



Forest Industry Training and
Education Consortium Inc.

VISUALLY STRESS-GRADED HARDWOOD

(GRADE SPECIFICATION SUMMARY)

(Conforms to Australian Standard 2082 - 2000)

INTRODUCTION

These specifications set out the requirements for visually stress-grading seasoned or unseasoned, sawn, dressed or sized hardwood which is intended for structural purposes.

To comply with the Standard, the complete specification for any grade consists of the general provisions given in AS 2082, Section 1, together with the relevant grade description given in Section 2.

While the main factor in AS 2082 is strength, consideration has been given to the necessity for a surface which provides a firm backing for the attachment of cladding, lining, etc.

Four structural grades apply. From these are derived stud, lintel and wall plate grades (straighter material) and appearance grades (fewer visual blemishes), which have their more stringent limitations. Limits for permissible characteristics in the four structural grades are shown in the large table overleaf.

GRADE LIMITATION AND GRADING

The basis for grading structural timber is the assessment of the characteristic or group of characteristics within a piece, which is considered to have the greatest limiting effect on the grade of that piece, when assessed in accordance with the grading rules. Each piece shall be inspected on all surfaces and the ends.

Each parcel of timber shall contain a range of material such that not all of the material is near the lower limits of the grade.

Within any parcel a maximum variation of 5% between the gradings of pieces by different graders shall be acceptable, provided that none of the pieces in the disputed 5% falls more than one grade below the designated grade.

If a cross-section of a piece of timber is reduced by longitudinal sawing or dressing, the original grading is nullified.

Unless the purchaser orders otherwise, species may be supplied mixed, and where there is a mixture and the timber is not branded in the manner provided in AS 2082, the stress grade applicable to the species of lowest strength present will apply to the whole parcel. If the species present cannot be identified, the strength group rating will be that given for mixed hardwoods in Table A4 of AS 2082.

LYCTUS SUSCEPTIBLE SAPWOOD

AS 2082 refers to wane, want and sapwood susceptible to Lyctid attack.

Although the standard makes provision for sapwood that is Lyctus susceptible, in Queensland the Timber Utilization and Marketing Act requires all susceptible sapwood to be treated.

Note: the purchaser may specify other requirements but these must not relax the specifications included in the standard if stress grades are to be allocated.

COMBINATION OF CHARACTERISTICS (IMPERFECTIONS)

- A combination of characteristics shall be permitted if the aggregate size of the combination is less than that of one characteristic of the maximum permissible size.
- A combination exists when two or more characteristics occur in a length of the piece such that there is less than twice the width of the piece between them. Characteristics in combinations may not necessarily appear on the same surface.
- If bow, spring, twist and/or cup are present they shall be measured separately and deemed not to be in combination with each other or any other characteristics.

MECHANICAL DAMAGE – Damage caused by hooks, ropes, forklifts etc shall be permitted, provided that its effect is no more serious than that of a permissible characteristic.

SIZES AND TOLERANCES – Deviation of the actual from the specified dimensions of the timber by more than the following is not permitted:

- The length shall not be less than that specified.
- For width and thickness, except where permitted wane, wane or hit and miss occurs, measured at any point in the length of the piece –
 - for unseasoned timber ± 3 mm;
 - for seasoned timber $+ 5, - 0$ mm
- for sized timber – as for (i) and (ii) with an additional requirement of a maximum 2 mm difference between all pieces within a parcel for the sized dimensions; and
- for dressed timber $+2, -0$ mm of the specified finished size

STRENGTH GROUPS, STRUCTURAL AND STRESS GRADES UNSEASONED (SEASONED IN BRACKETS)

Strength Groups	Structural No. 1	Structural No. 2	Structural No. 3	Structural No. 4.
S1 (SD1)	F27 (F43)	F22 (F34)	F17 (F27)	F14 (F22)
S2 (SD2)	F22 (F34)	F17 (F27)	F14 (F22)	F11 (F17)
S3 (SD3)	F17 (F27)	F14 (F22)	F11 (F17)	F 8 (F14)
S4 (SD4)	F14 (F22)	F11 (F17)	F 8 (F14)	F 7 (F11)
S5 (SD5)	F11 (F17)	F 8 (F14)	F 7 (F11)	F 5 (F 8)
S6 (SD6)	F 8 (F14)	F 7 (F11)	F 5 (F 8)	F 4 (F 7)

Species	Strength Group	
	Unseasoned	Seasoned
Blackbutt	S2	(SD2)
Blackbutt (New England)	S3	(SD3)
Box, Grey (Gum Topped)	S2	(SD2)
Gum, Grey	S1	(SD2)
Gum, Red Forest	S3	(SD4)
Gum, Spotted	S2	(SD2)
Ironbark, Grey	S1	(SD1)
Ironbark, Red (Broad leaved)	S1	(SD1)
Ironbark, Red (Narrow leaved)	S2	(SD3)
Mahogany, White	S2	(SD3)
Messmate, Gympie	S2	(SD3)
Stringybark, Blackdown	S3	(SD3)
Tallowwood	S2	(SD2)
*Unidentified Qld/Nth N.S.W.	S3	
*Unidentified Nth N.S.W. Highlands	S4	

*Do not apply to rainforest species

GRADES AND MAXIMUM PERMISSIBLE CHARACTERISTICS

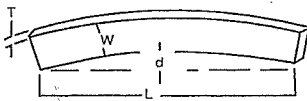


TYPE OF CHARACTERISTIC	STRUCTURAL GRADE No. 1.	STRUCTURAL GRADE No. 2.	STRUCTURAL GRADE No. 3.	STRUCTURAL No. 4.
(A) KNOTS – tight, loose, sound, unsound, intergrown or not, round, oval, aris, single or clusters, knot and other holes (not insect holes):	Not exceeding 1/7 of width of surface	Not exceeding 1/4 of width of surface	Not exceeding 1/3 of width of surface	Not exceeding 3/8 of width of surface
(b) BORER HOLES (NOT ASSOCIATED WITH DECAY) i) diameter up to 3 mm – not exceeding: ii) diameter over 3 mm (or separated by less than twice diameter)	12 holes per 100 x 100 mm As for knots	20 holes per 100 x 100 mm As for knots	Unlimited if separation is twice diameter As for knots.	Unlimited if separation is twice diameter As for knots
(C) TERMITE GALLERIES – I) WHERE ENCLOSED II) NOT ENCLOSED (OPEN FOR INSPECTION)	not permitted as for want and wane	Not permitted as for want and wane	Not permitted as for want and wane	Not permitted as for want and wane
(D) SLOPE OF GRAIN – NOT EXCEEDING:	for Jarrah I in 12 all other species 1 in 15	for Jarrah I in 8 all other species 1 in 10	for Jarrah 1 in 6 all other species 1 in 8	all species (including jarrah) 1 in 6
(E) HEART, HEARTSHAKES: I) SMALLER DIMENSION LESS THAN 175 MM: II) SMALLER DIMENSION 175 MM OR GREATER:	Not Permitted Permissible if within central one third of width and thickness	Not Permitted Permissible if within central one third of width and thickness	Not Permitted Permissible if within central one third of width and thickness	Not Permitted Permissible if within central one third of width and thickness
(F) TIGHT GUM VEINS: – (I) AGGREGATE LENGTH: (II) INDIVIDUAL LENGTH – (A) NOT FROM ONE SURFACE TO ANOTHER: – (B) FROM ONE SURFACE TO ANOTHER:	not to exceed 1 1/2 length of piece not exceeding 1/2 length of piece. not exceeding 1/4 length of piece	Unlimited	Unlimited	Unlimited
(g) LOOSE GUM VEINS, RING SHAKES AND INCLUDED BARK (i) width: (ii) aggregate length: (iii) extending from one surface to another: . not intersecting end: . intersecting end:	Not exceeding 3 mm Not exceeding 1/10 length of piece Not Permitted	Not exceeding 3 mm Not exceeding 1/6 length of piece Not Permitted	Not exceeding 3 mm Not exceeding 1/4 length of piece not permitted considered an end split	Not exceeding 3 mm Not exceeding 1/2 length of piece not permitted considered an end split
(H) POCKETS OF GUM, LATEX, RESIN; INJURY OVERGROWTH: I) ONE SURFACE TO ANOTHER AND INTERSECTING AN END: II) OTHERWISE: (A) INDIVIDUAL LENGTH NOT EXCEEDING (LESSER OF): (B) INDIVIDUAL WIDTH (MEASURED RADIALLY): 1) ONE SURFACE ONLY: 2) ONE SURFACE TO ANOTHER:	Considered an end split 3 times width or 300 mm not exceeding 1/4 of surface or 12 mm not exceeding 1/8 of surface or 6 mm	Considered an end split 3 times width or 300 mm not exceeding 1/3 of surface or 20 mm not exceeding 1/4 of surface or 12 mm	Considered an end split 3 times width or 300 mm not exceeding 1/2 of surface or 25 mm not exceeding 1/3 of surface or 20 mm	Considered an end split The lesser of 3 times width or 300 mm not exceeding 1/2 of surface or 30 mm not exceeding 1/3 of surface or 25 mm
(i) END SPLITS – aggregate length at each end not exceeding:	width of piece, or 100 mm	the lesser of width of piece, or 100 mm	the lesser of 1 1/2 times width, or 150 mm	the lesser of 1 1/2 times width, or 150 mm
(j) CHECKS OTHER THAN INTERNAL - i) width: ii) individual length:	Not exceeding 3 mm wide Not exceeding 1/4 the length of piece	Not exceeding 3 mm wide not exceeding 1/3 the length of piece	Not exceeding 3 mm wide not exceeding 1/2 the length of piece	Not exceeding 3 mm wide not exceeding 1/2 the length of piece
(K) INTERNAL CHECKS – LOSS OF CROSS-SECTION:	Not exceeding 1/10	Not exceeding 1/10	Not exceeding 1/10	Not exceeding 1/10
(L) PRIMARY ROT- DEPTH: AGGREGATE AREA IN ANY 2 METRE LENGTH:	Not exceeding 3 mm not exceeding 150 mm x 100 mm	Not exceeding 3 mm not exceeding 150 mm x 100 mm	Not exceeding 3 mm not exceeding 150 mm x 100 mm	Not exceeding 3 mm not exceeding 150 mm x 100 mm
(m) WANT, WANE AND LYCTID SUSCEPTIBLE SAPWOOD in aggregate or individually:	Not exceeding 1/10 of cross section Not exceeding 1/3 width of edge nor 1/2 width of face	Not exceeding 1/5 of cross section Not exceeding 1/3 width of edge nor 1/2 width of face	Not exceeding 1/5 of cross section Not exceeding 1/3 width of edge nor 1/2 width of face	Not exceeding 1/5 of cross section Not exceeding 1/3 width of edge nor 1/2 width of face
(n) HIT AND MISS - i) within the limits for want and wane ii) exceeding the limits for want and wane	Permitted Depth not exceeding 3 mm and individual length not exceeding 600 mm	Permitted Depth not exceeding 3 mm and individual length not exceeding 600 mm	Permitted Depth not exceeding 3 mm and individual length not exceeding 600 mm	Permitted Depth not exceeding 3 mm and individual length not exceeding 600 mm
(o) BOW, SPRING AND TWIST	See tables on reverse side			
(P) CUP	1 MM PER 50 MM OF WIDTH	1MM PER 50 MM OF WIDTH	1MM PER 50 MM OF WIDTH	1MM PER 50MM OF WIDTH

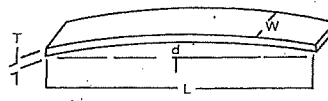
MAXIMUM PERMISSIBLE BOW AND SPRING C1

Length	Maximum permissible spring or bow, d mm												
(L)	Width W (for spring) or thickness T (for bow), mm												
m	38	50	75	100	125	150	175	200	225	250	275	300	350
1.8	10	10	7	5	4	3	3	3	2	2	1	1	1
2.4	20	15	12	9	7	6	5	4	4	4	3	3	3
3.0	35	25	19	14	11	9	8	7	6	6	5	5	4
3.6	50	35	25	20	13	13	12	10	9	8	7	7	6
4.2	60	45	28	25	22	18	16	14	12	11	10	9	8
4.8	70	50	30	30	29	24	21	18	16	14	13	12	10
5.4	75	55	40	40	36	30	26	23	20	18	17	15	13
6.0	80	60	45	45	45	37	30	28	25	22	20	19	16
6.6	85	65	50	45	45	45	39	34	30	27	25	23	19
7.2 and over	90	70	55	50	50	50	46	40	36	32	29	27	23

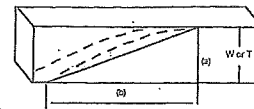
NOTE: The permissible allowances for nominal lengths between those quoted in the table may be obtained by interpolation



Spring = d (see table for values of d)



Bow = d (see table for values of d)



Length of at least 3W or 3T

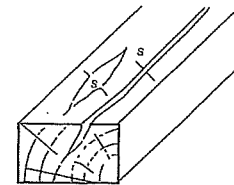
(a) General slope measured = α/b

SLOPE OF GRAIN



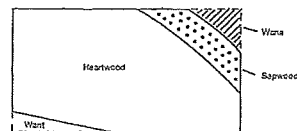
Length of at least 2W or 3T

(b) Slope = α/b



Size of gum pocket or base gum vein = S

GUM POCKETS AND VEINS

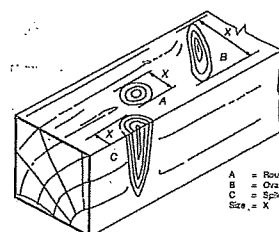


WANED AND WAHT



Size of internal check = S

INTERNAL CHECKS



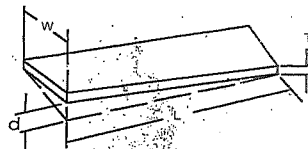
A = Round
B = Oval
C = Spike or Ann
Size = X

KNOTS

MAXIMUM PERMISSIBLE TWIST (d) in mm

Nominal Length (L) m	Nominal Thickness (T) mm	Nominal Width (W) mm			
		75	101 to 150	151 to 200	201 to 300
Up to 2.4	Up to 50 Over 50 to 75 Over 75	7	10	15	
		6	8	11	
		4	6	8	
2.7 to 3.0	Up to 50 Over 50 to 75 Over 75	7	10	14	20
		5	8	11	15
		3	5	8	11
3.3 to 3.6	Up to 50 Over 50 to 75 Over 75	8	13	18	25
		6	9	13	19
		4	6	9	13
3.9 to 4.2	Up to 50 Over 50 to 75 Over 75	9	15	21	29
		7	11	15	22
		5	7	10	15
4.5 to 4.8	Up to 50 Over 50 to 75 Over 75	10	16	23	33
		7	12	17	24
		5	8	11	16
5.1 to 5.4	Up to 50 Over 50 to 75 Over 75	11	18	26	37
		8	14	19	27
		6	9	13	18
5.7 and over	Up to 50 Over 50 to 75 Over 75	12	20	28	40
		9	15	21	30
		6	10	14	20

NOTE: The limitations on distortion have been governed by consideration of production and utilization within the constraints of the principles of structural adequacy



Maximum permissible twist = d
(see Table for values of d)



VISUALLY STRESS-GRADED SOFTWOOD FOR STRUCTURAL USE

TABLE 3.1.3b TWIST

Nominal length (L) m	Nominal thickness (T) mm	Maximum Permissible Twist Nominal width (W), mm			
		Up to 100	101 to 150	151 to 200	201 to 250
up to 2.4	up to 50	5	7	10	15
	over 50 to 75	4	6	8	11
2.7 to 3.0	up to 50	7	10	14	20
	over 50 to 75	5	8	11	15
3.3 to 3.6	up to 50	8	13	18	25
	over 50 to 75	6	9	13	19
3.9 to 4.2	up to 50	9	15	51	29
	over 50 to 75	7	11	15	22
4.5 to 4.8	up to 50	10	16	23	33
	over 50 to 75	7	12	17	24
5.1 to 5.4	up to 50	11	18	26	37
	over 50 to 75	8	14	19	27
5.7 and over	up to 50	12	20	28	40
	over 50 to 75	9	15	21	30

NOTE:

The limitations on distortion have been governed by considerations of production and utilization within the constraints of the principles of structural adequacy.