



Outdoor Structures Australia

Practical solutions that enhance community design projects

SUBJECT : GRADING AND PROPERTIES OF TIMBER

INTRODUCTION

The strength of timber is described in terms of "stress grades". Stress Grading is a way of classifying timber, either visually or by mechanical means to indicate the basic properties to be used for structural design purposes.

The stress grade is designated in a form such as "F14", which indicates that the working stress in bending is approximately 14 MPA (Megapascals). The stress grade is influenced by:

1. The inherent strength of the species concerned, eg. Iron Bark (Strength Group 1) is stronger than Blackbutt (Strength Group 2), and Slash Pine (Strength Group 5) is stronger than Radiata Pine (Strength Group 6), and

As all of the species of hardwood which we supply for structural purposes are a minimum (& mostly) Strength Group 2, for simplicity, we use this group as our standard.

2. The quality of the sample of timber being examined. i.e. The stress grade will vary within one species depending on the size and extent of faults such as knots, gum pockets, or sloping grain.

For a sample of timber from Strength Group 2 to be graded as F14, it must not have:

1. A knot more than 1/3 of the width, and/or
2. Loose gum veins 1/4 of the length, and/or
3. Want & wane 1/4 of the cross section

For a sample from the same species to be graded as F17, it must not have:

1. A knot more than 1/4 of the width, and/or
2. Loose gum veins 1/6 of the length, and/or
3. Want & wane 1/5 of the cross section

In most cases, the size and grade of timber required for a particular application is determined from tables contained in Technical Publications such as the TRADAC Timber Framing Manuals.

Stress grading only guarantees the strength of the timber at the time of grading and does not guarantee other characteristics such as appearance, durability under adverse conditions, and shrinkage.

APPEARANCE

If timber is to be used in an application where its

appearance is important, the faults which are allowed under the grading rules may well be unacceptable. Ordering a higher grade of timber e.g. F17, will not guarantee satisfactory appearance, as, the lesser size and extent of faults which are allowed under the higher grade may still be unacceptable.

To ensure satisfactory appearance, "select" or "appearance" grade timber should be ordered. In this case, timber of a high standard which contains few of the faults inherent in the species would be selected from "run of mill" production, and supplied as select grade. Select grade is charged at a dearer rate than structural grade.

As "appearance grade" hardwood contains few, and then normally only minor, defects, it naturally follows that it would be of a high strength grade (F17 or greater) if it were to be visually graded. In Hardwood, whether F14 Select or F17 Select were to be ordered, then to all intents & purposes, the "select" would determine the quality, and the same timber would be supplied in both cases.

Certain hardwood products, eg Verandah Posts, Fascias and Steps amongst others, are almost always required to be of selected quality and/or species. Unless otherwise specified, such products will be quoted, supplied and charged as Select Grade.

Consideration must be given to the effect that the intended surface finish will have on rough sawn appearance grade Hardwood used internally. Spotted Gum (our preferred species for Select Grade), must be treated if any sapwood is present in a particular piece, and treated timber may be visually unacceptable in certain situations.

If the timber is to be coated with a clear finish, or lightly stained, species should be ordered and supplied which do not require treating (thereby retaining the timber's natural colour) The disadvantage with using other species is that the timber may exhibit more surface checking during seasoning than would Spotted Gum. If dressed, and then coated with a clear finish, or lightly stained, Spotted Gum can generally be supplied, as any superficial green stain will be dressed off with only the sapwood remaining green after dressing. If the timber is to be painted, then it is normally acceptable to supply treated Spotted Gum, as the green colouring will be painted over (after the surface has been washed and brushed to remove surface chemical which may

affect paint adhesion).

Appearance grade pine is normally ordered in conjunction with a high stress grade of the particular species, eg. for cypress - F7 Appearance Grade. This does not mean the timber will be supplied without knots and other faults, but that it will be of a high standard within the species. The required stress grade should still be specified, if applicable, so as to ensure that the timber is at least suitable for its structural application.

Some species of pine can be ordered and supplied as "clears" , i.e. no knots or faults, but at a significant premium over structural grade. or even select quality..

SELECT SPECIES

Some species of hardwood have superior weathering and mechanical properties to others within the same strength group. Spotted Gum is more resistant to cracking during drying than many other species, and hence is our preferred choice for appearance grade timber.

Spotted Gum is also widely regarded as being more flexible than many other species, and is widely used for stockyard rails where resistance to impact is important.

DRESSING

Timber which is ordered as "sized" (or "thickened") is assumed to be required for structural purposes only, and of the stress grade specified. "Sized" normally means dressing one face and/or one edge only, to make the timber a particular size, eg. sizing floor joists to provide a uniform horizontal surface for fixing flooring, or sizing wall studs to provide a uniform vertical surface for fixing internal sheeting.

Timber which is required to be Dressed on 4 sides or "D.A.R." (Dressed all round) is almost always required to be of superior appearance. Unless otherwise specified, timber ordered as D.A.R. will be quoted, supplied and charged as Appearance Grade.

Unless a finished size is nominated, timber dressed on 1 face only is supplied 3mm below the nominal dimension, whereas timber dressed on 2 opposite faces is supplied 5mm below the nominal dimension. When timber is freshly sawn, a tolerance of 3mm below the nominal size is allowed. It is assumed that, in the selection of timber sizes, the customer has made the appropriate allowance for the finished size to be 5mm below the nominal size, when requiring timber to be D.A.R..

DURABILITY

Ordering by stress grade ensures that the timber will take its required load at the time it is supplied, but does not ensure its long term durability where it is exposed to adverse conditions eg. as in-ground posts, pergola timber, or verandah bearers and joists where they will be intermittently wet and dry.

Common timber species are given a durability rating, which gives an indication of the resistance of the heartwood of the species to fungal and insect (termite) attack. The durability rating is expressed as one of four classes, and is based on in-ground field trials of heartwood. The range is from Class 1 (25-50 years in-

ground life) to Class 4 (1-8 years in-ground life). Untreated sapwood is generally regarded as Class 4 durability, irrespective of species.

When timber is to be exposed to the weather, it is advisable to use only species of Durability Class 2 eg. Blackbutt, Spotted Gum, Stringy Bark, or of Durability Class 1 eg. Grey Gum, Forest Red Gum, Iron Bark, Tallowwood. Not all species are readily available in all areas or at any one time.

It is advisable, for the small extra expense, to treat all exposed exterior timber, to protect the sapwood from premature deterioration through fungal decay, (provided that the species being considered is actually treatable). For satisfactory long term performance, it is still necessary to protect CCA treated timber against weathering with a suitable paint, stain, or oil system. (Refer to Information Sheet - CCA Treatment of Timber).

It is not necessary to treat any exterior timber containing sapwood, which is not exposed, (unless against insect attack), such as verandah rafters under roof, as these remain dry and are not susceptible to fungal decay.

SHRINKAGE

Log timber contains moisture at the time it is cut. As the timber dries out, (seasons), shrinkage will occur which varies between species, from say 3-12% in the common Hardwood species, and 3-5% in the common pine species..

Consideration must be given in design & construction to allow for shrinkage where unseasoned timber is used.

Hardwood species of high shrinkage, eg. Rose Gum, (12%) should only be used in situations where structural adequacy is important but shrinkage is not a structural or visual concern, eg. can be used as roof battens in enclosed roof spaces, (but not as battens on open verandahs or as main structural members).

Careful consideration of the timber properties which are required for specific applications can help to ensure that the timber supplied meets all of the purchasers requirements, other than just of strength.

(The above information includes material which has been largely drawn from TRADAC and NAFI publications.)