

Gang-Nail Guide Lines No.27



ARE YOUR JOINTS UP TO STRENGTH?



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Structural timber is categorised into two different groups.

The first group is known as the 'Timber Strength Group' which uses an 'S' prefix and covers a range from S1 to S7 for unseasoned timber or SD1 to SD7 for seasoned timber.

This Strength Group system enables the classification of many different species of timber into groups having similar strength and stiffness properties.

The stress grade or 'F' grade, as it is commonly referred to, is determined by sorting the individual pieces of timber according to the size and location of strength reducing defects.

This can be done by using visual inspection or by mechanically measuring the stiffness by a sophisticated machine.

The second group is known as the 'Joint Group'.

The classification of this group is based on the ability of the timber species to restrain the loads of mechanical fasteners.

Timber joint groups use 'J' prefix for unseasoned timber and 'JD' for seasoned timber.

This grouping is quite different to the Timber Strength group, as although denser timbers generally have both higher timber strength and joint strength

properties than lower density species, this is not always the case.

From Table 1 below you will see Douglas Fir (elsewhere) with seasoned density of 550 kg/cbm has been allocated a Joint Group of JD5, whereas Australian grown Radiata Pine which has the same average density has been allocated JD4.

Whereas the timber strength dictates how far a rafter can span for a given roof load the Joint Group determines the effectiveness of fasteners and anchorages.

If we consider, for example, a joist hanger connection to the ridge beam, with relevant information from the joist hanger manufacturers, we can determine that the joist hanger can support up to 47 per cent more roof area for a timber with JD3 (KD Hardwood) joint group when compared to a JD4 (Radiata Pine).

The recent introduction of MGP Pine (Machine Graded Pine) with its higher allowable working stresses has enabled Radiata to be used in applications where hardwoods may have been used before.

In-Grade testing and stringent quality assurance has enabled MGP Pine to improve the design stresses for pine.

However as the joint group is independent of the structural grading method employed, MGP and the 'F' grades of pine both have the same joint group, even though they have different stress grades.

Designers of timber structures need to be also aware that timbers that have been chemically treated may have their structural properties altered.



For example, CCA (Copper, Chrome and Arsenic) treated timber must be re-dried and re-graded after treatment.

Use of this timber in the wet state not only changes both strength and joint properties; it will also cause rapid corrosion of any galvanised or unprotected fasteners.

The expression "a chain is only as strong as its weakest link" is also true for trusses.

The consequences of not designing a connection with the correct joint group may have a disastrous outcome.

It makes good sense that when designing a timber beam or truss, considerations should be first given to the type of timber species to be adopted.

If in doubt, contact your nail plate manufacturer for help.

Species	Moisture Condition	Strength Group	Joint Group	Design Density (kg/m ³)
Mixed Australian hardwoods	Unseasoned	S4	J3	1050
	Seasoned	SD4	JD3	650
Rainforest species	Unseasoned	S7	J4	750
	Seasoned	SD7	JD4	500
Mixed Pinus species (Australian grown)	Unseasoned	-	-	850
	Seasoned	SD7	JD4	550
Douglas Fir, elsewhere	Unseasoned	S6	J5	710
	Seasoned	SD6	JD5	550
Radiata Pine (Australia and New Zealand)	-	-	-	-
	Seasoned	SD4	JD4	550

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