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It is simply not possible to grade sawn timber successfully to maintain uniform standards of timber quality throughout the country without a set of recognised set of rules. Grading rules are a compound of visual identification of these physical defects through the use of common sense, practical experience, and the proven performance of graded timber in use and under controlled laboratory testing conditions. These rules are regularly revised and updated.

The official grading rules applied in Papua New Guinea are the same as those applied by the Australian and New Zealand Standards Associations which forms the basis of the grading rules in use in the country. (National Timber Grading Rules NZS3631: 1988)

However this manual is designed to be a simplified and an illustrative introduction to the Malaysian Grading Rules for Sawn Hardwoods (MGR) 1968 Edition. It is intended as an aid for training in basic recognition of the terms and the methods used to determine the extent of defects and tolerances in grading of sawn hardwood lumber.

This manual is divided into three parts.

Part 1 discusses the cutting system of grading.
Part 2 deals with miscut timber in width and thickness.
Part 3 covers the limitations of defects defined in General Market Specifications. The defect system of grading which is not covered in this manual will be the subject of a second booklet.

The unit of measure used in this manual is based on the “inch” system. However should the conversion from “inch” unit of measure to metric measurement be required, the usual conversion factors should apply.

Acknowledgement

The material in this edition of the timber grading rules comes from several sources and people. I would like to and in particular acknowledge the following people for their great contributions in assistance in compiling this Timber Grading Training Manual.

Acier project FST/2012/092 program coordinators and activity team leaders in this program designed for Enhancing Value Added Wood Processing in Papua New Guinea (2016).

Miss Barbara Ozarska, Associate Professor from the University of Melbourne for providing the illustration via email.

Miss Elain Galore, research officer with TFTC for printing illustrations used in this edition, Mr Baleng Lagep HOD for wood Technology section of TFTC for providing additional information, Mr. Daniel Marika for his commitment for formulating and compiling of the resource pack.
Introduction to Timber Grading

Timber Grading
What is Timber Grading?

Grading of sawn timber is the operation or the process of sorting sawn timber according to quality and the intended end use of the timber. It is done by physical observations of the defects that appear on the timber surface.

Why Grade Timber?

The purpose of grading is:

1. To ensure that various qualities of sawn timber recoverable from a log are used in the applications for which they are best suited for.
2. To maintain uniform standards of quality so that a given grade will represent the same value and be suitable for the same range of users, regardless of the mill or log from which it comes from. It therefore establishes a sound basis for trading.

Correct and accurate grading has an important kina/dollar value to the seller too. As a grader you can make or lose both the reputation of your yard and a great deal of money as shown in the following example.

Grading Timber

In practice graders often have to work at speed, sometimes under adverse conditions, making it impossible to measure all defects accurately. The business of grading at speed is an art which can only be acquired with practice. It involves sorting pieces of timber into fairly easily recognisable categories.

Therefore, in a first approach to learning the art of grading, it is probably the best to try to form a mental picture of a typical board in each grade. In Pine boards for example, the typical select A grade board has o its better face and edge an unbroken surface, with light inter-grown knots, and no bark, pith or wane. The general light colour is the keynote. On the other hand, typical box grade board would call attention to itself by having large conspicuous dark coloured defects. The typical cuttings grade board would have large dark-coloured defects suggesting box grade, but with these separated by long clear lengths.

In the practical grading situation, it is necessary to keep a balance between being too slow and fastidious over the measurement of defects on the one hand, and being too undiscriminating in the interest of haste on the other.

Notwithstanding the fact that visual grading is not an exact science, most of the defects encountered have clearly defined units which relate to the maximum allowable in the piece. Marginal pieces should be relegated to a lower grade. A grading efficiency of 95% or better, which the rules prescribe should be possible to achieve without difficulty.
Beginning to grade according to the rules

The National Timber Grading Rules give important general guidelines to their use that timber graders should take note of before beginning to grade specific categories.

1. The rules are equally applicable to green or seasoned timber and to rough sawn or machined timber. Ideally, therefore, a separate grading should be carried out after each stage of processing. If the timber is graded only at the initial stage (in the green rough sawn condition) the material should not be included in a high grade if it is likely to lose knots during drying or if the knots are likely to chip out during machining. It is therefore a requirement that the grader should quickly learn to recognise:

a. Which knots stay tight during seasoning?
b. Which knots cause kinks or wrap in seasoned timber?
c. What wrap effect pith and low density wood may have on the piece during drying?
d. Which knots are likely to chip, or pull out in machining?

On the other hand, defects in rough sawn timber that will be removed in dressing or gauging should not be considered as a grade determining defect. Effective grading on the green chain which takes account of changes as a result of further processing calls for considerable experience.

2. The grading rules give definitions of and methods of measuring the commonly encountered defects. Occasionally, however, defects will be encountered which are not specifically covered in the rules (e.g. bruises caused by forklift) and in these cases the grader must use his/her own judgement in assessing them by basing his/her decision on the equivalent effect they would have compared with defects that are described. Defects which are defined in the rules but not specifically mentioned for a particular grade are not permitted.

3. Groups of defects occurring in a piece of timber are to be assessed according to their combined damaging effect upon the piece.
Part 1: The Cutting System

The Defect System and the Cutting System

NB: Timber Grades are determined by one or other of the following systems.

<table>
<thead>
<tr>
<th>Defect System</th>
<th>Cutting System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is employed for grading timber normally intended for special purposes.</td>
<td>Is employed for grading timber that is usually re-sawn to smaller sizes before use.</td>
</tr>
<tr>
<td>Example: Railway Sleepers.</td>
<td>Example: Furniture and Cabinet Making</td>
</tr>
<tr>
<td>Grading is based on permissible defects as defined for each grade.</td>
<td>Grading is determined on the percentage of the total surface area of that face that could be included in a limited number of cuttings. (clear face or sound face)</td>
</tr>
<tr>
<td>Timber containing more defects than are allowed by the grade is deemed to be rejected.</td>
<td>Timber yielding the highest percentage of clear face cutting determines the best grade.</td>
</tr>
</tbody>
</table>

Definitions of terms used in the cutting system

1. A Cutting
   What is A Cutting?

A Cutting is a rectangular portion of a piece of sawn timber that could be obtained if so desired by cross cutting, ripping, or both.

*Fig: 1. Cross Cutting*
2. Clear Face Cutting
   What is Clear Face Cutting?

   On the face graded is a cutting that is clear of all defects other than bright sapwood when allowed in specific rules for Prime, Select, Standard and Serviceable grades.
On the reverse face of clear face cutting, the portion must not have defects which are worse than those listed under the sound face cutting.
3. Sound Face Cutting
   What is Sound Face Cutting?

The sound face cutting is the cutting that is free on both faces from decay, heart or wane (other than slight sliver on one corner), shakes, splits, and brittle heart (other than allowed in the specific rules for any grade).

This Portion will admit:

a) Sound Sapwood.

b) Sound Knots.

c) Stain.

g) Resin Pockets whose length plus breadth does not exceed two inches.

h) Seasoning Checks

i) Pin Holes
d) Latex Traces.  

j) Unstained Shot Holes not more than 6 per 72 square inch.  
(measured by the length and full width)

e) Latex Shakes.  
f) Included Ploem

**Method of Determining Clear Face and Sound Face Cutting**

*Fig: 8. Face Graded*

In Clear Face cutting the cutting is clear of all defects and the area outside the cutting must not have defects other than those listed under Sound Face Cutting.

*Fig: 9. Reverse Face*

The Sound Face Cutting on the reverse face must not have defects which are worse than those listed under Sound Face Cutting as illustrated in Fig. 7, on page 6 & 7

**Method of Measuring Resin Pockets**

**Resin Pocket**

A Resin Pocket is a hole containing gummy deposits on a face or edge.
Measure the length ("L") and the breath ("B") of the resin pocket. Add them together and if the result (L + B) exceeds the two inches (50mm) limit, the resin pocket has to be ripped or docked as illustrated in figs; 11 and 12 on page 8.

**Resin Pocket Exceeding the Limit**

*Fig: 11. Docking of Resin Pocket*
Definition of Unstained Shot Holes and Defined Units

Unstained Shot Holes;

1. Unstained Shot Holes over 1/16" in diameter but not exceeding 1/8" in diameter and where edges the edges of the holes are not stained or discoloured.
2. Unstained Shot Holes may be admitted in the sound face cutting, provided they do not exceed six holes in an area of 72 square inches measuring by the length and full width of the piece as illustrated in fig 13.
Procedure of obtaining area of limitation for unstained shot holes

*Fig: 14. Allowable units of Unstained Shot Holes*

**Procedures**

a) Measure a length (L) and full width (W) of the piece where most unstained shot holes occur as shown in fig 14 above.

b) Multiply a length (L) by the full width (W) eg: (L x W) to obtain a resultant surface area which equals to 72 square inches.

c) Count the number of unstained shot holes appearing within the surface area measured.

d) If the number of unstained shot holes exceeded the limit of 6 holes in an area of 72 square inches, the area is defective and has to be docked or ripped as illustrated in fig 16.

**Unstained Shot Holes exceeding the limit of 6 holes per 72 square inches**

*Fig: 15. Docking of Unstained Shot Holes*
Procedures of Grading under the Cutting System

The following procedures shall apply when grading under the Cutting System

1. Choose the worse face of the piece. That is the face containing the most defects.
2. Check whether the defects on the worst face can quantify for Prime, Select, Standard, Sound, or Serviceable grade or cause the whole piece to be rejected.
3. Check also the reverse face of any cutting to ensure that it does not contain more defects than are permitted as defined in Clear and Sound Face Cuttings and also the portion outside the clear or sound face cuttings does not contain more defects than are allowed in specific rules for each grade.
Part: 2. General Requirement

Miscut Timber

A) Thickness
Timber which is tapered (wedge shaped) in cross section due to faulty sawing and has a greater variation than the table shown bellow in thickness between the thinnest and the thickest points of the wedge shall be deemed to be miscut.

Fig: 17. Miscut in Thickness

Table 1: Allowable maximum miscut tolerances

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Miscut Variation</th>
<th>Allowable maximum miscut tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2”</td>
<td>1/8”</td>
<td>3/8”</td>
</tr>
<tr>
<td>3/4”</td>
<td></td>
<td>5/8”</td>
</tr>
<tr>
<td>1”</td>
<td>1/4”</td>
<td></td>
</tr>
<tr>
<td>1 1/2”</td>
<td></td>
<td>1 ¼”</td>
</tr>
<tr>
<td>1 3/4”</td>
<td></td>
<td>1 ½”</td>
</tr>
<tr>
<td>2”</td>
<td></td>
<td>1 ¼”</td>
</tr>
<tr>
<td>2 ½”</td>
<td>3/8”</td>
<td>2 1/8”</td>
</tr>
<tr>
<td>2 3/4”</td>
<td></td>
<td>2 3/8”</td>
</tr>
<tr>
<td>3”</td>
<td></td>
<td>2 5/8”</td>
</tr>
<tr>
<td>3 ½”</td>
<td></td>
<td>3 1/8”</td>
</tr>
<tr>
<td>4”</td>
<td></td>
<td>3 ½”</td>
</tr>
<tr>
<td>4 ½”</td>
<td>½”</td>
<td></td>
</tr>
<tr>
<td>5”</td>
<td></td>
<td>4”</td>
</tr>
<tr>
<td>5 ½”</td>
<td></td>
<td>4 ½”</td>
</tr>
<tr>
<td>6”</td>
<td></td>
<td>5”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 ½”</td>
</tr>
</tbody>
</table>
Docking of Miscut in Thickness
Any variation in thickness (measured at the thinnest and the thickest points of the wedge) which is measured *less than the allowable maximum miscut* and trimmed as illustrated in fig. 18 below.

*Fig: 18. Docking of Miscut in Thickness*

Portion “A” is deemed to be miscut and has to be cut because the thinner point measured in this portion is less than the miscut tolerance of ¾” defined for one inch (1”) thick boards.

Portion “B” is not deemed a miscut and can be admitted in the cuttings as the thinnest point measuring ¾” inch defined for one inch (1”) thick boards.

B) Width
Where the width of a piece of timber *varies by more than 1 inch at any point along the piece*, the piece shall be deemed to be miscut.
If the variation of 1 inch is exceeded, the piece shall be deemed to be miscut and has to be docked off as in fig 20.

**Fig: 20 Docking of Miscut in Width**
Part 3: General Market Specifications (GMS)

Rules defining all the grades in general market specifications

1. SCOPE
   a) These rules are intended primarily for grading boards and planks which are usually resawn before use for a variety of purpose.
   b) They may be used for grading fixed width and/or fixed length in which case minimum widths and lengths specified in each grade may be ignored provided the width is not less than 4 inches and length not less than 6 feet.
   c) The system of grading is based on the cutting system and grading is executed on the worse face and that is the face containing the most defects.

2. SPLITS
   A split is a defect that is to be limited in all species and can be admitted outside the cuttings when assessing the clear or sound face cuttings provided the splits do not exceed in total length in inches the full length of the piece in feet. However, if the splits limit is exceeded, the splits will have to be trimmed.

*Fig: 21. Splits*
Method of measuring and docketing of splits

1. Measure the length of splits.
2. Add the length of splits together to obtain the total length of splits. (e.g. 10” + 6” + 2” = 18”)
3. Check the full length of board on which the splits appear. (length of board as shown in fig 22 is 22), therefore the total length of splits permitted is 12 inches.
4. Since the total length of splits appearing on this board is 18 inches which exceeded the permitted total length of splits of 12 inches, the splits will have to be docked as illustrated in figures 23, 24 and 25 on page 18 and 19

Docking of Splits

a) Alternatives in correct docking

Splits exceeding the limit can be docked as illustrated in fig 23 or fig 24. The remaining splits which do not exceed the limit can be admitted outside the cuttings when assessing clear or sound face cuttings.

Fig: 23. Correct Docking of Split
b) Incorrect docking

It is incorrect to dock all the splits which appear on the piece of timber as illustrated in fig 25.

Fig: 25. Incorrect Docking of Splits
Definition and rules defining splits

DIVERGING SPLIT

1. Diverging split is a split which diverges individually to the edge of a piece of a sawn timber.
2. In diverging split, the split must not diverge more than 1 inch (distance “a”) to a foot in length of the split (distance “b”) that is for every foot (12 inches) of split, the distance “a” must not be more than 1 inch.

Fig: 26. Diverging Split

\[ a = \text{Distance of Divergence} \]
\[ b = \text{Length of Diverging split} \]

Maximum distance of Divergence permitted

\[ a = \frac{b}{12} \]
Method of determining diverging split allowance

Fig: 27. Docking of Diverging Split

a) For a Diverging Split of 14 inches in length as shown in fig 27, the distance of divergence a “A” should not be more than 14 ÷ 12 which is 1.16 inches.

b) Since the distance of Divergence “A” is measured 2 inches and the distance exceeded the maximum divergence distance of 1.16 inches, the diverging split is considered a defect and has to be docked as illustrated in fig 27 above.
Definition of major defects in general market specifications

The following major defects shall apply;

1. **HEART**

   - Heart is dead wood tissue forming the core of a tree trunk.
   - Heart is not allowed in any piece of timber in any grade.

2. **DECAY**

   - Decay is caused by destruction of wood fibres by fungi.
   - Decay is not allowed in any piece of timber in any grade.
3. **LIVE BORERS**

*Fig: 30 (above), Live borers*

Pin holes which appear to be caused by live borers where a (usually) lighter coloured powder like dust (frass) can be seen are not allowed in any piece in any grade.
4. WANE

Wane is the natural absence of wood on the edge or surface produced by cutting the piece from the outer surface of a log. Wane is not allowed in any piece except Serviceable grade.

*Fig: 31. Wane*
5. BRITTLE HEART

Brittle Heart is characterised by abnormal softness of timber resulted from cutting the piece from the inner surface of a log containing such defective core. There is no difference colour from unaffected wood and a sawn cross section that shows a pitted condition. Brittle Heart is not allowed in any piece except serviceable grade.

*Fig: 32. Brittle Heart*
Definition of permissible defects and limits in general market specifications

Sapwood

Sapwood is the outer layers of wood adjacent to the bark. It is lighter in colour than Heartwood and is clearly demarcated except in some species such a Basswood and Labula where there is no clear distinction between Sapwood and Heartwood.

Fig: 33. Sapwood
Prime Grade

Sapwood whether bright or not is a defect that is to be excluded from all clear face cuttings.

Fig: 34. Prime Grade – Sapwood
Select Grade

Bright Sapwood shall not be regarded as a defect and may be permitted in clear face cutting provided;

a) The aggregate Sapwood (distance of a + b) does not exceed 1/3 the width of the piece, and
b) The Sapwood does not appear on both faces.

*Fig: 35. Select Grade – Sapwood*

| Table 2: Maximum aggregate allowance of sapwood permitted in select grade for the vary widths |
|-----------------------------------|---|---|---|---|---|---|---|---|
| **Widths** | 6” | 7” | 8” | 9” | 10” | 11” | 12” | 5” |
| **Allowance** | 2” | 2 5/16” | 2 5/8” | 3” | 3 5/16” | 3 5/8” | 4” | 1 5/8” |

If the above allowance of Sapwood for the various widths is exceeded, the sapwood is to be excluded from clear face cuttings.
Select Grade

1. Sapwood limit is not exceeded; Bright sapwood can be included in clear face cuttings.

*Fig: 36. Sapwood appearing on one Face and one Edge only*
2. Sapwood limit exceeded, bright sapwood is to be excluded from clear face cuttings.

*Fig: 37. Sapwood exceeding allowable limit*
3. Sapwood appearing on both faces, bright sapwood to be excluded from clear faces cuttings.

*Fig: 38. Sapwood appearing on both Face Faces*
Standard Grade

Bright sapwood shall not be regarded as a defect and may be included in clear face cuttings without any defined limit.

*Fig: 39. Sapwood in Standard Grade*

Serviceable Grade (as in above)
The same as applies as in standard grade.

**Table 3: Summary of sapwood allowance in various grades**

<table>
<thead>
<tr>
<th>GRADES</th>
<th>SAPWOOD ALLOWANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRIME GRADE</strong></td>
<td>Sapwood whether bright or not is to be excluded from clear face cutting. (meaning no sapwood is allowed)</td>
</tr>
<tr>
<td><strong>SELECT GRADE</strong></td>
<td>If sapwood does not exceed:</td>
</tr>
<tr>
<td></td>
<td>In aggregate 1/3 the width of the piece end</td>
</tr>
<tr>
<td></td>
<td>Does not appear on both faces</td>
</tr>
<tr>
<td></td>
<td>Sapwood may be included in clear face cutting.</td>
</tr>
<tr>
<td><strong>STANDARD GRADE</strong></td>
<td>No limit and may be included in clear face cutting.</td>
</tr>
<tr>
<td><strong>SERVICEABLE GRADE</strong></td>
<td>No limit and may be included in sound face cutting.</td>
</tr>
</tbody>
</table>
Knots

Knots are inclusions of branch growth sections in the sawn timber. The cross section of a knot is usually circular or oval in shape and is measured by taking the mean of the longest and shortest diameter.

*Fig: 40. Measurement of Knot*

The average diameter of the knot is obtained by adding distances of “A” and “B” together and divide by 2.

*I.e. Average Diameter of knot is $= \frac{A + B}{2}$*

**Prime Grade**

The average diameter of the Sound Knot shall not exceed 1/3 the width of the face on which it appears. The average diameter of the Knot *not exceeding* the limit can be admitted outside the cuttings.

**Select Grade**

The average diameter of the Sound Knot shall not exceed 1/3 the width of the face on which it appears. The average diameter of the Knot *not exceeding* the limit can be admitted outside the cuttings.
Table 4: Average Knot Diameter allowance permitted in Prime and Select Grades

<table>
<thead>
<tr>
<th>GRADES</th>
<th>WIDTHS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5”</td>
</tr>
<tr>
<td>PRIME</td>
<td>-</td>
</tr>
<tr>
<td>SELECT</td>
<td>1 5/8”</td>
</tr>
<tr>
<td>STANDARD</td>
<td>NO SIZE LIMIT</td>
</tr>
<tr>
<td>SERVICEABLE</td>
<td>NO SIZE LIMIT</td>
</tr>
</tbody>
</table>

If the above average knot diameter allowance of prime and select grade is exceeded, the knot has to be docked or ripped as illustrated in Figs 41 and 42 or rejected to the next lower grade.

*Fig: 41. Ripping of Knot*
Standard Grade

Hollow knots and sound knots without size limit can be admitted outside clear face cuttings

Fig: 42. Docking of Knot

Fig: 43. Knot in Standard Grade
Serviceable Grade

Sound knot without any size limit can be admitted in sound face cutting and hollow knot is allowed outside the cuttings.

*Fig: 44. Knot in Serviceable Grade*

<table>
<thead>
<tr>
<th>GRADES</th>
<th>SUMMARY OF KNOT ALLOWANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIME</td>
<td>Average diameter of the knot not to exceed 1/3 the width of the piece</td>
</tr>
<tr>
<td>SELECT</td>
<td>Average diameter of the knot not to exceed 1/3 the width of the piece</td>
</tr>
<tr>
<td>STANDARD</td>
<td>Hollow Knot and Sound Knot permitted without any size limit outside the clear face cuttings.</td>
</tr>
<tr>
<td>SERVICEABLE</td>
<td>Sound knot without any size limit can be admitted in sound face cutting. Hollow knot is allowed outside the cuttings.</td>
</tr>
</tbody>
</table>
Spring

Spring is the curvature of a piece of sawn timber in the plane of its wide face.

*Fig: 50. Spring*

![Measure this distance](image)

To measure the spring, lay the concave edge of the timber against a straight edge and measure the greatest distance between the edge and the face.

**Table 6: Maximum springs defined in general market specification grades**

<table>
<thead>
<tr>
<th>LENGTH OF TIMBER</th>
<th>GRADES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRIME 1” PER 12’</td>
</tr>
<tr>
<td>6’</td>
<td>¼”</td>
</tr>
<tr>
<td>7’</td>
<td>7/8”</td>
</tr>
<tr>
<td>8’</td>
<td>11/16”</td>
</tr>
<tr>
<td>9’</td>
<td>¾”</td>
</tr>
<tr>
<td>10’</td>
<td>13/16”</td>
</tr>
<tr>
<td>11’</td>
<td>1 5/16”</td>
</tr>
<tr>
<td>12’</td>
<td>1”</td>
</tr>
<tr>
<td>13’</td>
<td>1 1/16”</td>
</tr>
<tr>
<td>14’</td>
<td>1 1/8”</td>
</tr>
<tr>
<td>15’</td>
<td>1 ¼”</td>
</tr>
<tr>
<td>16’</td>
<td>1 5/16”</td>
</tr>
<tr>
<td>17’</td>
<td>1 7/16”</td>
</tr>
<tr>
<td>18’</td>
<td>1 ½”</td>
</tr>
<tr>
<td>19’</td>
<td>1 9/16”</td>
</tr>
<tr>
<td>20’</td>
<td>1 11/16”</td>
</tr>
</tbody>
</table>

If the spring limit for various grades is exceeded, the spring is considered a defect and has to be rejected.
Wrap

Wrap is distortion of a piece of sawn timber usually occurring during seasoning. It includes bowing, cupping and twist.

Bowing is the curvature of a piece of sawn timber in the direction of its length.

Fig: 51. Bowing

Cupping is the curvature of a piece of timber across its width.

Fig: 52. Cupping
**Twist** is the spiral distortion of a piece of sawn timber.

*Fig: 53. Twist*

**Table 7: Summary of warp as defined in the various grades**

<table>
<thead>
<tr>
<th>GRADES</th>
<th>SUMMARY OF WRAP ALLOWANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIME GRADE</td>
<td>Not permitted if the whole piece could not be surfaced to standard surface thickness</td>
</tr>
<tr>
<td>SELECT GRADE</td>
<td>As prime grade except slightly wrap pieces of 10” and wider can be admitted if they can be ripped to produce 2 pieces to Select and could surface two sides to standard surface thickness.</td>
</tr>
<tr>
<td>STANDARD GRADE</td>
<td>Not permitted if two sides of clear cuttings could not be surfaced to standard surface thickness should they be removed from the piece</td>
</tr>
<tr>
<td>SERVICEABLE GRADE</td>
<td>As in Standard Grade</td>
</tr>
</tbody>
</table>
Brittle Heart

Brittle heart is the defective core of a log characterised by abnormal brittleness (softness). There is no difference in colour from unaffected wood and a sawn cross-section showing a pitted condition, but the limits of the defect cannot be sharply defined.

Prime Grade

A defect not allowed in this grade.

Select Grade

A defect not allowed in this grade.

Standard Grade

A defect not allowed in this grade.

Serviceable Grade

Brittle heart is allowed on one face and one edge only, provided the strength of the piece is not materially affected and may be included in the cuttings.

Fig: 54. Brittle Heart
Wane

Wane is the lack of wood on any face or edge of a piece of sawn timber usually caused by a portion of the original rounded surface of a log remaining on the piece.

*Fig: 55. Wane*

**Prime Grade**

A defect not allowed in this grade.

**Select Grade**

A defect not allowed in this grade.

**Standard Grade**

A defect not allowed in this grade.

**Serviceable Grade**

Wane is allowed on the worse face and one edge only. For widths 6” and up Wane should not exceed 1/8 the width of the piece.
Wane allowance for widths 6 inches and up

*Fig: 56. Serviceable Grade – Wane in Widths 6 inches and up*

---

Wane allowance for widths less than 6 inches

*Fig: 57. Serviceable Grade – Wane in Widths less than 6 inches*
Table 8: Maximum Wane allowance defined in widths of 6 inches and up

<table>
<thead>
<tr>
<th>WIDTHS</th>
<th>6”</th>
<th>7”</th>
<th>8”</th>
<th>9”</th>
<th>10”</th>
<th>11”</th>
<th>12”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Wane Allowance of 1/6 the width</td>
<td>1”</td>
<td>1 ½”</td>
<td>1 3/8”</td>
<td>1 ½”</td>
<td>1 5/8”</td>
<td>1 7/8”</td>
<td>2”</td>
</tr>
</tbody>
</table>

Table 9: Maximum Wane allowance defined in widths of less than 6 inches

<table>
<thead>
<tr>
<th>WIDTHS</th>
<th>4” (100mm)</th>
<th>5” (125mm)</th>
</tr>
</thead>
</table>
| Maximum Wane Allowance of 1/8 the width. | ½” (38mm) | 5/8” ( |}

If the above maximum wane allowance is exceeded the Wane is considered a defect and has to be docked or ripped as illustrated in figs 56 and 57.

**Serviceable Grade**

Method of docking and ripping of excessive wane

*Fig: 58. Ripping of Wane*
Fig. 59. Docking of Wane
### Table 10: Summary of grades, defects allowance, cutting requirements, ETC, for general market specifications

<table>
<thead>
<tr>
<th></th>
<th>PRIME</th>
<th>SELECT</th>
<th>STANDARD</th>
<th>SERVICEABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WIDTHS</strong></td>
<td><strong>6” AND UP</strong></td>
<td><strong>5” AND UP</strong></td>
<td><strong>4” AND UP</strong></td>
<td><strong>4” AND UP</strong></td>
</tr>
<tr>
<td><strong>LENIGHTHS</strong></td>
<td><strong>10’ AND UP</strong></td>
<td><strong>8’ AND UP</strong></td>
<td><strong>6’ AND UP</strong></td>
<td><strong>6’ AND UP</strong></td>
</tr>
<tr>
<td><strong>SAPWOOD</strong></td>
<td>A defect to be excluded from all clear face cutting</td>
<td>Can be admitted in clear face cuttings is sapwood does not exceed 1/3 the width and not appearing on both faces.</td>
<td>Admitted in clear face cutting without limit.</td>
<td>Admitted in sound face cutting without limit</td>
</tr>
<tr>
<td><strong>KNOTS</strong></td>
<td>Average diameter of knot not exceeding 1/3 the width of the face on which it appears can be admitted outside the clear face cutting.</td>
<td>Average diameter of knot not exceeding 1/3 the width of the face on which it appears and can be admitted outside the clear face cutting.</td>
<td>Admitted outside sound face cuttings without size limit for sound and hollow knots.</td>
<td>Admitted inside sound face cuttings without size limit and hollow knot permitted outside sound face cutting</td>
</tr>
<tr>
<td><strong>SPRING</strong></td>
<td>1” PER 12’</td>
<td>1” PER 12’</td>
<td>1” PER 8’</td>
<td>1” PER 8’</td>
</tr>
<tr>
<td><strong>WARP</strong> (OTHER THAN SPRING)</td>
<td>Not permitted if the whole piece could not be surfaced to standard surface thickness.</td>
<td>As in Prime grade except slightly warped pieces of 10” inches and wider can be admitted if they can be ripped to produce two pieces to grade select and could surface two sides to standard surface thickness.</td>
<td>Not permitted if two sides of clear face cuttings could not be surfaced to standard surface thickness should they be removed from the piece.</td>
<td>As in Standard Grade.</td>
</tr>
<tr>
<td><strong>WANE</strong></td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Allowed on worse face and one edge only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not to exceed 1/6 the width for widths 6” and up. Not to exceed 1/8 the width for widths of less than 6”</td>
</tr>
<tr>
<td><strong>BRITTLE HEART</strong></td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Allowed on one face and one edge only.</td>
</tr>
<tr>
<td><strong>PERCENTAGE OF CLEAR FACE CUTTING</strong></td>
<td>91.66% - 11/12ths</td>
<td>75% - 9/12</td>
<td>66.66% - 8/12ths</td>
<td>66.66% - 8/12ths</td>
</tr>
</tbody>
</table>
Reference