GUYANA TIMBER GRADING RULES

FOR HARDWOODS

Third Edition

Guyana Forestry Commission
2002
Foreword

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These rules shall be known as the Guyana Timber Grading Rules for Hardwoods (GTGR)

They are the supreme grading rules for products specified in this document throughout Guyana
1. Introduction

The Guyana Forestry Commission (GFC) first issued timber grading rules in 1974. Since then, there have been changes in the nature and capacity of industry, the requirements of customers and the nature of markets. These developments mean that more comprehensive and up-to-date grading rules are now required. This revised edition addresses this need.

The preparation of this edition was based on Guyana Grading Rules for Hardwood Timber published in September 1974 and revised in May 1977. Resource documents were consulted from the International Standards Organisation (ISO), grading rules from Brazil, Malaysia, Sarawak, USA and Nordic Countries as well as the Guyana Code of Practice for the Seasoning of Hardwood Lumber. The revised rules cover 13 types of forest produce, increased from the 6 types represented in the 1977 Rules.

During revision, attention was given to standardisation of measurements in metric units and to terminology and measurements in accordance with ISO standards. Invaluable and informative comments and suggestions were obtained from the Forest Products Association, the National Bureau of Standards, primary and secondary wood processors, engineers and architects.

The correct utilisation of these rules requires careful study and understanding to apply them to the best effect, so that individual judgement does not contradict the established standard definitions and the grading criteria. Produce must be graded and measured in the condition presented at grading, without any allowance aimed at upgrading.
2. Guyana Timber Grading Rules

2.1 Interpretation

The Guyana Timber Grading Rules (GTGR) will be applied throughout Guyana for grading forest produce with type references GR01 to GR13. The rules apply to all local and export markets. A timber marketing certificate will be issued in accordance with the grade for each type of produce.

2.2 Definitions

The following terms and definitions apply:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grading authority</td>
<td>The GFC is responsible for supervising all timber grading, employing Quality Control Inspectors, issuing certificates and licences in timber grading and dry-kiln operation and issuing marketing and export certificates</td>
</tr>
<tr>
<td>Timber grader</td>
<td>A person who holds a valid timber grading certificate and licence issued by the grading authority</td>
</tr>
<tr>
<td>Dry kiln operator</td>
<td>A person who holds a valid dry kiln operating certificate and license issued by the grading authority</td>
</tr>
<tr>
<td>Quality control inspector</td>
<td>An employee of the grading authority who is charged with the task of inspecting the work of timber graders and who carries out re-grading when required.</td>
</tr>
<tr>
<td>Supplier or seller</td>
<td>Any person or company in Guyana who supplies timber for the local market and/or export under these rules.</td>
</tr>
<tr>
<td>Customer</td>
<td>Any person or company in Guyana or abroad who places a contract for the purchase of timber under these rules.</td>
</tr>
</tbody>
</table>

2.3 Grading and grade marks

Unless otherwise stated in these rules, graded timber should be stencilled as follows:

```
<table>
<thead>
<tr>
<th>Produce of Guyana</th>
<th>GR04</th>
<th>STD</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark of origin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product type reference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade mark</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registration number of timber grader</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Notes

1. The full stencil marks shall be placed on two sides of each bundle. All lettering or numbering should be 25 mm in height. The registered number of the timber grader should always be in a circle; no other number may be in a circle.
2. The use of any of the grade marks shall be restricted to timber graded by a timber grader or quality control inspector and covered by a marketing certificate. The approved grade marks that are valid are indicated for each of the forest product types referenced as GR01 to GR13.

3. The mark of origin “Produce of Guyana” should not be placed on timber sawn outside Guyana.

4. The customer’s own marks such as destination or trade mark may be added.

2.4 Method of determining the grades

The GTGR are based on the quality and quantity of “defects” in a piece or parcel. Grading is carried out according to the type of forest produce intended for a certain use so the defect based system of grading is more appropriate than the alternative “cutting based system”.

Permissible defects are defined for each grade. A piece of timber is rejected if it has more defects than are allowed for the product. For example, if a railway sleeper is found to contain sapwood in more than half of the width of the sleeper at either of the rail seats, the sleeper will not meet the required grade and will therefore be rejected.

2.5 Timber grading service and quality control

The grading authority and rules exist to independently confirm and assess a predefined objective quality standard so that customers can purchase Guyanese timber with confidence. This function is adequately fulfilled by the provision of advice to customers on timber quality assurance, by general supervision of the preparation of timber, by training of graders and by undertaking routine monitoring of competence and performance. Only authorised timber graders may carry out timber grading.

Under certain circumstances the grading authority may approve grading by quality control inspectors, such as when requested by customers and producers. Otherwise the inspector carries out “check-grading” only. The grading authority will not accept liability in respect of timber received in an unsatisfactory condition.

Timber graded under these rules by timber graders is subject to supervision by the grading authority and check grading of not less than 10% by quality control inspectors. The work of certified dry kiln operators is also subject to supervision.

The inspector’s duties are to exercise a general supervision over timber grading and kiln drying as directed by the grading authority. Texture, percentage moisture content and densities may not be taken into account when check grading.

Fees and other charges in respect of timber graded, or check graded, or otherwise inspected by quality control inspectors shall be notified from time to time by the grading authority, and shall be payable by the person or firm requesting the grading or inspection. Before any grading can be undertaken by a timber grader, a true copy, or true extract from the specifications of timber to be graded and the contract
made between the customer and the supplier must be forwarded to the grading authority with an application for grading.

Specifications must include the type of timber, quantity, sizes, grades, average widths and lengths, multiple lengths, seasoning period, railway gauge for sleepers and any other special conditions. The type of timber supplied shall be as specified in the contract.

2.6 Re-grading and variation in grading

Any supplier who is dissatisfied with the grading of any piece in a consignment by the timber grader may apply in writing to the grading authority within 14 days for re-grading. The timber in question will be re-examined by a quality control inspector (other than the person making the original grading) within 14 days.

The normal grading fees will be charged a second time unless there is a difference in grade classification affecting more than 5% of the total number of pieces in the consignment. During the period of re-examination, no account shall be taken of any defects that in the opinion of the quality control inspector are attributable to faulty storage subsequent to the original grading.

2.7 Certificates

Certificates of competence for timber graders and dry kiln operators will be issued by the grading authority after it is satisfied that the applicants have attained the level of competence required. All certificates will bear the holder's personal identification number. Any registered holder of a certificate may be suspended from performing their function if their work or professional conduct is found to be unsatisfactory.

A marketing certificate will be issued for all graded timber in accordance with the following procedure:

1. All timber graders will maintain a tally form that will be totalled when grading is completed

2. A grading summary will be prepared and submitted to the supplier

3. The supplier will prepare a schedule of timber to be shipped and send it with the grading summary to the grading authority

4. The grading authority will issue a marketing certificate.

If any customer wishes to have the timber inspected by a quality control inspector to confirm freedom from live borer infestation, species identification or any other fact approved by the grading authority, they must submit a written request giving full details of requirements. The quality control inspector will inspect as large a proportion of the timber as possible and the customer will submit a schedule of timber to be shipped to the grading authority who will issue an export certificate.
All timber check-graded in excess of 60 days before it is finally shipped must be re-inspected by a quality control inspector who may order the timber to be re-graded if it appears to him that degrade has occurred since the original grading.

Re-inspection is compulsory for kiln-dried graded timber that has been stored for more than 4 months from the date of check grading to the last date of kiln drying or if shipped later than 2 months after the last kiln drying date.

For timber received in an unsatisfactory condition, complaints from customers should be lodged immediately with the grading authority.
3. Timbers of Guyana

3.1 Density and durability

Timbers of Guyana can be classified into three density classes: high, medium and low density, and four natural durability classes namely 1A, 1, 2A and 2. Air dry density provides a general indication of end-use suitability, performance and durability. Due to natural variation, an individual sample of timber may fall outside the predetermined density class for that species.

High-density hardwoods are very heavy construction timbers ranging in density from about 800 to 1200 kg/m$^3$ air-dry condition. All of the species in this group fall within durability classes of either 1A or 1.

Class 1A timbers are highly durable under all conditions of exposure including ground contact. Under tropical conditions ground contact life in service may exceed 10 years, under temperate conditions, this may exceed 40 years. In addition, class 1A timber species are highly resistant to attack by insects though full control of tropical subterranean termite attack may require soil poisoning with a contact insecticide. Service life above ground with minimum protection is indefinite in all climates.

Class 1 timbers are very durable in protected exterior situations, e.g. construction, buildings, cladding etc., but are not durable in ground contact. They are highly resistant to attack by dry-wood termites (Cryptotermes spp.). When utilised for non-ground contact applications, these timbers may require further protection from subterranean termite attack such as soil poisoning and/or the inclusion of termite shields in the substructure. They fall in the first and second strength class A and B (see section 3.2).

Table 1  High-density commercial species

<table>
<thead>
<tr>
<th>No.</th>
<th>Botanical name</th>
<th>Common name</th>
<th>Strength group</th>
<th>Durability class</th>
<th>Density (kg/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Swartzia leiocalycina</td>
<td>Wamara</td>
<td>A</td>
<td>1A</td>
<td>1200</td>
</tr>
<tr>
<td>2</td>
<td>Eschweilera spp.</td>
<td>Kakaralli-Black</td>
<td>A</td>
<td>1A</td>
<td>1120</td>
</tr>
<tr>
<td>3</td>
<td>Chlorocardium rodiei</td>
<td>Greenheart</td>
<td>A</td>
<td>1A</td>
<td>1005</td>
</tr>
<tr>
<td>4</td>
<td>Moronoea coccinea</td>
<td>Manniballi</td>
<td>B</td>
<td>1</td>
<td>1005</td>
</tr>
<tr>
<td>5</td>
<td>Mora gonggripii</td>
<td>Morabukea</td>
<td>A</td>
<td>1A</td>
<td>1005</td>
</tr>
<tr>
<td>6</td>
<td>Diplotropis purpurea</td>
<td>Tatabu</td>
<td>B</td>
<td>1</td>
<td>1005</td>
</tr>
<tr>
<td>7</td>
<td>Peltogyne pubescens</td>
<td>Purpleheart</td>
<td>A</td>
<td>1</td>
<td>960</td>
</tr>
<tr>
<td>8</td>
<td>Eperua falcata</td>
<td>Wallaba</td>
<td>B</td>
<td>1A</td>
<td>960</td>
</tr>
<tr>
<td>9</td>
<td>Hymenaea courbaril</td>
<td>Locust</td>
<td>B</td>
<td>1</td>
<td>880</td>
</tr>
</tbody>
</table>
Medium-density hardwoods are moderately heavy to heavy construction timbers ranging in density from about 700 to 800 kg/m³ at air-dry conditions. Some of these timbers are heavy and strong enough to be classified as high-density hardwoods but under tropical conditions they lack sufficient natural durability when exposed to the weather or used in contact with the ground unless they are properly treated with preservatives before use. Most species in this density class are naturally durable in temperate countries where climatic conditions are less conducive to the activity of wood destroying agents.

Class 2A timbers are not durable under exterior exposed conditions but suitable for internal finishing and furniture where Cryptotermes (dry wood termite) is not a hazard. Only two of the thirty commercial species of Guyana are in this class. Both fall in the third strength class; one of them (Symphonia globulifera) is very durable.

### Table 2  Medium-density commercial species

<table>
<thead>
<tr>
<th>No.</th>
<th>Botanical name</th>
<th>Standard name</th>
<th>Strength group</th>
<th>Durability class</th>
<th>Density (kg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Symphonia globulifera</em></td>
<td>Manni</td>
<td>C</td>
<td>1</td>
<td>720</td>
</tr>
<tr>
<td>2</td>
<td><em>Terminalia amazonia</em></td>
<td>Fukadi</td>
<td>C</td>
<td>2a</td>
<td>720</td>
</tr>
</tbody>
</table>

Low-density hardwoods include all the relatively light weight and soft timbers which range in density from about 400 to 700 kg/m³ at air-dry conditions. These are the general utility timbers of Guyana, many of which are excellent for high-class joinery work, cabinet making, furniture, decorative panelling, etc.

### Table 3  Low-density commercial species

<table>
<thead>
<tr>
<th>No.</th>
<th>Botanical name</th>
<th>Standard name</th>
<th>Strength group</th>
<th>Durability class</th>
<th>Density (kg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Tapirira marchandii</em></td>
<td>Duka</td>
<td>D</td>
<td>2</td>
<td>480</td>
</tr>
<tr>
<td>2</td>
<td><em>Parahancornia fasciculata</em></td>
<td>Dukali</td>
<td>D</td>
<td>2</td>
<td>480</td>
</tr>
<tr>
<td>3</td>
<td><em>Jacaranda copaia</em></td>
<td>Futui</td>
<td>D</td>
<td>2</td>
<td>480</td>
</tr>
<tr>
<td>4</td>
<td><em>Trattinickia demerarea</em></td>
<td>Ulu</td>
<td>D</td>
<td>2</td>
<td>480</td>
</tr>
<tr>
<td>5</td>
<td><em>Quassia amara</em></td>
<td>Simarupa</td>
<td>D</td>
<td>2</td>
<td>480</td>
</tr>
<tr>
<td>No.</td>
<td>Botanical name</td>
<td>Standard name</td>
<td>Strength group</td>
<td>Durability class</td>
<td>Density (kg/m³)</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------</td>
<td>---------------</td>
<td>----------------</td>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>6</td>
<td>Catostemma commune</td>
<td>Baromalli</td>
<td>C</td>
<td>2</td>
<td>560</td>
</tr>
<tr>
<td>7</td>
<td>Carapa guianensis</td>
<td>Crabwood</td>
<td>C</td>
<td>1</td>
<td>560</td>
</tr>
<tr>
<td>8</td>
<td>Alexa spp.</td>
<td>Haiariballi</td>
<td>D</td>
<td>2</td>
<td>560</td>
</tr>
<tr>
<td>9</td>
<td>Virola surinamensis</td>
<td>Dalli</td>
<td>D</td>
<td>2</td>
<td>560</td>
</tr>
<tr>
<td>10</td>
<td>Protium decandrum</td>
<td>Kurokai</td>
<td>D</td>
<td>2A</td>
<td>560</td>
</tr>
<tr>
<td>11</td>
<td>Inga alba</td>
<td>Maporokon</td>
<td>D</td>
<td>2</td>
<td>560</td>
</tr>
<tr>
<td>12</td>
<td>Pouteria speciosa</td>
<td>Suya</td>
<td>D</td>
<td>2</td>
<td>560</td>
</tr>
<tr>
<td>13</td>
<td>Ocotea rubra</td>
<td>Determa</td>
<td>C</td>
<td>1</td>
<td>625</td>
</tr>
<tr>
<td>14</td>
<td>Loxopterygium sagotti</td>
<td>Hububalli</td>
<td>D</td>
<td>1A</td>
<td>640</td>
</tr>
<tr>
<td>15</td>
<td>Aspidosperma spp.</td>
<td>Shibadan</td>
<td>B</td>
<td>1</td>
<td>640</td>
</tr>
<tr>
<td>16</td>
<td>Ocotea puberula</td>
<td>Silverballi</td>
<td>D</td>
<td>1</td>
<td>640</td>
</tr>
</tbody>
</table>

Except for Shibidan, all the low-density hardwoods fall in the third or fourth durability class (C or D). However, among these species, highly naturally durable species occur. For instance, species such as Hububalli, Shibadan and Determa are grouped in natural strength group of 1A and 1. Provided that proper precautions are taken against attack by wood destroying agents, even those low-density hardwoods of durability class 2 and 2A make very satisfactory timbers for general construction.

### 3.2 Strength properties

The strength of Guyana timbers covers a wide range from low density species with strength comparable to the soft pine timbers of temperate countries to high density species such as Greenheart and Kakaralli which are among the strongest timbers in the world.

For the purpose of simplifying engineering design, Guyanese timbers have been grouped into four strength groups designated A, B, C and D. A being the strongest and D the weakest group. This accords with international practice in timber structural design.

Table 4 lists the average ultimate strength values of the four strength groups. These values are not for use in design but to indicate the basis of the strength grouping. These figures represent stress values obtained in short duration laboratory tests on defect-free samples.

### Table 4 Average properties of strength groups

<table>
<thead>
<tr>
<th>Grp</th>
<th>Modulus of rupture (kg/cm²)</th>
<th>Modulus of elasticity in bending (kg/cm²)</th>
<th>Crushing strength parallel to grain (kg/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3 Design Stresses

Basic working stresses for design have been derived from the ultimate strength properties of the four groups and are given in Table 5. The stresses apply to select grade timber graded in accordance with GR04. The stresses are for what are known as “normal” conditions of loading, following standard design practice of USA and Canada. Timber structures can be designed using these stresses and the methods of any recognised timber design code, for example, those in use in USA, and Canada, UK or Australia.

Table 5  Basic working stresses under loads of normal duration for unseasoned timbers of select grade GR04 (kg/m³)

<table>
<thead>
<tr>
<th>Type of stress</th>
<th>Select grade strength group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Bending and tension parallel to grain *</td>
<td>9,400</td>
</tr>
<tr>
<td>Modulus of elasticity</td>
<td>7,055,000</td>
</tr>
<tr>
<td>Shear in beams</td>
<td>880</td>
</tr>
<tr>
<td>Shear at joints</td>
<td>1,170</td>
</tr>
<tr>
<td>Bearing parallel to grain</td>
<td>6,400</td>
</tr>
<tr>
<td>Bearing perpendicular to grain</td>
<td>5,900</td>
</tr>
</tbody>
</table>

Note

“Normal” duration of loading means continuous application of design stress for ten years. For members in pure tension, working stress may be reduced by 20% to allow for the effect of defects.

3.4 Design Stresses for Greenheart

Greenheart is a timber of exceptional and uniform strength and has been widely used for engineering applications throughout the world for many years. Extensive tests to determine design stresses for Greenheart have been carried out in England, USA and Canada. Unseasoned sawn material graded as select under GTGR corresponds to a ‘65’ grade and may be used at the following stresses for ‘normal’ conditions of loading.
3.5 Timbers for marine construction

Marine construction such as wharves, locks, sea defences and shore protection, exposes timber to special hazards from marine borers such as *Teredo* and *Limner*. Guyana is the sole producer of Greenheart (*Chlorocardium rodiaei*) a timber with exceptional resistance to marine borer attack and at the same time possessing outstanding strength and resistance to decay. Being available in long lengths and in quantity, it has become the first choice species throughout the world for marine construction applications.

Special grading rules are given for three types of Greenheart production intended principally for marine construction. They are for sawn squares, hewn squares and round piling.

Engineering design stresses are also given for Greenheart based on extensive tests carried out in laboratories in the UK, USA and Canada. Another important species, for marine construction work is Black Kakaralli, which is resistant to attack by marine organisms, has high strength and is resistant to decay. Black Kakaralli is mainly used as round piling and is available hewn and in sawn squares. Black Kakaralli is ideally suited to applications where shorter length piling at an economic price is called for.

In addition to the above, Guyana produces sawn Greenheart and a wide range of other highly durable, high strength species in sawn sizes suitable for wharf decking and other applications where there is a low risk of direct exposure to attack by marine organisms.

3.6 Seasoning

For most applications it is important to use timber that has been dried to the average moisture content that will be attained by the product in service. For timber destined for products to be used inside buildings, for example furniture, then drying to a moisture content of between 8 and 14% is generally recommended. The general rule is that the customer specifies the required moisture content of the timber. With air seasoning there is virtually no control of the temperature, relative humidity or speed.
of air circulating through the lumber in stacking. Kiln drying is the preferred method of drying timber and may be required by the customer.

When the timber is kiln dried, this has to be endorsed by the grading authority. The timber must be kiln dried by a registered kiln drying plant under the supervision of a registered and licensed dry kiln operator.

3.7 **Moisture content**

Where the moisture content of seasoned lumber is required to be certified, samples for certification are taken by a timber inspector as follows:

- one sample is taken for every hundred lengths, with a minimum sample size of three
- samples are taken at random, selected over the whole of the stacked lumber in a representative way
- a sample shall consist of a piece 30 cm long, cut from a board no closer than 45 cm from either end
- immediately on cutting, the sample is branded by the inspector with the date, their mark and the marketing certificate serial number of the batch
- the sample is then placed immediately in a separate sealed polyethylene bag
- moisture content is determined for the samples as quickly as possible and not more than one week after sampling.

The determination of moisture content should be started within 24 hours of receipt of the samples. After testing, a test certificate is issued by the GFC showing the moisture content of the samples, dates of sampling and testing, the grading certificate number and the name of the producer or shipper requesting the sampling.

Timber may be graded under the following moisture content conditions:

- **Green** includes all sawn timber that is either freshly sawn or merely surface dry. No verification of moisture content is required during grading.

- **Shipping dry** applies to sawn timber which has been seasoned, in stack for a sufficient period of time for its moisture content to fall to approximately 35% or less. For 25 mm timber a minimum period in stack of 3 months is usually required. Thicker sizes require a longer time.

The purpose of partial seasoning to shipping dry is to prevent deterioration of the lumber during shipment over long distances. As the moisture content of shipping dry lumber is variable, customers normally specify a minimum period in stack when purchasing lumber of this moisture specification. Properly dated stacks are the only means by which the time in stack can be verified. When a timber grader is requested to verify the number of days that the lumber has been in stack to be considered as a shipping dry, the process is as follows:
before grading, the timber grader makes sure that the timber has been in stack for the required length of period for drying

- the timber grader examines the stacking situation and makes sure that the stacking meets the required stacking standard
- the timber grader verifies that the timber has been in stack and records the seasoning period on the timber marketing certificate.

A narrow range of moisture content may be specified for special applications. Electrical moisture meters properly calibrated and maintained may be used for production control and inspection but in the event of dispute the oven drying method shall be used.

3.8 Preservation

The durability of timbers of classes 2A and 2 that include sapwood is increased and they are suitable for use in protected exterior use in building when they are treated by an approved preservation process as defined in the Timber Marketing Act. The preservative process gives protection against decay by *Lyctus* attack. Protection of the timber by painting when used externally is necessary to prevent leaching of preservative and loss of protection.

In order to ensure timber is free from wood destroying pathogens and to qualify for the required standard (where indicated in this rule), preservative treatment, such as impregnation is necessary. Grading is usually done before impregnation, however when impregnated timber is specified in a contract the grading is done after the timber is impregnated. Endorsement is made on the timber marketing certificate and the type of preservative used is specified.
### 4. Forest products and grades

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Prime</th>
<th>Select</th>
<th>Sound</th>
<th>Merchantable</th>
<th>Prime</th>
<th>Select</th>
<th>Sound</th>
<th>Merchantable</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR01</td>
<td>Sawn baulks</td>
<td>Prime</td>
<td>Select</td>
<td></td>
<td></td>
<td>PRIM</td>
<td>SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR02</td>
<td>Hewn squares</td>
<td>Prime</td>
<td></td>
<td></td>
<td></td>
<td>PRIM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR03</td>
<td>Round timber piles</td>
<td>Prime</td>
<td>Select</td>
<td></td>
<td></td>
<td>PRIM</td>
<td>SEL</td>
<td>SUD</td>
<td></td>
</tr>
<tr>
<td>GR04</td>
<td>Sawn timber for building and construction</td>
<td>Prime</td>
<td>Select</td>
<td></td>
<td></td>
<td>PRIM</td>
<td>SEL</td>
<td>SUD</td>
<td></td>
</tr>
<tr>
<td>GR05</td>
<td>Sawn timber for dressing and furniture manufacture</td>
<td>Prime</td>
<td>Standard</td>
<td>Factory-suited</td>
<td>Mill-run</td>
<td>PRIM</td>
<td>STD</td>
<td>F.S.</td>
<td>MR</td>
</tr>
<tr>
<td>GR06</td>
<td>Dressed products from seasoned timber</td>
<td>Prime</td>
<td>Standard</td>
<td></td>
<td></td>
<td>PRIM</td>
<td>STD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR07</td>
<td>Railway sleepers/crossings</td>
<td>Select</td>
<td>Standard</td>
<td></td>
<td></td>
<td>SEL</td>
<td>STD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR08</td>
<td>Round transmission poles</td>
<td>Prime</td>
<td>Select</td>
<td></td>
<td></td>
<td>PRIM</td>
<td>SEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR09</td>
<td>Telegraph and electric power cross-arms</td>
<td>Prime</td>
<td></td>
<td></td>
<td></td>
<td>PRIM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR10</td>
<td>Fencing posts</td>
<td>Select</td>
<td></td>
<td></td>
<td></td>
<td>SEL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR11</td>
<td>Shingles</td>
<td>Prime</td>
<td></td>
<td></td>
<td></td>
<td>PRIM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR12</td>
<td>Fence staves</td>
<td>Prime</td>
<td></td>
<td></td>
<td></td>
<td>PRIM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR13</td>
<td>Hardwood logs</td>
<td>First peeler quality</td>
<td>Superior sawmill quality</td>
<td>Standard sawmill quality</td>
<td>Fair sawmill quality</td>
<td>Small sawmill quality</td>
<td>Low Quality</td>
<td>FPQ</td>
<td>SUP</td>
</tr>
</tbody>
</table>
GR01  Sawn baulk

Purpose
For grading sawn baulk (large scantlings) for marine construction and other civil engineering work as well as for general construction.

Manufacture
Includes any rectangular section (including squares) with an end nominal cross-section of not less than 280 cm\(^2\). All timbers must be accurately sawn from sound logs. Surface may be either sawn or planed. All ends shall be cut square and oil painted.

Dimensions and tolerances
Unless otherwise specified in the contract the following tolerances apply and shall be measured at the time of grading.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>+ 150 mm</td>
</tr>
<tr>
<td>Width</td>
<td>± 6 mm</td>
</tr>
</tbody>
</table>

Straightness
- Lengths up to 9.0 m must have less than 25 mm deviation
- Lengths above 9.0 m must have less than 40 mm deviation

Wane
- See table

<table>
<thead>
<tr>
<th>Defect limits by nominal size in metres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length up to 9.0 m and less than 625 cm(^2) nominal cross-section</td>
</tr>
<tr>
<td>Wane on any face should not measure more than 25 mm cross-section.</td>
</tr>
</tbody>
</table>

Note: for long length timbers, especially in 16.0 to 22.0 metre class, wane requirements tend to limit supply. Intelligent relaxation of wane requirements in these long lengths by customers in their specifications assists prompt and economic supply of this material.

Prohibited defects
- Brittle and rotten heart
- Plugged defects
- Severe heart trace and shakes, cross breaks and compression failures in any of the faces

**Grade distinctions**

Baulks shall be generally free of defects, which significantly affect the strength of the piece, but the following shall be permitted in accordance with the specific grade requirements.

<table>
<thead>
<tr>
<th>Prime</th>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only <em>Chlorocardium rodiae</em></td>
<td>Other species may be included</td>
</tr>
<tr>
<td>Nominal area of cross-section is no less than 280 cm²</td>
<td></td>
</tr>
<tr>
<td>Heartwood is entirely boxed</td>
<td>Heartwood may not be boxed entirely</td>
</tr>
<tr>
<td>Curvature shall not exceed 70 mm for every 5 metre length of the baulk.</td>
<td></td>
</tr>
<tr>
<td>Star shake: small and generally tight. Not to extend into any face except as a tight shake.</td>
<td></td>
</tr>
<tr>
<td>Ring shake not more than 75 mm in diameter and tight. Cup shake not to open for more than ¼ of the circumference of the circle it follows, and not longer than ½ of the circumference of this circle.</td>
<td></td>
</tr>
<tr>
<td>End-shake: the aggregate length of the shakes at each end of the baulk shall not exceed 8 cm for every one-metre length of the baulk or less than the maximum width of the piece which ever is smaller. The shakes shall be tight</td>
<td></td>
</tr>
<tr>
<td>Face shakes (spalls): when occurring on three faces maximum penetration of the shake into the piece to be limited to 12 mm when measured from the face to the shake at right angles to the length of the piece. Pieces with such faces to be limited to not more than 10% of the lot.</td>
<td></td>
</tr>
<tr>
<td>Occasional pin hole borer is tolerated</td>
<td>Pin hole borer and shallow worm holes that are not associated with stain are permitted</td>
</tr>
<tr>
<td>Sound knots up to 75 mm in diameter and scattered</td>
<td></td>
</tr>
</tbody>
</table>
GR02  Hewn squares

Purpose
For grading hewn squares (shipping timbers) produced from sound live trees.

 Manufacture
All sides shall be well hewn, flat, true and free of large through shakes, severe edge shakes and seasoning checks. Ends shall be cut square and oil painted immediately after cross cutting. Finished squares shall be straight and true within the tolerances given below. Spiral grained logs are not permitted. Any piece having plugged defects shall be rejected.

Dimensions and tolerances
Unless specified otherwise in the contract the following dimensions and tolerance limits shall apply.

Length
lengths up to 9.0 m, allowances are ± 150 mm.
lengths more than 9.0 m, allowances are ± 300 mm.

Cross section
to be measured by calliper half way along the piece in two directions at right angle to each other and in the centre of each face. Allowance specified in each diameter measurement equals ± 25 mm.

Taper
approximately 25 mm deviation in 6.0 m length shall be allowed.

Straightness
up to 16.0 metres length, deviation up to 25mm.
lengths between 16.0 m and 18.0 m, deviation up to 40 mm.
lengths greater than 18.0 m, deviation up to 50 mm.

Wane
up to 16.0 metres length, wane of 5 mm per 25 mm of face width is permitted.
over 16.0 metres length, wane of 5 mm per 20 mm of face width is permitted.

Defects
Hewn squares shall be generally free of defects, which significantly affect the strength of the piece, but the following shall be permitted.

Knots
sound knots up to 25% of face width are permitted. Unsound knots and knot clusters are not permitted

Pinhole borer
occasional pinhole borer is permitted

Decay and rotten heart
not permitted
Seasoning checks permitted

Shakes
open star shake and ring shake are permitted only if they do not exceed 75 mm in diameter.

Edge shakes extending from one face to opposite or adjacent one. Allowable maximum length of edge shake, if tight, is 1½ times the width of the piece.

End shake
for sizes up to 350 mm x 350 mm, the maximum end shake penetration, measured at right angles shall be 40 mm
for sizes exceeding this cross-section limit, permitted end shake length can reach 50 mm.
GR03  Round timber piles

Purpose
For grading natural round timber piling cut from sound living trees.

Manufacture
Taper  Piles shall have gradual taper throughout their length and be cut one metre above the butt swell of the tree.
Trimming  Piles shall be cleanly trimmed of all branch stubs and knot overgrowths projecting more than 25 mm beyond the general surface of the pile.
Bark  All piles shall be debarked except that occasional bark in-growth is permitted over sound wood.
Sawing  All piles shall be cleanly cut off at butt and tip at right angles to the general axis of the piles.

Dimensions and tolerances
Length  Up to 12.0 m length, cutting allowance shall be limited to ± 300 mm.
For lengths greater than 12.0 m the allowance can be up to 600 mm.
The average length of all piles in a shipment shall not be less than the length specified plus half of the tolerance allowance.
Straightness  A straight line joining the centres of the butt and tip of the pile shall lie within the pile. Reverse curvatures and short crooks deeper than 40 mm for every one-metre length are not permitted.

Prohibited Defects
All grades of piles shall be generally free of defects, which significantly affect the strength or driveability of the pile. The following defects are not permitted:

- Sound knots and knots clusters of group knots with widths greater than one third of the diameter of the section where they occur.
- Rotten and hollow knots except occasional knotholes and scars less than one-third of the diameter where they occur and sound knots not greater than 40 mm in depth.
- Rotten heart
- Shakes and splits in the tip of the pile.
- Large open star shakes and shakes in the butt
- Tight shakes in the butt longer than 450 mm
- Severe bruising or damage caused in falling or handling.
- Spiral grain of pitch steeper than ½ turn (180°) in 6.0 metres.
- Fractures and compression failures

**Minimum butt and tip diameters recommended for Prime grade**

<table>
<thead>
<tr>
<th>Length in metres</th>
<th>Diameter one metre from butt or larger end in centimetres</th>
<th>Diameter at tip or smaller end in centimetres</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-12</td>
<td>35.0</td>
<td>32.5</td>
</tr>
<tr>
<td>12-15</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td>15-21</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>21+</td>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>

Conforms generally with ASTM D55 - 70 “Round Timber Piles” and CSA standard 056 - 1965 “Round Timber Piles”

**Grade distinctions**

<table>
<thead>
<tr>
<th>Grading factors</th>
<th>For length up to 21.0 m</th>
<th>For length over 21.0 m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prime</td>
<td>Select</td>
</tr>
<tr>
<td>Butt diameter in mm</td>
<td>350 – 450</td>
<td>Not &gt; 500</td>
</tr>
<tr>
<td>Tip diameter in mm</td>
<td>180 – 250</td>
<td>Not &lt; 200</td>
</tr>
<tr>
<td>Tapering quality (%)</td>
<td>&gt; 75</td>
<td>70 – 75</td>
</tr>
<tr>
<td>Species</td>
<td>CR</td>
<td>IOCS</td>
</tr>
<tr>
<td>Diam. of ring shake</td>
<td>&lt; 25</td>
<td>up to 50</td>
</tr>
<tr>
<td>Tight shakes at butt</td>
<td>&lt; 100</td>
<td>up to 300</td>
</tr>
</tbody>
</table>

Dimensions in millimetres unless stated

CR – *Chlorocardium rodiaei*

IOCS – includes other commercial species
GR04  Sawn timber for building and construction

Purpose

For grading sawn hardwood timber for framing in building and construction. Both rough sawn and gauged (size matched) timber are included.

Sawing tolerance

All timber shall be well and truly sawn to specified nominal dimensions and with square trimmed ends. Marking out of defects without trimming is not permitted.

The following tolerance to nominal sizes at time of sawing shall apply:

Thickness and width  
- up to 75 mm nominal, ± 5 mm
- above 75 mm nominal, ± 10 mm

Where timber of close dimensional tolerance is produced by machine gauging (planing) after sawing a planing tolerance of ± 3 mm shall be allowed.

Grade distinctions

There are four grades allocated for GR04.

Timber may be ordered as a particular species and grade e.g. “Mora Select Grade” or by type of forest product and grade e.g. “GR04 Prime Grade”.

Sawn timber will normally be graded and supplied green; but it may be supplied in “shipping dry” condition by arrangement between the customer and supplier.

Sawn timber meeting this specification shall not contain defects beyond the limits given in the table below.

<table>
<thead>
<tr>
<th>Grading factors</th>
<th>Prime</th>
<th>Select</th>
<th>Sound</th>
<th>Merchantable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Greater than 2.4m with an interval of 0.1m</td>
<td>Greater than 0.5m with an interval of 0.1m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knots, loose, decayed or hollow</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>One quarter width of face to 75 mm diameter maximum</td>
</tr>
<tr>
<td>Knots, sound, tight and inter-grown</td>
<td>Not permitted</td>
<td>25 mm diameter maximum and scattered</td>
<td>50mm diameter or 1/3 width of the face whichever is less.</td>
<td>75 mm diameter or 1/2 width of face whichever is less.</td>
</tr>
<tr>
<td>Grading factors</td>
<td>Prime</td>
<td>Select</td>
<td>Sound</td>
<td>Merchantable</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>End Shakes</td>
<td>None</td>
<td>A quarter width of face in length and at one end only</td>
<td>Half width of face in length at one end only</td>
<td>Width of face in length at one end only</td>
</tr>
<tr>
<td>Face shakes</td>
<td>None</td>
<td>Showing on one face only and length not more than 1/3 of the width of that face</td>
<td>Showing on one face only and not more than 60 cm in total length.</td>
<td>Half the length of piece on one face and not more than ¼ maximum width. Must not penetrate through opposite or adjacent faces for more than 60 cm</td>
</tr>
<tr>
<td>Sapwood, sound not treated by preservative</td>
<td>Permitted only when the species is in durability Class 1A</td>
<td>Permitted only when the species is of durability Class 1 or 1A.</td>
<td>A perimeter measurement of 50 mm or 20% whichever is greater.</td>
<td>A perimeter measurement of 25%.</td>
</tr>
<tr>
<td>Sapwood, treated by an approved preservation process</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
</tr>
<tr>
<td>Sloping grain</td>
<td>None, only local deviations</td>
<td>None, only local deviations</td>
<td>50 - 60 %</td>
<td>&gt; 60 %</td>
</tr>
<tr>
<td>Bow</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>40 mm in 5 m length</td>
<td>60 mm in 5 m length</td>
</tr>
<tr>
<td>Spring</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>20 mm in 5 m length</td>
<td>30 mm in 5 m length</td>
</tr>
<tr>
<td>Twist</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Slight</td>
<td>Up to 5 mm per 5 m length</td>
</tr>
<tr>
<td>Holes, bark and gum pockets</td>
<td>None</td>
<td>5 mm wide and 50 mm long in one face only</td>
<td>10 mm wide and 75 mm long one face only</td>
<td>25 mm wide and 150 mm long</td>
</tr>
<tr>
<td>Compression failure</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Slight and Occasional</td>
</tr>
<tr>
<td>Brittle heart and unsound heart</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
<tr>
<td>Sound black heart and heart stain</td>
<td>Slight</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
</tr>
<tr>
<td>Grading factors</td>
<td>Prime</td>
<td>Select</td>
<td>Sound</td>
<td>Merchantable</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------</td>
<td>---------------------------------------------</td>
<td>--------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Insect and grub holes 3 mm diameter</td>
<td>None</td>
<td>Scattered and not more than equivalent of 1 per metre of length</td>
<td>Scattered and not more than equivalent of 2 per metre of length</td>
<td>Not clustered but up to 4 per metre of length</td>
</tr>
<tr>
<td>and above</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinhole (ambrosia) borer holes</td>
<td>None</td>
<td>None</td>
<td>Slight on one face only</td>
<td>Moderate but scattered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seasoning checks</td>
<td>None</td>
<td>Slight</td>
<td>Moderate</td>
<td>Up to 30 mm per metre of length</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wane</td>
<td>None</td>
<td>20 mm perimeter per metre of length maximum</td>
<td>40 mm perimeter per metre of length maximum</td>
<td>60 mm perimeter per metre of length maximum</td>
</tr>
<tr>
<td>Want</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GR05 Sawn timber for dressing and furniture manufacture

Purpose
For grading sawn timber up to 75 mm in thickness and not more than 250 cm² end cross-section, intended for dressing and furniture manufacturer.

Unseasoned
Timber green off saw, partially seasoned or shipping dry will be regarded as unseasoned. Where a particular time in stack is specified by the customer this shall be verified as far as possible by the grader but no guarantee as to actual moisture content can be given.

Seasoned
Seasoned timber in these rules means timber seasoned in air, kiln or a combination of methods to moisture content below 18%. This shall be verified as far as possible by the grader and on request a certificate covering sampling for moisture content of a shipment can be given.

Dimensions and tolerances
All timber shall be well sawn to specified dimensions and with square-trimmed ends. The following allowances to the nominal sizes need to be ascertained, at the time of grading, unless specially agreed between the customer and supplier.

Thickness
up to 75 mm nominal thickness the allowance shall be ± 5 mm
for 75 mm nominal and thicker the allowance shall be ± 10 mm

Width
up to 75 mm nominal the allowance shall be ± 10 mm

Length
trimmed lengths shall measure 0 to 100 mm longer than nominal for Prime and Standard grades
there shall be additional 25 mm allowance to the length specified by the customer. The same allowance applies to Mill-Run grade.
## Grade distinctions

<table>
<thead>
<tr>
<th>Grading factors</th>
<th>Factory-suited</th>
<th>Prime</th>
<th>Standard</th>
<th>Mill-Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>A quality equal or superior to prime but cut to size by arrangement with the customer. For use in furniture, parquet etc.</td>
<td>For the highest quality work</td>
<td>Very good quality for normal use in building, joinery and utility furniture construction</td>
<td>Moderate to low quality for normal use in building, joinery and utility furniture in local markets</td>
</tr>
<tr>
<td>Length</td>
<td>Customer specified</td>
<td>Minimum of 1.8 m</td>
<td>Minimum of 1.8 m</td>
<td>Length greater than 0.6 m</td>
</tr>
<tr>
<td>Knots, dead, loose or decayed</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>25 mm diameter maximum</td>
<td>Permitted</td>
</tr>
<tr>
<td>Knots, sound, tight intergrown</td>
<td>25 mm diameter maximum 1 per piece in 10% of the lot.</td>
<td>25 mm diameter 1 per 2 metres in 20% of lot</td>
<td>75 mm diameter maximum</td>
<td>Permitted</td>
</tr>
<tr>
<td>Edge Shakes</td>
<td>Not permitted</td>
<td>At one end only up to 75 mm in length</td>
<td>At one end only 75 mm or half width of face</td>
<td>Permitted at both ends only if the aggregate length does not exceed 1/5 of the length</td>
</tr>
<tr>
<td>Face Shakes</td>
<td>Not permitted</td>
<td>On worse face only 150 mm total length per piece in 10% of lot</td>
<td>On worse face only 900 mm long total length by 3 mm wide</td>
<td>On worse face only Up to 75 mm per metre of length of the piece in up to 25% of lot</td>
</tr>
<tr>
<td>Sapwood, sound, not Lyctus susceptible</td>
<td>No limit unless specified by customer. In many timbers sapwood is not strongly differentiated in colour from heartwood and is not Lyctus susceptible. However in some species the sapwood is of different colour and may or may not be desired depending on species. A customer may specify the timber free of sap in which case it will be limited as for sapwood, Lyctus susceptible. Sapwood may be preserved by an approved process, as defined in the Timber Marketing Act in which case it will be of natural colour and not Lyctus susceptible.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sapwood, sound Lyctus susceptible</td>
<td>18 mm, one corner only 25 mm perimeter 100 mm perimeter 150 mm perimeter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sloping grain</td>
<td>Up to 15%</td>
<td>Up to 15%</td>
<td>Up to 15%</td>
<td>Up to 20%</td>
</tr>
<tr>
<td>Bow</td>
<td>Not permitted</td>
<td>10 mm per metre length</td>
<td>20 mm per metre length</td>
<td>Up to 40 mm per metre length</td>
</tr>
<tr>
<td>Spring</td>
<td>Not permitted</td>
<td>5 mm per metre of length evenly distributed</td>
<td>5 mm per metre of length evenly distributed</td>
<td>Up to 25 mm per metre of length evenly distributed</td>
</tr>
<tr>
<td>Grading factors</td>
<td>Factory-suited</td>
<td>Prime</td>
<td>Standard</td>
<td>Mill-Run</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------</td>
<td>--------------------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Twist</td>
<td>Not permitted</td>
<td>Slight in 10% of lot</td>
<td>Slight in 15% of lot</td>
<td>Slight in 20% of lot</td>
</tr>
<tr>
<td>Pin holes (Ambrosia) borer</td>
<td>Occasional on one face only in 10% of lot</td>
<td>3 mm diameter Maximum 3 in 5 metres length in 10% of lot</td>
<td>3 mm diameter 3 per metre of length</td>
<td>Up to 4 mm diameter Up to 5 per metre of length</td>
</tr>
<tr>
<td>Grubholes</td>
<td>Not permitted</td>
<td>1 per 2 m in 10% of lot</td>
<td>Average of 1 per 2 m length</td>
<td>Average of 1 per 1.5 m length</td>
</tr>
<tr>
<td>Check-seasoning</td>
<td>Slight on one face only</td>
<td>Slight on one face only</td>
<td>Slight on one face only</td>
<td>One face or one side edge only</td>
</tr>
<tr>
<td>Brittle heart</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>One face only where sound, up to 75 mm long</td>
</tr>
<tr>
<td>Log stain and incipient decay</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Slight and occasional</td>
</tr>
<tr>
<td>Holes, bark pockets</td>
<td>Not permitted</td>
<td>To be classified as loose knots</td>
<td>To be classified as loose knots</td>
<td>To be classified as loose knots</td>
</tr>
</tbody>
</table>
GR06  Dressed products from seasoned timber

Purpose
For grading dressed products from seasoned hardwoods.

The Prime grade is intended for finishing and construction work of the highest quality. Standard grade is intended for general construction and finishing purposes where sound lumber well milled but of lesser visual quality than grade A is adequate.

The following products are included under these rules.

- Tongue and groove siding
- Tongue and groove flooring
- Secret nail flooring
- Channel lining
- V-joint lining
- Spring and rebate siding
- Dressed boards, square edged.

Standard profiles are given for these products in figure 1.

Moisture Content
All dressed products meeting these rules shall have a moisture content not less than 10% and not more than 15% at the time of dressing. The oven drying method shall be used to determine moisture content.

Quality of Dressing
All products shall be of sound wood, well milled to a smooth surface and free from defects on the face other than those described for the particular product and grade.

Tolerance
Tolerance in thickness and width at the time of milling shall be plus 1 mm minus 0 mm. Tongue and groove shall match as described and each product shall conform to the standard profiles.

Branding
All dressed products shall be indelibly marked on the back by the grader to show.

- the grader’s registered number.
- the grade of the dressed item PRIM or STD and the type reference number of this forest product.

In addition, the registered brand or name of the manufacturer shall be applied.

End trimming
All dressed products shall be trimmed square at the ends. Marking out of defects without trimming is not allowed.

Species

Dressed products of any hardwood species may be graded under these rules and may be supplied either as lots comprising a single nominated species or in lots comprising several species by arrangement between customer and supplier.

Grade distinctions

The limits of defects affecting appearance and performance of the two grades are given below. Limits refer to defects appearing on the better face. Any imperfections may appear on the back of the piece providing they do not significantly affect the strength or fixing of the products. No defect is allowed at the edges where it would result in fitting problem.

<table>
<thead>
<tr>
<th>Grading factors</th>
<th>Prime</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knots, sound, tight and intergrown</td>
<td>¼ face width or 25 mm diameter maximum</td>
<td>½ face width or 50 mm diameter maximum</td>
</tr>
<tr>
<td>Knots, dead, decayed and knot holes</td>
<td>Not permitted</td>
<td>12 mm diameter</td>
</tr>
<tr>
<td>Pin holes (<em>Ambrosia</em> borer)</td>
<td>4 per 5 metres of length</td>
<td>Occasional, well scattered</td>
</tr>
<tr>
<td>Unsound heart and pith</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
<tr>
<td>Gum and bark pockets</td>
<td>Not permitted</td>
<td>12 mm wide x 75 mm long and tight</td>
</tr>
<tr>
<td>Wane</td>
<td>Not permitted</td>
<td>1 in 4 meters of length</td>
</tr>
<tr>
<td>Bow</td>
<td>16 mm in a metre length</td>
<td>18 mm in a metre length</td>
</tr>
<tr>
<td>Spring</td>
<td>5 mm in a metre length and evenly distributed</td>
<td>8 mm in a metre length, evenly distributed</td>
</tr>
<tr>
<td>Shake</td>
<td>Not permitted</td>
<td>Occasional and less than 150 mm long</td>
</tr>
<tr>
<td>Compression failure</td>
<td>Slight</td>
<td>Slight</td>
</tr>
<tr>
<td>Sound sapwood not treated by an approved preservation process not immune to <em>Lytus</em></td>
<td>Not permitted (see note)</td>
<td>25 mm width on face</td>
</tr>
<tr>
<td>Sapwood – sound meaning treated by an approved preservation process or naturally immune to <em>Lytus</em></td>
<td>Not limited</td>
<td>Not limited</td>
</tr>
<tr>
<td>Seasoning checks</td>
<td>50 mm long not more than 1 in a metre</td>
<td>Slight well scattered</td>
</tr>
<tr>
<td>Grading factors</td>
<td>Prime</td>
<td>Standard</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Mismatch</td>
<td>Not permitted</td>
<td>0.5 mm maximum in 10% of parcel</td>
</tr>
<tr>
<td>Skip (hit and miss)</td>
<td>Not permitted</td>
<td>Not greater than 80 mm long and 2 mm deep in 5 metre length</td>
</tr>
<tr>
<td>Broken, missing &amp; short tongues</td>
<td>Not permitted</td>
<td>Maximum 110 mm long per metre in 10% of parcel</td>
</tr>
<tr>
<td>Broken &amp; missing groove</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
<tr>
<td>Kick out</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
</tbody>
</table>

**Note**
In many Guyana hardwoods the sapwood is similar in colour and texture to heartwood and is not Lyctus borer susceptible. In these timbers sound sapwood would be admitted without limit under these rules. Where sapwood is distinctly different in colour it may be desired for its decorative effect e.g. Wamara, in other cases it may not be desired e.g. Purpleheart. In Prime grade a customer may specify by arrangement that the timber be sap free. Where sapwood has been treated by an approved preservation process as defined in the Timber Marketing Act then it will be of natural colour and perfectly sound.
Figure 1  Standard profiles for GR06

1a  Tongue and groove siding

1b  Tongue and groove flooring

1c  Secret nail flooring

1d  Channel lining

1e  V-joint lining

1f  Spring and rebate siding
Purpose

For grading of sawn or hewn railway sleepers, or bridge or other timbers, on which rail seats are fixed constants determined by the gauge of the railway. The rule also enables grading of hewn or sawn railway crossings or other timbers used at junctions where rail seats are varied.

Standard sizes

Railway gauges are usually classified as follows:

- wide gauge from 140 to 160 cm
- medium gauge from 90 to 110 cm
- narrow gauge from 60 to 80 cm

The top and bottom shall be cut as near as possible to parallel and the thickness of the sleeper should be no less than half of the width. Sleepers should be cut slightly larger than the specified dimensions with size tolerance permitted at the time of the inspection shown in the table below.

Not more than 5% of the sleepers may be undersize in any dimension (length, width or thickness).

The maximum variation in thickness (excluding wane) between the thinnest and the thickest point on a sleeper shall not exceed 5 mm.

<table>
<thead>
<tr>
<th>Type of gauge</th>
<th>Cross section in mm</th>
<th>Tolerances in mm</th>
<th>Length in centimetres</th>
<th>Tolerances in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Width</td>
<td>Thickness</td>
<td></td>
</tr>
<tr>
<td>Wide gauge</td>
<td>250 x 125</td>
<td>+ 13</td>
<td>+ 13</td>
<td>275, 260, 240</td>
</tr>
<tr>
<td>Medium gauge</td>
<td>225 x 112</td>
<td>+ 13</td>
<td>+ 13</td>
<td>215, 200, 185</td>
</tr>
<tr>
<td>Narrow gauge</td>
<td>200 x 100</td>
<td>+ 13</td>
<td>+ 13</td>
<td>150, 120</td>
</tr>
</tbody>
</table>

Sleepers of other sizes can be graded under these rules but the tolerances shown in the table shall apply.

General requirements

All sleepers must be free from decay and such shakes, hollow knots, compression failures, bark or other defects that, in the opinion of the timber grader, would render any piece unsuitable for use as a sleeper. Sleepers must be free from heart (pith) unless otherwise specified in the contract in which case, the heart must be sound.
Straightness

Sleepers should be reasonably straight. Permissible deviations from straightness are as follows:

Spring  A string stretched from the mid-point on one end to the mid-point of the other end of the sleeper on the wide face should be wholly within the sleeper.

Cup  A straight edge laid across the wide face of the sleeper should not be more than 6 mm from the deepest part of the cup.

Twist  For sleepers, a string stretched diagonally on either wide face should not be more than 10 mm from any point on the face.

   For crossings, twist is permitted provided it can be removed by adzing.

Bow  A string stretched from the mid-point of one end of the sleeper to the mid-point of the other end on the edge (narrow face), should not deviate from the centre line of this face by more than 4 mm per metre length of the sleeper or crossing.

Knots

Both rail seats shall be free from knots of 25 mm diameter and wider. One tight sound knot of less than 25 mm diameter may be permitted at the rail seat. Tight sound knots up to 75 mm may be permitted away from the rail seat.

For crossings, sound knots are permitted provided that there is no more than one knot of up to 75 mm diameter per each metre of length.

End shakes

The aggregate length of the longest shakes at each end of the sleeper shall not exceed 80 mm per metre length of the piece. Any single shake of length exceeding 160 mm per metre length of the sleeper shall be adequately clamped with an S-hook or other approved device.

Included phloem

Sleepers containing included phloem which runs from one end of the sleeper to the other or from one face to the other and is less than 30° to the vertical, will be rejected. Strands of included phloem should not be numerous or grouped so as to materially affect the strength of the piece.

Grade distinctions

<table>
<thead>
<tr>
<th>Grading factors</th>
<th>Railway sleepers</th>
<th>Railway crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select</td>
<td>Standard</td>
</tr>
<tr>
<td>Sapwood</td>
<td>One wide face shall be free from sapwood. The other</td>
<td>Sound sapwood is admitted without limit. However the</td>
</tr>
<tr>
<td><strong>Wane</strong></td>
<td>One wide face shall be free from wane. The other side may contain wane provided it does not exceed ¼ of the width of the sleeper at either rail seat or ½ the width elsewhere.</td>
<td>Wane is permitted on only one of the wide faces and the width of the rail seat shall not be reduced by more than 25% due to the wane.</td>
</tr>
<tr>
<td><strong>Phloem</strong></td>
<td>No phloem is allowed.</td>
<td>Phloem not stretching fully end to end or side to side.</td>
</tr>
<tr>
<td><strong>Side shakes</strong></td>
<td>Maximum penetration of side shake measured at right angles to the length of the sleeper in any face or edge is 25 mm.</td>
<td>Maximum penetration of side shake measured at right angles to the length of the sleeper in any face or edge is 50 mm.</td>
</tr>
</tbody>
</table>

**Note**

The two most suitable sleeper and crossings timbers in Guyana are *Chlorocardium rodiaei* and *Mora gonggrijpii*. The Select grade is naturally durable. The Standard grade should be impregnated.

Rail seats shall be on the better face. However when wane is present on one face, they shall be on that face. Rail seat is defined as that portion of the sleeper lying on either side of the centre line of each rail, 580 mm wide for wide gauge, 560 mm wide for medium gauge and 150 mm for narrow gauge railways. The centre line of the rail will be taken as half the gauge + 50 mm from the centre line of the sleeper.
Purpose
For grading round transmission poles cut from sound living trees.

Species
This specification is written for the species Wallaba (Eperua spp.) but may be used for other species by arrangement between customer and supplier.

Manufacture
All poles shall be of first quality with bark and sapwood removed, and shall not show any sign of heart rot. They shall have uniform taper and be reasonably round and straight. The tip of the pole shall be roofed or pointed, while the butt shall be square to the length.

Length tolerance
Up to 12 metres, + 150 mm
Over 12 metres, + 250 mm

Straightness
A straight line from centre of the butt to centre of the tip shall be at no point less than one-tenth of the diameter of the pole from the near side at point of consideration.

Permitted defects
Poles shall be generally free of defects, which significantly affect the strength of the pole, but the following shall be permitted:

Shake at butt up to 380 mm long
Grub holes slight and occasional
Sound knots except in clusters and of a diameter not more than 25% of the diameter of the pole at a point where they occur
Spiral grains half turn (180°) in 9 metres
Clean heart shakes showing on surface of pole, aggregate length not more than 10% of length of pole
Season checks moderate
Sapwood occasional short surface streaks of sapwood are allowed, while patches of ingrown sapwood of maximum width or length not exceeding the diameter of the pole where they occur and not more than 6 mm in thickness shall be permitted in 10% of lot
Side spalls not in excess of 6 mm in depth in 10% of the lot.

**Prohibited defects**
Plugged defects and holes larger than 25 mm
Decay and rotten heart
Tight shake at tip longer than 75 mm
Compression failure and cross break

**Anti-shaketing devices**
Nail plates or other approved anti-shaketing devices may be applied to butts and/or tips where shaketing is likely to occur.

**Grade distinctions**
The minimum butt and tip diameters in millimetres for specified lengths are shown below:

<table>
<thead>
<tr>
<th>Length in metres</th>
<th>Prime</th>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diameter 1.5 m from butt</td>
<td>Diameter at tip</td>
</tr>
<tr>
<td>Under 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 - 12</td>
<td>180 – 300</td>
<td>140 – 240</td>
</tr>
<tr>
<td>15 – 18</td>
<td>300 – 400</td>
<td>220 – 300</td>
</tr>
<tr>
<td>over 18</td>
<td>340 – 420</td>
<td>220 – 300</td>
</tr>
</tbody>
</table>
Telegraph and electric power cross-arms

Purpose
For grading of sawn hardwood cross-arms manufactured for carrying telegraph wires or electric power lines.

Manufacture
All cross-arms shall be free of pith and accurately produced from sound logs. Surface may either be sawn or dressed. All ends shall be cut square and oil painted.

Ordering
Cross-arms may be ordered under these rules as a particular species or by class number and will normally be graded and supplied green but may be supplied seasoned by arrangement between the customer and supplier.

Sawing tolerance
Unless otherwise specified in the contract cross-arms shall be sawn with the following tolerance:

<table>
<thead>
<tr>
<th>Dimensional</th>
<th>up to 75 mm nominal, + 6 mm, - 0 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>above 75 mm nominal, + 9 mm, - 3 mm</td>
</tr>
<tr>
<td>Length</td>
<td>+ 25 mm, - 0 mm</td>
</tr>
<tr>
<td>Dressed</td>
<td>less than 25 mm, - 6 mm</td>
</tr>
<tr>
<td></td>
<td>above 25 mm, - 9 mm</td>
</tr>
</tbody>
</table>

A planing tolerance of ± 3 mm shall be allowed on these dimensions.

Defects
All cross-arms shall be generally free of such defects that may affect their strength, but the following shall be permitted.

<table>
<thead>
<tr>
<th>Sapwood which is not treated by preservation</th>
<th>Not permitted except for Chlorocardium rodiae which only allows 20% perimeter measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapwood treated by preservation</td>
<td>No limitation</td>
</tr>
<tr>
<td>Sloping grain</td>
<td>Generally grain should run parallel to the length; but a maximum of 50 mm deviation from parallel per metre of length is permitted</td>
</tr>
<tr>
<td>Knots</td>
<td>Sound, tight and inter-grown, not in cluster and up to 25 mm in diameter are permitted</td>
</tr>
<tr>
<td>Issue</td>
<td>Allowance</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>End and surface checks</td>
<td>Moderate</td>
</tr>
<tr>
<td>Pin holes</td>
<td>Permitted if scattered</td>
</tr>
<tr>
<td>Compression failures</td>
<td>Not permitted</td>
</tr>
<tr>
<td>Heart shakes</td>
<td>Not permitted</td>
</tr>
</tbody>
</table>
GR10  Fencing posts

Purpose
For grading of machine or hand-shaped fencing posts of Wallaba (*Eperua spp.*).

Manufacture
All fencing posts shall be generally round and shall have approximately the same diameter throughout their length with the ends cut square.

Dimensions and tolerances
Unless otherwise specified in the contract the following dimensional and length tolerances shall apply:

- 1.8 to 3.0 m length and 80 to 120 mm diameter + 75 mm, - 0 mm allowance
- 3.0 to 5.5 m length and 120 to 150 mm diameter + 150 mm, - 0 mm allowance

Straightness
A straight line drawn at the side of the post shall show a maximum deviation of:

- 1.8 to 3.0 m length 20 mm deviation
- 3.0 to 5.5 m length 25 mm deviation

Permitted defects
All posts shall be generally free of defects that may significantly affect the strength of the post. The following shall be permitted:

- Knots: loose, decayed or hollow  Permitted if the diameter does not exceed 40 mm
- Knots: sound and ingrown  Permitted but only in 1/3 of the circumference of the post
- End shakes  Permitted when maximum length at one end does not exceed 100 mm
- Shakes  Permitted but not to extend throughout the length of the post
- Sapwood  12 mm maximum thickness at both ends but not exceeding 1/3 of the circumference of the post
- Grub Holes  Permitted if scattered
- Pinholes  Permitted
- Seasoning checks  Permitted
Purpose
For grading machine and hand-made shingles made from Wallaba (*Eperua spp.*) for roofing and panelling purposes.

Manufacture
All shingles shall be of sound wood, free of sapwood, generally flat, and free of holes, cracks and fissures which are likely to affect their serviceability. The ends shall be cut square and the sides shall be generally true to the length of the piece and parallel.

Dimensions and tolerances
Unless otherwise specified the length of each shingle shall be 450 mm with a tolerance of + 25 mm, - 0 mm.

Unless specially ordered the widths of shingles shall be 100, 125, 150 or 175 mm with a cutting allowance of ± 5 mm.

The thickness of each shingle shall be 5 to 8 mm at the butt and 3 to 5 mm at the tip.

Packing
Shingles shall be properly packed and securely bundled in sets of fifty. An additional amount of reject shingles shall be placed around the bundle to fully protect the shingles while in transit or under storage.
GR12  Fencing staves

Purpose
For grading hand and machine-made fencing staves made from Wallaba (Eperua) and other species that are intended to be used for fencing.

Manufacture
All staves shall be of sound wood, free of sapwood, generally flat, and free of holes, cracks and fissures which are likely to affect the serviceability of the staves. The ends shall be cut square and the sides shall be generally true to the length of the piece and parallel.

Dimensions and tolerances
Unless otherwise specified the length of each stave shall be 1.5 m with a tolerance of + 50 mm, - 0 mm.
Unless specially ordered the widths of staves shall be 75, 100, 125, 150, 175, 200 mm with a tolerance of ± 5 mm.
The thickness of each stave shall be not less than 5 mm and not more than 15 mm.

Packing
Staves shall be properly packed and securely bundled in sets of not more than twenty-five. The bundle shall be well strapped at three places to fully protect the staves while in transit.
GR13   Hardwood logs

<table>
<thead>
<tr>
<th>Quality</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>First peeler quality</td>
<td>FPQ</td>
</tr>
<tr>
<td>Superior sawmill quality</td>
<td>SUP</td>
</tr>
<tr>
<td>Standard sawmill quality</td>
<td>SSQ</td>
</tr>
<tr>
<td>Fair sawmill quality</td>
<td>FSQ</td>
</tr>
<tr>
<td>Small sawmill quality</td>
<td>SMSQ</td>
</tr>
<tr>
<td>Low quality</td>
<td>LQ</td>
</tr>
</tbody>
</table>

Purpose
For grading hardwood round logs

General requirements

- Logs shall not have rotten knot
- The minimum radial sound shell must be at least 15 cm or 1/3 of the cross-section diameter of the log whichever is the larger
- Logs shall be fresh cut, straight with both ends well trimmed and representing a true circle.
- One or two shakes are permitted provided their aggregate length does not exceed 5% of the total length of the log.
- Trimmed buttress are permitted.

A. First peeler quality (FPQ)
A first peeler grade suitable for back and face veneers

Length
Minimum of 6 metres

Diameter
60 cm or larger at mid girth of the log measured under bark

The diameter at the smaller end shall measure not less than 85% of the diameter measured at the larger end.

Straight-grained. Maximum deviation of the grain from straightness (spiral grain) shall not exceed 1 cm in every 5 metre length along the log projected into the plane.

Heart must be well centred and must be confined within 10% of the geometrical centre of the cross-sectional diameter of the log. This requirement applies to both ends of the log.
B. **Superior sawmill quality (SSQ)**

A second peeler grade suitable for back, face and core veneers and also for good sawmill material

**Length**

Minimum of 6 metres

**Diameter**

60 cm or larger at mid-girth of the log measured under bark

The diameter at the smaller end shall measure not less than 80% of the diameter measured at the larger end

Straight-grained, maximum deviation of the grain from straightness (spiral grain) shall not exceed 1 cm in every 1 metre length along the log projected into the plane.

Heart must be well centred and must be confined within 10% of the geometrical centre of the cross-sectional diameter of the log. This requirement applies to both ends of the log.

**Allowable defects**

The following additional defect may be permitted for this grade:

- One or two shakes where aggregate length does not exceed 5% of the total length of the log
- One sound knot that does not exceed 15% of the average log diameter for every 5 metre length along the log
- Concentration of pinholes of 15 to 20 within 144 cm\(^2\) within the total of the log surface
- One or two shakes where aggregate length does not exceed 5% of the length of the log.
- Simple curvature where the deviation of the longitudinal axis of the log from a straight line at the deepest point is up to 20% of the log diameter.

C. **Standard sawmill quality (SSQ)**

A third peeler grade that is suitable for back, face and core veneers and also for sawmill conversion.

**Length**

Minimum of 4.6 metres

**Diameter**

60 cm or larger at mid girth of the log measured under bark
The diameter at the smaller end shall measure not less than 75% of the diameter measured at the larger end.

Straight-grained, maximum deviation of the grain from straightness (spiral grain) shall not exceed 1 cm on every 90 cm length along the log projected into the plane.

Heart must be well centred and must be confined within 15% of geometrical centre of the cross-sectional diameter of the log and must be corresponding on both ends.

**Allowable defects**
The following additional defect may be permitted:

- One or two shakes where aggregate length does not exceed 5% of the total length of the log.
- One sound knot that does not exceed 20% of the average log diameter for every 5 metres length along the log.
- Up to 50 shotholes for every 3 m log length scattered over the surface of the log but not extending beyond the sapwood.
- Shakes at one or both ends of the log where aggregate length is over 5% and up to 15% of the length of the log.
- Simple curvature where the deviation of the longitudinal axis of the log from a straight line at the deepest point is 20 to 30% of the average log diameter.
- Heartwood rot or hollow on the butt end only, and not exceeding 10% of the cross-sectional area of the log.

D. **Fair sawmill quality (FSQ)**

A fourth peeler grade suitable for sawmill conversion and core veneer use.

**Length**

Minimum of 4.6 metres

**Diameter**

50 cm or larger at mid girth of the log measured under bark.

The diameter at the smaller end shall measure not less than 70% of the diameter measured at the larger end.

Straight-grained, maximum deviation of the grain from straightness (spiral grain) shall not exceed 1 cm on every 90 cm length along the log projected into the plane.

Heart must be well centred and must be confined within 20% of geometrical centre of the cross-sectional diameter of the log and must be corresponding on both ends.

**Allowable defects**
The following additional defects may be permitted:
• One or two shakes where aggregate length does not exceed 5% of the total length of the log.
• One sound knot that does not exceed 50% of the average log diameter for every 5 metres length along the log
• Up to 50 shotholes for every 3 m log length scattered over the surface of the log but not extending beyond the sapwood.
• Shakes at one or both ends of the log where aggregate length is over 15 to 40% of the length of the log.
• Simple curvature or compound curvature (two crooks) where the deviation of the longitudinal axis of the log from a straight line at the deepest point is over 30 to 40% of the average log diameter, provided that the first curvature must reach a length of 3.5 metres.
• Heartwood rot or hollow on one or both ends, and over 10 to 20% of the cross-sectional area of the log.

E. Small sawmill quality (SMSQ)
A grade that includes all small and super small logs. The upper portion of larger trees may also be graded under this class.

Length
Minimum of 4.6 metres

Diameter
Forty centimetres or larger at mid girth of the log measured under bark.
Logs need not be fresh cut, but must be free from decay and fungal attack except for the allowance given below.
The diameter at the smaller end shall measure not less than 70% of the diameter measured at the larger end
Straight-grained, maximum deviation of the grain from straightness (spiral grain) shall not exceed 1 cm on every 20 cm length along the log projected into the plane.
Heart must be well centred and must be confined within 60% of geometrical centre of the cross-sectional diameter of the log and must be corresponding on both ends.

Allowable defects
The following additional defects may be permitted:
• One or two shakes where aggregate length does not exceed 5% of the total length of the log.
• One sound knot that does not exceed 20% of the average log diameter for every 5 metres length along the log
• Up to 50 shotheoles for every 3 m log length scattered over the surface of the log but not extending beyond the sapwood.
• Shakes at one or both ends of the log whose aggregate length is over 15% and up to 40% of the length of the log.
• Simple curvature or compound curvature where the deviation of the longitudinal axis of the log from a straight line at the deepest point is over 30% to 40% of the average log diameter, provided that the first curvature must reach a length of 3.5 metres.
• Heartwood rot or hollow on one or both ends, and over not more than 20% of the cross-sectional area of the log.

F. Low quality (LQ)
Includes all logs which have the required length and diameter but with excessive defects that disqualifies them from any of the above grades. They are only suitable for sawmilling and the conversion is expected to be low. Most large hollow logs can be categorised under this grade.

Length
Minimum of 4.6 metres

Diameter
35 cm or larger at mid-girth of the log measured under bark.
Logs with the defects described above are permitted provided the average minimum radial sound shell must reach 15 cm or 1/3 of the cross-sectional diameter of the log, whichever is the larger.
5. Definitions

Air dried  Timber air dried to a moisture content in equilibrium with outdoor atmospheric humidity under local climatic conditions

Average length or width  For a parcel of timber the simple average length or width of the timber in the parcel is calculated by dividing the sum of the nominal lengths of the pieces by the number of pieces to give the average length or by dividing the sum of the nominal widths of the pieces by the number of pieces to give the average width

Bare, dead, exact  Applied to sawn timber that measures, at the time of inspection, the same as the dimensions specified

Bark pockets  Patches of bark enclosed within the growing tree (in-bark) and present in the sawnwood as a defect. Often containing gum or resin; c.f. gum vein, gum pocket

Blemish  Any feature that mars the appearance of timber but has no adverse effect on its technical quality. The following blemishes are not considered as defects in grading logs:

- curvature which is less than 10% of the average log diameter
- sound knots which have less than 25 mm diameter provided that their density is not more than two knots within a 2 metre interval of the log length along the axis of the log
- surface checks brought about by the sun whose penetration is less than 25 mm
- small borer holes scattered on a surface of a log but in a concentration of less than 15 within 144 cm² and not penetrating beyond the depth of the sapwood
- side or surface shakes that are less than 15 cm long along the axis of the log
- any feature such as slight decay, slight shakes

Board  A piece of sawn timber 5 cm or less in thickness and usually less than 15 cm in width

Board foot  A unit of timber measurement equivalent in volume to a piece having nominal dimensions of one foot (length) by twelve inches (width) one inch (thickness). This unit is abbreviated to FBM (feet board measure) or simply BM. In this rule measurements are made using metric units

Borer holes  A defect caused by insects which tunnel in the wood. Insect damage may occur in the living tree or shortly after felling while it is green. Usually caused by Ambrosia or pinhole borers and Bostrychid borers or after seasoning by Lyctus borers, termites, etc. In these rules borer attack is graded under three headings:

- pinhole borer: holes up to 3 mm diameter with or without associated staining
- grub holes: holes 6 mm and larger
- Lyctus borer: holes about 2 mm diameter and associated with destruction of the sapwood timber by the borer

Unless severely clustered so as to weaken the timber, pinhole and grub hole borer affects appearance only and can be tolerated in some grades, especially structural. Lyctus attack usually leads to destruction of the sapwood and is not permitted in any grade except in some framing grades where the amount of Lyctus susceptible sapwood is strictly limited
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bow</strong></td>
<td>Curvature along the length on the wide face of lumber usually resulting from stress in the log. Measured as the greatest deviation of the surface of a piece from a projection of the flat surface (figure 2). Allowable limits for bow are expressed as millimetres of offset per metre of length.</td>
</tr>
<tr>
<td><img src="image1" alt="Figure 2a Simple bow" /></td>
<td><img src="image2" alt="Figure 2b Compound bow" /></td>
</tr>
<tr>
<td><strong>Boxed heart</strong></td>
<td>A term used when the heart is enclosed within the four surfaces of a hewn or sawn timber through its entire length and reasonably well centred at both ends (figure 3).</td>
</tr>
<tr>
<td><img src="image3" alt="Figure 3 Boxed heart" /></td>
<td></td>
</tr>
<tr>
<td><strong>Brittle heart</strong></td>
<td>The wood in the zone adjacent to the pith, usually about 100 mm diameter which in an old tree may become brittle and decayed. Wood with brittle heart may often appear normal but will exhibit abrupt failure rather than splintering when broken under load; c.f. heart, heartwood.</td>
</tr>
<tr>
<td><strong>Buttress</strong></td>
<td>Any outgrowth of the butt connecting it to the root.</td>
</tr>
<tr>
<td><strong>Cant</strong></td>
<td>A section of a log produced in a sawmill and intended for further cutting.</td>
</tr>
<tr>
<td><strong>Check</strong></td>
<td>A fissure or crack along the grain of the timber but which does not pass through from one face to the opposite or adjacent one. Most checks are the result of stresses produced at right angles to the grain by moisture gradients during seasoning, and often called seasoning checks. End check is the most obvious.</td>
</tr>
<tr>
<td><strong>Clear</strong></td>
<td>Free of all visual defects, sound.</td>
</tr>
<tr>
<td><strong>Close stacked</strong></td>
<td>Lumber that is stacked solid without stickers. Also called block stacked.</td>
</tr>
</tbody>
</table>
Compression failures
Fractures in the grain of timber running transversely to the grain, often at approximately 45 degrees. They are the result of failure of the timber under severe compression stresses (figure 4). These compression stresses may result from growth stresses induced in the living tree that place the centre of the tree under severe compression and the outer zone under tension. This type of failure may be found towards the pith in older trees. Compression failure may also be the result of severe stresses caused by wind or when the falling tree hits the ground. These failures are found in the outer zones of the tree. Compression failures may be only visible when the timber is dressed. This defect is not permitted in structural grades.

Figure 4 Compression failure

Cubic foot
The volume of timber equivalent to a cube with sides measuring 1 foot in length, and is equal to 12 board feet or 0.028 m$^3$

Cubic metre
The volume of timber equivalent to a cube with sides measuring 1 metre in length. The standard of timber measurement under the metric system. Equals 424 FBM

Cup, cupping
Curvature in a piece of timber across the grain after sawing. Usually caused by drying stresses. Cup is measured as the greatest deviation from a straight line across the width of the piece, expressed in millimetres or as fractions of the width (figure 5)

Figure 5 Cup

Curvature
Deviation of the longitudinal section of the log from a straight line. Curvature is normally expressed as a percentage of the log diameter. Also referred to as bend.
Simple curvature
Bend of the log characterised by one crook only. Measured as the deviation of the longitudinal axis from a straight line (figure 6).

Figure 6 Simple curvature

Compound curvature
Bend of the log characterised by two or more crooks in one or several planes. Each bend or curvature is assessed separately (figure 7).

Figure 7 Compound curvature

Cylindrical log
Perfect round log where both ends represent a true circle. The standard is rarely achieved. Roundness is determined by measuring the largest diameter and the diameter at right angles to it and is expressed by the lesser diameter as a percentage of the greater diameter.

Decay
Destruction of the cell wall structure of wood caused by fungi including dry rot and wet rot. It is usually accompanied by discoloration of the wood and strength is seriously reduced.

Staining fungi, which feed only on the contents of the cells, do not reduce the strength of the wood but merely discolour it. For decay to take place the moisture content of the wood must be above 20%. Many of the timbers of Guyana have a high degree of natural resistance to attack by wood decaying fungi. Generally the resistance of the sapwood of all species to attack by both wood destroying and staining fungi is lower than of the heartwood.

Defect
Any feature whether occurring in the living tree naturally or produced in the process of conversion of lumber that affects the appearance or utility of sawn timber. Defect is the basis of the GTGR, which permits the sorting of hardwood timbers into groups and grades with definite end uses. The permitted incidence of the several types of defects in the various grades is defined in the rules.

Degraded
Occurs through poor storage, transport or handling when additional defects are developed in timber which would not have been permitted during initial grading.
Diamonding  A form of warp resulting from greater tangential than radial shrinkage that may cause a piece of green timber cut square or rectangular in cross-section to become diamond shaped (figure 8). Occurs when the rays of the timber are not parallel to the face or edge of the piece and is severe when the rays are at 45 degrees to these faces and the timber species has a high differential between its radial and tangential shrinkage. In most species this ratio is about 1.5 to 2.0

Figure 8 Diamonding

Dote  Decay in its early stages

Dressed timber  Timber, which has been planed to remove the marks of sawing on one or more faces. It is also called surfaced timber. Often abbreviated S1S (surfaced one side) up to S4S (Surfaced 4 sides) and D1S (Dressed one side), D1S1E (dressed one side and one edge), etc. up to DAR (dressed all round)

Edges  The two narrow surfaces of rectangular sawn stock

Equilibrium moisture content  The moisture content eventually attained in wood exposed to a given level of relative humidity (RH) and temperature. Since relative humidity is constantly changing the equilibrium moisture content (EMC) of timber also changes. In Georgetown EMC ranges from 12 to 16%. EMC in fully air conditioned buildings is usually 9 to 12% and calls for special care in seasoning timber for these situations

Faces  Longitudinal surfaces representing the width or wide surface of rectangular sawn stock; c.f. edges

Better face  Is the face having the superior appearance in visual grading

Worse face  Is the face having the inferior appearance in visual grading

Flat crack  A simple form of star shake consisting of a single shake lying along a diameter of the log. See shake
**Flat sawn** *(backsawn)*

Timber sawn so that the wide face is generally parallel to the growth rings and at an angle to the rays of the timber (figure 9). The extreme limit of flat sawn stock is when the rays make an angle of 45 degrees to the faces.

Figure 9 Flat sawn timber

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**Flitch**

A section of a log produced in the first stage of the sawmill intended for further cutting. May be of rectangular or irregular cross-section.

**Floatwood**

Low to medium density species, which will float as logs. Often (incorrectly) called softwoods in local trade. In Guyana these floating species are all technically hardwoods. See softwood and hardwood.

**Fresh cut**

A log which has sound sapwood, free from large and deep grub or wormholes as well as free from fungi.

**Full sawn**

When timber is cut so that its true measured size is greater than the nominal or ordered size. Usually done to allow for shrinkage of width and thickness during seasoning, c.f. tolerance.

**Gradient**

When seasoning of timber is not complete, so that different zones of the cross section (surface and core) have differing moisture content, the timber is said to have a moisture gradient.

**Grain**

See: Sloping grain.

**Green timber**

Unseasoned or partially seasoned timber. Timber fresh sawn or “green off saw”.

**Growth stress**

The stress, which develops in the growing trunk of a tree due to growth processes and which when released during sawing, may cause the sawn wood to spring and burst. The stress in the trunk is always tensile in the sapwood and compressive in the heart. Sawn wood from stressed logs tends to curve so that the sap side becomes concave and the heart side convex. Growth stresses are the major cause of shakes and compression failures in growing trees and of spring, bow and end shakes in sawn wood, and hence the major cause of degrade in dense tropical hardwoods.

**Gum vein, gum pocket**

Gum is a resin-like substance produced as a normal growth process by most trees, and may be dispersed through the wood or accumulated in veins, pockets or cavities. In some species this may become noticeable after seasoning.

**Hardwoods**

A term used to describe all timbers of the broad-leafed tree species. The structure of hardwood timber is different (fibres and vessels) to that of the softwoods (tracheids). The forests of Guyana consist of tropical hardwoods.

**Heart**

The central portion of the cross-section of a log immediately surrounding the pith. In older trees this area may be defective due to decay or excessive brittleness. See brittle heart, heartwood, boxed heart, sound heart.
| **Heartwood** | The inner part of the tree beneath the sapwood where the cells are no longer taking part in the growth process of the tree. Usually darker than sapwood in colour due to pigment deposits in the vessels, which also increases resistance to insect and fungal attack. |
| **Hewn timber** | Timber which has been squared from a log by an axe or adze rather than by sawing. Often used for heavy engineering timbers. |
| **Honey-combing** | Internal fissures or checks running in a radial direction produced in timbers of large section by attempting to season them too rapidly during kiln drying. Not usually visible until the timber is crosscut. This defect is not common among species from Guyana. |
| **Knot** | Portions of branches embedded in the wood. Knots are categorised by their position in the piece, mutual position, and degree of inter-growth or condition of the wood. When the log is sawn the knots appear as transverse round or oval sections (round knots) in the wide face of flat sawn timber (figure 10) or as longitudinal sections (spike knots) in the wide face of quarter sawn timber (figure 11). Knots as defects are measured as their width across the face on which they occur whether round or spike. The size of a knot is measured from the point where the fibres of the wood forming the knot terminate, often at a fine line of bark tissue. Any area of dark heartwood surrounding the knot is ignored, as it is not part of the knot itself. |
| **Scattered knots** | Knots located separately so that the distance between them in longitudinal direction of the piece is greater than their width, or in cases where the width exceeds 150 mm, are greater than 150 mm apart. |
Group (cluster) knots

Round, oval and *arris* knots forming a group of two or more knots in an area where the length is equal to the width, or in case where the width exceeds 150 mm, in an area 150 mm long (figure 12). They are measured by the sum of the sizes of all knots. Each round or oval knot is measured by the minimum diameter of the knot cross-section while *arris* knots are measured by the extension of the knot on the *arris*

Figure 12 Group knots

Arris knots

Knots exposed on the *arris*. Measured as the length of the knot along the *arris* (figure 13).

Figure 13 Arris knot

Dead knots

Knots with their annual rings not inter-grown with the surrounding wood, or inter-grown with it only to a length ¼ or less of the cross-sectional perimeter of the knot

Hollow knot or knothole

Where the section of the knot produced in sawmilling has fallen out or decayed to leave a hole

Rotten knot

Knots in which more than 1/3 of the cross-section is rotten

Sound knot

Knots showing no indication of decay

Unsound knot

Knots in which not more than 1/3 of the cross section is rotten

Log

A bole or a length of bole or large branch after felling, trimming and crosscutting

Lumber

Sawn wood, usually with a cross-section less than 280 cm²

Moisture content

The amount of water wood contains expressed as a percentage of its oven dry weight. Green timber freshly sawn may contain 70 to 100% moisture, shipping dry timber 20 to 30% and air seasoned timber about 12 to 16%. For furniture and joinery products most timber will need to be kiln dried to a final moisture content of between 9 and 12% depending on ambient conditions
Pipe
Hollowness in a log or timber along the centre of the heart following the pith and caused usually by attack of subterranean termites on the standing tree

Pith
The spongy central core 3 to 6 mm diameter in the exact growth centre of the log section. Pith is the remains of the growing tip of the tree

Plank
A piece of sawn timber more than 25 mm thick and more than 150 cm wide with width not less than twice the thickness

Punk, punky heart
Unsound decayed wood usually part of the heart of the log. Also called fireheart

Quarter sawn
The opposite to flat or backsawn. Sawnwood cut so that its width is substantially parallel with the rays of the timber (figure 14). Pieces are considered quarter sawn under these rules when the rays make an angle of not more than 45 degrees to the wide face; c.f. flat sawn

Figure 14 Quarter sawn timber

Radial direction
The direction measured from the pith along a radius of the cross section of log or tree stem; c.f. tangential direction

Rays
Ribbons of tissue containing parenchyma cells, which run outward on a radius from the pith to the bark. They give a characteristic fine striped appearance to a timber surface when it is split along a radial direction

Relative humidity
The ratio of the actual amount of water vapour contained in the atmosphere at a particular temperature to the amount required for saturation calculated as a percentage

Resin pocket
See gum vein

Rot
See decay

Rough sawn timber
See sawn timber

Run off
See want
Sapwood
The outer layer of wood in a tree stem adjacent to the bark and playing an active part in the growth process of the tree (alburnum). Sound sapwood is as strong as heartwood and is normally included in sawn wood. The sapwood of some species is subject to Lyctus Borer attack and may become discoloured due to staining fungi. Under the GTGR sound sapwood, not Lyctus susceptible, is admitted in all grades unless excluded by special arrangement.
Simple preservation by diffusion of salts of boron and fluorine are used for the treatment of Lyctus susceptible sapwood.
Since sapwood is not normally as durable as heartwood, under severe conditions of exposure i.e. in ground contact or a marine environment, sapwood, unless treated with a non-leachable preservative, is usually excluded or limited in engineering timbers.

Sawn timber (lumber)
Timber usually of rectangular cross section and cut square at each end produced in a sawmill from logs.

Scale
Closely spaced small shakes giving the face of sawn or dressed lumber a scaly appearance (see shake).

Scant (sawn)
Timbers which when graded measure less by at least half of the cutting allowance in the nominal dimension. Normally such a scant causes rejection by the GTGR unless subject to special conditions agreed with the customer.

Scantlings
Sawn timber more than 25 mm thick and 75 mm wide of end section and less than about 280 square centimetres. Usually intended for use in construction and building work.

Seasoning
The process of drying wood to the point where the moisture content is sufficiently low to enable its product to be used satisfactorily in service without degrade.

Kiln seasoning
The process in which green or partially air-seasoned timber is dried in a kiln. This allows the timber to be seasoned quickly or to a lower moisture content than the local EMC. Under the GTGR seasoned timber is defined as timber seasoned to a standard moisture content of between 8 and 14%.

Seasoning checks
Separations of wood cells along the grain as a result of uneven shrinkage, most common on end-grain surfaces of timber.

Shake
Separation of the wood fibres along the grain. In the case of a log, shakes are broadly divided by their position in the log: end shake and side shake. In the case of sawn lumber, shakes are divided by their type, their position in the piece, and their depth.
**Log shakes**

Measured as the length in centimetres along the longitudinal axis of the log

Figure 15a Side shake  Figure 15b Through shake  Figure 15c Drying shake

![Log shakes](image)

**Cup shake**

Ring shake c.f., extending for less than half a diameter

**Deep shakes**

Shakes deeper than 5 mm for pieces of not more than 50 mm in thickness, and those deeper than 1/10 of the thickness in the thicker pieces, but not appearing on the other side of the piece

**Edge shakes**

Shakes appearing on an edge but which may also appear on the ends (figure 16). They are measured by their maximum penetration (in millimetres or as fractions of the thickness or width of the piece) and by their length (in centimetres or as fractions of the length of the piece)

Figure 16 Edge shake

![Edge shake](image)
**End shakes**  
Shakes appearing on an end but not appearing on the faces or on the edges (figure 17). They are measured on the end by their length in millimetres or on that side of the piece where their projection is greater as a fraction of the width. If it is an end-ring shake forming less than half a circle (figure 16d), it is measured by the chord. Those forming half a circle and more are measured by the diameter.

Figure 17 End shake

**Face shake**  
Shakes appearing on a face but which may also appear on the ends (figure 18)

Figure 18 Face shake

**Frost cracks**  
Radial-directed shakes extending from the sapwood to the heartwood and characterised by a considerable extension lengthwise along the piece. They are developed in the standing tree and are accompanied by a darkening of the adjoining wood and by local curvatures in the annual rings.

**Heart shake**  
Radial shade extending from the heart and characterised by a considerable extension lengthwise along the piece (figure 19)

Figure 19 Heart shake
**Ring shakes**  
A separation of wood structure parallel to the growth rings, often in the first layer(s) of earlywood, usually occurring in the standing tree and characterised by a considerable extension lengthwise along the piece (figure 20). Also known as ring failure, shell shake

Figure 20 Ring shake

**Shallow shakes**  
Shakes no deeper than 5 mm for pieces of not less than 50 mm in thickness or not deeper than 1/10 of the thickness in the thicker pieces but not appearing on the other side of the piece

**Through shakes**  
Shakes appearing on two sides, or twice on one side of the piece in the case of ring shakes

**Shorts**  
Pieces of sawn timber less than 2.4 m long

**Shrinkage**  
The reduction in size across the grain, which occurs when timber is seasoned from the green condition. To meet a particular dimension when seasoned, green timber must be cut oversize by an amount commonly about 5-10%, known as the shrinkage allowance. There is virtually no shrinkage in timber along the grain when it is seasoned from the green state

**Sloping grain**  
Divergence of grain from the direction of the longitudinal axis of the piece. Sloping grains are measured in the most characteristic place of the grain over a length of not less than double the width of the piece. The value of the deviation of grain (without taking into consideration local deviations) is measured and expressed as a percentage (figure 21). Sloping grain affects the strength of a piece of timber and must be limited in timber intended for engineering use

Figure 21 Sloping grain
Interlocked grain

Repeated alternation of left and right-hand spiral grain, each reversal usually distributed over several growth rings. Interlocked grain has no serious effect on strength but makes the timber difficult to split and may produce an attractive ribbon stripe figure in the timber on quarter sawn faces. It should not be confused with sloping grain.

Softwoods

Gymnosperm group of timber species as distinct from the broad leaved angiosperm or hardwood group of timbers. Typical true softwoods are the Caribbean pine and Canadian white pine.

Sound

Free from decay

Sound heart

When the wood surrounding the pith of the log is free of decay, severe shakes and is otherwise sound it is described as sound-heart and lumber sawn to include it is said to include sound-heart; c.f. heart.

Spall

A shake, which is running along the grain mainly from the face or side of sawn or hewn timbers. It is a fault arising during manufacture.

Spring

Curvature along the length of the edge of a board. Also called crook and side-bend. Limits for spring are given in the grading rules as millimetres of offset per metre of length (figure 22). As for bow, allowable offset increases as the square of the length. Thus 25 mm deviation from the flat plain in a 3.5 m length becomes equivalent to 100 mm deviation in a 7 m length.

Figure 22 Spring

Stain or discoloration

A variation from the natural colour of the wood. May be caused by sap stain fungi, by incipient decay, by chemical effect from metals such as iron or as a result of some abnormal growth process in the tree. Stain which is sound (not related to decay), is permitted in grades where appearance is not a factor, or where it would normally be removed by dressing.

Stickers

The strips of wood placed at regular intervals between each layer of timber when it is stacked for seasoning to permit free circulation of air.

Surface dry

Timber where only the surface of the board has dried and where the interior in cross section is still green. Such timber is not regarded as shipping dry.

Tally

The measurement of timber in a parcel listed by width, thickness, length, species, grade, etc.

Tangential direction

The direction in a cross-section of a piece of timber at right angles to the medullar rays and parallel to the growth rings where they are present.
**Tolerance**  
A portion of the length, width or thickness of log or timber provided to maintain its nominal length as specified in a standard. Usually given as a plus and minus amount.

For example, sawnwood of size 2.5 m ± 25 mm, would be acceptable as long as it measures 2.5 m plus an additional allowance of between 0 and 25 mm (between 2.50 m and 2.75 m). If the order is written as 2.5 m + 10 mm, - 8 mm, the timber would be accepted when the allowance is between (10 – 8 =) 2 mm and 10 mm, i.e. as long as it measures between 2.52 m and 2.60 m.

**Twist**  
A form of warp in which the four corners of a flat surface (board) are no longer in the same plane (figure 23). Twist is measured as the greatest deviation of the surface of a piece from the plane surface in millimetres or as fractions of the length of the piece.

**Undressed timber**  
Sawn timber which has not been smoothed by planing to a regular dimension.

**Wane**  
The lack of wood on any face or edge of sawn wood due to it being sawn too close to the surface of the log. Bark may or may not be present. Incidence of wane is limited in the GTGR. Wane is measured by the maximum difference between the width of the corresponding sides of the piece in millimetres or as fraction of the width of the corresponding sides (figure 24); c.f. want.

**Want**  
When through bad sawing a portion of the timber usually at an end is below tolerance on size. It is not a permitted defect under GTGR. Also called run off.

**Warp**  
Distortion in timber caused by growth or seasoning stresses. It includes bow, spring, twist and cupping.

**Weather stain**  
Surface discoloration produced on timber during seasoning by exposure to sun and rain. It is superficial and is not a defect in sawnwood.

**Worm holes**  
A term used in the timber trade loosely to describe borer holes.
Wrought, wrot

A timber surface produced either by sawing or planing
6. Timbers of commercial interest

<table>
<thead>
<tr>
<th>Species</th>
<th>Air-dry density</th>
<th>Strength group</th>
<th>Durability class</th>
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</thead>
<tbody>
<tr>
<td>Baromalli <em>Catostemma commune</em></td>
<td>560 kg/m³</td>
<td>C</td>
<td>2</td>
</tr>
</tbody>
</table>

A low to medium density timber, not naturally durable, with an attractive ray figure on quarter sawn surfaces. Baromalli has been tested for plywood manufacture and has been assessed as suitable. Suitable for general manufacturing and interior construction. Air dries without extensive degrade and works easily with machine and hand tools, giving a clean but somewhat fibrous finish. Easily preserved by diffusion.

The heartwood is dull yellowish to pinkish-brown, not sharply defined from the lighter coloured sapwood which is susceptible to sap-staining fungi. The texture is rather coarse and the grain straight. Dark coloured resin streaks occur as arcs on the cross section and lines on the surface.

| Crabwood *Carapa guianensis* | 560 kg/m³       | C              | 1               |

A low to medium density timber used traditionally for general carpentry, furniture and cabinet work. Suitable for general hardwood joinery such as shop fittings. The wood is durable and moderately difficult to season. Straight grained material works easily with both hand and machine tools, finishing smoothly. Tendency to split on nailing. Takes stain and polishes well.

The heartwood is variable in colour from pale pink through rich red brown to dark brown streaked with black; sapwood in light coloured material not readily defined - otherwise oatmeal coloured and distinguishable. Lustre and texture variable. Grain usually straight, occasionally roey.

| Dalli *Virola surinamensis* | 560 kg/m³       | D              | 2               |

A tree with flat or square crown, horizontal branching, with spreading plank buttresses to 4.5 meters height. Occasionally stilt-rooted to 1.5 meters diameter, and over 42 meters height. Usually about 60 cm diameter, bole cylindrical 18 to 24 m long, frequent to locally common in riparian, mora and marsh forest throughout the country.

Wood pale cream with brown flecks; medium texture; straight grain; perishable, works easily without splitting; absorbs glue well, can be stained, varnished and polished, with good results; does not warp or check in drying. Locally used for match boxes, coffins, and inside boarding. Suitable for general carpentry, packing cases, plywood, slack coverage chipboard, and concrete shuttering.

| Determa *Nectandra rubra* | 625 kg/m³       | C              | 1               |

A large canopy tree with compact crown; unbuttressed; strongly tapered; 60 –90 cm diameter; 27 to 40 meters in height; bole 18 to 24 meters long; cylindrical. Locally occasional in rainforest. Distribution more or less following the bauxite from Essequibo River eastwards.

Wood pinkish red with golden lustre, moderately coarse textured, straight to irregular grained, faintly aromatic; moderately hard and heavy; highly resistant to insect and decay; compares favourably with moderately dense Mahogany, takes glue badly but takes nails well; stains well, turns well and carves well; requires filling before polishing. Used for boat and carriage building, masts, furniture, carving, interior work, and general carpentry.

| Duka *Tapirira marchandii* | 480 kg/m³       | D              | 2               |

A low density, soft timber suitable for interior finishing and utility furniture. Has been used for matchboxes. Not naturally durable. Air-dries easily with little degrade, works easily and finishes smoothly.

The heartwood is pinkish not sharply defined from the lighter coloured sapwood; fairly lustrous at first becoming pock-marked with small, dark-coloured gummy exude. Texture fine, grain straight.
<table>
<thead>
<tr>
<th>Species</th>
<th>Air-dry density</th>
<th>Strength group</th>
<th>Durability class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dukali</td>
<td>480 kg/m³</td>
<td>D</td>
<td>2</td>
</tr>
<tr>
<td>Parahancornia fasciculata</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Fukadi</td>
<td>720 kg/m³</td>
<td>C</td>
<td>2A</td>
</tr>
<tr>
<td>Terminalia amazonia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Futui</td>
<td>480 kg/m³</td>
<td>D</td>
<td>2</td>
</tr>
<tr>
<td>Jacaranda copaia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenheart</td>
<td>1005 kg/m³</td>
<td>A</td>
<td>1A</td>
</tr>
<tr>
<td>Chlorocardium rodiei</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haiariballi</td>
<td>560 kg/m³</td>
<td>D</td>
<td>2</td>
</tr>
<tr>
<td>Alexa imperatricis</td>
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</tr>
</tbody>
</table>

A low density timber not naturally durable. Suitable for interior construction, and general manufacturing. Air-dries easily with little degrade except for sap stain if improperly stacked; works easily and finishes smoothly. Easily preserved.

The heartwood is normally off-white, occasionally pale cream to pinkish, not sharply defined from sapwood. Fairly lustrous, odourless and tasteless; fairly hard and firm, texture moderately fine; grain straight.

A moderately heavy, moderately durable timber suitable for all interior finishing including flooring and furniture, and veneer for decorative purpose. Air-drying performance is variable. Straight grained timber finishes smoothly. Does not nail well because of a tendency to split and it can be glued, stained and polished satisfactorily.

Not naturally durable but easily preserved. Easy to work and machines cleanly when seasoned. Used for interior finishing and furniture components and suitable for exterior joinery if treated with preservative. Air-dries easily with little degrade, but heavily interlocked grain timber may be prone to warping.

The heartwood is pale cream to greyish white, not sharply defined from the sapwood. Somewhat lustrous, medium to coarse, uniform texture. Grain is usually straight, occasionally interlocked.

The best known of all the timbers of Guyana. A high density timber of great strength and durability. Fire resistant and highly resistant to Teredo and other marine organisms. The principal uses are in marine construction: piling, piers, lock and sluice gates, and timbers and planking in ship-building. It is the preferred local building timber, for framing, cladding and flooring. Air-dries readily due to its low even shrinkage but care is required in kiln drying.

The heartwood varies in colour from greenish yellow to olive brown to blackish, the light coloured timber often with irregular dark streaks. The sapwood is not sharply defined. The wood is lustrous and the grain usually straight but occasionally curly or roey.

Timber of three species of the genus Alexa of which A. imperatricis is the most abundant. A low density timber not naturally durable. The heartwood may show some collapse in seasoning but responds to reconditioning. The timber is easily preserved by diffusion, works easily and finishes satisfactorily. Suitable for interior construction, plywood manufacture and for paper pulp.

The sapwood is yellowish-brown coloured, very wide, merging gradually into creamy brown or pinkish heartwood. Lustre medium to low; texture medium to coarse; grain usually straight.
### Table: Timber Properties

<table>
<thead>
<tr>
<th>Species</th>
<th>Air-dry density</th>
<th>Strength group</th>
<th>Durability class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hububalli</strong> <em>Loxopterygium sagotii</em></td>
<td>640 kg/m³</td>
<td>D</td>
<td>1A</td>
</tr>
<tr>
<td>A low to medium density timber of high natural durability. An attractive furniture wood suitable for interior finishing and cabinet work. Air-dries easily with little degrade. Works well and finishes smoothly. The heartwood is brown or reddish brown or tan, streaked with broad black bands on the flat-sawn and thin black streaks on the radial surface. Greyish-white sapwood sharply defined. Lustrous, non-figured surfaces often pock marked with gummy exude. Slight odour; tasteless. Grain usually straight, sometimes very irregular. Texture moderately fine.</td>
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</tr>
<tr>
<td><strong>Kabukalli</strong> <em>Goupia glabra</em></td>
<td>800 kg/m³</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>A medium to high density timber of high natural durability suitable for heavy construction, house building, furniture and decorative veneer. Works easily to a smooth finish. The heartwood light brown, often with scattered oily specks, darkening to reddish or pinkish on exposure. Sapwood distinct but not sharply demarcated. Freshly cut material has a foetid odour, which disappears on drying. Texture coarse. Grain straight to irregular.</td>
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<td></td>
</tr>
<tr>
<td><strong>Kakaralli, Black</strong> <em>Eschweilera sagotiana</em></td>
<td>1120 kg/m³</td>
<td>A</td>
<td>1A</td>
</tr>
<tr>
<td>Timber of several species of the genus <em>Eschweilera</em>. The species here described is <em>Eschweilera sagotiana</em>, common black Kakaralli. A very dense, hard, naturally durable, tough and strong timber, suitable for marine and heavy construction. It contains an appreciable amount of silica and is difficult to work, having a dulling effect on cutting edges. The heartwood is light brown with pinkish tinge when unseasoned, becoming greyish to reddish brown when dry. Odourless and tasteless. Texture fine, uniform, and vessel lines containing white deposits. Grain usually straight.</td>
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<tr>
<td><strong>Kereti Silverballi</strong> <em>Nectandra</em></td>
<td>640 kg/m³</td>
<td>D</td>
<td>1</td>
</tr>
<tr>
<td>Timber from a group of low density species of <em>Nectandra</em> and <em>Ocotea</em>. The timber is soft but firm textured, moderately durable and suitable for all interior finishing cupboards and furniture construction. It air-dries readily with little degrade and works easily, finishing smoothly. The colour of heartwood ranges from greyish through yellowish buff to light brown and darkens on exposure. The straw coloured sapwood is not distinguishable in the lighter coloured material. The wood is lustrous, fine textured and usually straight grained. Fresh cut green wood has an offensive odour, which changes on drying to faintly to highly aromatic depending on species.</td>
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</tr>
<tr>
<td><strong>Kirikaua</strong> <em>Iryanthera lancifolia</em></td>
<td>560 kg/m³</td>
<td>D</td>
<td>2</td>
</tr>
<tr>
<td>A low density soft timber not naturally durable. Air dries easily with little degrade; suitable for interior finishing, works easily with both hand and machine tools. The heartwood is light pinkish to dull oatmeal in colour not sharply defined from the sapwood. Lustre medium. Odourless and tasteless. Texture medium to fine. Grain straight.</td>
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<tr>
<td><strong>Kurokai</strong> <em>Protium decandrum</em></td>
<td>560 kg/m³</td>
<td>D</td>
<td>2</td>
</tr>
<tr>
<td>A low to medium density timber, not naturally durable in exposed exterior conditions. Suitable for interior work, furniture and cabinet making, excellent for utility veneer and plywood manufacture. Fairly easy to season; works fairly easily but the grain has a tendency to rise in finishing. The heartwood is pinkish brown darkening on exposure. Sapwood pale buff-coloured. Lustre medium to high. Texture uniform moderately fine grain straight to irregular, sometimes interlocked.</td>
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<td></td>
</tr>
<tr>
<td>Species</td>
<td>Air-dry density</td>
<td>Strength group</td>
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</tr>
<tr>
<td>Locust</td>
<td>880 kg/m³</td>
<td>B</td>
<td>1</td>
</tr>
</tbody>
</table>
| Timber of two species, *Hymenaea courbaril* and *H. davisii*. The commoner, *H. courbaril* is a heavy, hard, strong and durable timber suitable for general construction. Its decorative appearance makes it especially suitable for high grade furniture, cabinet work and decorative joinery and veneer. Moderately difficult to work but finishes smoothly.

The heartwood is light brown or brown, often with dark streaks and with a subdued golden glow. Usually wide whitish grey sapwood is sharply defined. Lustre medium, uniform, vessel lines distinct. Odourless and tasteless. Grain usually straight.

**Manni** *Symphonia globulifera* 720 kg/m³  D  1

A medium density easily worked, durable timber. Sapwood prone to *Lyctus* attack. Air-dries easily with tendency to slight checking and warping. The timber is suitable for general construction, carpentry, and railway sleepers.

The heartwood is variable in colour from yellowish to pinkish or reddish brown, sometimes with a greenish tinge; greenish yellow deposits sometimes visible in the vessel lines. The usually wide sapwood is greyish white, distinct from heartwood and susceptible to sap-stain fungi. Lustre usually low due to abundance of wood parenchyma; texture coarse, harsh to the touch. Grain is usually straight; odourless and tasteless.

**Manniballi** *Moronoea coccinea* 880 kg/m³  B 1

A dense, hard and tough, durable timber suitable for general construction and furniture. Air dries readily with little degrade and is easily worked though somewhat splintery, finishing smoothly and taking a high polish.

The fresh heartwood is pale creamy yellow with lines of lighter coloured pencil stripping of parenchyma. Rarely some samples are mottled a rich, deep reddish, brown. Normal timber darkens with age to a deep yellow brown. Lustre medium. The wood gives off a slight spicy odour while being worked. The texture is medium and the grain usually straight.

**Maporokon** *Inga alba* 560 kg/m³  D  2

A low to medium density timber; fairly hard, suitable for interior finishing and furniture and possibly for sliced decorative veneer. Easy to work, finishing smoothly.

The heartwood is dark pinkish brown with dark brown prominent vessel lines. Sapwood almost white becoming greyish. Wood lustrous, odourless and tasteless. Texture coarse. Grain straight.

**Mora** *Mora excelsa* 1005 kg/m³  A  1A

A dense, hard, strong and tough timber; very durable. Traditional uses include railway sleepers, heavy construction, bridges, mud cills, boat building (ribs, knees, etc.) motor bus bodies and decking; wagons and house construction. The wood is moderately difficult to work, hard to saw but machines well, turning well and producing a smooth finish on straight-grained material. It is difficult to nail but holds nails and rail spikes well; very difficult to split.

The heartwood variable in colour from pale brown to reddish brown, often with white deposits in the vessel lines. Greyish sapwood readily attacked by insects and decay. Lustre low to medium. Slight odour and astringent taste. Texture coarse to medium. Grain often irregular sometimes interlocked.

**Morabukea** *Mora gonggripii* 1005 kg/m³  A  1A

For all practical purposes similar to Mora in density, strength, structure, appearance and uses.

The heartwood of Morabukea is a deeper reddish brown, is more fine-textured, lustrous and straight-grained.
Timber from four species of the genus *Peltogyne*. A dense, very strong and durable timber used in heavy construction, building construction, decorative joinery, shop fittings, furniture, turnery, parquetry, billiard cue butts and veneer. The wood is not especially difficult to work. Saws planes and turns well, finishing smoothly. Air dries easily with slight to moderate warping in thick material.

The fresh-cut heartwood is a dull brown colour becoming purplish brown to deep purple or violet on exposure. The purple colour darkens with age to black brown; but bleaches to a dull grey-brown if exposed to direct sunlight. The greyish white sapwood is sharply defined. Lustre medium; texture medium to fine; grain usually straight, sometimes interlocked giving rise to a fine stripe figure.

**Purpleheart**

*Peltogyne violacea*

650 kg/m$^3$     A 3

A rather hard, strong timber suitable for general house construction, panelling and furniture. The wood is easy to work but hard to nail. It polishes well.

Heartwood is greenish yellow-brown, sometimes with pink-tinged zones; odourless but with slight bitter taste; texture medium to fine; grain straight to irregular.

**Shibadan** *Aspidosperma album*

640 kg/m$^3$     B 1

A low density timber, not naturally durable and suitable for all interior finishing, and cupboards, etc. Also suitable for utility wood ware, furniture and toys. Shibadan is easy to work with both hand and machine tools. It is liable to attack by sap stain fungi.

Heartwood is whitish, not differentiated from the whitish or straw coloured sapwood. The storied structure of the rays is readily visible. The wood is lustrous with a medium uniform texture. It is odourless, but has a slightly bitter taste. The grain is usually straight.

**Simarupa** *Quassia amara*

480 kg/m$^3$     D 2

A low density timber not naturally durable under exterior exposed conditions but suitable for general carpentry in interior construction.

The wood is pinkish cream, occasionally pale purple flushed; not lustrous; moderately fine-textured; grain usually straight.

**Suya** *Pouteria speciosa*

560 kg/m$^3$     D 2

A rather heavy, hard, tough and strong timber, naturally durable. Suitable for general building construction including flooring and panelling, furniture, turnery, and sliced decorative veneer. Difficult to work but finishes smoothly, taking a high polish after filling.

The wood is rich brown to dark brown with striping of light coloured parenchyma; vessel lines sometimes with white crystalline deposits. The thin dirty white to yellowish sapwood is sharply defined. Lustre variable according to straightness of grain, waxy, grain usually straight, sometimes irregular, often interlocked giving rise to a fine stripe figure; texture coarse; odourless and tasteless.

**Tatabu** *Diplopterys purpurea*

1005 kg/m$^3$     B 1

A dense, highly durable, strong timber suitable for general house construction and furniture. Popular for flooring and panelling. Machines cleanly and air dries with little degrade.

Heartwood varies from fawn colour to reddish-brown to dark brown. Sapwood is not well defined. Lustre and texture medium to fine and the wood is odourless and tasteless. The grain is usually straight.
<table>
<thead>
<tr>
<th>Species</th>
<th>Air-dry density</th>
<th>Strength group</th>
<th>Durability class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ulu</td>
<td>480 kg/m³</td>
<td>D</td>
<td>2</td>
</tr>
</tbody>
</table>

Timber from the species *Trattinickia demerarea* and *Trattinickia rhoifolia* from the Burseraceae family. Trees have large and rounded crowns; unbuttressed or with thick low buttresses, cylindrical, little taper, with aromatic resin present. They grow to 2.4 metres in diameter and 36.5 metres height. Usually 60 to 90 cm diameter; bole 21 to 24 m high; occasional in heavy forest; general distribution.

Wood pale creamy, finely flecked brown, fairly lustrous; texture medium to coarse; grain roey, non-resistant to decay. Suitable for inside boarding, cupboard linings, canoes and plywood.

| Wallaba                  | 960 kg/m³       | B              | 1A               |

Timber of several trees of the genus *Eperua*. The best known is *Eperua falcata* (soft wallaba). A highly durable timber used traditionally for transmission poles, fence posts, paling and vat staves, shingles, fuel-wood and charcoal. It is also used both hewn and in the round for housing framing. The wood is very fissile but difficult to saw because of its resin content.

Heartwood a dull red to reddish or purplish brown, the surface stained with dark oily or resinous exude; sharply defined from the greyish sapwood. The wood is not lustrous. A disagreeable, rancid odour is noticeable. The texture is coarse and the grain straight.

| Wamara  Swartzia leiocalycina | 1200 kg/m³      | A              | 1A               |

A very dense, very hard, very durable timber popular for fine furniture and cabinet work, parquet flooring, fine turnery and inlay work. Suitable for heavy durable construction. The wood is difficult to work but scraping and sanding is easy giving a fine finish, which takes a high polish.

The heartwood is purple or purplish-brown sharply differentiated from the thick, white or yellowish-white sapwood, which is often used in furniture along with heartwood to give a two-toned effect. A rather fine-textured, moderately lustrous timber, the storied structure readily visible. Odour and taste not distinctive. The grain is usually straight.