

INFORMATION SHEET

STRUCTURAL MATERIALS



PLYWOOD

SECTION PROPERTIES

The information provided below has been taken from the New Zealand Timber Design Guide 2007, published by the Timber Industry Federation and edited by Professor A H Buchanan. To purchase a copy of the Timber Design Guide, visit www.nztif.co.nz

Wood is weak perpendicular to the grain direction. Hence in plywood the veneers perpendicular to the stress direction carry little or no load and the strength and stiffness of plywood depends on the veneer arrangement and quality. The calculated strength of a plywood panel must be either the product of a veneer stress times a reduced section property or, a panel stress times the gross section property. The first approach is used in New Zealand where one set of stresses is given for all radiata pine plywood, and the section properties are modified according to layup, thickness and the direction of stress.

Consult manufacturers' literature for the properties of specific plywood thicknesses and qualities and further advice on design issues.

The design strength of plywood is obtained in a similar manner to that for sawn timber except that engineering calculations need to account for the different contributions of veneers parallel and perpendicular to the direction of applied stress. The simple formulae $A = bd$, $Z = bd^2/6$ and $I = bd^3/12$ do not apply. Section properties must be calculated as described in AS/NZS 2269 or in Appendix F of NZS 3603. The section properties were derived in this way for Ecoply plywood.

Table 1: Effective Section Properties for Ecoply Plywood

				Section properties per mm width							
				Parallel to the face grain				Perpendicular to the face grain			
Nominal plywood thickness	Actual thickness	Identity code*	Mass	Moment of inertia	Section modulus	Shear constant	Cross section area	Moment of inertia	Section modulus	Shear constant	Cross section area
mm	mm		kg/m ²	I	Z	I/Q	A	I	Z	I/Q ⁺	A
				mm ⁴	mm ³	mm ²	mm ²	mm ⁴	mm ³	mm ²	mm ²
7	7.2	7-24-3	4.0	30	8.33	5.19	4.87	2.05	1.71	2.30	2.54
9	9	9-30-3	5.0	59	13.0	6.48	6.09	4.01	2.67	2.87	3.18
12	12	12-24-5	6.6	115	19.2	9.26	7.34	33.4	9.27	5.45	5.02
12	12	12-30-4	5.0	127	21.1	9.3	6.20	21.8	7.3	4.40	6.20
15	15	15-30-5	8.3	225	29.9	11.6	9.18	65.2	14.5	6.81	6.27
17	16.8	17-24-7	9.2	285	33.9	12.2	9.82	122	20.4	9.47	7.49
17	16.8	17-24-6	9.2	273	32.5	12.3	11.0	134	22.3	9.50	6.30
19	19.2	19-30-7	10.6	451	46.9	13.7	12.2	157	23.8	10.7	7.60
21	21	21-30-7	11.6	556	52.9	15.2	12.3	239	31.9	11.8	9.36
25	24.6	25-30-9	13.5	897	72.9	17.8	15.3	381	41	13.9	10.10

* Identity code: panel thickness – outermost veneer thickness x 10 – number of plies

+ I/Q values for rolling shear are for stress at the neutral axis calculated as in NZS 3603