

SRI LANKA STANDARD 763 : 1986

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**SPECIFICATION FOR
TIMBER BATTENS FOR
PLYWOOD TEA CHESTS**

SRI LANKA STANDARDS INSTITUTION

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SLS 763:1986

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SRI LANKA STANDARD

SPECIFICATION FOR TIMBER BATTENS FOR PLYWOOD TEA CHESTS

FOREWORD

This Sri Lanka Standard was authorised for adoption and publication by the Council of the Sri Lanka Standards Institution on 1986-11-14, after the draft, finalised by the Drafting Committee on Packaging of Tea, had been approved by the Civil Engineering Divisional Committee.

This specification is one of a series of Sri Lanka Standards on Plywood Tea Chests. The other standards in this series are:

- SLS 751 Plywood panels for tea chests;
- SLS 109 Metal fittings for plywood tea chests; and
- SLS 378 Plywood tea chests.

This standard together with SLS 751:1986 supersedes CS 108:1971 Ceylon Standard Specification for Components for Plywood Tea Chests (Metric Units).

The requirements of battens specified in the CS 108:1971 were inadequate whereas this Sri Lanka Standard covers the requirements of battens completely, including the methods of tests for evaluating the requirements of battens.

A study on timbers hitherto used in the manufacture of battens was carried out by testing samples for properties such as density, nail withdrawal resistance and the modulus of rupture. The recommended species of timber for tea chest battens given in Appendix A is based on this study.

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 an analysis, shall be rounded off in accordance with CS 102. The number of significant figures to be retained in the rounded off value shall be the same as that of the specified value in this standard.

The assistance derived from publications of the International Organization for Standardization, the British Standards Institution, the Indian Standards Institution and the Japanese Standards Association in the preparation of this standard is gratefully acknowledged.

1 SCOPE

This specification covers requirements of timber battens used in the manufacture of plywood tea chests specified in SLS 378.

2 REFERENCES

- ISO 3130 Wood-determination of moisture content for physical and mechanical tests.
- ISO 3131 Wood-determination of density for physical and mechanical tests.
- CS 102 Presentation of numerical values.
- SLS 378 Plywood tea chests.
- SLS 428 Random sampling methods.

3 DEFINITIONS

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

3.1 batten : A rectangular cross-sectioned piece of timber used in the edges of a tea chest.

3.2 decay : Disintegration of wood tissues caused by fungi and/or micro-organisms.

3.3 insect holes (borer holes) : A hole caused by insects or their larvae.

3.4 knot : A portion of a branch enclosed in the wood by the natural growth of the tree.

3.4.1 diameter of a knot : The maximum distance between two points farthest apart on the periphery of a round knot, on the face on which it becomes visible. In the case of spike or splay knot, the maximum width of the knot visible on the face on which it appears shall be taken as its diameter.

3.4.2 dead knot (loose knot) : A knot which is not held firmly in place.

3.4.3 live knot (sound knot) : A knot free from decay and other defects, firmly intergrown with the surrounding wood.

3.4.4 pin knot : A knot, not more than 6 mm in diameter.

3.4.5 spike or splay knot : A knot cut more or less parallel to its long axis so that the exposed section is elongated.

3.5 split : A separation of fibres which extends from one face of the batten to another and running along the grain.

3.6 warp : A deviation or distortion from a true plane of the surface of the batten.

4 REQUIREMENTS

4.1 Timber

It is recommended that the battens be manufactured from any of the timber species listed in the Appendix A.

4.2 Manufacture

All the battens shall be finished smooth. The battens to be located at the top or bottom of tea chests (horizontal edges) shall have mitred ends (45°) whereas the side battens (vertical edges) shall have square ends.

4.3 Dimensions

The length of battens shall vary according to the size of tea chest and shall be as given in Table 1. Each of the given dimensions shall be subjected to a tolerance of $+1$ mm.
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4.4 Quality requirements

4.4.1 Visual defects

4.4.1.1 The battens shall be free from resin streaks or pockets, splits, twists and warp, insect holes, decay, loose knots, live knots larger than 6 mm diameter, and other defects which are likely to reduce the strength of a batten.

4.4.1.2 The alignment of fibres in battens shall be such that nowhere along the length of the batten may fibre direction start on one face and end on the opposite face (see Fig. 1).

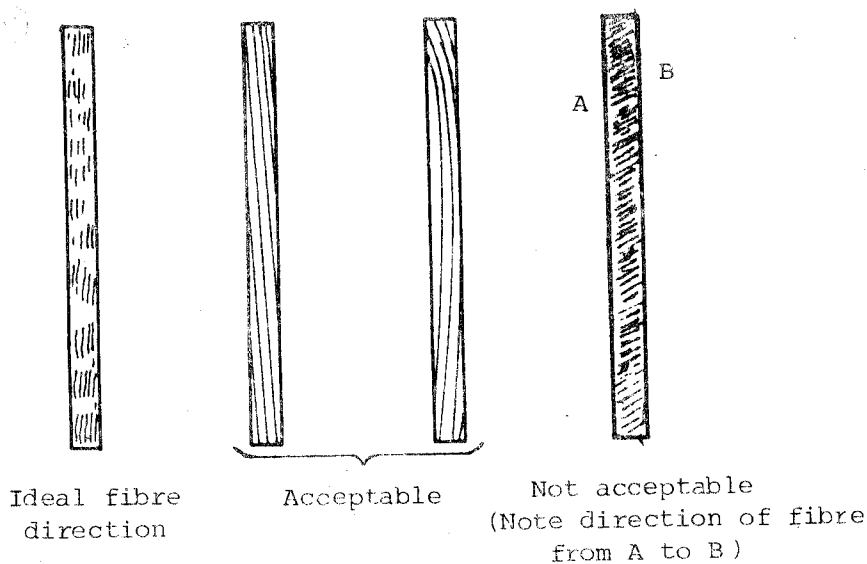


FIGURE 1 - Possible fibre directions in battens

4.4.1.3 Pin knots, provided they contain no resin and surface hair cracks, may be permitted.

4.4.1.4 Dead insect holes may be permitted provided they are pin holes (i.e. maximum diameter 2 mm).

4.4.2. *Moisture content*

The moisture content of battens shall not exceed 15 per cent.

The method of test for moisture content shall be as specified in 7.1 and the criteria for conformity shall be in accordance with C.5.2.2.

4.4.3. *Density*

The density of battens shall be not less than 400 kg/m³ and not more than 850 kg/m³.

The method of test for density shall be as specified in 7.2 and the criteria for conformity shall be in accordance with C.5.2.3.

4.4.4. *Breaking load*

The breaking load of battens shall not be less than the following:

Length of batten (mm)	Breaking load (N)
390	1080
490	760
548	690

The method of test for breaking load shall be as specified in 7.3 and the criteria for conformity shall be in accordance with C.5.2.1.

4.4.5. *Nail withdrawal resistance*

The nail withdrawal resistance of battens shall be not less than 15 N/mm.

The method of test for nail withdrawal resistance shall be as specified in 7.4 and the criteria for conformity shall be in accordance with C.5.2.4.

5 PACKING

The battens shall be delivered in a clean and dry condition. Each size shall be separately packed or bundled. Each such package or bundle shall contain 200 battens.

6 MARKING

6.1 Each batten shall be legibly and indelibly marked with the manufacturer's name and address, trade mark or other identification mark agreed between purchaser and supplier.

6.2 The following information shall be given on each bundle or package of battens.

- (a) Manufacturer's name and address and trade mark or other agreed identification mark;
- (b) Size and indication whether battens are meant for top and bottom or side of the chest;
- (c) Number of battens in the package or bundle; and
- (d) Month and year of manufacture.

NOTE - Attention is drawn to certification facilities offered by SLSI, see the inside back cover of this standard specification.

7 METHODS OF TEST

7.1 Moisture content

The battens shall be tested for moisture content in accordance with ISO 3130.

7.2 Density

The density of battens shall be determined as specified in the ISO 3131.

7.3 Static bending test

A central load shall be applied on each full length batten supported on test span (see Fig. 2 for details of test apparatus).

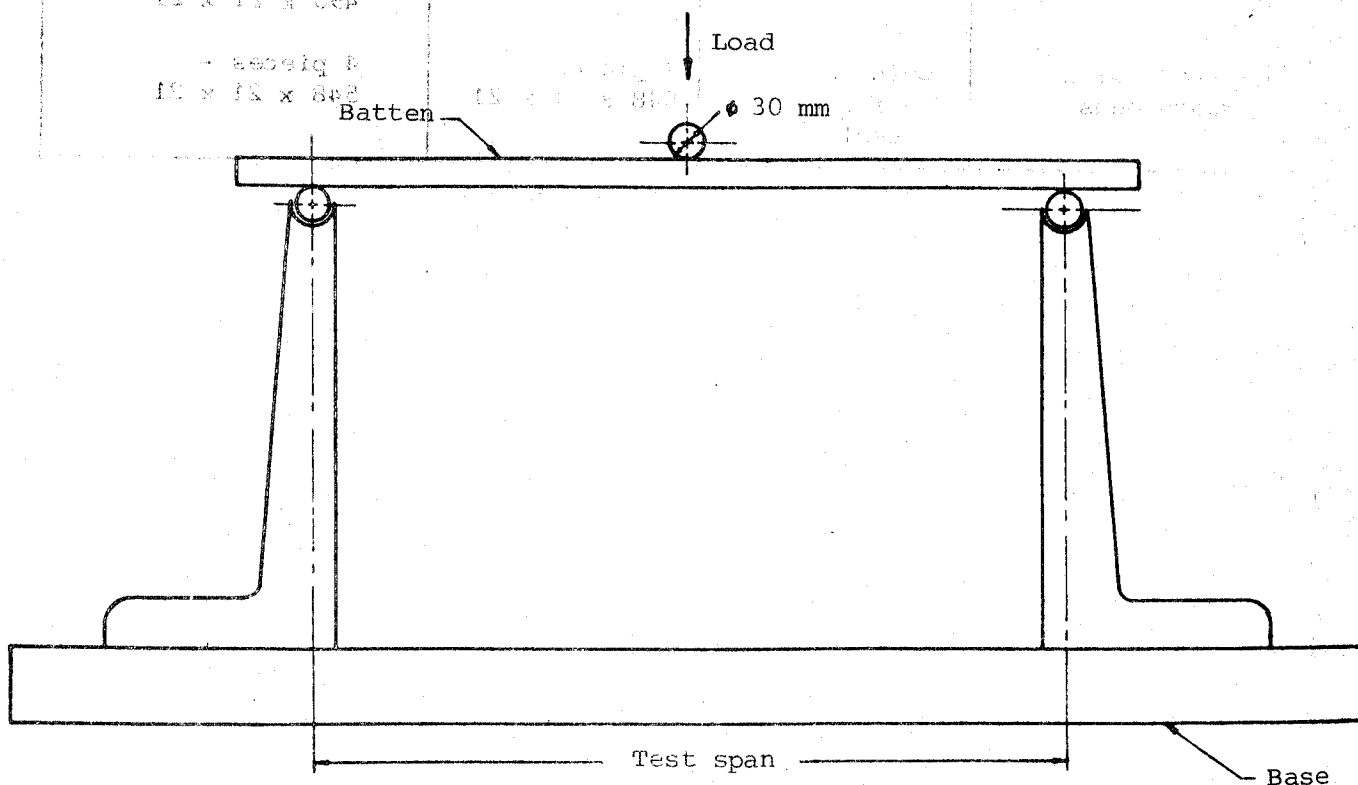


FIGURE 2 - Test apparatus for static bending

The specified test spans are as follows:

Length of batten (mm)	Test span (mm)
390	350
490	450
548	508

7.4 Nail withdrawal test

The nail withdrawal resistance of battens shall be determined as specified in the Appendix B.

8 SAMPLING

The method of drawing representative samples of battens and the criteria for conformity shall be as given in Appendix C.

TABLE 1 - Dimensions of battens

All dimensions are in millimetres

Type of batten	Location	Chest size 600x400x400	Chest size 600x500x400
Battens with mitred ends (45°)	Top and bottom (Horizontal edges)	8 pieces - 390 x 21 x 21	4 pieces - 390 x 21 x 21
			4 pieces - 490 x 21 x 21
Battens with square ends	Corners (Vertical edges)	4 pieces - 548 x 21 x 21	4 pieces - 548 x 21 x 21

APPENDIX A

SPECIES OF TIMBER SUITABLE FOR THE MANUFACTURE OF TEA CHEST BATTENS

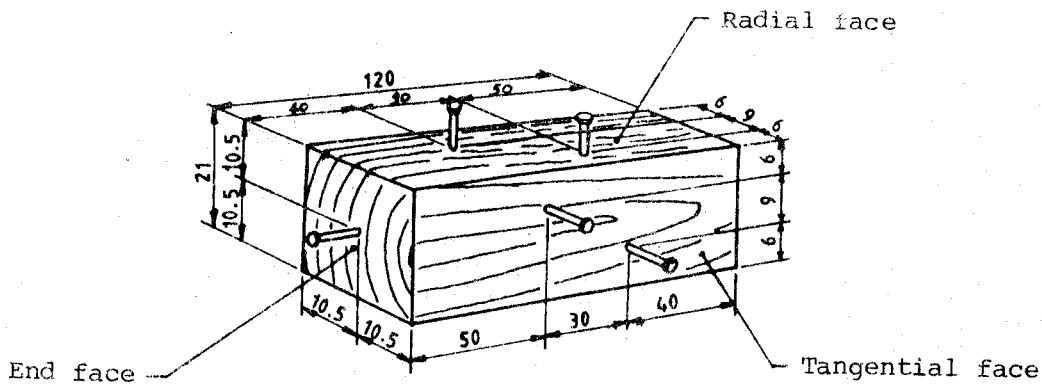
Local Name	Botanical Name
Andunwenna	<i>Ilex zeylanica</i>
Aridda	<i>Camptosperma zeylanica</i>
Beraliya	<i>Doona cordifolia</i>
Bomi	<i>Litsea glutinosa</i>
Diyapara	<i>Wormia triquetra</i>
Diyataliya	<i>Mastixia tetrandra</i>
Etdemata	<i>Gmelina arborea</i>
Hal	<i>Vateria copallifera</i>
Havarinuqa	<i>Alstonia macrophylla</i>
Hora	<i>Dipterocarpus zeylanicus</i>
Hulanidda	<i>Shorea stipularis</i>
Kekuna	<i>Canarium zeylanicum</i>
Katuboda	<i>Cullenia zeylanica</i>
Katuimbul	<i>Salmalia malabarica</i>
Kolon	<i>Adina cordifolia</i>
Lunumidella	<i>Melia dubia</i>
Malaboda	<i>Myristica dactyloides</i>
Rubber (Boron treated)	<i>Hevea brasiliensis</i>
Talan	<i>Litsea gardneri</i>
Thiniya	<i>Doona congestiniflora</i>
Toona	<i>Cedrella toona</i>
Ululu	<i>Machilus macarantha</i>
Walukeena	<i>Calophyllum bracteatum</i>

APPENDIX B

NAIL WITHDRAWAL TEST

B.1 TEST SPECIMENS

Nail withdrawal test shall be made on 21 mm x 21 mm x 120 mm specimens. Nails specified under B.2 shall be driven exactly at right angles to the faces of the specimen to a total penetration of about two-thirds of the total length of the nail (about 17 mm). In the specimen, six nails shall be driven in such a way that there are two nails on a tangential surface, two nails on a radial surface and one on each end. The driving positions of nails shall be arranged as shown in the Fig. 3.



All dimensions are in millimetres

FIGURE 3 - Driving positions of nails

B.2 EQUIPMENT

B.2.1 The test shall be conducted on a testing machine provided with a device suitable to grip the test specimen to the fixed head and the nail to the movable head of the machine. The equipment shall have suitable arrangements, such as cushioning springs to prevent any sudden shocks to the machine.

B.2.2 Nails used shall be round wire nails of 25 mm length and 1.7 mm shank diameter. They shall be of mild steel, straight, bright, diamond pointed and shall have plain heads. Each nail shall be used only once. If a split occurs while driving the nail, the specimen should be replaced.

B.3 PROCEDURE

B.3.1 Driving of nails

The nails shall be driven to the length specified in B.1 with five to ten drivings using a hammer weighing about 350 g.

B.3.2 Placing of specimen

The specimen, prepared as in B.1 shall be held firmly during the test. The nail gripping device shall then be clamped to the nail.

B.3.3 Rate of loading

The pulling load shall be applied continuously at a rate of about 295 N to 590 N per minute depending on the hardness of the wood.

B.3.4 Recording of data

The maximum load required to pull out the nails (N) and the driven lengths of the nails (mm) shall be recorded.

B.3.5 Determination of nail withdrawal resistance

The nail withdrawal resistance shall be determined from the following formula:

Nail withdrawal resistance of wood (N/mm) = P/L

where,

P = Maximum load required to pull out a nail (N)

L = Driven length of a nail (mm)

If necessary, the relation curve between the pulling load and pulled length of the nail shall be found; and the work load for unit nail-pulling length through wood shall be found from the following formula:

Work load for unit nail-pulling length through
wood (N.mm/mm) = W/L

where,

W = work load required to pull nail (N.mm)

L = driven length of nail (mm).

APPENDIX C

SAMPLING

C.1 LOT

In a consignment all the battens of same type, size and manufactured under relatively similar conditions shall be grouped together to constitute a lot.

C.1.1 If the manufacturing conditions are not known, consignments from different sources of supply shall be grouped into separate lots.

C.2 DEFECTIVE BATTEN

A batten that does not conform to any one or more visual and dimensional requirements shall be considered as a defective batten.

C.3 SCALE OF SAMPLING

C.3.1 Each lot shall be inspected and tested separately for ascertaining conformity of the lot to the requirements of this specification.

C.3.2 The number of battens to be selected from the lot shall depend upon size of the lot and shall be in accordance with Table 2.

C.3.3 The battens shall be selected at random. In order to ensure randomness of selection random number tables as given in SLS 428 shall be used.

TABLE 2 - Scale of sampling

Number of battens in the lot (1)	Stage of sample (2)	Sample size (3)	Cumulative sample size (4)	Acceptance number (5)	Rejection number (6)	Sub sample size (7)
Up to 1 000	1st stage	13	13	0	3	3
	2nd stage	13	26	3	4	
1 001 to 3 000	1st stage	20	20	1	4	4
	2nd stage	20	40	4	5	
3 001 to 10 000	1st stage	32	32	2	5	5
	2nd stage	32	64	6	7	
10 001 to 35 000	1st stage	50	50	3	7	5
	2nd stage	50	100	8	9	
35 001 and above	1st stage	80	80	5	9	7
	2nd stage	80	160	12	13	

C.4 NUMBER OF TESTS

C.4.1 The samples selected in one or two stages as the case may be, shall be examined for visual and dimensional requirements (see 4.2, 4.3 and 4.4.1).

C.4.1.1 The batten selected as in the first stage shall be examined for the visual and dimensional requirements. If the number of defectives in the first stage, lies between acceptance number (Column 5 of Table 2) and the rejection number (Column 6 of Table 2) a second stage sample of size given in Column 3 of Table 2 shall be drawn and examined for the visual and dimensional requirements.

C.4.2 If the lot has been found satisfactory with respect of visual and dimensional requirements, two sub samples, each having size as given in Column 7 of Table 2 shall be selected at random.

Each batten of the sub samples shall be tested in accordance with Table 3.

TABLE 3 - Number of tests

Sub sample	Requirements
1	Moisture content (4.4.2)
	Density (4.4.3)
	Breaking load (4.4.4)
2	Nail withdrawal resistance - (4.4.5)

C.5 CONFORMITY TO STANDARD

The lot shall be considered as conforming to the requirements of this specification if the condition given in C.5.1 and C.5.2 are satisfied.

C.5.1 Visual and dimensional requirements for battens

The number of defectives in the first stage sample is less than or equal to the corresponding first stage acceptance number given in Column 5 of Table 2.

OR

The number of defectives in the first stage and second stage samples (cumulative sample) is less than or equal to the corresponding second stage acceptance number given in Column 5 of Table 2.

C.5.2 Other requirements

C.5.2.1 The value of the expression $(\bar{X} - 0.5R)$ (see Note 1) using test results for static bending test is greater than or equal to the corresponding limit in this specification.

C.5.2.2 The value of the expression $(\bar{\bar{X}} + 0.5\bar{R})$ (see Note 2) calculated using test results on moisture content is less than or equal to corresponding limit in this specification.

C.5.2.3 The value of the expression $(\bar{X} \pm 0.5R)$ (see Note 1) using test results on density lie within the corresponding values in this specification.

C.5.2.4 The value of expression $(\bar{\bar{X}} - 0.5\bar{R})$ (see Note 2) calculated using test results of nail withdrawal resistance is greater than or equal to the corresponding limit in this specification.

NOTES

1 If one test result is obtained from each batten tested, the mean and range will be as follows:

$$\bar{X} = \frac{\text{Sum of the test results}}{\text{Number of test results}} ; \text{ and } R = \text{Difference between maximum and minimum values of the test results}$$

2 If more than one test results are obtained from each batten tested, the mean and range for each batten shall be calculated first. Then \bar{X} and \bar{R} shall be calculated as follows:

$$\bar{\bar{X}} = \frac{\text{Sum of average values}}{\text{Number of battens tested}} ; \text{ and } \bar{R} = \frac{\text{Sum of range values}}{\text{Number of battens tested}}$$

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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.

Further particulars of the terms and conditions of the permit may be obtained from the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.



SRI LANKA STANDARDS INSTITUTION

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