IS 12077 (1987): Code of practice for testing of timbers for plywood manufacture [CED 20: Wood and other Lignocellulosic products]

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IS: 12077-1987
Reaffirmed 2010

Indian Standard

CODE OF PRACTICE FOR TESTING OF TIMBERS FOR PLYWOOD MANUFACTURE

UDC 674-412 : 674-419·32

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

Gr 3 *December* 1987

Indian Standard

CODE OF PRACTICE FOR TESTING OF TIMBERS FOR PLYWOOD MANUFACTURE

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AMENDMENT NO. 1 AUGUST 1992
TO
IS 12077 : 1987 CODE OF PRACTICE FOR TESTING OF TIMBERS FOR PLYWOOD MANUFACTURE

(*Page* 3, *clause* 2.1) — Delete the matter 'IS : 303-1975† and'.

(*Page* 3, *foot-note marked with* '†' *mark*) — Delete.

(*Page* 7, *clause* 4.2.2.3) — Substitute 'IS 303 : 1989' *for* 'IS : 303-1975'.

(*Page* 7, *clause* 4.2.4) — Substitute 'IS 303 : 1989' *for* 'IS : 303-1975'.

(*Page* 7, *foot-note marked with* '†' *mark*) — Substitute the following for the existing foot-note:

'*Specification for plywod for general purposes (*third revision*).'

[*Page* 8, *clause* 4.3(G), *line* 1] — Substitute 'MR' *for* 'CWR'.

(CED 20)

Reprography Unit, BIS, New Delhi, India

Indian Standard

CODE OF PRACTICE FOR TESTING OF TIMBERS FOR PLYWOOD MANUFACTURE

0. FOREWORD

0.1 This Indian Standard was adopted by the Bureau of Indian Standards on 29 April 1987, after the draft finalized by the Wood Products Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 This standard has been formulated to guide the industry in arriving at the most efficient way of processing the timber logs during manufacture of plywood. The various tests specified in this standard also aid in assessing the suitability of the species of timber.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2 - 1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard covers requirements of timber and its source, its processing to determine the peeling, drying and splicing characteristics and gluing properties of veneer and assessment of the timber for its suitability for plywood manufacture.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 303-1975† and IS : 707 - 1976‡ shall apply.

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*Rules for rounding off numerical values (*revised*).

†Specification for plywood for general purposes (*second revision*).

‡Glossary of terms applicable to timber technology and utilization (*second revision*).

3. MATERIAL

3.1 Veneer logs, preferably of diameter 0·4 m and above (minimum girth 1·20 m), length 1·5 m and multiples thereof, with a total quantity of not less than 3 m^3 of timber are required for detailed examination of each species.

3.2 Tests should be carried out on freshly-felled logs. Each log should preferably come from a separate tree. Bark should be left on, and end coating and spray treatment against fungal and insect attack applied immediately after felling.

4. PROCEDURE

4.1 Details of Timber Under Investigation and Its Source

4.1.1 The source of supply of the timber species and their trade and botanical names together with their density in kg/m^3 in the green state and when dried to 12 percent moisture content shall be recorded.

4.1.2 The mean diameter of the bolt shall be measured after cross-cutting the log and a record be made of its straightness, shape, knots, corrugations, gum pockets, decay, insect attack, spiral grain and of any shakes and splits.

NOTE — It is recommended that information on whether the logs are typical of the forests or selected specimens, their availability, usual girths lengths estimated extraction rates and liability to degrade after felling, storage and transit should also be recorded.

4.2 Processing Trials — The object of processing trials is to indicate the most efficient way of processing the timber at each stage of plywood manufacture.

4.2.1 *Peeling* — The quality of veneer peeled depends to a large extent on the quality of timber and lathe settings. The effect of lathe settings on the veneer quality is assessed on the basis of uniformity in thickness, surface roughness and lathe checks. The important lathe settings which affect the quality of veneers are : (a) horizontal gap, (b) vertical gap, (c) knife angle, (d) knife bevel angle and (e) knife height with respect to spindle centre (*see* Fig. 1). Boiling/steaming the bolts helps in increasing the veneer yield, improving the surface quality and reducing the splits.

4.2.1.1 *Lathe setting* — The horizontal gap varies depending on timber species, log temperature, moisture content, veneer thickness, etc, and ranges normally from 75% to 95% of the thickness of veneer peeled. Vertical gap should be kept at 20% to 25% of the thickness of veneer peeled. The knife angle varies depending on timber species, veneer

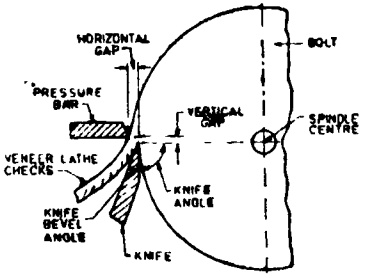

FIG. 1 RELATIVE POSITIONS OF KNIFE, PRESSURE BAR AND VENEER

thickness and usually ranges from 93° to 91° at a maximum bolt diameter of 1·5 m and 92° to 90° at a minimum bolt diameter of 0·2 m. Knife edge height shall be aligned in a horizontal plane with respect to spindle centres. Knife is generally ground to a bevel angle of 20° to 22°. Lathe settings, for getting desired quality of veneers for each species are determined by trial and error method within these requirements and recorded in Table 1.

TABLE 1 LATHE SETTINGS

(*Clause* 4.2.1.1)

VENEER THICKNESS (mm)	HORIZONTAL GAP (mm)	VERTICAL GAP (mm)	KNIFE ANGLE	
			At Maximum Bolt Diameter (Deg—min)	At Minimum Bolt Diameter (Deg—min)

4.2.1.2 ***Green veneer yield*** **— Generally the green veneer yield of timber species ranges from 40 to 60 percent of the total volume of timber yield measurements shall be recorded as shown in Table 2.**

TABLE 2 GREEN VENEER YIELD

(*Clause* 4.2.1.2)

DESCRIPTION	VOLUME PERCENT
1. Veneer yield	
2. Core loss	
3. Rounding loss	
4. Spur trim loss	
5. Green clipping loss	
Total	100 percent

4.2.2 *Drying* — Temperature for drying veneers should be around 140°C. The moisture content of veneer after drying should be 6-8 percent and 10 percent for manufacturing plywood with phenol formaldehyde and urea formaldehyde resins respectively. Drying defects such as development of splits, waviness, metal staining, gum exudation, etc, that occur during drying may be recorded. Dried veneers should be stacked for about 8-10 days in order to achieve uniform moisture content before using them for further processing.

4.2.2.1 *Drying time* — The drying times for veneers of different thicknesses (for example, 1·0, 1·6 and 2·4 mm) may be determined and recorded as shown in Table 3.

TABLE 3 DRYING TIME

VENEER THICKNESS mm	MOISTURE CONTENT OF VENEER		DRYER TEMPERATURE °C	DRYING TIME min
	Initial percent	Final percent		

Generally, drying times for 1·0, 1·6 and 2·4 mm thick, veneers vary from 4-6 min, 6-12 min, and 15-21 min respectively at a drier temperature of 120°C, moisture content of dried veneer 8 to 10 percent and initial moisture content of veneer, 65 percent.

4.2.2.2 *Veneer shrinkage* — Shrinkage of veneer during drying shall be determined on the basis of initial and final measurement of width and

thickness. Percentage shrinkage of veneers shall be recorded as shown in Table 4.

TABLE 4 VENEER SHRINKAGE

(*Clause* 4.2.2.2)

Moisture Content of Veneer		Shrinkage of Veneer	
Initial percent	Final percent	Width percent	Thickness percent

4.2.2.3 *Features of dry veneers* — These are determined in relation to growth and processing characteristics of the species, namely, whether the veneer contains discolouration (sound and unsound), dote, insect hole, knits (dead and tight), pin knots (dead and live), splits, swirl, etc. Based on these defects, the veneers should be initially assessed if they are suitable for different types of surfaces for plywood in accordance with IS : 303-1975*.

4.2.3 *Splicing* — Veneers of different thicknesses (for example, 1·0, 1·6 and 2·4 mm) may be spliced at different speeds using splicing adhesives (for example, UF resin, UM resin, etc) for determining the best speed of splicing. Splicing speeds, generally, vary depending on gluing properties of the species. The splicing speed in terms of linear speed of the jointed length of veneer is normally 5-26 m/min for veneers with thicknesses ranging from 2·4 to 1·0 mm and when spliced at a temperature of 175°C using UF resin.

4.2.4 *Gluing Properties* — For determining gluing properties, 3-ply plywood panels of equal construction using 1·6 mm veneers shall be made and tested for conformity in accordance with IS : 303-1975* and the results are recorded in Table 5.

4.3 Assessment — A detailed report on the tests with all technical data should be given to aid the user to make his assessment regarding the suitability of the species of timber for plywood manufacture. Following points may be kept in view while determining the suitability of species of timber for plywood manufacture.

*Specification for plywood for general purposes (*second revision*).

TABLE 5 GLUE ADHESION STRENGTH

(*Clause* 4.2.4)

Grade of Plywood	Dry State		Wet State		Mycological	
	Failing Load kg	Glue Failure percent	Failing Load kg	Glue Failure percent	Failing Load kg	Glue Failure percent

A timber may be classified as unsuitable if it has markedly shown one or more of the following characteristics:

a) Contains internal stresses or shakes that cause the bolts to break up in peeling or lead to the production of maximum veneers of narrow width,

b) Growth features are such that a large core of timber unsuitable for peeling is left,

c) Contains mineral deposits such as silica that rapidly blunt the knife,

d) Adjustments to the lathe settings have failed to reduce appreciably wooliness or 'pick out' of the veneer surface,

e) The veneer dries patchily, splits or distorts and is difficult to handle or is unduly brittle,

f) Glue adhesion properties are extremely poor,

g) When plywood is made using CWR type adhesive and tested as described in 4.2.4 samples do not give the required failing load and give persistent wood failure, and

h) Distorts strongly when made into plywood.

(*Continued from page* 2)

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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