of any section of a pole (usually differentiated when measured at an elliptical shaped pole)

3.36

Moisture Content (MC)

amount of water contained in wood, usually expressed as a weight percentage of its oven-dry weight

3.37

outer bark

layer of tissues (generally of a dry corky nature) outside the vascular cambium

3.38

penetration

depth which the preservative has reached from the surface of the wood.

3.39

Pith

small core in the structural centre of the wood pole

3.40

pole girth

circumference of the pole at any given point.

3.41

pole species

scientific group of tree types suitable for use as poles.

3.42

preservation

any process of chemical or physical treatment undertaken to extend the life of wood in service by increasing its resistance to deterioration.

3.43

preservative

chemical or a mixture of chemicals in a form suitable for application to poles in order to preserve them from damage caused by wood destroying agents

3.44

red heart

condition caused by fungus, *Formes pin*, which occurs in the living tree. Usually found in pine trees

3.44**retention**

quantity of preservative in a specified zone of the pole

3.45**sapwood**

outer layer of the pole (xylem) surrounding the heartwood which in a growing tree consists of living cells and generally is lighter in colour.

3.46**Scar**

result of injury to the living tree which has begun to compartmentalize and a sign that the injury is being contained.

3.47**shake/ring shake**

separation along the grain, the greater part of which occurs between the rings of annual growth

3.48**sound knot**

knot that is solid across the face in spite of having surface checks, and of which the fibres are so completely intergrown with the surrounding wood that it can be relied upon to retain its position in the wood.

3.49**spiral grain**

twist of grain in the pole or the wood in which the fibres take a spiral course about the trunk of the tree instead of the vertical course

3.50**splinter pull**

formation of hollows in normal wood at the butt of a pole, caused by long needle like splinters during felling.

3.51**Split**

lengthwise/longitudinal separation of the wood extending completely through the piece from one surface to another.

3.52**Stain (sap stain)**

discoloration of the sapwood, caused by the action of certain molds and fungi which is not accompanied by softening or other disintegration of the wood. Usually found in pine trees.

3.53**Stayblock**

treated piece of wood buried in the ground to support a stay wire connected to and erected wood pole.

3.54**Sweep**

natural curvature that extends over more than 2m of the length of a pole.

3.55**Taper**

longitudinal gradual decrease in diameter as you move from the butt end to the top of the pole.

3.56**Turpentine**

fluid obtained by the distillation of resin obtained from live trees.

3.57

Turpentine acid face scars

area in the lower portion of the pole where bark hack removal with acid applied has caused resin to flow.

3.58

Turpentine cat face scars

depression in the surface of a pole resulting from the wood hack into the sap wood where the tree has not compartmentalized the wound and re-established the normal cross section of the pole.

3.59

Wood density

ratio of wood oven-dry weight to its volume

3.60

Wood natural defects

features which develop during tree growth making wood less suitable for a particular purpose.

4 Felling

4.1 Trees shall be felled not more than 15 cm to the ground as possible and no timber shall be removed, trimmed or cut from the butt end so as to reduce its natural size. The ends shall be sawn to give a flat section and branches shall be dressed down flush with the trunk. Bark shall be removed as soon as practicable after felling except for eucalyptus, which requires a longer seasoning time.

4.2 Rotation age for harvesting Eucalyptus trees for utility poles shall be at least eight (8) years. All trees for poles shall be felled properly and at a controlled speed in order to avoid mechanical damages. All Eucalyptus trees for poles should be debarked immediately after felling.

5 Materials requirements

5.1 Species

5.1.1 Poles shall be made from species that meet the requirements for power and telecommunication poles. Common species are given in Annex...C

5.1.2 When tested, after all machining has been completed, in accordance with either B.1 or B.2, each pole and cross-arm shall be capable of withstanding, without showing any signs of failure, a force F calculated in accordance with the appropriate formula given in Annex B. The force F corresponds to a minimum fibre stress (in bending) of 55 MPa.

5.1.3 Other species apart from those listed listed under Annex... may be used as long as they meet the requirements of this standard.

5.2 Grading

5.2.1 Prohibited defects

- a) Cross-breaks (cracks);
- b) Decay, except as permitted for firm red heart in 5.2.2(a), defective butts in 5.2.3(d) and decayed knots in 5.2.3(f);
- c) Dead streaks, except as permitted in 5.2.3(f);
- d) Hollow butts or tops, except as permitted under hollow pith centers;

- e) Marine borer damage;
- f) Holes, open or plugged, except holes for test purposes, which shall be plugged;
- g) Nails, spikes and other metal not specifically authorized by the purchaser
- h) elliptical poles shall not be accepted



Figure — Typical section of an elliptical pole

5.2.2 Permitted defects

- a) Firm red heart — Firm red heart not accompanied by softening or other disintegration (decay) of the wood is permitted;
- b) Hollow pith centres — Hollow pith centres in the tops or butts and in knots are permitted in poles that are to be given full-length treatment;
- c) Sapstain — Sapstain that is not accompanied by softening or other disintegration (decay) of the wood is permitted; and
- d) Scars — Turpentine acid face scars are permitted anywhere on the pole surface.



Figure — Sap stain (Pine)

5.2.3 Limited defects

- a) Bark inclusions — Depressions containing bark inclusions shall be not more than 50 mm in depth measured from the surface of the pole;
- b) Compression wood — The outer 25 mm of all poles shall be free from compression wood visible on either end;
- c) Dead streaks — A single, sound dead streak is permitted in East African pencil cedar, provided the greatest width of the streak is less than 25 % of the circumference of the pole at the point of measurement; and
- d) Defective butts — Hollowing in the butt caused by “splinter pulling” in felling the tree is permitted, provided that the area of such hollow is less than 10 % of the butt area. Also hollow heart does not

occur closer than 50 mm to the side surface and provided that the depth of the hollow does not exceed 600 mm, measured from the butt surface.

- e) Insect damage — Insect damage, consisting of holes 1.5 mm or less in diameter, or surface scoring or channeling is permitted provided there is no active infestation and the strength of the pole is not affected by the degree of damage. Specifically, the following shall be permitted:
- i. Scoring or channeling (or both), of depth not exceeding 3 mm, on the surface of a pole.
 - ii. Not more than five bark borer holes in any 1 m length of a pole provided that the holes are tightly plugged (after treatment) with an acceptable treated wood dowel.
 - iii. Not more than 20 pinhole borer holes, in any 1 m length of a pole.



f) Knots

Sound knot

Individual knots with diameters $< 1/6$ of the pole girth at that point. The sum of diameters of sound knots in the worst 150 mm of pole should be $< 1/3$ of the pole girth at that point.



Unsound Knot

Dead Knot: unsound knot containing a dead



Dead Knot: knot in which its fibres are only partly intergrown ($\leq 75\%$) with those of the surrounding wood and that sometimes includes bark.

Decayed knot: unsound knot containing a decay



The allowable diameter of any unsound or combined diameters of a group of unsound knots (decayed and dead knots) shall not exceed one half of the allowances given for sound knots.

NOTE The limitations of knots are based on past practice and satisfactory performance.

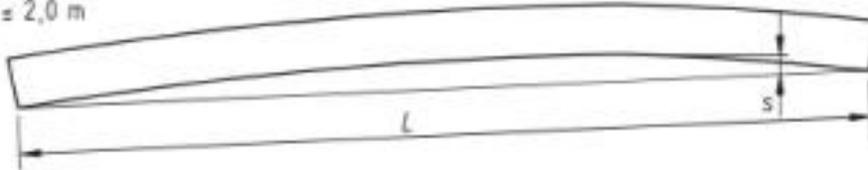
- a) Scars (cat face) — No pole shall have a scar or turpentine cat face located within 600 mm of the groundline. Other sound scars are permitted elsewhere on the pole surface, provided they are smoothly trimmed and do not interfere with the cutting of any grain, and provided that:
 - i. the circumference at any point on trimmed surface located between the butt and 600 mm below the groundline is not less than the minimum circumference specified at 1.5 m from the butt for the class and length of the pole (see Table 1 and Table 2); and
 - ii. the depth of the trimmed scar is not more than 50 mm, if the diameter is 250 mm or less, or 1/5 the pole diameter at the location of the scar if the diameter is more than 250 mm.
- b) Shakes — Shakes in the butt surface which are not closer than 50 mm to the side surface of the pole are permitted, provided they do not extend to the groundline. Shakes or a combination of connected shakes which are closer than 50 mm to the side surface of the pole are permitted provided they do not extend further than 600 mm from the butt surface and do not have an opening wider than 3mm. Shakes in the top surface are permitted in poles that are to be given full length preservative treatment provided that the diameter of the shake is not greater than 50 % the diameter of the top of the pole.

Sweep and crook Shall be permitted to the extent that a straight line from the center of the top to the centre of the pole at 1.5m from the butt remains within the pole.

- a) Cross-arms of length less than 6,0 m
 Acceptable if $s \leq 15 L$ (s in millimetres, L in metres), all L



- 1) Crook : $L \leq 2,0$ m



- 2) Sweep : $L \geq 2,0$ m

- b) Cross-arms and poles of length at least 6,0 m
 Acceptable if straight line connecting midpoints at butt and top remains within cross-arm everywhere



- 1) Crook



- 2) Sweep

- c) Poles of length at least 6,0 m
 Acceptable if straight line connecting midpoints at TGL and top remains within pole everywhere



- 1) Crook



- 2) Sweep

Org.13959a

Figure 1 — Measurement of sweep in one plane and one direction

- c) Slope of grain — Spiral grain shall not exceed a slope of 1 in 6.



d) Splits & checks

In the top

A split or a combination of two single checks (each check terminating at the pith center and separated by not less than 1/6 of the circumference) having one or both portions located in a vertical plane within 30 degrees of the top bolt hole shall not extend downward along the pole more than 6 inches (15cm). All other combinations of checks or a split shall not extend downward along the pole more than 12 inches (0.31 m).

In the butt

A split or a combination of two single checks, as defined above, shall not extend upward along the pole more than 2 feet (0.61 m).

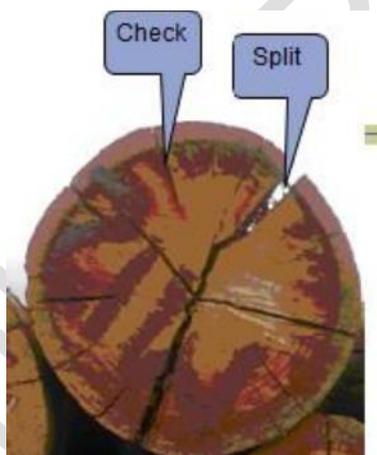
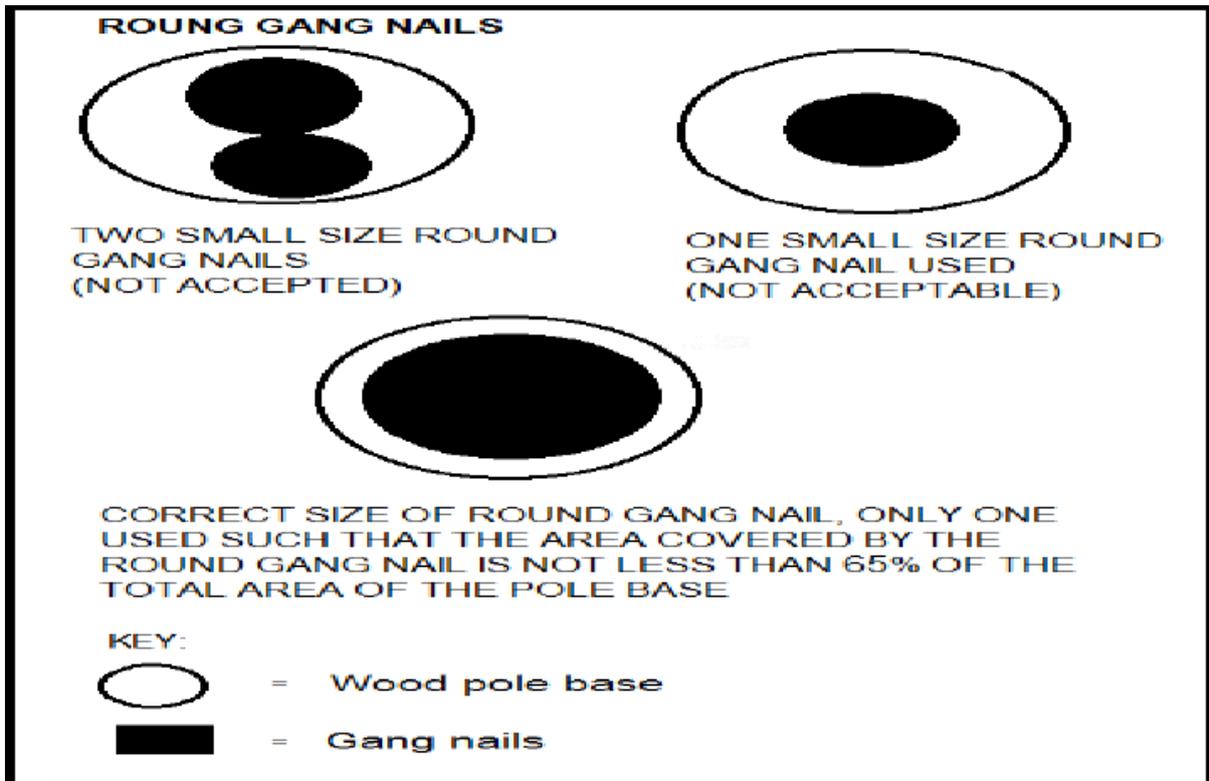


Table 1 — Maximum permissible defects

1	2	3
	Permissible maximum	
	Poles	Cross-arms
Description of defect		
Checks		
a) End checks		
1) Number ^a		
Top	4	3
Butt	4	3
2) Length (as it appears on the surface)		

Top	2 x top dia.	2 x top dia.
Butt	5 x butt dia.	2 x butt dia.
3) Width		
i) Top		
If top dia. does not exceed 180 mm:	1/10 dia. or 15 mm (whichever is less)	6mm
If top dia. exceeds 180 mm:	1/10 dia. or 15 mm (whichever is less)	10 mm
ii) Butt		
If top dia. does not exceed 180 mm:		
Individual width	1/10 dia. or 25 mm (whichever is less)	1/10 dia. or 10 mm (whichever is less)
Sum of widths	50mm	-
If top dia. exceeds 180 mm:		
Individual width	1/10 dia. or 25 mm (whichever is less)	1/10 dia. or 15 mm (whichever is less)
Sum of widths	50mm	-
b) Surface checks		
1) Number ^b	3 at any cross section	3 at any cross section
2) Individual length	8 x dia. ^c	8 x dia. ^c
3) Individual width	15 mm	10mm
4) Sum of widths	40 mm	25mm
^a End checks that extend through the centre of an end and appear in two opposite positions of the periphery are regarded as two checks.		
^b Provided that where three checks occur together at any cross section, the sum of their lengths shall not exceed half the length of the pole or cross-arm.		
^c The diameter of the pole or cross-arm midway along the length of the check.		

The wood poles shall be prevented from cracking or splitting at the top and butt by using galvanized round Gang nails which covers not less than 65% of the total area of the pole ends surface as shown on Figure below. Gang nails shall be able to penetrate not less than 14 mm and galvanized to at least 47µm. In addition to the gang nails, the manufacturer may use spiral binding to prevent any splitting or cracking of the pole.



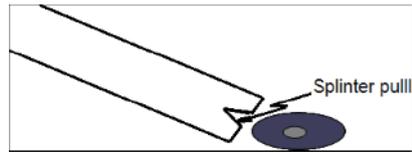
- m) Splinter pull
- n) Pole length
- o) Taper
- p) Mechanical damages
- l) Sapwood thickness

Thickness of sapwood should be at least 15 mm.



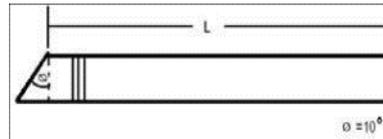
- m) Splinter pull

Defective butt from splinter pulling provided the area of the hollow is < 10% of the butt area.



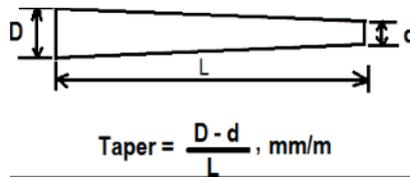
n) Pole length

Can be shorter by not more than 75mm or 150mm longer than the nominal length. At top of the pole, length is measured from the lower part of the slant cut which should be 100.



o) Taper

Taper shall not exceed 10mm per m.



p) Mechanical damages

Damages are not allowed except when:

- i. The depth of the damage is not more than 3mm and;
- ii. The length of the damage is less than 300mm and;
- iii. The width of the damage is less than 25mm.



6 Dimensions and permitted tolerances

6.1 Size of poles

Table — Dimension of poles

Length	Minimum top diameter	Minimum diameter at theoretical Ground line	Minimum testing force Cantilever loading	
			kN	(kgf)
m	mm	mm		
1.5	80			
1.5	100			
1.5	120			
1.5	140			
1.5	160			
2	80	82.5	7.57	771.93
2	100	102.5	14.52	1480.63
2	120	122.5	24.78	2526.86
2	140	142.5	39.01	3977.91
2	160	162.5	57.84	5898.04
2.5	80	85	3.68	375.26
2.5	100	105	6.94	707.68
2.5	120	125	11.7	1193.07
2.5	140	145	18.27	1863.02
2.5	160	165	26.91	2744.06
3	100	107.5	4.78	487.42
3	120	127.5	7.98	813.73
3	140	147.5	12.36	1260.37
3	160	167.5	18.1	1845.69
3	180	187.5	25.39	2589.06
3.5	100	110	3.78	385.45
3.5	120	130	6.24	636.30
3.5	140	150	9.58	976.89
3.5	160	170	13.94	1421.48
4.5	100	115	2.83	288.58
4.5	120	135	4.57	466.01
4.5	140	155	6.92	705.64
4.5	160	175	9.97	1016.66
4.5	180	195	13.79	1406.19
6	80	102.5	1.49	151.94
6	100	122.5	2.54	259.01
6	120	142.5	4	407.89
6	140	162.5	5.93	604.69
6	160	182.5	8.4	856.56
6	180	202.5	11.48	1170.63

7	80	107.5	1.37	139.70
7	100	127.5	2.28	232.50
7	120	147.5	3.53	359.96
7	140	167.5	5.17	527.19
7	160	187.5	7.25	739.29
7	180	207.5	9.83	1002.38
8	80	112.5	1.3	132.56
8	100	132.5	2.13	217.20
8	120	152.5	3.24	330.39
8	140	172.5	4.69	478.25
8	160	192.5	6.52	664.85
8	180	212.5	8.77	894.29
9	120	157.5	3.05	311.01
9	130	168	4.05	412.99
9	140	177.5	4.37	445.62
9	150	188	5.67	578.18
9	160	197.5	6.02	613.87
9	180	217.5	8.04	819.85
10	130	173	3.86	393.61
10	140	182.5	4.15	423.18
10	155	198	5.79	590.42
10	160	202.5	5.67	578.18
10	180	222.5	7.52	766.83
10	200	242.5	9.73	992.18
11	140	187.5	3.99	406.87
11	160	207.5	5.41	551.67
11	180	227.5	7.13	727.06
11	200	247.5	9.19	937.12
11	210	258	11.37	1159.42
11	220	267.5	11.6	1182.87
12	140	192.5	3.89	396.67
12	160	212.5	5.23	533.31
12	180	232.5	6.85	698.51
12	185	238	8.02	817.81
12	200	252.5	8.77	894.29
12	210	263	10.82	1103.33
12	220	272.5	11.02	1123.73
13	140	197.5	3.81	388.51
13	160	217.5	5.09	519.04
13	165	223	5.99	610.81

13	180	237.5	6.63	676.07
13	190	248	8.24	840.25
13	200	257.5	8.45	861.66
13	215	273	11.00	1121.69
13	220	277.5	10.57	1077.84
14	160	222.5	4.99	508.84
14	180	242.5	6.46	658.74
14	200	262.5	8.2	836.17
14	215	278	10.64	1084.98
14	220	282.5	10.22	1042.15
15	160	227.5	4.92	501.70
15	180	247.5	6.34	646.50
15	200	267.5	8	815.77
15	220	288	10.91	1112.51
16	160	232.5	4.88	497.62
16	180	252.5	6.24	636.30
16	200	272.5	7.85	800.48
16	220	292.5	9.71	990.14
17	225	303	11.00	1121.69
18	160	242.5	4.84	493.54
18	180	262.5	6.13	625.09
18	200	282.5	7.65	780.08
18	225	308	10.82	1103.33

This East African Standard shall be applicable to preferred dressed sizes of poles as given in Table 1.

NOTE All circumferences and diameters are applicable to debarked and seasoned or dry poles.

6.2 Diameters

Many nominally round poles have a natural elliptical cross section; the diameter measurements of such poles shall be of the minor axes.

6.3 Length

Length shall be measured between the extreme ends of the pole or in case of a pole with a sweep (see 5.2.3(i)); length shall be measured to the short end of the slope.

6.4 Tolerances

Poles shall be not more than 75 mm shorter or 150 mm longer than the nominal length (see 7.2).

6.5 Classification

The true diameter class shall be determined by measuring the diameter at 1.5 m from the butt end. This dimension will determine the true class of a pole, provided that its top diameter (measured at the minimum length point) is large enough.

7 Manufacturing requirements

7.1 General

Outer bark shall be removed from all poles and inner bark shall not be permitted. All poles shall be round with no excessive removal of the sapwood.

7.2 Taper

The taper in a pole from top to the butt shall not exceed 10 mm per meter of the length of a pole.

7.3 Cut of ends

The butts of the poles shall be cut perpendicular to the central axis with a tolerance of 50 mm across the sawn surface. The top of the pole shall be slant cut with a 10°- 30° slope.

7.4 Trimming

Knots on the pole surface, whether partially or fully grown and branch stubs shall be trimmed close. Trimming may be done by handtools.

7.5 Shaving

If shaving is used, the depth of cut shall not be more than necessary to remove inner bark and to trim all branch stubs and overgrown knots smoothly and closely. There shall be no abrupt change in the contour of the pole surface between the groundline and the above ground sections. The lower 600 mm pole section may be trimmed to remove wood fibres causing butt flare, provided sufficient sapwood remains to obtain the minimum penetration requirements.

No sapwood shall be removed from the butt of the pole to 1 m above proposed ground level, the minimum sapwood thickness being 25 mm. The remainder of the pole should be trimmed to produce a rounded pole while maintaining a minimum sapwood thickness of 20 mm.

7.6 Drilling

Where practicable, poles shall be delivered predrilled to suit the different types of pole duties and configurations. All drilling and fabrication shall be carried out before preservative treatment.

The drilling configuration shall be as per the customer requirements.

8 Stacking and preparation of poles at depots

All poles shall be stacked in open formation, before and after dressing, on suitable skids so that the lowest timber of each stack is at least 250 mm above the ground. Sufficient dunnage or cross-timbers shall be used to distribute the total mass without imposing under strain on the poles at the lower layers. The surface of the seasoning ground under and around the stacks shall be well drained and kept free from bark, shavings, grass and weeds.

9 Moisture content

9.1 Preservation of species shall not take place until the average moisture content of each batch of the poles is reduced to not more than 25 %. No individual pole in the batch shall have a moisture content greater than 28 %.

9.2 The moisture content of the poles shall be determined prior to treatment by the oven test method or any other suitable method in accordance with the method described in annex B of EAS 323.

9.3 Poles for preservation shall be protected against heavy and continuous rain.

10 Poles preservation

10.1 The following species shall be pressure impregnated with creosote in accordance with EAS 323 or with a copper/chromium/arsenic (CCA) mixture in accordance with EAS 324.

- Red wood
- Corsican pines
- Douglas fir
- Dunkeld larch
- Lodgepole pine
- East African pencil cedar
- Eucalyptus

10.2 When pressure impregnating in accordance with EAS 323, the coal tar creosote used shall comply with type 2 and the net retention of preservative in a charge shall be not less than 115 kg/m³ of the total volume.

10.3 When pressure impregnating in accordance with EAS 324, the copper/chromium/arsenic mixture shall have a solution strength not less than 5 % (m/v) and the sapwood retention of preservatives in a charge shall be not less than 20 kg/m³ of active oxide sapwood.

11 Marking and labelling

11.1 Each pole shall have an Aluminium or galvanized mild steel gouge name plate of at least 75mm long, 55mm wide and 1mm thick placed at 1.8m from the ground line and shall be marked with characters not less than 3.5mm high, 3.5mm wide and gouged at most 0.25mm deep. Spacing between characters shall be 1mm and between words 2mm. Each name plate shall be attached by means of galvanized nails of at least 30mm in length and at least 2.5mm in diameter. the coatings on the galvanized mild steel tags shall comply with the requirements for class Z 275 of ISO 3575 and the coatings on the nails shall have a galvanizing thickness of at least 25 µm. The coded information shall include the following:

- a) Client name;
- b) Contract Number (Optional)
- c) Batch number (e.g. 01);
- d) Batch Size (Optional)
- e) Pole length in metres;

- f) Pole top diameter in mm;
- g) Country of origin,

Example TZ for Tanzania, KE for Kenya, UG for Uganda, BU for Burundi, RW for Rwanda SS for South Sudan and DRC for Democratic Republic of Congo, CMR for Cameroon.

- i). Species of the pole

Example EU for Eucalyptus, where the species is known, it should be indicated for example, ES for Eucalyptus Saligna

- ii). Month and Year of preservative treatment;

Example 05/2023

- iii). Type of preservative treatment (e.g. CCA for Copper Chromium Arsenic); and

- iv). Name or Mark of Preserver/Manufacturer.

The layout of these markings is appended as Figure below.

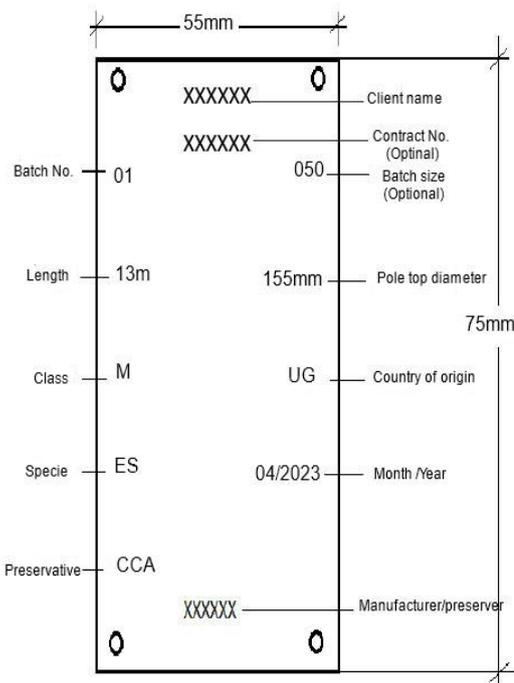


Figure 1: Required markings for wood poles

Pole treated with creosote shall carry no other distinguishing mark. Appropriate letters shall denote other forms of preservation.

Each pole shall also have the pole length in metres and the pole class impressed on the pole butt

'For traceability any other method of poles marking may be used, e.g bar code and chips'

11.2 Sampling

For Public Review

Table — Sample sizes

1		2	3	4	5
Lot size, poles, cross-arms or spacers		Sample for inspection		Sample for testing	
		Sample size, poles, cross-arms or spacers	Acceptance number	Sample size, poles, cross-arms or spacers	Acceptance number ^a
50	450	20	2	8	0
151	500	50	5	13	1
501	1200	80	7	20	1
1201	3200	125	10	32	2

^a Not applicable to the moisture content of poles and cross-arms treated with a mixture of copper-chromium-arsenic compounds.

Annex A **(normative)**

Stay-blocks and brace blocks

A.1 Materials requirements

Preferably stayblock and brace blocks shall be sourced from naturally durable species for example Mninga (angolensis pterocarpus angolensis) or Mtundu (croton macrostachys) but species listed in 5.1 may be used with specified preservative treatment.

A.2 Dimensions and characteristics

The stayblocks and brace blocks may be cut from sawn timber or from the round timber to produce rectangular, round or half round sections, whichever is economical, from the available material. Stayblocks and brace blocks shall be in accordance with Figure 3 and figure 4 respectively; and with the following requirements:

A.2.1 The width of stayblocks and brace blocks shall be as near as possible to the dimension stated but must be within the range of 200 mm to 300 mm. If it is convenient to cut stayblocks and brace blocks from larger size poles, then the side shall be cut as indicated in the figures to reduce the maximum width. The longitudinally cut surfaces of stayblocks and brace blocks shall be straight and clean-cut, while annual rings shall be approximately parallel to the wide face. Planing is not required. Wain is permitted on one face. The blocks shall be bored as indicated in Figures 3 and 4.

A.2.2 These stayblocks and brace blocks have been designed for a minimum failing load and resistance to uplift of 65 kN. Uplift calculations are based on installation of sand of density of 550 kg/m³, which is considered to be representative of average worst ground conditions, with a minimum angle between stay pole of 30°.

A.3 Preservative treatment

The blocks shall be treated by either coal tar creosote in accordance with EAS 323 or copper/chromium/arsenic mixture in accordance with EAS 324 after fabrication using Bethel/Rueping processes.

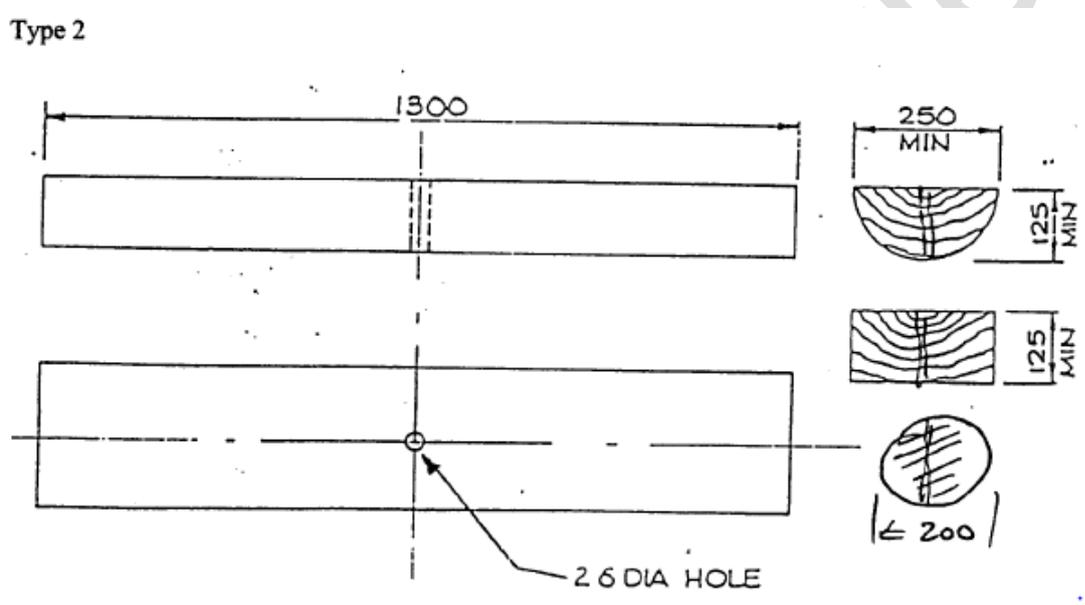
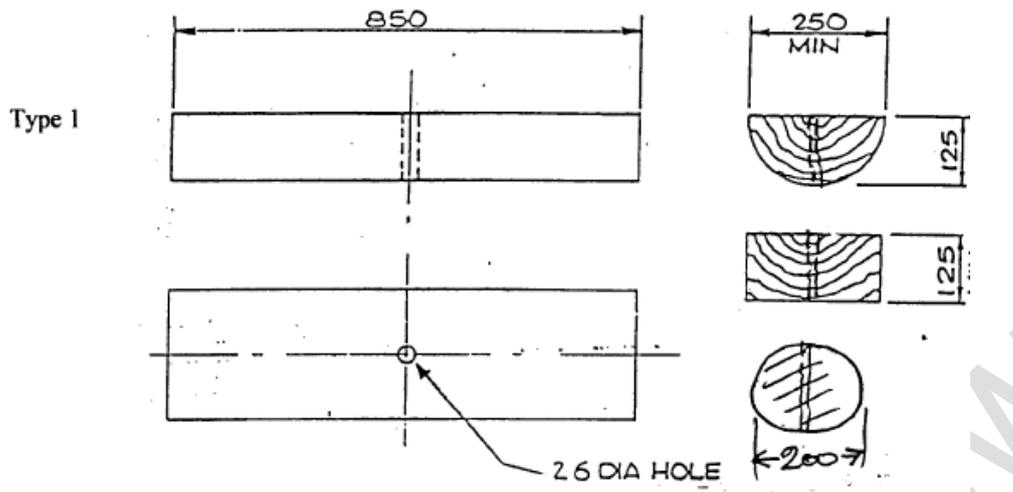


Figure 3 — Stay-blocks dimensions

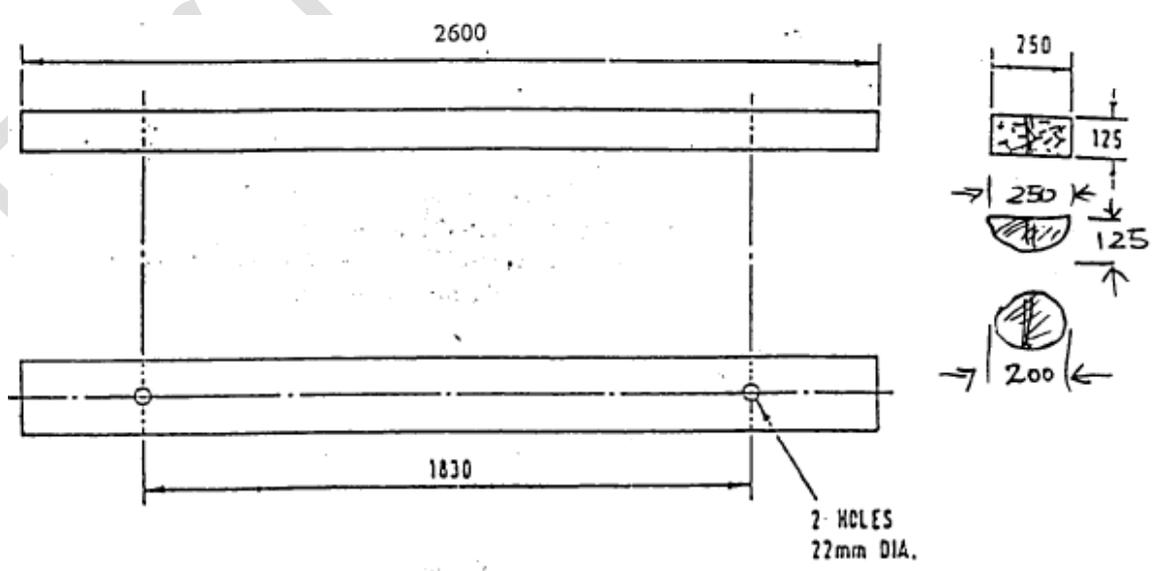


Figure 4 — Brace blocks dimensions

Annex B

Standard or trade name	Scientific names	Other names
	<i>Eucalyptus grandis</i>	River Red Gum
Gum	<i>Eucalyptus hybrid clones</i>	
Iron Bark	<i>Eucalyptus paniculata</i>	Gum or Eucalyptus
Spotted Gum	<i>Eucalyptus citriodora (corymbia citiadora)</i> or <i>Eucalyptus maculata (corymbia maculata)</i>	Lemon Scented Gum or Eucalyptus
Tallow wood	<i>Eucalyptus microcorys</i>	Spotted Gum or eucalyptus blue gum
Blue gum	<i>Eucalyptus globulus</i>	
Regnans saligna gum	<i>Eucalyptus regnans</i>	Giant Gum (mountain ash)
	<i>Eucalyptus saligna</i>	Blue gum (<i>Saligna</i> gum)
	<i>Eucalyptus camaludensis</i> <i>Pinus sylvestris</i>	

Annex B (normative)

Bending strength (MOR) for poles and cross-arms

B.1 Strength values for poles and cross-arms

The mean bending strength of eucalyptus species specified in this standard is 63 MPa.

B.2 Cantilever loading test for poles 6 m and longer

B.2.1 Apparatus

B.2.1.1 Crib, capable of securing the pole under test from the butt end to the TGL, and that will

- a) ensure no significant movement of the clamped butt during a test; and
- b) prevent any rotational movement of the pole.

B.2.1.2 Wooden saddles, or similar suitable clamping devices (to secure the pole in the crib), of curvature that suits the diameter of the pole under test, and that will not damage the pole during the test.

B.2.1.3 Winch, or similar device, of suitable capacity and preferably motor-driven, that is capable of applying force to the pole under test, the force being applied horizontally and at an average angle of approximately 90° to the pole, through a cable of such a length that, during a test, the angle varies between slightly less than and slightly more than 90°.

NOTE The position of the crib relative to the winch has to be altered for varying lengths of poles under test.

B.2.1.4 Force indicator or recorder, calibrated to indicate or record (as relevant), to within 2.5 %, the actual force applied to the pole.

B.2.2 Procedure

B.2.2.1 Using the wooden saddles, securely clamp the butt of the pole in the crib, over a distance of 1.5 m \pm 25 mm from the butt end. If the pole displays crook or sweep, ensure that the concave side of the crook or sweep faces towards the winch. Secure the cable to the pole at a position 600 mm \pm 25 mm or 100 mm \pm 25 mm, as relevant (see B.2.3), from the top end, and so position and secure the crib or winch (or both), that the angle between the axis of the pole and the cable is slightly less than 90°.

B.2.2.2 Take up the slack and, without jerking the pole, apply force (gradually and at as uniform a rate as possible) until the force reaches the appropriate value of F, calculated using the formula given in B.2.3. Then stop the test and release the force.

B.2.2.3 Consider the pole to be defective if any visible sign of failure was noted during the test.

B.2.3 Calculation

Calculate the value of F as follows:

$$F = \frac{\sigma \times D^3}{10.2 \times L_1}$$

where

- F is the force, in newtons, required to cause a mean fibre stress in cantilever loading of 63 MPa;
- σ is the mean fibre stress, i.e. 63 MPa;
- D is the minimum diameter, in millimetres, of the pole or cross-arm at the TGL (i.e. 1 500 mm from the butt end), based on the specified minimum top diameter and a taper of 5 mm per metre of length; and
- L1 is the distance, in millimetres, between the TGL and 600 mm from the top end in the case of poles and cross-arms of length at least 6.0 m, and between the TGL and 100 mm from the top end in other cases.

B.3 Midpoint loading test for poles and cross-arms shorter than 6 m

B.3.1 Apparatus

B.3.1.1 Two suitable anchorages, that:

- a) will not damage the pole/cross-arm during the test; and
- b) are such that the distance between them can be adjusted to the appropriate test span, i.e. the length of the pole/cross-arm under test, minus 600 mm or minus 200 mm, as relevant (see B.3.3).

B.3.1.2 Suitable force applicator, that is positioned centrally between the anchorages, for example:

- a) either a hydraulic or a pneumatic ram of adequate capacity and stroke, that has a pressure foot of radius such as to fit the under test and that will not damage the pole/cross-arm during the test; or
- b) diameter at midlength of the pole/cross-arm a suitable winch and cable.

B.3.1.3 Force indicator or recorder, calibrated to indicate or record (as relevant), to within 2.5%, the actual force applied to the pole/cross-arm.

B.3.2 Procedure

B.3.2.1 So position the pole/cross-arm under test in the apparatus that the anchorages secure the pole/cross-arm at positions 300 mm \pm 25 mm or 100 mm \pm 25 mm (as relevant) from its ends and that, if the pole/cross-arm displays crook or sweep, the concave side of the crook/sweep faces towards the ram or the convex side of the crook/sweep faces towards the winch, as appropriate.

B.3.2.2 If a winch and cable is used, take up the slack and, without jerking the pole/cross-arm, apply force to the midlength point of the pole/cross-arm. If a ram is used, extend the ram (without impacting the pole/cross-arm) until it touches the midlength point of the pole/cross-arm. In each case, increase the force (gradually and at as uniform a rate as possible) until it reaches the appropriate value of F, calculated using the formula given in B.3.3. Then stop the test and release the force.

B.3.2.3 Consider the pole/cross-arm to be defective if any visible sign of failure was noted during the test.

B.3.2.4 If the force is applied in any plane other than the horizontal and vertical plane upward, a correction factor shall be applied to force F.

B.3.3 Calculation

Calculate the value of F as follows

$$F = \frac{\sigma \times \pi \times D^3}{8 \times L_2}$$

where

F is the force, in Newtons, required to cause a fibre stress in midpoint loading of 55 MPa or 75 MPa, as relevant;

σ is the relevant fibre stress, that is, 55 MPa or 75 MPa;

D is the diameter of the pole or cross-arm at mid length point, in millimetres, based on the specified minimum top diameter and a taper of 5 mm/m of length (see Table C.1); and

L_2 is the distance, in millimetres, between 300 mm from the top end and 300 mm from the butt end in the case of poles and cross-arms of length at least 6 m, and between 100 mm from the top end and 100 mm from the butt end in other cases.

Bibliography

EAS 322: 2002, *Wood poles and blocks for power and telecommunication lines — Specification*

For Public Review

For Public Review