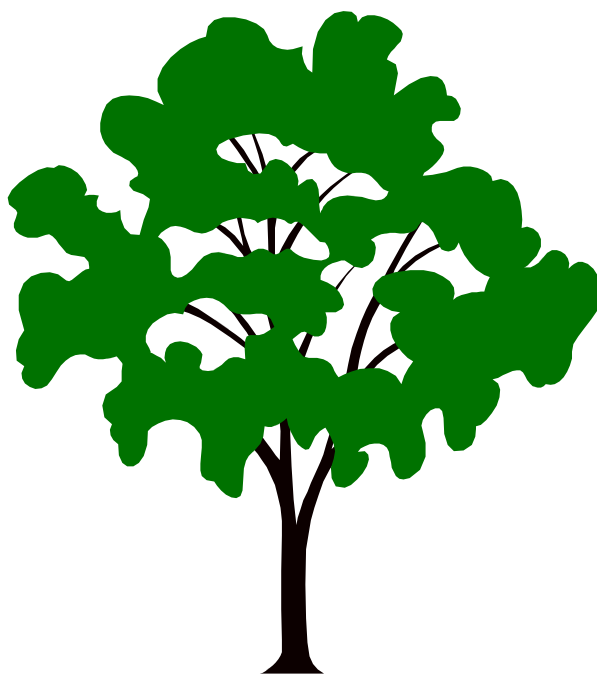


HARDWOOD SAWLOG CLASSIFICATION GUIDELINES



Edition 3



Contents

1	INTRODUCTION	4
1.1	General.....	4
1.2	Compulsory Sawlog Specifications	4
1.3	Principle of Hardwood Sawlog Presentation and Classification.	4
2	LENGTH	5
2.1	Minimum Length.....	5
2.2	Tolerance	5
3	TOP END DIAMETER	6
3.1	Minimum Diameter	6
3.2	Ovality	6
4	CENTRE DIAMETER	7
4.1	General.....	7
4.2	Determination of Centre Diameter in Multi-grade Sawlogs.....	8
5	PIPE DEFECT	12
5.1	General.....	12
5.2	Measurement of Pipe	12
5.3	Compulsory Pipe Species	13
5.4	Size Limits	13
5.5	Open Ring Shakes, Loose or Open Gum Veins	14
5.6	Examples of Ring Shakes and Gum Veins Considered as Pipe	15
5.7	Examples of Ring Shakes and Gum Veins NOT Considered as Pipe.....	16
5.8	Starshakes and Windshakes.....	18
5.9	Rot Pockets and Fire Scars	19
5.10	Pipe Defect – Sawlogs Less Than or Equal to 6.0 metres	19
5.11	Pipe Defect –Sawlogs 6.3 metres or Longer	20
6	DEFECT OUTSIDE PIPE	21
6.1	General.....	21
6.2	Double Heart	22
6.3	Radial Checking in Timber from Dead and Dying Trees.....	23
7	BENDS	25

7.1	General.....	25
7.2	Method of Measurement of a Bend.....	25
8	IRREGULAR SHAPE	26
9	COARSE WAVY GRAIN (BRUSH BOX ONLY).....	26
10	SPIRAL GRAIN	27
11	SAWLOGS 6.3 METRES OR LONGER WITH SPIRAL GRAIN OR BRUSH BOX LOGS WITH COARSE WAVY GRAIN.....	27
12	LIMBS.....	28
12.1	General.....	28
12.2	Limbs at the Same Height.....	28
12.3	Position of Limbs	29
12.4	Bumps	30

Key Definitions

Term	Definition
Accredited Cutter	A cutter accredited by DPI Forestry to level 1A or level 1 B.
compulsory sawlog	A sawlog or sawlog section meeting the specifications detailed in s.1.2.
decay or doze	Decay or doze is a deterioration of the wood fibre which is usually softer and discoloured compared to adjacent sound wood.
log	A sawlog or a sawlog section
salvage sawlog	A sawlog or sawlog section that does not meet compulsory sawlog grade as specified in s.1.2. A purchaser has the “option” of either taking or not taking an salvage sawlog from a sale area, but once removed from a sale area will be charged to a purchasers account at the appropriate rate.
multigrade sawlog	A sawlog that, after final classification, contains both compulsory and salvage sawlog sections.
sawlog	A single length of tree bole, headed and butted and properly presented by a cutter for classification and measurement.
sawlog section	A length of one grade along a sawlog.

Introduction

1.1 General

The purpose of these Guidelines is to outline the specifications that a log must meet in order to be regarded as a compulsory sawlog, and provide procedures to assist Accredited Cutters, Purchaser's Representatives and DPI Forestry Harvesting and Marketing staff in classifying and presenting compulsory sawlogs.

All timber not meeting the requirements of a compulsory sawlog will be regarded as optional ie. removal is not compulsory and may be taken at the option of a purchaser.

1.2 Compulsory Sawlog Specifications

A compulsory sawlog is a sawlog or sawlog section of a compulsory species (s. 14, Table 7) with:-

- A length of not less than 2.4 metres, and;
- A minimum small end diameter underbark of not less than 30 centimetres, except for "Compulsory pipe species" which have a minimum small end diameter underbark of not less than 34 centimetres; or where ovality is present, the smallest diameter underbark is not less than 26 centimetres and 30 centimetres for compulsory pipe species, and the average diameter is 30 centimetres and 34 centimetres for compulsory pipe species, and;
- If containing pipe (or defects considered as pipe), the pipe has a diameter not greater than that specified in Table 3 of s. 5.4 of these Guidelines, and ;
- If containing defect outside of pipe, the defect affects less than 50% of the cross sectional area outside any pipe, and;
- If containing double heart, the distance between the centre of each heart is less than 25% of the top end diameter underbark, excluding flare, and;
- If containing bends, the bends are not greater than 2.5 degrees if the diameter underbark at the centre of the bend is less than 40 centimetres; 5 degrees if the diameter underbark at the centre of the bend is between 40 and 49 centimetres or 10 degrees if the diameter underbark at the centre of the bend is greater than 49 centimetres; and
- If misshapen, a shape that allows at least 50% of the sawlog to produce sawn timber; and
- If containing wavy grain, the wavy grain does not exceed 5 centimetres in width (Brush Box only); and
- If containing spiral grain that runs continuously around the heart of the sawlog in one direction and does not double back, the spiral grain does not exceed a slope of 1:6 on the sapwood surface; and
- If containing limbs 10 centimetres or more in underbark diameter at the surface of the sawlog (and similarly bumps concealing limbs), the limbs / bumps do not affect more than 50% of the circumference of the log section.

1.3 Principle of Hardwood Sawlog Presentation and Classification.

DPI Forestry will monitor all hardwood sawlog sales to ensure that logs are presented and measured to maximise the length, and fairly represent the volume, of compulsory sawlog present. Assessment of cutter proficiency will be made periodically using Sound Practice Indicators, and spot checks may be conducted at any time.

Where it is suspected that a log length contains a compulsory sawlog section, an authorised DPI Forestry employee, accredited cutter or accredited purchaser's representative ("the measurer") at final classification of a hardwood sawlog must reclassify and measure a log to maximise the volume of compulsory sawlog, or alternatively require the log to be properly presented by the cutter.

In presenting logs or in butting and/ or heading logs, the cutter is not to cut within a compulsory sawlog section and at all times must cut to maximise the volume of wood presented as "compulsory sawlog".

Cross-cutting of logs quarantined for final classification in a mill yard or other agreed location is not permitted, except in the presence of an authorised DPI Forestry employee.

Salvage sawlog sections not required by the purchaser must be removed from the log prior to hauling. Once removed from a Sale Area all optional and compulsory sawlog sections will be charged out at the appropriate rates.

2 Length

2.1 Minimum Length

To be considered compulsory, the minimum length of a sawlog or sawlog section must be 2.4 metres. Chargeable lengths increment in 0.3 metre intervals. There is no maximum length.

Figure 1 Minimum Compulsory Log Length

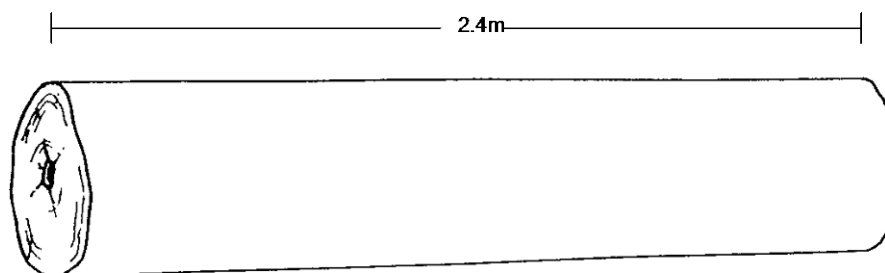
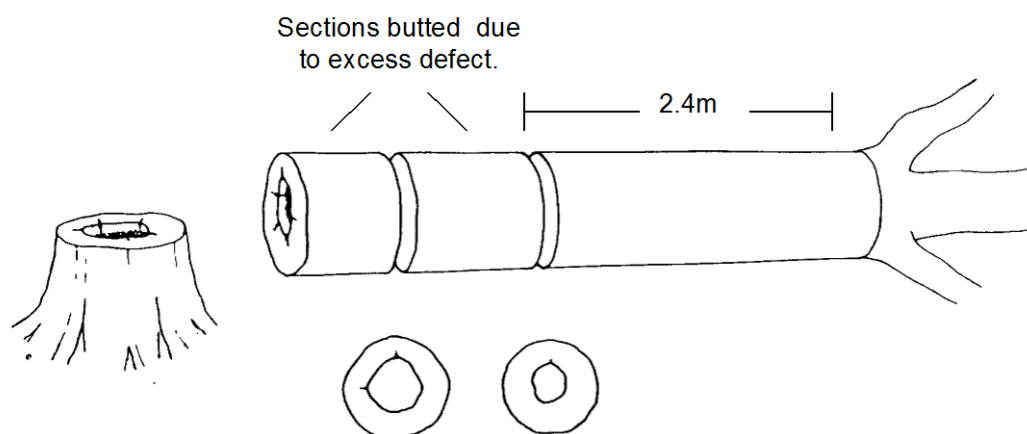


Figure 2 Sections Butted for Defect



In terms of s 1.3, in all situations a tree bole must be cut to produce the maximum length of compulsory wood.

2.2 Tolerance

Provided logs are crosscut properly, a maximum length tolerance of 0.1 metres will be allowed on all straight sawlogs up to 13.8 metres in length, while a maximum tolerance of 0.2 metres will be allowed for straight sawlogs exceeding 13.8 metres.

An additional tolerance of up to 0.1 metres will be allowed for each sawcut deemed necessary to present a sawlog containing significant bends¹ as straight sections 2.4 metres or longer.

¹ Significant bends: A sawlog would be classified as having significant bends where the sawlog would require cross cutting in order to saw from end to end on the same side of the heart.

3 Top End Diameter

3.1 Minimum Diameter

The minimum top end diameter underbark of a compulsory sawlog or sawlog section is:

- 34 cm for species that attract a minimum compulsory pipe of 8 cms.
- 30 cms for all other species.

The "compulsory pipe" hardwood species are:-

- red mahogany
- blackbutt
- rose gum (flooded gum)
- brush box.

The minimum top end diameter point for the compulsory section of a sawlog must be determined prior to further classification.

Figure 3 Minimum Top End Diameter of a Compulsory Sawlog

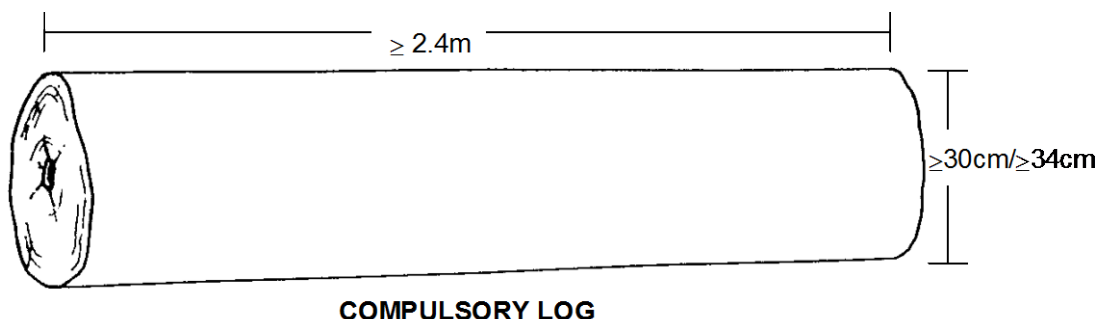
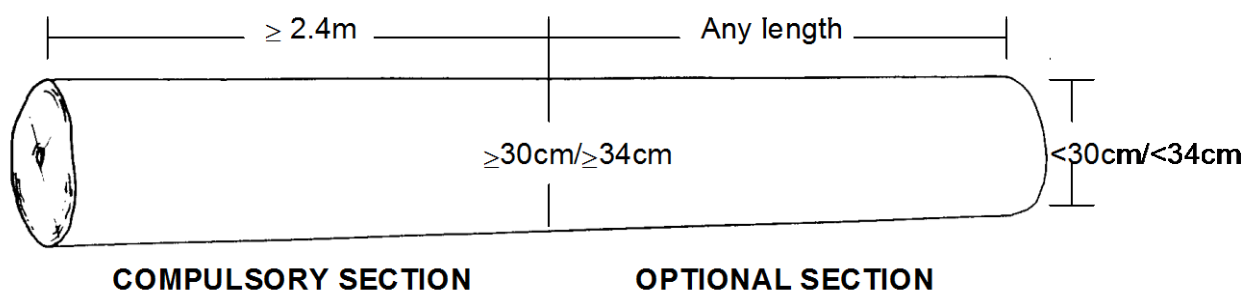


Figure 4 Upper Limit of a Compulsory Sawlog Section

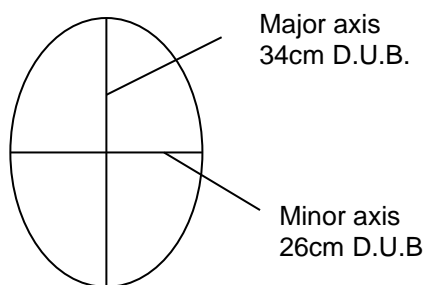
The upper limit of a compulsory sawlog section is defined as the point 2.4 metres or greater from the butt end of a log, and 30 cm top end diameter, or 34 cm for species attracting a compulsory pipe.



3.2 Ovality

Measurement of the top end diameter will normally be made by diameter tape, but if the sawlog is oval shaped, diameter will be measured as the average of the major and minor axis. A log will be compulsory if the smallest diameter is not less than 26 centimetres underbark, and the average diameter is 30 centimetres.

Figure 5 Ovality Illustrated



The corresponding dimensions for "compulsory pipe" species is a smallest diameter under bark of 30cm and an average diameter under bark of 34 cm.

4 Centre Diameter

4.1 General

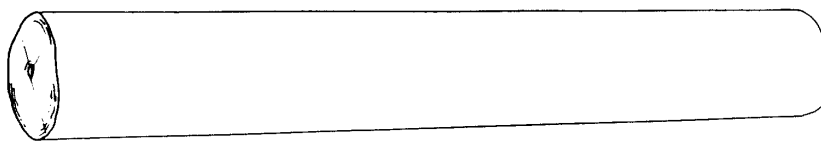
Centre diameter will be measured in rounded down centimetre intervals underbark, except for Spotted Gum which may be measured overbark utilising the bark thickness values shown in Table 1 (see further below).

For a single grade sawlog centre diameter must be measured at the centre of the log, i.e. midway between the ends of the log. For a multi-grade sawlog, centre diameters are to be determined and recorded for each sawlog section either by separate measurement or in accordance with the provisions in Section 4.2.

An underbark centre diameter measurement may be obtained by any of the following methods:

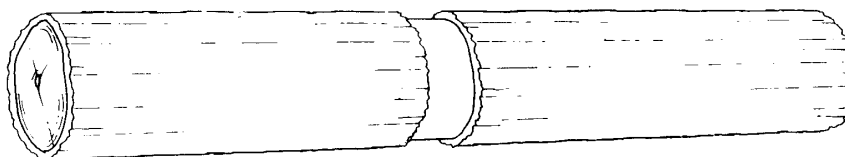
- By fully debarking the sawlog; or

Figure 6 Fully Debarked Log



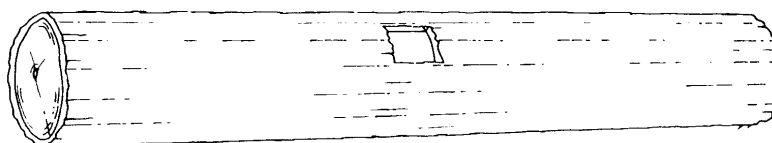
- By removing a ring of bark at the centre point on the sawlog; or

Figure 7 Debarking Rings



- By removing a small square of bark at the centre point, measuring the bark's thickness, doubling this figure and then deducting this amount from the overbark measurement of centre diameter.

Figure 8 Barking a Patch for Bark Thickness Measurement



Measurement of centre diameter for Spotted Gum may be made either overbark or underbark at the option of the purchaser. If measurement is to be made overbark, the underbark diameter for Spotted Gum is to be determined from the deductions for bark prescribed in Table 1 below:

Table 1 Spotted Gum Bark Thickness Allowance

Centre Diameter Overbark	Allowable Reduction of Overbark Diameter for Bark Thickness
Up to 40 cm	1 cm
41 to 70 cm	2 cm
71 to 90 cm	3 cm
91 to 120 cm	4 cm
121 cm and over	5 cm

4.2 Determination of Centre Diameter in Multi-grade Sawlogs

Measurement procedures for multigrade sawlogs recognise the need for efficiency, while at the same time fairly representing the volume of compulsory and optional log sections present.

CONSIDERATION 1

Where a sawlog, as presented by a cutter, is assessed as containing optional sections with a length greater than or equal to 2.4 metres, such optional sections must be measured as separate logs, and have dimensions recorded which fairly represent the volume present.

The identification of optional section(s) greater than or equal to 2.4 metres has the effect of “splitting” a presented sawlog into a number of remaining sections that may or may not be multigrade.

If multigrade, these remaining sections will be subject to CONSIDERATION 2 below. If single grade, i.e. a compulsory sawlog, centre diameter shall be measured in terms of s. 4.1 previous.

CONSIDERATION 2

Where a multigrade sawlog (or remaining multigrade sawlog section resulting from CONSIDERATION 1 above) DOES NOT contain any optional section with length greater than or equal to 2.4 metres, the compulsory sawlog length may be recorded as the sum of the lengths of compulsory sections present, similarly the salvage sawlog length may be recorded as the sum of the lengths of optional sections present.

The recorded centre diameter for both compulsory and optional components of the multigrade sawlog shall be the centre diameter of the multigrade sawlog under evaluation; centre diameter shall be measured in terms of s. 4.1 previous.

CONSIDERATION 3

The centre diameter of optional log sections with a length greater than or equal to 2.4 metres (identified under CONSIDERATION 1 above) may be estimated based on an extrapolation of the nearest actual measure of centre diameter within a multigrade sawlog, assuming a taper of ± 1 cm per meter of log length, except where there is a marked change in diameter resulting from a particular defect and in such cases an optional section must be physically measured as described in s.4.1.

Table 2 below provides a number of examples which show how to use a taper value of 1 cm per meter to estimate diameter at a point on a log at a given distance from a physical measure point.

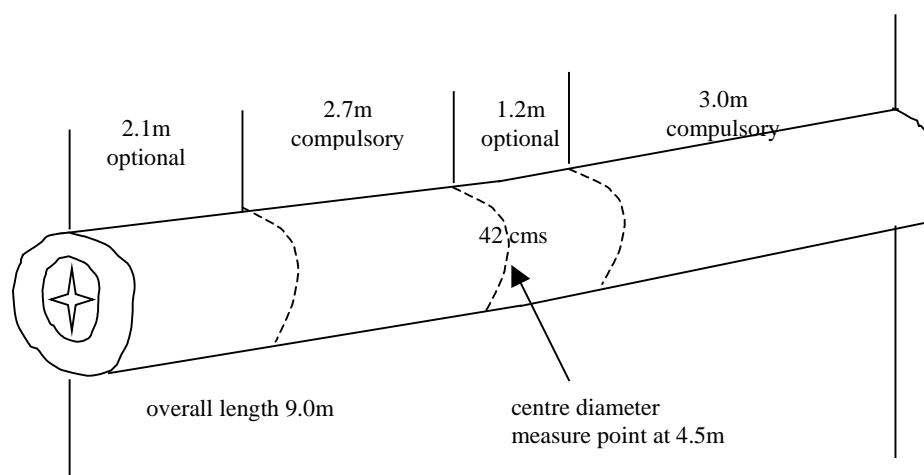
Table 2 Use of Taper to Estimate Centre Diameter

Physical Measure of Centre Diameter (cm)	Direction to Alternative Measure Point	Distance to Alternative Centre Diameter Measure Point (m)	Estimated Centre Diameter at the Alternative Measure Point (cm)
56	Toward the butt	3.9	60
42	Toward the head	1.5	40
38	Toward the butt	2.7	41
50	Toward the head	6.1	44

Note that if the *Distance to Alternative Centre Diameter Measure Point* falls exactly on the “half metre”, the value is rounded up.

In deciding on the most appropriate method for measuring the centre diameter of optional log sections 2.4 metres or greater in length, the measurer will be guided by considerations of accuracy and efficiency.

Measurement methods for centre diameter are illustrated below.

EXAMPLE 1**Figure 9 Multigrade Sawlog Containing Optional Sections < 2.4 Metres**

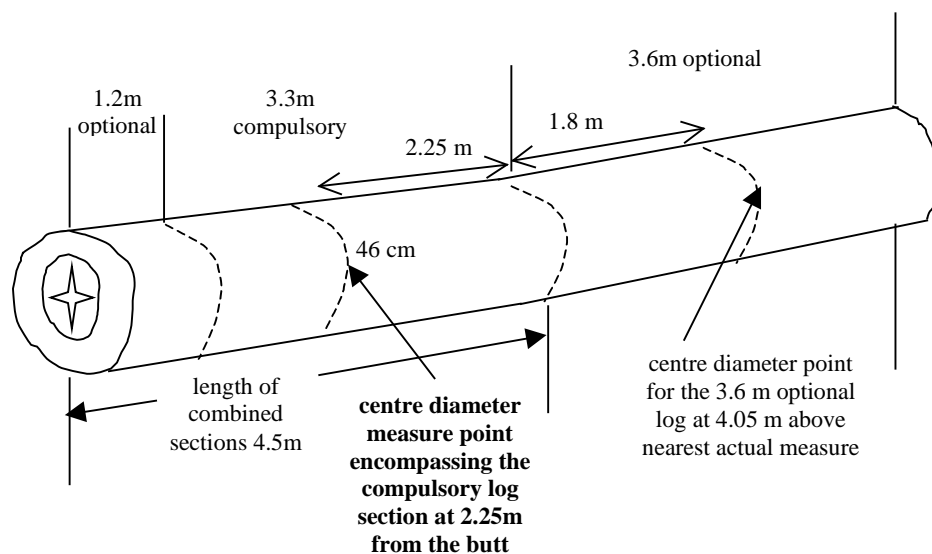
Log recorded as: -

- 5.7 x 42 compulsory
- 3.3 x 42 optional.

EXAMPLE 2

In the following example, it is assumed that all grades present within a multigrade sawlog were fully classified and measured out in the field.

Figure 10 Multigrade Sawlog Containing an Optional Top Log Section ≥ 2.4 Metres



Centre diameter of optional top log calculated and recorded as:

$$\begin{aligned} \text{C.D.} &= 46 - (4 \times 1) \text{ cm} \\ &= 42 \text{ cms} \end{aligned}$$

i.e. 3.6 x 42 optional

Assumes 1 cm taper per metre with the distance between estimation points rounded to the nearest metre.

Remainder of log recorded as:-

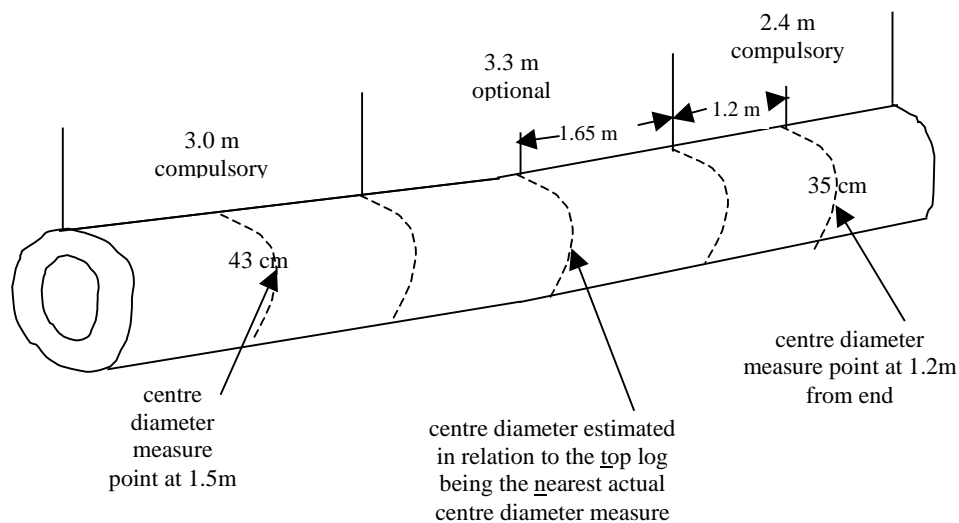
3.3 x 46 compulsory

1.2 x 46 optional.

EXAMPLE 3

In the following example also, it is assumed that all grades present within a multigrade sawlog were fully classified and measured out in the field.

Figure 11 Multigrade Sawlog Containing an Optional Mid Section ≥ 2.4 Metres



Centre diameter of optional centre log calculated as:

$$\begin{aligned}\text{C.D.} &= 35 + (3 \times 1) \text{ cm} \\ &= 38 \text{ cm}\end{aligned}$$

Note that the nearest actual centre diameter measure point is $1.65 + 1.2$ metres, or 3m rounded distance away.

Log would be recorded as:-

- 3.0 x 43 compulsory
- 3.3 x 38 optional
- 2.4 x 35 compulsory.

EXAMPLE 4

In this last example, the sawlog was presented as a “3”, i.e. the cutter presented an ungraded log length with a single centre diameter.

Diameter “A” in Figure 12 below was measured by the cutter, and is located at the midpoint of the total log length, i.e. 6.15 metres along the overall 12.3 metre log. The cutter recorded the log as a 12.3 x 45 “3” leaving its final classification to an Accredited Measurer.

An Accredited Measurer later determined that the 12.3 metre log contained the following 3 sections:-

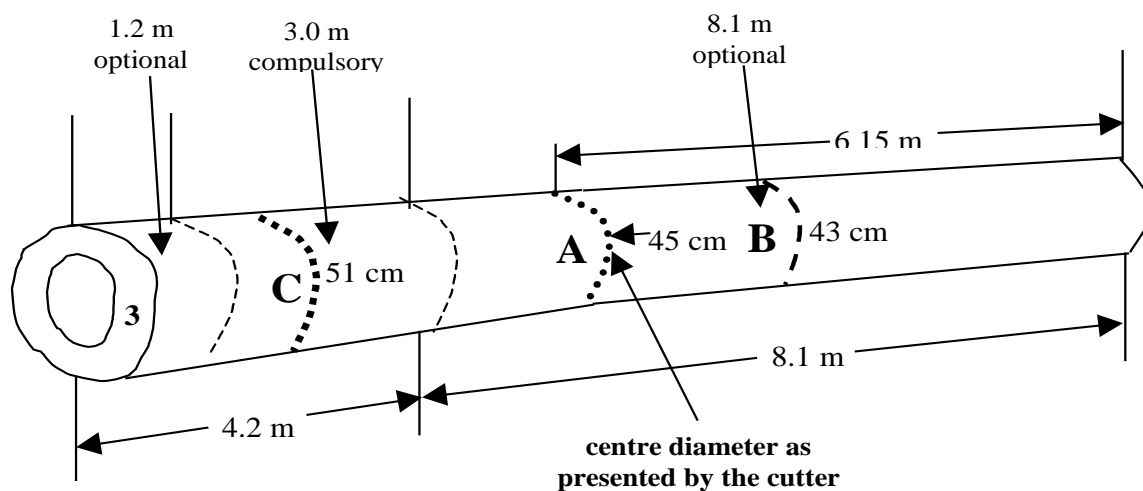
1. 1.2 m optional at the butt
2. 3.0 m compulsory
3. 8.1 m optional head log

In terms of s. 4.2 CONSIDERATION 1, the 8.1 m optional head log must be measured as a distinct section. Its centre diameter may be measured directly or be estimated assuming 1 cm per metre taper from the nearest actual centre diameter measure, which in this case is measure “A” (refer to s. 4.2 CONSIDERATION 3).

The rounded distance in metres from “A” to “B” is 2 metres, therefore the head log would be assigned a centre diameter of $45 - 2 = 43$ cm.

The remaining part of the sawlog is a multigrade section, and contains only a short optional section < 2.4 metres. In terms of s. 4.2 CONSIDERATION 2, this multigrade sawlog requires a single centre diameter measure at point “C” in Figure 12, being 2.1 metres from the butt of the log. Centre diameter “C” must be physically measured. The taper estimation methods in 4.2 CONSIDERATION 3 do not apply to this section of the log.

Figure 12 Multigrade Sawlog Containing an Optional End Section ≥ 2.4 Metres Initially Presented by the Cutter as a Single Ungraded Length



In summary, the diameters A, B and C in Figure 12 were derived as follows:-

Diameter	Description and Method of Measurement
A	Measured by the cutter and located at the midpoint of the total log length, i.e 6.15 metres along the overall 12.3 metre log.
B	Estimated at the time of final classification, from the nearest actual diameter measure point which in this example is "A",
C	Physically measured at the time of final classification

The final recorded dimensions for the log in *EXAMPLE 4* are:-

1.2 x 51 optional

3.0 x 51 compulsory

8.1 x 43 optional

Notwithstanding anything in the above examples, purchasers may choose to physically measure the centre diameter of each component of a multigrade sawlog individually at their discretion as per s. 4.1, but if so done, each and every component section of the multigrade sawlog must be physically measured for length and centre diameter.

5 Pipe Defect

5.1 General

Pipe defect may be related to open ring shakes, heart breakdown caused by fungal attack, or to termites or borers resulting in wood disintegration or degeneration.

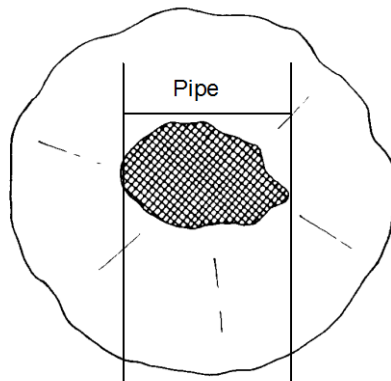
5.2 Measurement of Pipe

Pipe defect in a sawlog section (i.e. a single grade sawlog or a section of a multigrade sawlog), is measured and defined as the greatest diameter of pipe along the length of the log section, measured directly or estimated by indirect means to the nearest centimetre.

The classification of a sawlog section as either compulsory or optional on pipe is based on a comparison of the measured pipe diameter referred to above and the relevant sawlog section centre diameter underbark.

As an initial step, prior to determining the level of pipe defect in a sawlog section, the measurer must ensure that any optional grade material in the head or butt of the section is so classified in order to maximise the volume of compulsory grade timber in the remaining parts of the log section as prescribed by s.1.3.

Figure 13 Pipe Defect Measurement Illustrated



Examples:

- Actual pipe measurement = 42.6 cm. Pipe dimension to the nearest whole centimetre is 43 cm.
- Actual pipe measurement = 42.4 cm. Pipe dimension to the nearest whole centimetre is 42 cm.
- Actual pipe measurement = 42.5 cm. Pipe dimension to the nearest whole centimetre is 43 cm.

5.3 Compulsory Pipe Species

Sawlogs of the following species attract a minimum pipe of 8 centimetres even if solid. Hence any sawlog of these species less than 35 centimetres centre diameter will be classed as optional as shown by Table 3.

- Red Mahogany
- Blackbutt
- Rose Gum (Flooded Gum)
- Brush Box

5.4 Size Limits

The maximum allowable diameter of pipe defect for compulsory sawlogs of various size classes is shown below.

Table 3 Pipe Defect Scale

Centre Diameter of Sawlog under bark (centimetres)	Maximum Allowable Pipe Diameter for a Compulsory Sawlog (centimetres)
30-34	5
35-39	17
40-44	20
45-49	24
50-54	28
55-59	31
60-64	34
65-69	38

Centre Diameter of Sawlog under bark (centimetres)	Maximum Allowable Pipe Diameter for a Compulsory Sawlog (centimetres)
70-74	42
75-79	45
80-84	48
85-89	51
90-94	55
95-99	58
100-104	61
105-109	65
110-114	68
115-119	71
120-124	74
125-129	77
130-134	80
135-139	83
140-144	86
145-149	89
150-154	91
155-159	94
160+	97

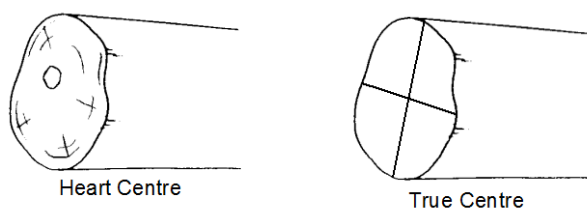
5.5 Open Ring Shakes, Loose or Open Gum Veins

An open ring shake is a partial or complete separation of adjoining layers of wood tissue due to causes other than drying. It usually occurs in the standing tree but may also result from damage during felling.

Gum veins, otherwise known as blood rings are ribbons of gum or kino between growth zones which may be bridged radially at short intervals by wood tissue. Blood rings which are not tight are regarded in the same way as open ring shakes.

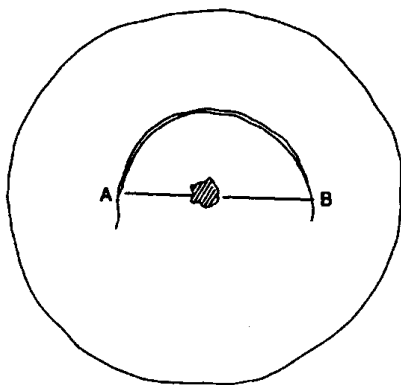
The measurement of ring shakes and gum veins is in relation to the position of the heart in a log rather than the geometric centre of the log. This distinction is illustrated in Figure 14 below.

Figure 14 'Heart Centre' As Opposed To The 'True Centre'



An open ring shake (or series of shakes as detailed further below) which is more than semicircular will be considered in the measurement of pipe. By way of example, the diameter of pipe assessed in Figure 15 will be the actual distance measured between A and B, i.e. if distance $A - B = 30 \text{ cm}$, pipe allowed will be 30 cm.

Figure 15 Ring Defect More Than Semi-circular



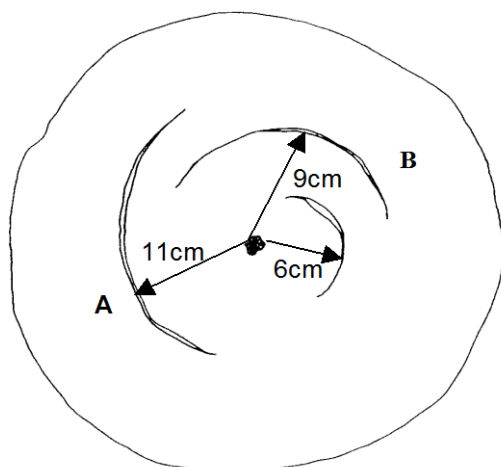
5.6 Examples of Ring Shakes and Gum Veins Considered as Pipe

EXAMPLE 1

A series of open ring shakes which collectively would be more than a semicircle will be considered in the measurement of pipe provided that:-

- the radial distance of such ring shakes **from the heart centre** of the log does not vary by more than 5 centimetres (refer to the example in Figure 16)
- the common sector of overlapping ring shakes is counted only once.

Figure 16 Radial Distance Between Each Ring Shake Is Not More Than 5 Centimetres

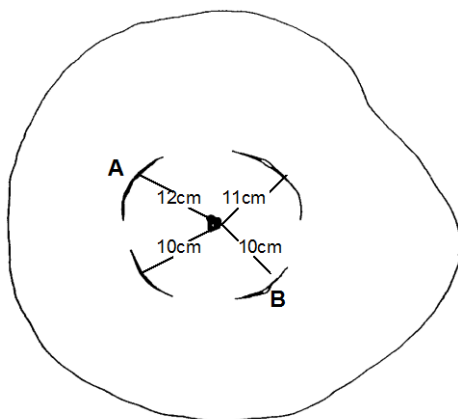


In Figure 16 the radial distance between each ring shake is not more than 5 centimetres and when added together amount to more than half a circle. Pipe diameter will therefore be measured as the distance between A and B.

EXAMPLE 2

In this case the radial distance between four ring shakes, from the heart centre of the log, does not vary by more than 5 centimetres, and when added together amount to more than half a circle, the actual pipe measurement is the larger diameter, A – B = 22cm as illustrated in Figure 17 below.

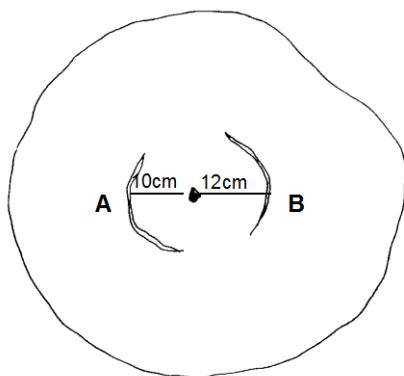
Figure 17 Four Ring Shakes



EXAMPLE 3

In this final example the radial distance between the two ring shakes also varies by less than 5 centimetres, and when added together amount to more than half a circle, pipe defect is the measured distance $A - B = 22\text{cm}$, as illustrated in Figure 18 below.

Figure 18 Two Ring Shakes



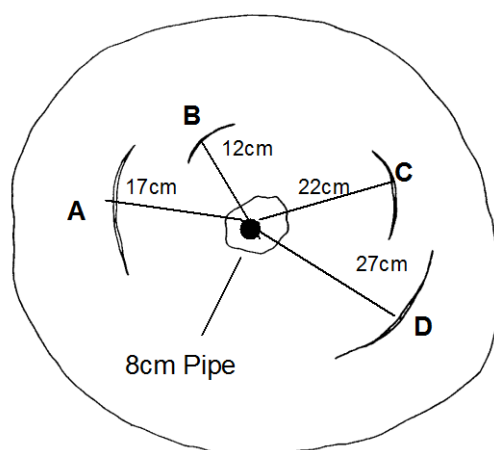
5.7 Examples of Ring Shakes and Gum Veins NOT Considered as Pipe

EXAMPLE 1

In this example the radial distance between ring shakes "A" and "B" in Figure 19 varies by 5 centimetres from the heart centre of the log and therefore may be combined, but when added together are not semi-circular. Therefore in this case the shakes are not considered in the measurement of pipe. Shakes "A" and "C" and "D" in Figure 19 are treated similarly.

The pipe diameter allowed would be the inner 8cm pipe shown.

Figure 19 Combined Ring Shakes are Not Semi-circular



EXAMPLE 2

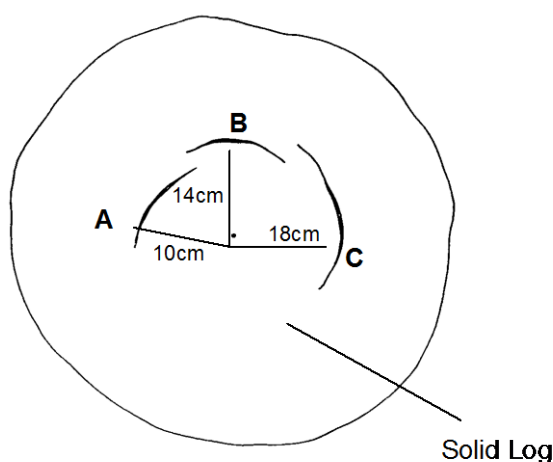
The radial distance between ring shakes "A" and "C" in Figure 20 varies by 8 centimetres from the heart centre of the log, therefore they are not combined and accordingly not considered in the measurement of pipe.

Ring shakes "B" and "C" vary by 4 centimetres from the heart centre of the log but when added together are not semi-circular and therefore not considered in the measurement of pipe. "A" and "B" likewise.

Therefore, pipe in this case would not be considered as affecting the compulsory status of this otherwise solid log.

Note that all combining shakes must be within a 5 centimetre band around the heart.

Figure 20 Ring Shakes Not Combined



EXAMPLE 3

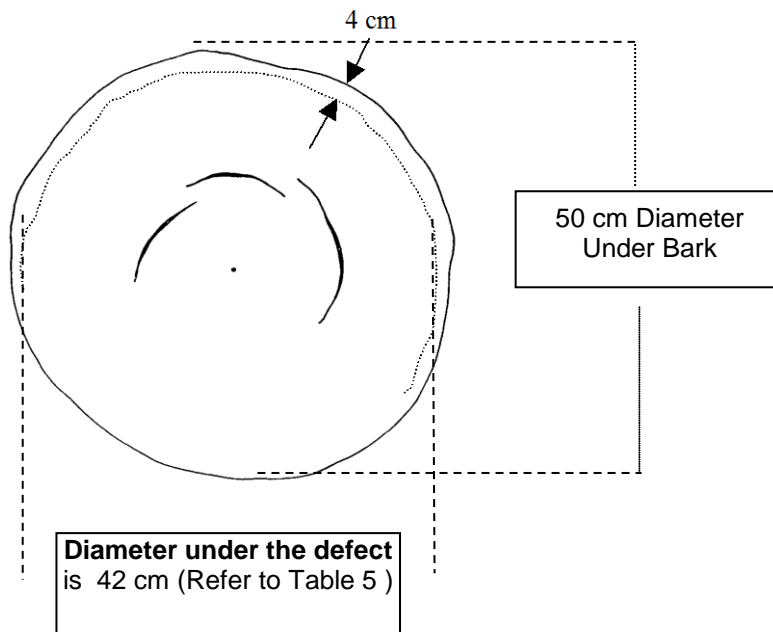
Where open gum veins occur in the outer circumference of a log (typically within 5 cm of the underbark surface), such defects shall not be considered as "pipe" (refer to Figure 21 below for an illustration).

Where the above open gum veins encompass more than 50% of the circumference of a log (not necessarily contiguously), classification will depend on the distance between the defect and the underbark surface of the log, and the size of any pipe present. Table 5 Guide for Assessing Radial Drying Checks – Timber from Dead and Dying Trees, may be used to assist in classifying this surface gum vein defect.

In classifying open ring veins located close to the surface of a log, and radial drying checks (see 6.3 further below), it is assumed that there is no millable timber between the defect and the log surface. The underlying principal remains that if 50% or more of the cross-section of a log outside pipe is considered millable, then that log must be classified as compulsory.

Where the depth of open gum rings is greater than 5 cm from the surface of a log, more detailed measurement may be required to determine the percentage of the log cross-section outside of pipe which is millable.

Figure 21 Open Gum Veins within 5 cm of the Underbark Surface of a Log.



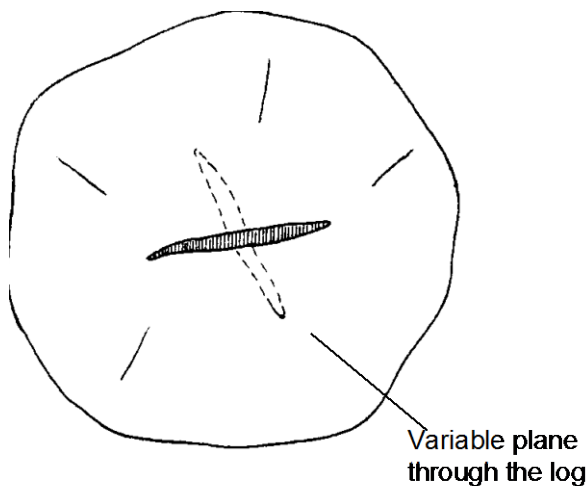
Provided no pipe is present, the log section shown in Figure 21 would accommodate an open annular gum vein up to 6 cm depth below the surface of the log (row 3 of Table 5). The maximum allowable pipe for a 42 cm diameter log is 20 cm (Table 5), and in this instance a 4 cm open gum vein would be classified as compulsory.

5.8 Starshakes and Windshakes

CONSIDERATION 1

Windshake where no decay is present should not be regarded as pipe unless the windshake “wanders” in a variable plane through the sawlog as illustrated in Figure 22 below.

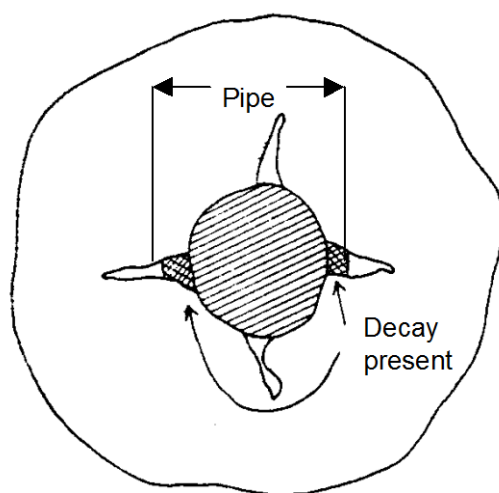
Figure 22 Starshakes and Windshakes Wandering



CONSIDERATION 2

Starshakes or windshakes are to be included in the measurement of pipe only to the extent that doze or decay is present as illustrated in Figure 23 below.

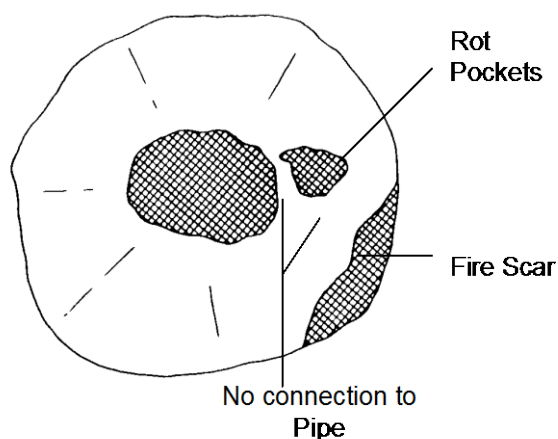
Figure 23 Starshakes and Windshakes with Decay



5.9 Rot Pockets and Fire Scars

Rot pockets and fire scars, excluding obvious limb and knot defects may be included in the measurement of pipe, if connected by defective wood to the main pipe. Drying checks connecting defects are not considered defective wood (refer to Figure 24 below).

Figure 24 Rot Pockets and Fire Scars



5.10 Pipe Defect – Sawlogs Less Than or Equal to 6.0 metres

Sawlogs 6.0 metres or less presented as optional because of pipe must be reclassified to maximise the volume of compulsory sawlog as provided for by s.5.2. Typically this will apply to logs with pipe defect likely to reduce significantly over a short distance.

For sawlog sections less than or equal to 6.0 metres in length, correctly presented to maximise the volume of potentially compulsory sawlog, measured pipe shall be deemed to apply to the full length of the sawlog section.

The optional or compulsory classification of the sawlog section shall be determined by reference to Table 3 in s.5.4.

5.11 Pipe Defect –Sawlogs 6.3 metres or Longer

Sawlogs 6.3 metres or longer presented as optional because of pipe must be reclassified to maximise the volume of compulsory sawlog as provided for by s.5.2. Typically this will apply to logs with pipe defect likely to reduce significantly over a short distance.

Excluding any initial classification of optional sections, where pipe defect indicates that all or part of a sawlog 6.3 metres or longer, may be optional, the overall log will be re-classified to maximise the length of compulsory sawlog.

Sawlogs are to be remeasured as a number of sub-sections of approximately equal length [Splitting], as specified in Table 4 below.

Where the lengths of log sections resulting from a split are not equal (because of the requirement to access a log in 0.3 m multiples), the shorter of the two resulting log sections will always be towards the butt of the log.

Table 4 Required Number of Log Sub-Sections

Log Length (m)	"Splitting" Restrictions [does not include reclassification as per s 5.2]
2.4 to 6.0 m	Nil splitting allowed
6.3 to 9.0 m	1 split allowed
9.3 m or longer	Multiple splits allowed to a minimum log section length of 2.4 m

The centre diameters of log sections identified by "splitting" may be measured directly or be estimated using the approximation methods described in s.4.2.

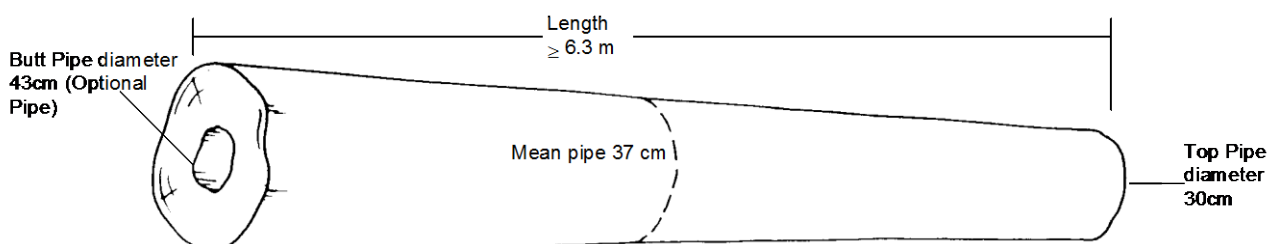
As noted in s.4, a purchaser has the option to physically measure these centre diameters rather than accept an approximation method.

In terms of pipe diameter determination for the top log of a "split", the method to be used depends on the circumstances. The various possibilities are considered below.

CASE 1 - Pipe Present at Both Log Ends

Where a sawlog 6.3 metres or longer in length shows pipe at each end and the defect is considered to carry through the sawlog, the pipe of the top sawlog split will be the mean of the pipe at the butt and the pipe at the head.

Figure 25 Pipe Present at Both Log Ends



$$\begin{aligned}
 \text{Pipe at butt} &= 43 \text{ cm} \\
 \text{Pipe at head} &= 30 \text{ cm} \\
 \text{Pipe allowance} &= \frac{43 + 30}{2} = \frac{73}{2} = 36\frac{1}{2} \text{ cm} = 37 \text{ cm}
 \end{aligned}$$

Note that pipe diameters may be calculated in half centimetres, but in all cases the final assessed pipe diameter is taken as the next largest whole centimetre. In the example above, the pipe diameter would be assessed as 37 cm.

CASE 2 - Pipe Present Only at the Butt

Where a sawlog 6.3 metres or longer in length shows a pipe at the butt and no pipe at the head, the pipe at the butt of the top sawlog section will be estimated, but irrespective must be less than half that of the pipe measured at the butt end.

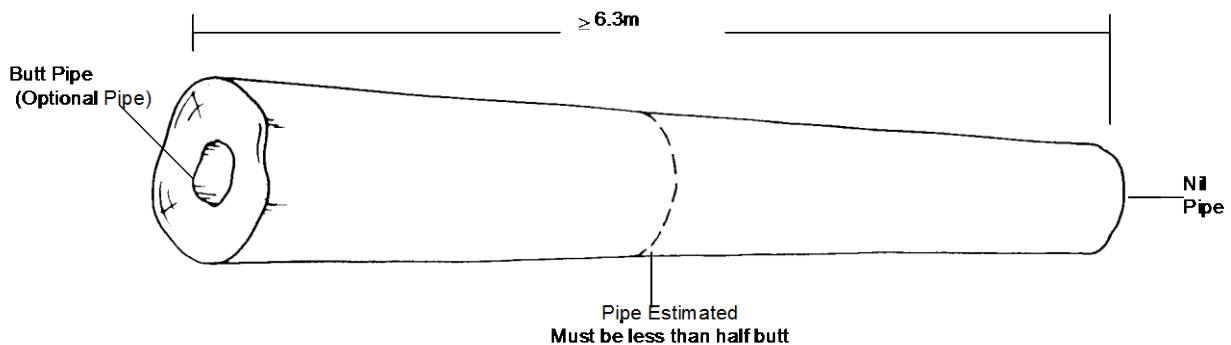
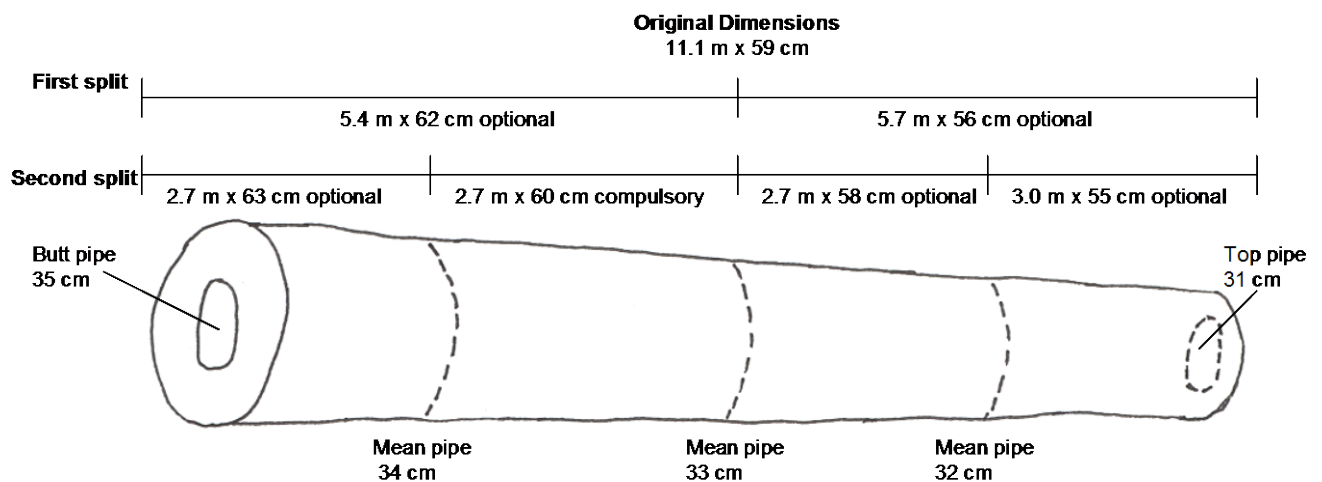
Figure 26 Pipe Present Only at the Butt**CASE 3 – Multiple Splitting**

Figure 27 below provides an example of “multiple splitting” and resulting measurements of pipe.

Figure 27 Multiple Splitting**1. First re-measure (split)**

5.4 m x 62 cm optional

5.7 m x 56 cm optional

2. Second re-measure (split)2.7 m x 63 cm
optional2.7 m x 60 cm
compulsory2.7 m x 58 cm
optional3.0 m x 55 cm
optional

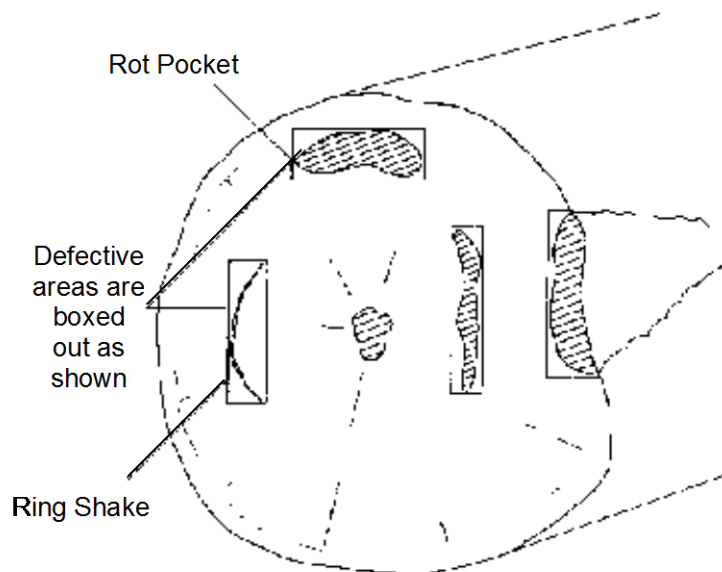
If any dispute should arise over the estimation of pipe the purchaser has the right to crosscut the sawlog to enable actual measurement to be made.

6 Defect Outside Pipe**6.1 General**

Where extra to pipe defect renders useless less than 50% of the cross-section outside the pipe, that log or log section shall be assessed as compulsory, provided that the pipe defect itself is within the limits specified in Table 3.

Defects other than pipe, for example star shakes, checks in dead timber, rot pockets, double heart, open gum veins or small ring shakes showing on the end of the log, are to be considered when calculating end of log defect outside of pipe, unless they are so located as to be covered by the pipe measurement. Refer to Figure 28 below for an illustration.

Figure 28 Defects Outside Pipe



6.2 Double Heart

Double heart occurs during the early growth stages of a tree, caused by the development of a double shoot and splitting of the main stem. This results in the formation of a double heart at the origin where the split occurs and is considered defective wood.

Double heart is not to be confused with the effect of limbs which can sometimes take on the appearance of double heart. Double heart can usually be identified by the following defining features;

- Flare is present on both sides of the log
- Each heart is similar in size
- Each heart is equidistant from the true centre of the log

Double heart will be classified as compulsory providing the distance between the centre (y) of each heart is not more than 25% of the top end diameter under bark (x), excluding flare (refer to Figure 29 below).

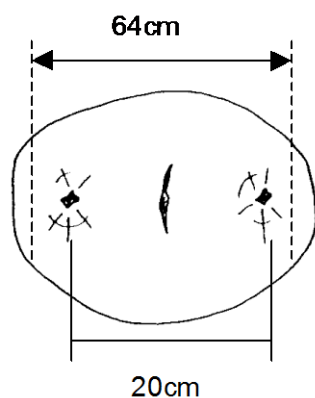
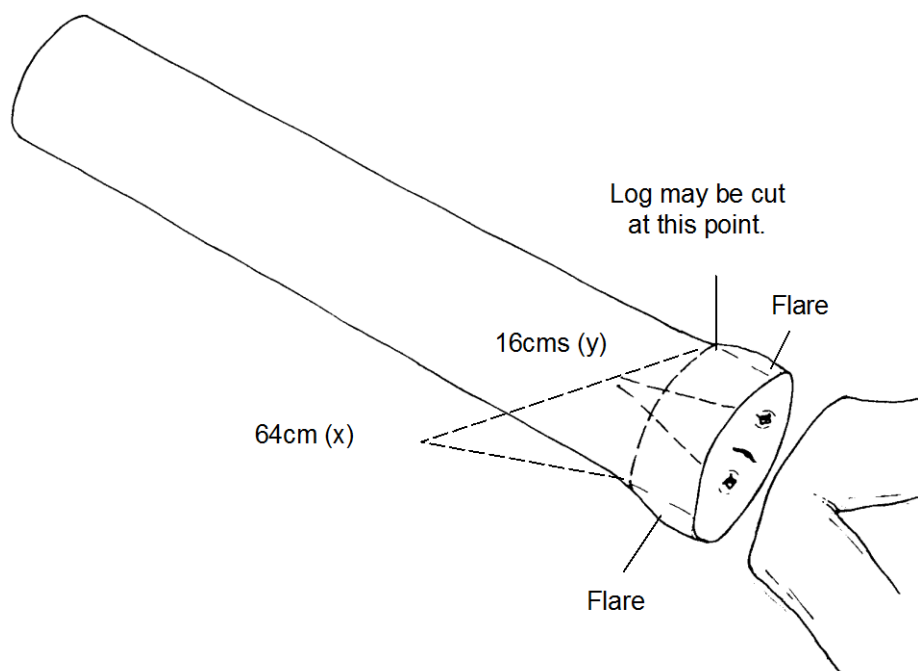
Figure 29 Double Heart

Figure (a)
 $20/64 \times 100 = 31\%$
 Optional

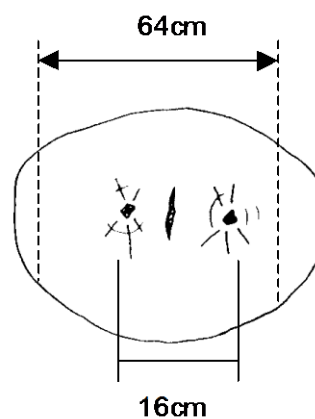


Figure (b)
 $16/64 \times 100 = 25\%$
 Compulsory

6.3 Radial Checking in Timber from Dead and Dying Trees

Dead timber showing deep radial checking affecting not more than 50% of the cross-sectional area of a log outside of pipe will be classified as compulsory.

Table 5 can be used as a guide in assessing the allowable levels of radial checking outside of pipe. Note that the diameter in the first column of Table 5 is the estimated centre diameter under defect (not the centre diameter overbark)

Table 5 Guide for Assessing Radial Drying Checks – Timber from Dead and Dying Trees

Centre Diameter of sawlog under defect (cm)	Max depth of checks before a solid sawlog becomes optional (cm)	Pipe Diameter (intermediate) (cm)	Max Depth of check before sawlog becomes optional (cm)	Max allowable pipe for a compulsory sawlog (cm)	Max depth of check before sawlog becomes optional (cm)
30 – 34	4	4	4	5	3
35 – 39	5	10	4	17	3
40 – 44	6	11	5	20	4
45 – 49	6	13	6	24	4
50 – 54	7	15	6	28	4
55 – 59	8	17	7	31	5
60 – 64	9	18	8	34	5
65 – 69	9	20	8	38	5
70 – 74	10	22	9	42	6
75 – 79	11	24	10	45	6
80 – 84	12	25	10	48	7
85 – 89	12	27	11	51	7
90 – 94	13	29	11	55	7
95 – 99	14	30	12	58	8
100 – 104	14	32	13	61	8
105 – 109	15	34	13	65	8
110 – 114	16	35	14	68	9
115 – 119	17	37	15	71	9
120 – 124	17	38	15	74	10
125 – 129	18	40	16	77	10
130 – 134	19	41	17	80	11
135 – 139	20	43	17	83	11
140 – 144	20	44	18	85	11
145 – 149	21	46	19	89	12
150 – 154	22	47	19	91	13
155 – 159	23	48	20	94	13
160+	23	50	20	97	13

Note : Table 5 assumes that no defects other than pipe and drying checks are present. The impact of other defects may also need to be allowed for.

7 Bends

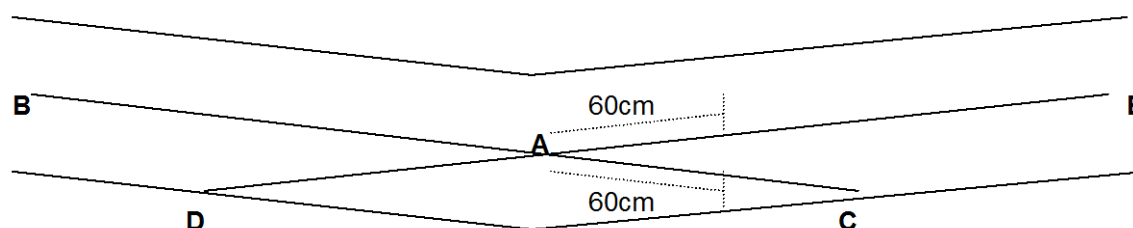
7.1 General

Sawlog sections containing bends up to following limits will be classified as compulsory.

- Sawlogs less than 40 centimetres diameter under bark at the centre of the bend - 2.5°
- Sawlogs 40 centimetres - 49 centimetres diameter under bark at the centre of the bend - 5°
- Sawlogs greater than 49 centimetres centre diameter under bark at the centre of the bend - 10°

7.2 Method of Measurement of a Bend

Figure 30 Bend Illustrated



1. Select the centre of the bend ("A").
2. Determine the centre line of a straight section, extend through the centre of the bend and mark on the sawlog ("B" to "C").
3. Determine the centre line of the other straight section, extend through the centre of the bend and mark on the sawlog. ("D" to "E").
4. Measure a point 60 cm from the point of intersect "A" along both lines, and measure the distance between the two lines.

Figure 31 Maximum Acceptable Bend in Sawlogs less than 40 cm D.U.B. at the Centre of the Bend is 2.5° and Measured as Shown

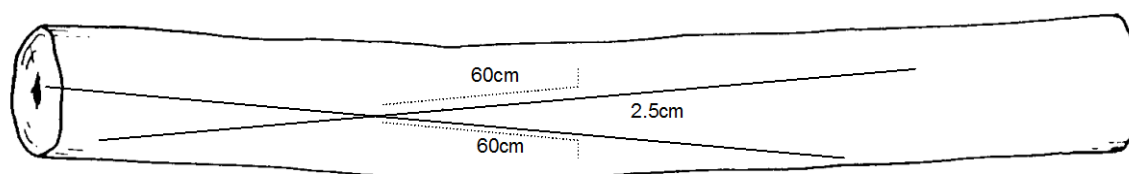


Figure 32 Maximum Acceptable Bend in Sawlogs 40 cm to 49 cm D.U.B. at the Centre of the Bend is 5° and Measured as Shown

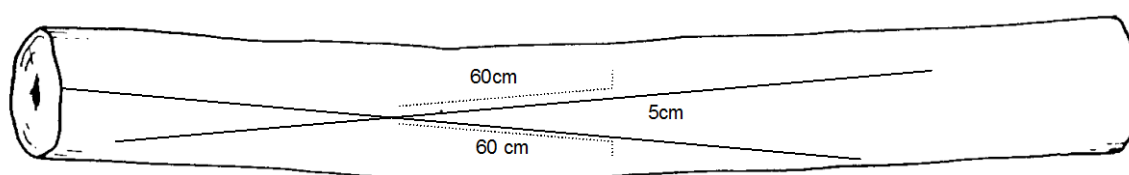
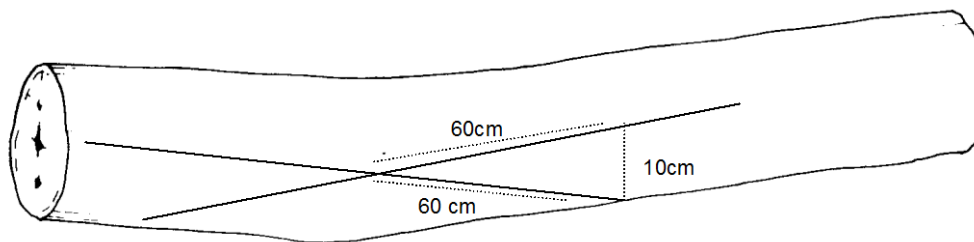


Figure 33 Maximum Acceptable Bend in Sawlogs 50 cm D.U.B or greater at the Centre of the Bend is 10° and Measured as Shown



8 Irregular Shape

Where the amount of irregular shape is excessive², then that section should be treated as optional, but only up to the point where the sawlog becomes compulsory.

Sections of Brush Box logs carrying fluting, bulbous butts or sharp taper should be regarded as optional.

Figure 34 Fluted Butts

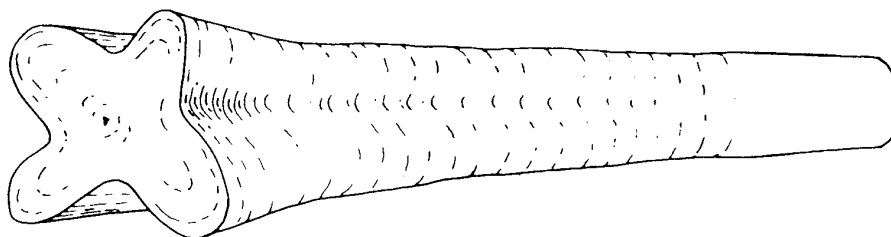
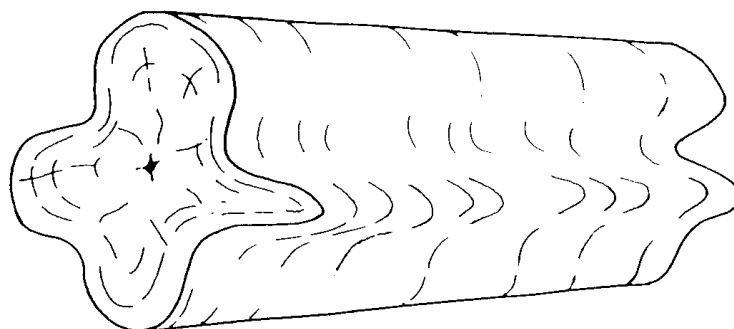


Figure 35 Consistent Fluting



9 Coarse Wavy Grain (Brush Box only)

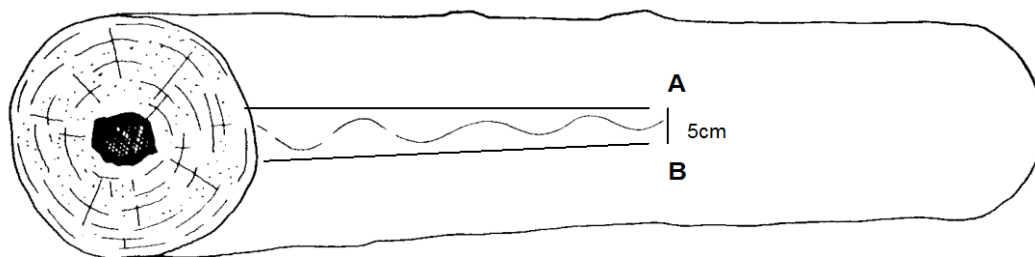
Coarse wavy grain occurs where the grain curves alternately in opposite directions (undulating form). Coarse wavy grain occurs in Brush box only and is not considered a defect in any other species.

² Excessive irregular shape occurs where 50% of the volume outside of pipe cannot be used for sawn timber.

It should be measured at the centre diameter of the sawlog under bark and at right angles to the "wave's" longitudinal direction from the lowest to the highest point of the 'wave'.

Sawlog sections containing coarse wavy grain up to five centimetres width will be classified as compulsory.

Figure 36 Course Wavy Grain



For sawlogs presented in lengths 6.3 metres or greater refer to s.11 for additional requirements.

10 Spiral Grain

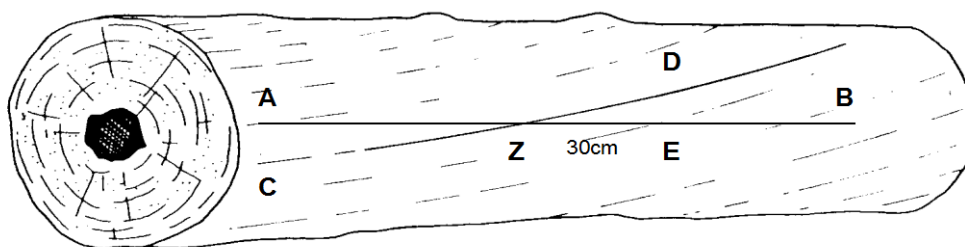
Spiral grain occurs where the grain runs continuously round a centre point (the heart) in one direction and generally does not double back.

Spiral grain must be measured or estimated at the centre diameter under bark point of a sawlog or sawlog section which is the subject of classification. The degree of spirality should be measured from the longitudinal axis of the sawlog or sawlog section.

Where the angle of the grain is not constant relative to the longitudinal axis of the log, the measurement of grain angle should fairly represent the predominant trend.

Sawlog sections containing spiral grain will be classified as compulsory if the slope of the grain is not more than 1:6 on the sapwood surface.

Figure 37 Spiral Grain



Centre diameter = "Z"

Axis of the log = "A" to "B"

Slope in grain = "C" to "D"

Measure 30 cm from "Z" to "E"

If "D" to "E" is greater than 5 cm the slope in grain is more than 1:6.

For sawlogs presented in lengths 6.3 metres or greater refer to s.11 for additional requirements.

11 Sawlogs 6.3 metres or Longer with Spiral Grain or Brush Box Logs with Coarse Wavy Grain

The following procedure will apply to sawlogs 6.3 metres or longer where coarse wavy grain or spiral grain indicates that all or part of the sawlog may be optional.

Sawlogs presented as optional because of coarse wavy grain or spiral grain are to be remeasured as a number of sub-sections of approximately equal length [Splitting], as specified in Table 6 below.

Coarse wavy grain or spiral grain will be measured at the centre point of each sawlog section subject to assessment.

Where the lengths of log sections resulting from a split are not equal (because of the requirement to access a log in 0.3 m multiples), the shorter of the two resulting log sections will always be towards the butt of the log.

Table 6 Required Number of Log Sub-Sections

Log Length (m)	Splitting" Restrictions
2.4 to 6.0 m	Nil splitting allowed
6.3 to 9.0 m	1 split allowed
9.3 m or longer	Multiple splits allowed to the minimum log section length of 2.4 m

The centre diameters of the required sub-sections may be obtained either by:

- actual measurement, or
- by utilising a taper value as described in s.4.2, Determination of Centre Diameter in Multi-grade Sawlogs.

Note that under the terms of s. 4.2 the purchaser has the option to physically measure these diameters.

12 Limbs

12.1 General

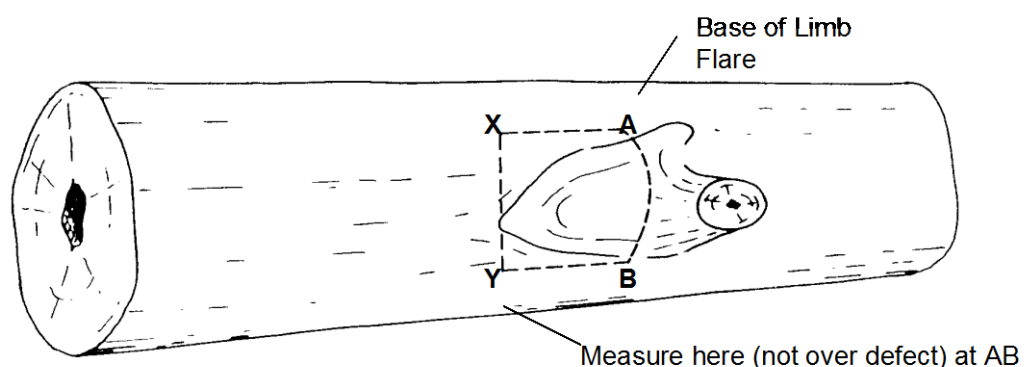
Limbs are to be considered a defect when the limb diameter underbark, measured at right angles to the axis of the log, at the surface of the log, is 10 centimetres or more.

If more than one limb is present in part of a log, over lapping limb sections are to be counted only once.

Limb defect is measured as the diameter of the limb (X-Y) in relation to the circumference of the sawlog at that point as shown in Figure 38 below.

A sawlog will be classified as compulsory where limb defect affects less than 50% of the log circumference, subject to the additional considerations in sections 12.2, 12.3 and 12.4 below.

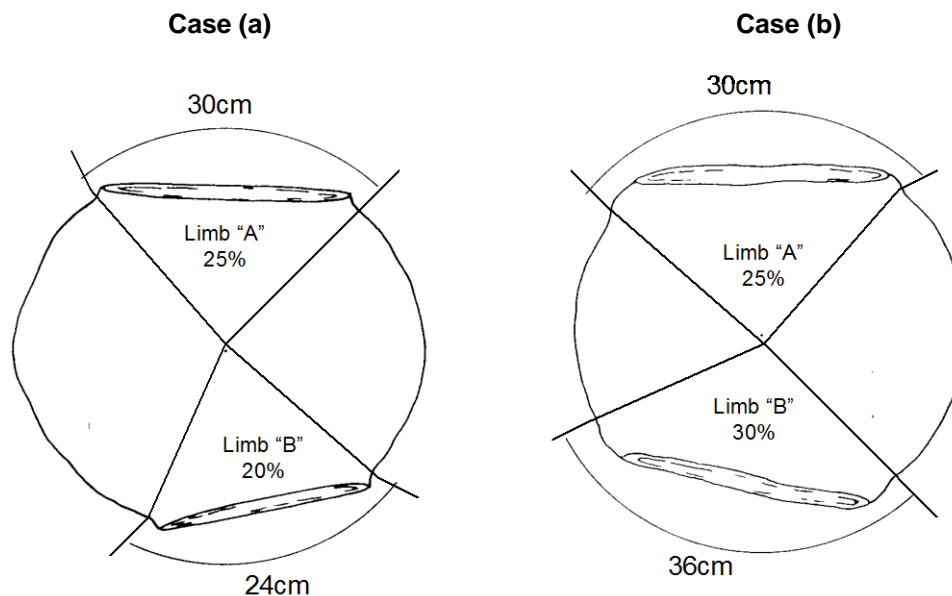
Figure 38 Measurement of Limbs



12.2 Limbs at the Same Height

Limbs which affect less than 50% of a sawlog individually may affect more than 50% of the log when added together. Two cases are illustrated in Figure 39 below.

Figure 39 Limbs at the Same Height



Where the sawlog circumference is taken as 120 cm at this point.

Compulsory Sawlog

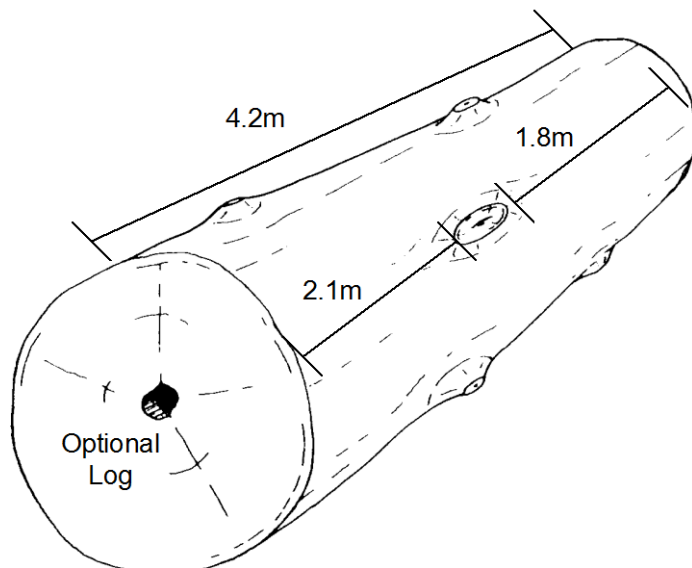
When added together, limbs affect 45% of the circumference of the log and will therefore be regarded as compulsory at that point.

Optional Sawlog

When added together, limbs affect 55% of the circumference of the log and will therefore be regarded as optional at that point.

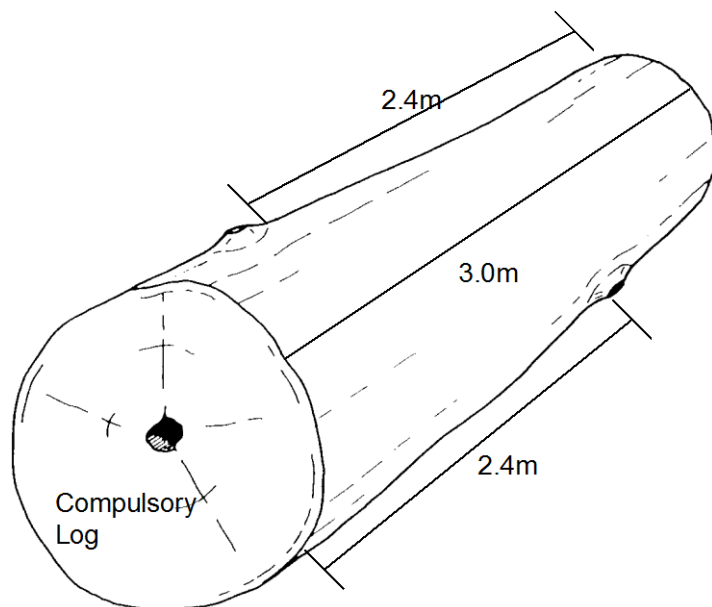
12.3 Position of Limbs

Figure 40 Limb Position Limits Recovery of 2.4 metre Merchantable Timber



Where the position of limbs when added together precludes the recovery of merchantable timber 2.4 metres or longer from 50% or more of the circumference of a sawlog, the section is to be regarded as **optional**. This assessment would be contingent on cutting to best advantage.

Figure 41 Limb Position Permits Sufficient Recovery of 2.4 metre Merchantable Timber



Where a log section will produce merchantable timber 2.4 metres longer and the position of limbs when added together affects not more than 50% of the circumference of a sawlog, the section is to be regarded as **compulsory**.

12.4 Bumps

A bump should be assessed in terms of the estimated size and type of defect it conceals.

In order to be considered as a limb defect, a bump would need to be associated with a limb 10 centimetres diameter or more.

Cutting into the round of a log to prove a defect is not permitted.