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CEYLON STANDARD 159 : 1972

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CODE OF PRACTICE FOR SEASONING OF TIMBER

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BUREAU OF CEYLON STANDARDS

CODE OF PRACTICE FOR SEASONING OF TIMBER

C.S. 159 : 1972
(Attached AMD 214)

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BUREAU OF CEYLON STANDARDS
53, DHARMAPALA MAWATHA,
COLOMBO 3.

CEYLON STANDARD CODE OF PRACTICE FOR SEASONING OF TIMBER

FOREWORD

This Ceylon Standard Code of Practice has been prepared by the Drafting Committee on Seasoning of Timber. It was approved by the Civil Engineering Divisional Committee of the Bureau of Ceylon Standards, and was authorized for adoption and publication by the Council of the Bureau on 3rd October, 1972.

Green timber, i.e. timber from freshly felled trees contains a high proportion of water. The actual moisture per cent of green timber varies greatly depending, *inter alia*, on the density of the timber. It generally ranges from 50 to 150 per cent. (See Clause 2.8).

Moisture in wood is found as "free water" in the cell cavities and as "bound water" in the cell walls.

When timber is exposed to the air it loses water. At first the free water is lost, and during this phase the wood does not undergo any appreciable dimensional changes. After all the free water is lost the water in the cell walls is gradually given up, and during this process the wood shrinks.

Wood does not shrink uniformly in all directions. Shrinkage in the tangential direction (i.e. at right angles to the rays) is generally appreciably greater than shrinkage in the radial direction (i.e. parallel to the rays), while longitudinal shrinkage in normal wood is negligible. Because of the difference in the extents of shrinkage in the tangential and radial directions, wood that is dried generally tends to acquire defects such as warping unless precautions are taken to prevent their occurrence.

Defects can also develop as a result of the outer layers drying faster than the inner core. When wood dries the exposed parts lose moisture first and a moisture gradient is set up in the wood. Moisture then moves outwards in the wood and the inner parts begin to dry. As drying beyond the Fibre Saturation Point (See Clause 2.4) is accompanied by dimensional changes the exposed parts will begin to shrink before the inner core, and this will result in stresses being set up. These stresses may cause defects to develop.

Seasoning is the process whereby timber is dried under controlled conditions so as to minimise or eliminate the defects referred to above.

The object of seasoning is to bring down the moisture content to a level at which the timber will be in equilibrium with the atmosphere under the conditions of use of the timber. The advantages of using seasoned timber instead of green timber is that shrinkage in service is minimised. Also, seasoned timber is not liable to be attacked by wood destroying and sap-staining fungi.

A set of tentative schedules extracted from the Indian Code of Practice for Seasoning of Timber (1958) are given in Appendix C. These schedules may only be taken as a rough guide.

All standard values given in this specification are in metric units. The Imperial units given in brackets for guidance are not the exact equivalents.

The assistance derived from the publications of the Indian Standards Institution in the preparation of this standard is gratefully acknowledged.

1. SCOPE

This code covers the methods of seasoning timber.

2. TERMINOLOGY

For the purpose of this standard the following definitions shall apply :

2.1 Case-hardening—This is a state of timber in which the surface layers become set (hardened) while in tension. It occurs as follows:

If loss of water from the exposed surfaces of timber is too rapid the outer layers may dry below the Fibre Saturation Point, while the core still remains above this point. The outer layers then tend to shrink but are prevented from doing so by the core which has not yet begun to shrink, and the outer layers may set while in tension. The wood is then said to be case-hardened. Subsequently the core dries below the Fibre Saturation Point and tends to shrink but is prevented from doing so by the outer layers which have set. The inner core is then under tension and outer layers under compression.

Case-hardening can give rise to honey-combing (See Clause 2.6) and, if the piece of timber is re-sawn, to severe warping (See Clause 2.11).

2.2 **Check**—A separation of fibres along the grain forming a crack or fissure that does not extend through the piece from one surface to another.

2.3 **Collapse**—Flattening or buckling of the wood elements during seasoning which results in excessive and uneven shrinkage and may manifest itself in the form of surface corrugations (washboard effect).

2.4 **Fibre Saturation Point—(F. S. P.)**—When wood dries, the free water in the cell cavities is lost first. This is followed by the loss of water from the cell walls. At the stage when the cell cavities are devoid of water while the walls are still saturated, the wood is said to be at its Fibre Saturation Point. In most timbers the moisture content at F. S. P. is between 25 and 30 per cent.

2.5 **Grain**—This term is used to indicate the general direction of the wood fibres relative to the axis of the tree or to the longitudinal edges of a piece of sawn timber.

Sloping Grain—Grain which is at an angle to the longitudinal axis of the cut piece.

2.6 **Honey-combing**—When the moist core of a piece of case-hardened timber dries as seasoning continues it will develop tension, and as a result of this it may get riddled with small checks (See Clause 2.2) along the rays. This condition is called Honey-combing. It occurs inside the timber and can be seen on cutting across the piece.

2.7 **Knot**—A portion of a branch enclosed in the wood by the natural growth of the tree.

2.7.1 **Live or sound knot**—A knot free from decay and other defects intergrown with or firmly held within the surrounding wood.

2.7.2 **Decayed or unsound knot**—A knot softer than the surrounding wood, and containing decay.

2.7.3 **Loose knot**—A knot which is not held firmly in place.

2.8 **Moisture Content**—This is the weight of water present in wood expressed as a percentage of the oven-dry weight of the wood.

2.9 **Shake**—A separation of the fibres along the grain due to stresses developed in the standing tree or in felling. These defects may

become extended during drying of timber. The separation of fibres may radiate out in several directions from the pith (star-shake) or may occur parallel to growth rings (cup-shake, ring-shake).

2.10 Splits—This is a separation of wood fibres along the grain, forming a crack or fissure that extends through the piece of timber from one face to another.

End-split—A split that occurs at the end of a log or a piece of timber.

2.11 Warping—Distortion of a piece of sawn timber causing departure from its original planes.

3. CLASSIFICATION OF DEFECTS FOR SEASONING PURPOSES

3.1 Seasoning defects—These are defects that may develop in timber in the course of seasoning. Examples of seasoning defects are end-splits, surface-checks, warping, case-hardening, collapse and honey-combing. These can be minimised, if not prevented, by following proper seasoning techniques.

3.2 Other defects—Non-seasoning defects found in timber are knots, cup-shake, sloping grain, etc. These cannot be eliminated, but further damage to wood can be prevented in many cases by adopting proper methods of seasoning.

4. METHODS

4.1 Timber begins to dry as soon as the tree is felled. It is generally desirable that the logs should be converted into sawn timber as soon as possible after felling. The sawn timber is then seasoned as set out below:

4.2 Two methods of seasoning are in common use viz:

Air seasoning (sometimes called natural seasoning) and kiln seasoning (often called artificial seasoning). In commercial practice a combination of both is often used i.e. air seasoning up to a point followed by kiln seasoning.

4.2.1 Air Seasoning

4.2.1.1 In this process the timber is subjected to air drying. The timber is stacked in such a way that every piece has all its surfaces exposed to the air so that drying may be uniform. The stack is

provided with overhead cover to prevent exposure to direct sunlight and to rain. A high air temperature and the presence of wind favour expeditious seasoning as the first factor reduces the relative humidity of the air, and the second removes the more humid air from the vicinity of the timber.

4.2.1.2 *Stacking*—The timber which is to be seasoned is arranged in stacks. The site selected for stacking must be well drained, and it should be free of vegetation and debris such as saw dust. Wherever, possible termite infested areas should be avoided. Where there is a danger of termite infestation during seasoning termite shields should be incorporated into stacks and a prophylactic treatment should be given regularly.

The structure on which the stack of timber is built should ideally consist of rows of piers with timber cross bearers joining each transverse row of piers. The piers may be built out of bricks or durable (and preferably also treated) hardwood. A suitable dimension for the cross bearers is 150 mm x 100 mm (or 6 ins x 4 ins) in section. The piers may be placed at intervals of 1 m (or 3 ft) breadthwise and 0.65 m (or 2 ft) lengthwise. (See Fig. (1), Appendix –D).

A sticker (See clause 4.2.1.6) is placed on each cross bearer before the first layer of timber is placed in position. The stickers are placed one above the other between the layers of timber as the stack is built up.

The height of the piers shall be such that the bottom layer of timber in the stack is at least 0.5 m. (or 1.5 ft) above ground level. Stacks should generally be limited to 2 m (or 6.5 ft) in width, with a minimum space of 0.5 m (or 1.5 ft) between stacks.

Individual stacks are generally box-piled i.e. the stack is in the shape of a rectangular box. Where it is difficult to exclude the possibility of rain water beating on to the stack it is preferable to

pile the timbers so that the individual layers have a slope of about 1 in 12. This will prevent the accumulation of water on the timber. When the stack has been built up it shall be numbered and dated.

4.2.1.3 *Sample Boards*—Sample boards should be generally 1 m (or 3 ft) or more long; they should be obtained from lengths of timber which are representative of the timber being seasoned. They shall be placed at the centre of the stack vertically one above the other at 1/3 and 2/3 the height of the stack. A notch is cut in the stickers at the position where the sample board is placed so as to facilitate removal for inspection, and re-insertion of the sample, in the course of seasoning (See Fig. (2), Appendix-D).

4.2.1.4 *Air Circulation*—The bases of the stacks shall be kept free of vegetation and other material which could impede the free flow of air. Stacks shall be arranged parallel to each other so as to leave alleys between them in both directions.

4.2.1.5 *Stack Protection*—Stacks shall be protected, either by being placed in open-sided sheds or, if in the open air, with individual overhead covers. If placed in a shed there shall be a minimum clearance of 1.2 m (or 4 ft) between the top of the stack and the roof of the shed. If stacks are placed in the open there shall be a minimum clearance of 150 mm (or 6 in) between the top of the stack and the cover provided. Covers shall have sufficient overhang to provide protection from direct sunlight and rain.

4.2.1.6 *Stickers*—These are strips of wood used to separate the successive layers of timber. Stickers of cross-section 25 mm by 25 mm (or 1 in x 1 in) are generally suitable for most species and sizes of timber. Stickers shall be made from sound, seasoned (preferably also treated) timber. All stickers in any one stack shall be of uniform thickness and shall be vertically aligned directly above the basal cross bearers.

The stickers, besides providing for free circulation of air between the layers of timber, also restrain some of the warping that is liable to occur during seasoning. Ideally, therefore, the lateral spacing between the stickers should be varied according to the species and thickness of the timber to be seasoned. It is, however, impracticable to vary the spacing with every stack, as this would generally involve altering the positions of the cross bearers and therefore of the piers. It is therefore recommended that the stickers be placed 0.65 m (or 2 ft) apart (to coincide with the spacing of piers recommended in Clause 4.2.1.2). In no case should the stickers be spaced over 1.30 m (or 4 ft) apart.

4.2.1.7 *End-coating*— Loss of water from the end surfaces of the timber is much faster than from the sides. Hence the end surfaces of boards or scantlings of timbers known to split or check shall be protected with a moisture-proof coating.

4.2.1.8 *Moisture Content of Samples*— Moisture content of the drying timber shall be determined periodically by the standard method described in Appendix A.

4.2.1.9 *Moisture Content of Seasoned Timber*—The timber shall be kept in the stacks until the mean moisture content indicated by the sample boards is not more than 15 per cent, at which point air seasoning may be considered to be completed.

4.2.1.10 *Records*—Details and dates of periodic moisture content determinations shall be recorded.

4.2.1.11 *Dry Storage*—All air seasoned timber shall be held in dry storage fully protected from the weather.

4.2.2 Kiln Seasoning

4.2.2.1 Kiln Seasoning is carried out in a closed chamber in which the humidity and temperature are controlled, and the air circulated by artificial means.

4.2.2.2 *Kiln Installations*—There are several types of kiln installations. A common type is one where fans

are located within the kiln, and the air circulated at right angles to the length of timber being seasoned.

Instruments—The relative humidity of the air within the kiln is determined by means of hygrometers. These may consist of wet and dry bulb thermometers which could be viewed from outside through glass panels on the kiln wall, or of self recording instruments where the dry and wet bulb temperatures are continuously recorded automatically. Some kilns are provided with instruments which automatically record and also maintain wet and dry bulb temperatures at pre-set values.

Generally two sets of wet and dry bulb thermometers should be provided. They should be placed in such positions that the temperature and humidity of the air both as it enters and leaves the stacks can be determined. The thermometer bulbs should be at least 75 mm (or 3 in) away from the kiln wall so as to be in the direct path of the air-flow. Where automatic temperature indicators and recorders are used it is advisable to test them periodically for accuracy.

4.2.2.3 *Air Circulation*—The air circulation shall be adequate and uniform throughout the length of the kiln. In the internal fan type of kiln the air circulation is generally reversible to ensure even drying throughout the stack.

4.2.2.4 *Baffles*—Baffles shall be provided for the fans to ensure even distribution of the air. Baffles shall also be provided above, below and at the ends of each stack prevent short-circuiting of the circulating air.

4.2.2.5 *Stickers*—Stickers of cross-section 25 mm x 25 mm (or 1 in x 1 in) are generally suitable for most species and sizes of timber. They shall be made from sound, seasoned timber and shall be of uniform thickness throughout the length. All stickers in any one charge shall be of uniform thickness and shall be vertically aligned directly

above the basal cross bearers. They shall be placed along the stack at intervals sufficient to prevent warping of the timber in the kiln charge, but in no case, should the stickers be spaced over 1 m (or 3 ft) apart.

4.2.2.6 *End-coating*—Loss of water from the end surfaces of the timber is much faster than from the sides. Hence the end surfaces of boards or scantlings of timbers known to split or check shall be protected with a moisture-proof coating.

4.2.2.7 *Composition*—The composition of any kiln charge shall normally be limited to single species of timber or at least to timbers requiring the same drying schedule. They should be of the same thickness. Green and air-dried timber should not be mixed in the same charge.

Sample board should be 1 m (or 3 ft.) or more long. They should be obtained from lengths of timber which are representative of the timber being seasoned. The sample boards should be evenly distributed throughout the stack and there should be a minimum of four per kiln charge. Sample boards should generally be end-coated.

4.2.2.8 *Moisture content of samples*—The moisture content of samples shall be determined periodically by the standard method given in Appendix A.

4.2.2.9 *Moisture content of seasoned timber*—Seasoning shall be carried out until the mean moisture content of the timber as indicated by the sample boards is no more than 12 per cent.

4.2.2.10 *Drying schedules*—A kiln drying schedule is a table giving the recommended temperature and relative humidity that should be maintained at different moisture contents of the timber. As the drying properties of timber species vary, different schedules will be required for different timbers. A set of tentative schedules are given in Appendix C. These schedules are intended for seasoning 25 mm (or 1 in) thick timber.

Schedule I is very severe, and is intended for timbers which are quick-drying and not liable to degrade during drying. The subsequent schedules are increasingly milder. Very mild schedules should be used for slow-drying timber and for timber which is liable to warping or other forms of degrade during seasoning.

It should be noted that these schedules may only be taken as a rough guide and, for seasoning a particular species, a schedule best suited to the species should be developed by the kiln operator.

For advice on the selection of tentative schedules for trial on different species the Research and Education Branch of the Forest Department may be consulted.

If the final moisture contents of the sample boards diverge greatly an equalising treatment should be given. This is done by maintaining in the kiln a relative humidity condition which corresponds to the desired average moisture content, while keeping the temperature at that of the final step of the schedule.

Equalising treatments may also be necessary during the intermediate stages of seasoning.

Where necessary a final conditioning treatment (steaming) is given to relieve drying stresses and to bring about a more uniform distribution of moisture within the individual pieces of timber. It is desirable to allow the timber to cool gradually in the kiln until the temperature has dropped to within 5°C (9°F) of the outside temperature.

4.2.2.11 *Records*—During the drying of each kiln charge the following records shall be made:

(i) Dry and wet bulb temperatures of the air at entry into the stack. These temperatures shall preferably be continuously recorded automatically, but if thermometers only are fitted to the kiln, temperatures shall be

recorded at intervals of not more than 6 hours and also at every change of conditions in the kiln.

(ii) Details shall be recorded of any malfunction of the kiln which causes stoppage of fans or other kiln parts, flow of water to the wet bulb, heat supply, or any other operation.

(iii) Details including dates and times of periodic moisture content sampling shall be recorded. The weights of sample boards at times or weighing shall be recorded together with details of check tests and calculations.

(iv) When a case-hardened or stress condition is suspected the 'prong test' (see Appendix B) shall be used to determine this condition, and the results recorded.

4.2.2.12 *Dry Storage*—All kiln seasoned timber shall be held in dry storage fully protected from the weather.

APPENDIX-A

DETERMINATION OF MOISTURE CONTENT

A-1 **Sample Board**—A sample board is cut from a length of timber which is representative of the timber being seasoned. It should be cut at least 300 mm (or 12 in) away from the ends of the length of timber. The sample board should be free of knots, bark and other defects.

A-2 **Test Pieces**—As soon as the sample board is cut, two test pieces 20–25 mm (or 1 in) long in the direction of the grain are cut from the ends of the board.

A-3 **Moisture Contents of the Test Pieces**—The test pieces are weighed immediately after cutting. They are then oven-dried (102° C–105° C) until their masses are constant. The percentage moisture contents are then determined by the formula:

$$\text{Moisture Content (per cent)} = \frac{m_1 - m_0}{m_0} \times 100$$

where m_1 = Initial mass of test piece
m_0 = Oven-dry mass of test piece

A-4 **Moisture Content of Sample Board**—The sample board is weighed as soon as the test pieces are cut out. The calculated average moisture content of the test pieces is then applied to the sample, and the hypothetical oven-dry mass of the sample board is calculated as follows:

$$M_0 = \frac{M_1}{\frac{\text{Moisture Content (per cent) of test piece}}{100} + 1}$$

where M_0 = Hypothetical oven-dry mass of sample board
M_1 = Mass of sample board

The moisture content of the sample board could be estimated at any time during seasoning by weighing it, and using this value together with the hypothetical oven-dry mass of the board.

The final moisture content is more accurately determined by cutting out a test piece similar to that described above, about 200 mm (or 8 in) away from one end of the sample board, weighing it (test piece) accurately, then oven-drying it to constant mass and re-weighing.

APPENDIX-B

B-1 **Prong Test**—A prong test is carried out after kiln seasoning is completed to determine whether there are any stresses between the outer layers of the timber and the core. A piece about 12 mm. (or 0.5 in) thick in the direction of the grain is cut out of the sample board at least 200 mm (or 8 in) from one end. This piece is sawn to within 25 mm (or 1 in) of one end to provide 3 prongs, and the middle prong then cut away. If there are any stresses in the wood the two prongs will move outwards or inwards (See Fig. (3), Appendix–D).

APPENDIX-C

Tentative Schedules for Kiln Seasoning of Timber. (Reproduced from the Indian Standard Code of Practice for Seasoning of Timber).

Schedule I

Moisture Content of the Wettest Timber on the Air Inlet Side	Temperature		Relative Humidity per cent
	Dry Bulb °C	Wet Bulb °C	
(1)	(2)	(3)	(4)
Green	52	44	62
60%	55	45	55
40%	60	46	44
30%	65	48	39
20%	68	48	33.5

Schedule II

Moisture Content of the Wettest Timber on the Air Inlet Side	Temperature		Relative Humidity per cent
	Dry Bulb °C	Wet Bulb °C	
(1)	(2)	(3)	(4)
Green	45	40	72
60%	47	40	64
40%	49	40	56
30%	53	40	44
20%	58	40	32.5

Schedule III

Moisture Content of the Wettest Timber on the Air Inlet Side	Temperature		Relative Humidity per cent
	Dry Bulb °C	Wet Bulb °C	
(1)	(2)	(3)	(4)
Green	42	38	76
60%	45	40	72
40%	47	40	64
35%	49	40	56
30%	51	40	50
25%	53	40	44
20%	55	40	39

Schedule IV

Moisture Content of the Wettest Timber on the Air Inlet Side	Temperature		Relative Humidity per cent
	Dry Bulb °C	Wet Bulb °C	
(1)	(2)	(3)	(4)
Green	42	38.5	80
60%	42	38	76
40%	45	40	72
35%	47	40	64
30%	49	40	56
25%	52	40	47
20%	55	40	39

Schedule V

Moisture Content of the Wettest Timber on the Air Inlet Side	Temperature		Relative Humidity per cent
	Dry Bulb °C	Wet Bulb °C	
(1)	(2)	(3)	(4)
Green	42	38.5	80
45%	45	40	72
35%	46	40	68
30%	48	40	60
25%	50	40	53
20%	52	40	47
15%	55	40	39

Schedule VI

Moisture Content of the Wettest Timber on the Air Inlet Side	Temperature		Relative Humidity per cent
	Dry Bulb °C	Wet Bulb °C	
(1)	(2)	(3)	(4)
Green	40	37	82
60%	42	38	76
40%	45	40	72
35%	46	40	68
30%	47	40	64
25%	48	40	60
20%	50	40	53
18%	52	40	47
15%	55	40	39

Schedule VII

Moisture Content of the Wettest Timber on the Air Inlet Side	Temperature		Relative Humidity per cent
	Dry Bulb °C	Wet Bulb °C	
(1)	(2)	(3)	(4)
Green	40	38	88
60%	41	38	82
40%	42	38	76
35%	45	40	72
30%	46	40	68
25%	47	40	64
20%	50	42	61
18%	52	42	54
15%	55	42	45

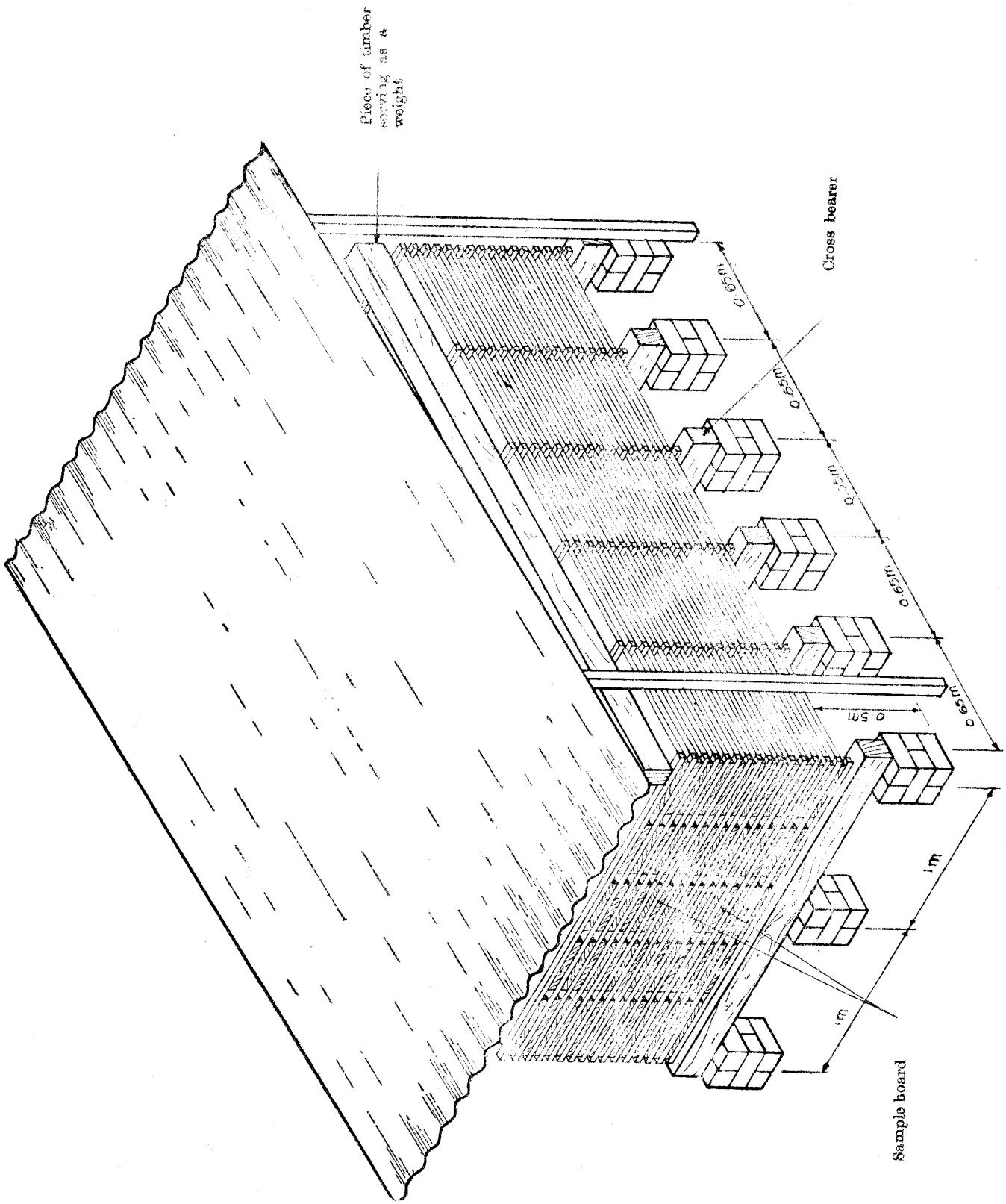

Fig. 1—AIR SEASONING STACK

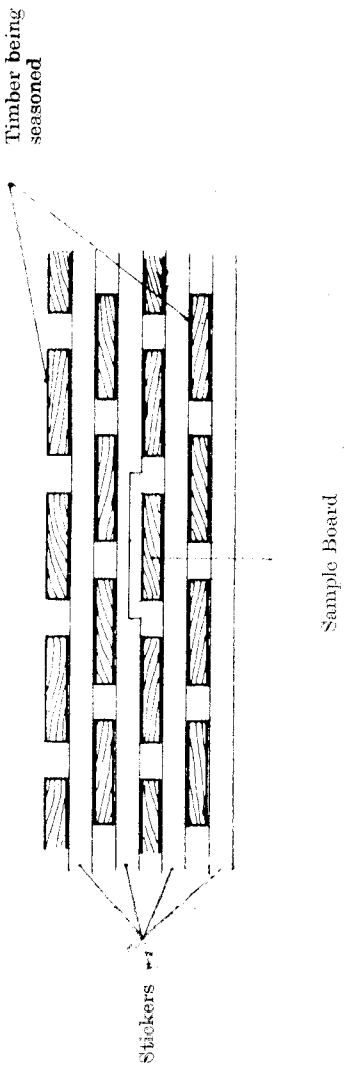

Diagram showing method of insertion of sample board in seasoning stack.

Fig. 2

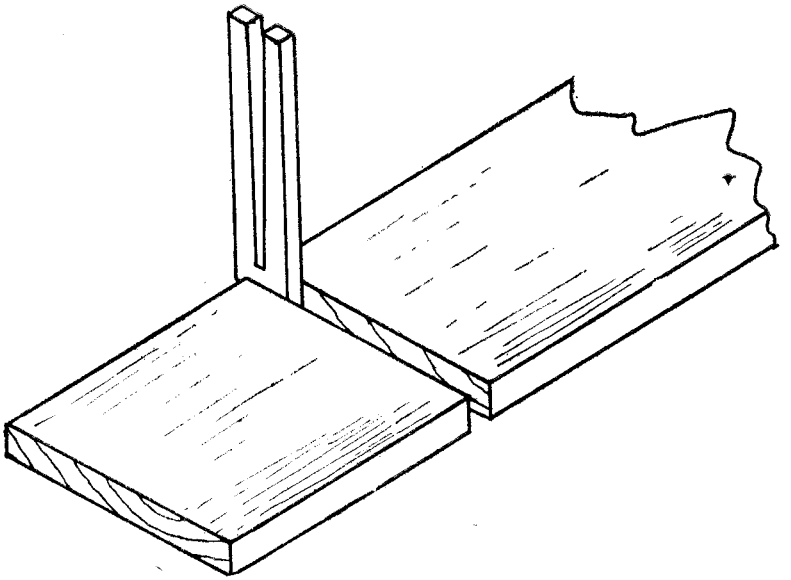

Diagram showing method of obtaining piece of wood for prong test.

Case-hardening.

Reverse case-hardening.

No case-hardening.

Fig. 3

AMENDMENT NO. 01 TO CS 159 : 1972

CEYLON STANDARD CODE OF PRACTICE FOR SEASONING OF TIMBER CS 159 : 1972

EXPLANATORY NOTE

The purpose of this amendment is to provide for "Recommended moisture content" of timber according to the end use of it and include the "testing, sampling and compliance of seasoned timber".

The incorporation of the amendment together with other requirements are presently being reviewed by the Working Group. It was proposed to authorize this amendment to facilitate the urgent implementation of this standard.

AMENDMENT NO. 01 APPROVED ON 1996-09-19 TO CS 159 : 1972

CEYLON STANDARD CODE OF PRACTICE FOR SEASONING OF TIMBER CS 159 : 1972

PAGE 6

Amend the last paragraph of the foreward as follows:

"The assistance derived from the publications of the British Standards Institution, the Bureau of Indian Standards and the Standards Australia in the preparation of this standard is gratefully acknowledge."

Insert the following new clause 2 : References and amend the subsequent clause numbers accordingly.

02 REFERENCES

SLS 623 - Building timber

BS 5756 - Tropical hardwood graded for structural use.

AS 2082 - Visually stress graded hardwood for structural purposes.

PAGE 7

Include the following as sub clause 3.5 and change the subsequent sub-clause numbers accordingly;

3.5 Equilibrium Moisture Content : Moisture content at which timber wood based on panel products neither gain nor loose moisture when exposed to a given ambient condition of temperatures and humidity (see Figure 4)

PAGE 14

Insert the following paragraph as the last paragraph under clause **5.2.2.10.**

"Equalizing treatments are used to reduce the moisture content spread within boards as well as between the wettest and driest boards in a kiln charge of timber. An equalizing treatment is suggested when the spread between the driest and the wettest kiln sample boards exceeds about 3 per cent moisture content in the final stages of drying. Begin the equalizing treatment when the driest sample is 3 per cent below the final target moisture content and continue until the wettest piece has dried to the target moisture content."

Insert the following as the last paragraph under **5.2.2.12.**

"Conditioning treatments are used to relieve the drying stresses and tension set (often called case hardening) that are present at the end of kiln drying and equalizing. Any timber that will be resawed, ripped, or machined non uniformly should be conditioned to relieve stresses. Failure to do so will result in warping (cupping, crooking, bowing, or twisting) during machining and will cause difficulty in boring. The conditioning treatment should be the final step in kiln drying after reaching the target moisture content and completing the equalizing treatment. Time required for conditioning can vary from 4 h to 72 h, depending on thickness of timber, density of species, the speed with which the proper depression can be achieved, and the amount of stress relief required. In general, more effective stress relief can be achieved in less time with thinner boards or lower density species than with thicker boards or more dense species".

PAGE 15

Clause 6 and Clause 7

Include the following clauses as **Clause 6** and **Clause 7** after the Clause **5.2.2.12.**

6 RECOMMENDED MOISTURE CONTENTS

6.1 General

To specify the maximum permissible limits of moisture content in timber, Sri Lanka is divided into four climatic zones (see Figure 5) as follows:-

a) Zone 1 (Arid Zone) – Mannar and Hambantota Districts, with mean annual rainfall of less than 1250 mm;

b) Zone 2 (Dry Zone) – Moderately dry regions, with a mean annual rainfall of 1250 mm up to 1875 mm;

c) Zone 3 (Intermediate Zone) – Moderately humid regions, with a mean annual rainfall of over 1875 mm up to 2500 mm; and

d) Zone 4 (Wet Zone) – Humid regions, with a mean annual rainfall over 2500 mm.

NOTE

For up-country (mountain zone) over 1220 m above mean sea level, limits of moisture content are as for Zone 1.

6.2 Limits of permissible Moisture content

The maximum permissible limits of moisture content for seasoned timber required for various timber stores and uses in each of the four zones are given in Table 1. Further, at the time of delivery, the moisture content of seasoned timber shall be not less than 10 per cent.

TABLE 1 : Maximum permissible moisture content of timber for different uses

Uses	Moisture content per cent			
	Zone 1	Zone 2	Zone 3	Zone 4
Agricultural Implements	16	16	16	16
Beams and rafters	25	25	30	30
Doors and windows	14	15	16	16
Flooring	12	12	14	14
Furniture	12	12	14	15
Carts and vehicles	14	14	16	16
Cooperage (tight)	12	12	14	14
Tool handles	12	14	16	16
Pattern making	12	12	14	15
Coach building	12	12	14	14
Small dimensional stock trade such as toys, picture frames, carving, etc.	12	12	14	14
Sleepers, posts and poles in outside locations	Moisture content reached after leaving them stacked in open air for a period of at least 6 months.			

6.3 Tolerances

Seasoned timber (whether air or kiln-dried) shall be deemed to conform to the moisture content requirements of this standard if the average moisture content of all the samples from a given lot is within +2 per cent and the moisture content of individual samples is within +3 per cent of the maximum permissible moisture content for the particular end use and locality indicated under Table 1, except for the following end uses for which tolerances shall be as follows:-

Uses	Tolerances
a) Agricultural implements b) Beams and rafters c) Carts and vehicles (not motor driven) d) Doors and windows (50 mm and above in thickness)	Average moisture content of all the samples from a lot shall be within +3 per cent and moisture content of individual samples within +5 per cent of the maximum permissible moisture content for the particular end use and locality indicated under **Table 1**.
e) Pattern making	Average moisture content of all the samples from a lot shall be within +2 per cent and moisture content of individual samples within ± 3 per cent of the maximum permissible moisture content for this end use and particular locality indicated under **Table 1**.

7 TESTING, SAMPLING AND COMPLIANCE

7.1 Seasoned timber shall be inspected and tested for conformity to specification of moisture content, residual case hardening stresses, wherever necessary, and natural as well as seasoning defects.

7.2 For inspection of a given lot of timber with regard to moisture content and residual case hardening stresses, not less than 5 per cent samples shall be selected at random for tests from any lot. In the case of identification of defects, each timber piece in the lot shall be inspected.

7.3 Conformity to moisture content requirements shall be determined in accordance with the limits specified in 6.2 and tolerances specified in **6.3**, using the results of tests conducted in accordance with Appendix A.

7.4 Seasoned timber shall be tested for residual case hardening stresses, wherever it is intended to be resawn or planed symmetrically of opposite faces for precision jobs or turned or carved to produce intricate shapes and designs. It shall be deemed to be free from objectionable stresses if prongs prepared from the test samples according to the procedure in Appendix B have no appreciable curvature after room-drying for 24 hours, so that outer prongs open or close by a distance not greater than half the gap of the cut-away middle prong. The extent of opening or closing is determined by the difference between the final and initial spacing of the inner extreme tips of the two timber prongs. Initial spacing shall be taken as the width of the cut-away middle prong measured at the base of two outer prongs.

7.5 Seasoned timber shall be inspected for defects (both natural and seasoning defects (see **SLS 623**) in accordance with the specifications laid down for swan timber or quality of timber for various end uses as in purchaser's specifications. SLS .....: (under preparation); "Identification, Grading and Marking of Imported construction timber". **BS 5756**, and **AS 2082**, Malaysian Grading rules, etc.

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APPENDIX B

Delete the word "kiln" in the first line of the paragraph.

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The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

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