

X

इंटरनेट

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार" Mazdoor Kisan Shakti Sangathan "The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ" Jawaharlal Nehru "Step Out From the Old to the New"

मानक

IS 8292 (1992): Evaluation of working quality of timber under different wood working operations- Method of test [CED 9: Timber and Timber Stores]









611111111

Made Available By Public.Resource.Org



RIGHT TO INFORMATION "ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता Bhartrhari-Nītiśatakam "Knowledge is such a treasure which cannot be stolen"





BLANK PAGE



PROTECTED BY COPYRIGHT

भारतीय मानक

विभिन्न काष्ठरूपण प्रसंस्करणों के अंतर्गत इमारती लकड़ी की कार्यकारी गुणताओं का मूल्यांकन — परीक्षण विधियाँ (पहला पुनरीक्षण)

Indian Standard

EVALUATION OF WORKING QUALITY OF TIMBER UNDER DIFFERENT WOOD WORKING OPERATIONS — METHOD OF TEST

(First Revision)

UDC 674.620.179.5

© BIS 1992

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

Price Group 4

FOREWORD

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

Besides physical and mechanical properties of timber, working quality of timber under different wood working operations form an important consideration for determining the suitability of timber for the manufacture of timber stores and products. This standard was, therefore, formulated in 1976 to lay down method of tests for evaluating working quality of timber under different wood working operations. In this revision following important modifications are made:

- a) Sanding is included as one of the wood working operations.
- b) An Annex has been added to determine 'Working Quality Index'.
- c) The clause on terminology has been enhanced.

In the formulation of this standard due weightage has been given to international coordination among the standards and practices prevalent in different countries in addition to relating it to the practices in the field in this country.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2: 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

EVALUATION OF WORKING QUALITY OF TIMBER UNDER DIFFERENT WOOD WORKING OPERATIONS — METHOD OF TEST

(First Revision)

1 SCOPE

This standard covers methods of conducting following operations (tests) for evaluating working quality of timber:

- a) Planing,
- b) Sanding,
- c) Turning,
- d) Shaping,
- e) Mortizing, and
- f) Boring.

These are the common wood working operations used in the manufacture of timber stores and products.

2 REFERENCES

-- --

The standards listed below are necessary adjuncts to this standard:

IS No.	Title		
707:1976	Glossary of terms applicable to timber technology and utilization (second revision)		
1708	Methods of testing of small		

(Parts 1 to 18): clear specimens of timber 1986 (second revision)

3 TERMINOLOGY

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

3.2 Case Hardening

A defect due to internal stresses of seasoned timber causing the piece to crook or to cup and bow if re-sawn/machined.

3.3 Chip Marks

Shallow dents in the surface caused by shavings that have clung to the cutters instead of passing off.

3.4 Cutter Head Speed

The rate in revolutions per minute at which the cutter head is revolving.

3.5 Cutting Angle

The angle between the face of the cutter and the line joining the cutting edge to the centre of the block.

3.6 Feed Rate

The rate in millimetres per second at which material is passing through the machine.

3.7 Fuzzy Grain

A defect caused by the tendency of the fibres to fray out in machining so producing a rough surface.

3.8 Machine Burn

It is evidenced by the dark charred patches on machined wood and is due to heating of the cutting tools.

3.9 Miscut Timber

The timber which is not cut straight or correct to the dimensions as required, or shows variation greater than permissible, is called miscut timber.

3.10 Raised Grain

A defect primarily due to the use of blunt cutters, consisting of roughened condition of the dressed surface of timber, in which some portions of the growth layers are higher than others; it is accentuated by differential shrinkage.

3.11 Rating Factor

A figure indicative of performance characteristic of timber under different wood working operations. It is taken as the total number of specimens of acceptable grade (see 8.3.1) expressed as percentage of the total number of specimens subjected to that particular test.

3.12 Skip

In planing operation, slight depressions occurring below the line of cut and remaining in rough in unplaned condition; these are known as skips (*syn.* Skip-in-planing; Skip-in-surfacing). A series of skips is sometimes referred to as 'hit and miss'.

3.13 Torn Grain

A machine defect of surfaced timber where the fibres of the wood have been torn out around knots and curly places by the action of tools or foreign matters.

3.14 Whiskers

These are uncut portions of the fibres that are pressed down during cutting (sanding) operations and come out during moistening or damping treatment.

4 TEST SPECIMEN

4.1 The tests shall be done on the material, seasoned to 12 ± 2 percent moisture content and conditioned at (65 ± 5) % RH and 27 ± 2 °C temperature.

4.2 A total of 50 samples of size $1200 \text{ mm} \times 100 \text{ mm} \times 25 \text{ mm}$ shall be selected from the material of each species to be tested. Timber shall be clear, that is, free from all defects like knots, apparent decay, surface checks and end splits, and shall be sound.

4.3 Following the plan given in Fig. 1, specimens for various tests shall be prepared from each sample as follows:

Planing and sub- sequent sanding test	One specimen of size 900 mm × 100 mm × 25 mm
Turning test	One specimen of size $150 \text{ mm} \times 25 \text{ mm} \times 25 \text{ mm}$
Shaping, mortizing and boring test	One specimen of size $300 \text{ mm} \times 75 \text{ mm} \times 25 \text{ mm}$
Moisture content and specific gravity	One specimen of size 25 mm \times 25 mm \times 25 mm

5 MACHINES

5.1 Exact specifications of the machines to be used for different operations are not given as variety of machines are available in the market. However, the specifications of the machines employed for testing, together with operating conditions, namely, feed speed, cutter head speed, horse power, etc, and information on cutting tools shall be made part of the record.

5.2 Cutting bits, cutters and blades shall be sharpened periodically to keep them in perfect condition. These shall conform to the relevant Indian standards.

6 WOOD WORKING TESTS

6.0 Following are the machining operations, under controlled conditions, to obtain relevant information on wood-machine relationships and subsequent evaluation of wood working quality.

6.1 Planing

6.1.1 Test Specimens

Fifty specimens shall be required for the test. The specimens shall be suitably marked to indicate side and direction of planing.

6.1.2 Equipment

The test shall be conducted on a thickness planing machine with auto-feed arrangement. Four sets of planing cutter blades at cutting angles of 15°, 20°, 25° and 30° shall be required for the test.

6.1.2.1 A dial gauge shall be fitted on the machine for making accurate measurements of the depth of cut. A wattmeter shall also be connected with the motor of the machine for recording power requirement.



All dimensions in millimetres.

FIG. 1 PLAN OF PREPARNIG SPECIMEN FOR DIFFERENT TESTS

6.1.3 Procedure

6.1.3.1 Four cuts of 2 mm depth, at an angle of 15°, 20°, 25° and 30° shall be made by passing the specimen through thickness planing machine. The specimen shall be fed into the machine first in one direction and again in the reverse direction and estimated each time separately. The power required shall be recorded for each pass of the specimen.

6.1.3.2 The planing test shall be conducted on both the faces of an individual specimen, such that consecutive cuts are made on different faces. The possibility of warping and deformations of the test samples is reduced to a great degree, by symmetric cutting of faces. Symmetrical cutting is important as sanding has also to be done.

6.1.3.3 Immediately after each pass, the specimens shall be visually examined for planing characteristics, and defects like raised grain, torn grain, fuzzy grain and chip marks noted. The specimens shall then be evaluated in the manner prescribed in $\mathbf{8}$.

6.2 Sanding

6.2.1 Test Specimens

The fifty specimens obtained after planing test shall be used for this test.

6.2.2 Equipmen

The test shall be conducted on a 3-drum sander. Each drum shall be mounted with sand papers of grit No. 60, 80 and 100 respectively. The feed speed shall be 60 mm/s.

6.2.3 Procedure

All the specimens shall be passed through 3-drum sanding machine to make a cut of 1 mm depth.

6.2.3.1 Immediately after each pass, the specimen shall be visually examined for sanding characteristics and defects like fuzzyness or wooliness, snake or spiral marks, scratching, and reduction in uncut fibres or whiskers shall be recorded.

6.2.3.2 Moistening or damping treatment shall be given to the sanded surface by swabbing with a wet cloth and the specimen shall be allowed to dry overnight. The sanded surface shall be visually examined for defect to determine net effect of sanding. The specimens shall then be evaluated in the manner prescribed in **8**.

6.3 Turning

6.3.1 Test Specimens

Fifty specimens of size 150 mm \times 25 mm \times 25 mm shall be required for the test.

6.3.2 Equipment

The machine shall be turning lathe of commercial wood working type with about 3 000 rev/min and a turning tool of the shape as shown in Fig. 2. In the absence of one piece turning tool, a usual type of turning tool set may also serve the purpose.

6.3.3 Procedure

6.3.3.1 Each specimen shall be suitably held and shall be turned to the shape as shown in Fig. 3.



All dimensions in millimetres. FIG. 2 TURNING TOOL



All dimensions in millimetres.

FIG. 3 TURNED SPECIMEN

6.3.3.2 The specimens shall be examined visually for turning characteristics, and defects like fuzzy grain, roughness and torn grain noted. The specimens shall then be evaluated in the manner prescribed in **8**.

6.4 Shaping

6.4.1 Test Specimens

Fifty specimens of size $300 \text{ mm} \times 75 \text{ mm} \times 25 \text{ mm}$ are required for the test.

6.4.2 Equipment

The test shall be done on a hand feed type single spindle moulder having a speed of at least 6000 rev/min. The cutter shall be ground to the shape (as shown in Fig. 4) capable of giving 2 mm deep sweep and maintained in good cutting condition. A band saw will also be required.



All dimensions in millimetres. FIG. 4 SHAPING CUTTER

6.4.3 Procedure

6.4.3.1 The specimen shall be hand sawn to the shape as shown in Fig. 5. They shall then be held in a suitable jig and cut to shape with the help of shaping cutter (Fig. 4), mounted on a moulder.

6.4.3.2 The specimens shall be visually examined for shaping characteristics, and defects like fuzzy grain, chipped grain, roughness and charring noted. The specimen shall then be evaluated in the manner prescribed in 8.

6.5 Mortizing

6.5.1 Test Specimens

Test specimens for mortizing shall be the same as for shaping test (see 6.4.1).

6.5.2 Equipment

The test shall be done on a hollow chisel type single spindle electric mortizing machine of about 3 000 rev/min. The chisel shall be of 12.5 mm size.

6.5.3 Procedure

6.5.3.1 Each specimen shall be held in a suitable jig and two mortises made on it extending through into a hardwood backing.



All dimensions in millimetres. FIG. 5 BAND SAW CUT SHAPING SPECIMEN

~6.5.3.2 For visual examination of the specimens the mortises shall be cut in two directions — one along and the other across the grain (see Fig. 6). Defects like roughness, tearout, crushing and charring shall be noted. The specimens shall then be evaluated in the manner prescribed in **8**.

6.6 Boring

6.6.1 Test specimens for boring test shall be the same as for shaping test (see 6.4.1).

6.6.2 Equipment

The test shall be conducted on a single spindle electric boring machine of about 3 000 rev/min. The bit shall be of 25 mm size and of single twist, solid centre brad point type.

6.6.3 Procedure

6.6.3.1 Each specimen shall be held with the help of a suitable jig and two holes bored through it.

6.6.3.2 Having completed shaping, mortizing and boring tests, the holes shall be cut in the two directions — one along and the other across the grain (*see* Fig. 6). Defects like roughness, torn grain, fuzzyness and crushing shall be noted. The specimens shall then be evaluated in the manner prescribed in **8**.

7 MOISTURE CONTENT AND SPECIFIC GRAVITY

Moisture content and specific gravity of each sample shall be determined according to the method given in IS 1708 (Part 1): 1986 and IS 1708 (Part 2): 1986, respectively.

8 EVALUATION

8.1 Immediately after the completion of each test, each specimen shall be carefully examined visually for various defects mentioned under each test separately. To give a quantitative measure, each defect observed shall be given a numerical defect value from 1 to 5 depending on the severity of the defect. Recording of data shall be made in the proforma given in Annex A. For each specimen these defect values shall be added to obtain total defect value of the specimen.

8.2 Grading

Specimens after each test shall be graded on the basis of observed defects in the following scale:

Grade I	Excellent	Defect free
Grade II	Good	Total defect value 1
Grade III	Fair	Total defect value 2
Grade IV	Poor	Total defect value 3 or 4
Grade V	Very poor	Total defect value 5 or more.

8.3 Rating Factor (RF)

On the basis of percentage of specimens of different grades the rating factor for evaluation of working quality under different operations shall be obtained as follows:

Test	Rating Factor
Planing	Percentage of Grade I specimens only.
Sanding	Percentage of Grade I specimens only.
Turning	Percentage of Grade I, II and III specimens only.
Shaping	Percentage of Grade I and II specimens only.
Mortizing	Percentage of Grade I, II and III specimens only.
Boring	Percentage of Grade I and II specimens only.

8.4 Annex B may be referred for evaluating the working quality index.





A, B Cut across the grain

C, D Cut along the grain

All dimensions in millimetres.

FIG. 6 SHAPING, BORING AND MORTIZING SPECIMEN SHOWING CUT ALONG AND ACROSS THE GRAIN TOGETHER WITH SIDE AND END VIEW OF BORE AND MORTISE

ANNEX A

(Clause 8.1)

PROFORMA FOR RECORDING OF DATA

Kind of Test		Date
Species	Moisture Content	Feed Rate, mm/s
Speed, rev/min	Knives	_Cutting Angle

Sample	Sample Defect	Defect Raised Grain Fuzzy Grain Torn Grain Tearout	Fuzzy	Torn Grain Chip	Crush- Cha	Charges	
Number	Free		Marks	ing	0		
1				······································			<u></u>
2							
2							
J A							
5							
6							
7							
8							
9							
•							
• `							
•							
•							
50							, -
Total			<u></u>				
Percentage					- <u></u> .		

ANNEX B

(Clause 8.4)

METHOD OF EVALUATION OF WORKING QUALITY INDEX

B-0 WORKING QUALITY INDEX

The working quality index, if so required shall be rated from the individual tests and the power requirements for over all comparison of the species.

B-1 ADJUSTING FACTOR (AF)

It is obtained by expressing all the values of different wood working tests for teak to the same order or magnitude with regard to principal planing test which is of primary importance.

B-2 WEIGHTED AVERAGE (WA)

It is the summation of the values of all wood working tests for individual species and can be expressed as follows:

$$WA = \Sigma (RF \times AF \times W) / \Sigma W$$

where W is relative weightage of operations and has the value of 5 for sanding, 4 for planing, 2 for turning and shaping, and 1 for mortizing and boring, thus

 $\Sigma W = 15.$

6

B-3 COMPOSITE RATING FACTOR (CRF)

A figure indicative of overall performance under all wood working tests of species relative to teak and serves as an Index:

$$CRF = \frac{WA \text{ of the species}}{WA \text{ of teak}} \times 100$$

B-4 EASE FACTOR (EF)

A figure indicative of ease of working of wood species relative to teak in wood working tests. It is quantitatively evaluated by measuring power requirement per cm width of the species under planing test.

$$EF = \frac{Power requirement of teak}{Power requirement of species} \times 100$$

B-5 WORKING QUALITY INDEX (WQI)

The Working Quality Index (WQI) is calculated by combining Composite Rating Factor (CRF) and weighted Ease Factor (EF) as follows:

$$WQI = \frac{CRF + 2(EF)}{3}$$

Standard Mark

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

Bureau of Indian Standards

BIS is a statutory institution established under the Bureau of Indian Standards Act, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc: No. CED 9 (4616)

Amendments Issued Since Publication			
Amend No.	Date of Issue	Text Affected	
	BUREAU OF INDIAN STANDARDS		
Headquarters :			
Manak Bhavan, 9 Bahadur Sh Telephones 1 331 01 31, 331 1	ah Zafar Marg, New Delhi 110002 3 75	Telegrams 1 Manaksanstha (Common to all Offices)	
Regional Offices ;		Telephone	
Central i Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002		{331 01 31 {331 13 75	
Eastern # 1/14 C. I. T. Scheme CALCUTTA 700054	VII M, V. I. P. Road, Maniktola	87 86 62	
Northern ; SCO 445:446, Sect	53 38 43		
Southern & C. I. T. Campus, I	V Cross Road, MADRAS 600113	235 02 16	
Western t Manakalaya, E9 Mi BOMBA¥ 400093	632 92 95		

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. PATNA. THIRUVANANTHAPURAM.

Printed at New India Printing Press, Khurja, India