DG04. COMPOSITE SECTION & LIMIT STATE DESIGN PROPERTIES

MGP 10 E[1] = 10,500 MPa G = 670 MPa

CODE[2]	TIMBER FLANGE mm	STEEL WEB mm	Zx 10^3 mm^3	Elx 10^9 Nmm^2	GA[3] 10^6 N	J 10^3 mm^4	Shear[5] capacity ΦVx kN	Moment capacity[6] kNm		Wt Kg/m
								Nominal Mx[7]	ΦMx[8] (k_1 = 0.8)	
T257aP10	70 x 44	242 x 0.8	661	861	2.0	2482	7.4	10.25	7.38	4.53
T257bP10	70 x 44	242 x 1.0	695	905	2.7	2482	10.2	10.78	7.76	4.85
T259aP10	87 x 45	242 x 0.8	790	1029	2.0	3636	7.4	12.25	8.82	5.45
T259bP10	87 x 45	242 x 1.0	824	1073	2.7	3636	10.2	12.77	9.20	5.77
T307bP10	70 x 44	297 x 1.0	944	1497	1.8	2482	11.6	14.64	10.54	5.18
T309bP10	87 x 45	297 x 1.0	1114	1766	1.8	3636	11.6	17.27	12.43	6.10
T309cP10	87 x 45	297 x 1.2	1166	1848	2.1	3636	14.0	18.07	13.01	6.50
T357bP10	70 x 70	297 x 1.0	1360	2527	2.0	6754	11.6	21.08	15.18	6.96
T357cP10	70 x 70	297 x 1.2	1404	2609	2.3	6754	14.0	21.76	15.67	7.36

MGP 12 E[1] = 13,300 MPa G = 850 MPa

CODE[2]	TIMBER FLANGE mm	STEEL WEB mm	Zx 10^3 mm^3	Elx 10^9 Nmm^2	GA[3] 10^6 N	J 10^3 mm^4	Shear[5] capacity ΦVx kN	Moment capacity[6] kNm		Wt Kg/m
								Nominal Mx[7]	ΦMx[8] (k_1 = 0.8)	
T259aP12	87 x 45	242 x 0.8	761	1256	2.0	3636	7.4	18.26	13.15	5.69
T259bP12	87 x 45	242 x 1.0	788	1300	2.7	3636	10.2	18.97	13.62	6.01
T309bP12	87 x 45	297 x 1.0	1059	2128	1.8	3636	11.6	25.42	18.30	6.34
T309cP12	87 x 45	297 x 1.2	1100	2210	2.1	3636	14.0	26.40	19.01	6.74
T357bP12	70 x 70	297 x 1.0	1313	3092	2.0	6754	11.6	31.51	22.69	7.24

LVL 13 E[1] = 13,860 MPa G = 880 MPa

CODE[2]	TIMBER FLANGE mm	STEEL WEB mm	Zx 10^3 mm^3	Elx 10^9 Nmm^2	GA[3] 10^6 N	J 10^3 mm^4	Shear[5] capacity ΦVx kN	Moment capacity[6] kNm		Wt Kg/m
								Nominal Mx[7]	ΦMx[8] (k_1 = 0.8)	
T259bL13	90 x 44	242 x 1.0	813	1398	2.7	3600	10.2	34.80	25.05	6.87
T307cL13	90 x 44	297 x 1.2	1130	2365	2.1	3600	14.0	48.36	34.82	7.26

NOTES

1. Composite section properties are based on the short duration modulus of elasticity for timber without the 5% reduction for shear deformation that is included in AS1720.1, i.e. E' = 1.05E
2. Beam code: T25, T30, T35 - joist overall depth (cm); 7 or 9 - joist width (cm); a, b, c - galvanized steel web thickness 0.8, 1.0 & 1.2mm respectively grade G200, Z275; P10, P12 - Pine timber flanges, grade equivalent to MGP10, MGP12 respectively, L13 - LVL flanges grade F16
3. EIx –flexural stiffness, tabulated values are based on theoretical values
4. GA -shear rigidity (mainly of the steel web), tabulated values are based on test results and interpolation
5. Design shear capacity ΦVx is controlled by the steel web (Φ = 0.9) to AS4600, timber modification factors do not apply
6. Moment capacity is based on the characteristic strength of the timber flanges and the timber modification factors in AS1720.1. The flanges are constructed from either MGP graded timber or LVL; after splitting MGP timber it is visually graded for equivalent strength; characteristic strengths adopted –P10 (beam code) f'_b = 15.5 MPa; P12 f'_b = 24.0 MPa; L13 f'_b = 42.8 MPa

6. Nominal bending capacity based on $k_{mod} = k_1 k_4 k_6 k_9 k_{11} k_{12} = 1.0$
8. Design bending capacities ΦMx are for residential cases, where capacity factor Φ = 0.9 and k_1 = 0.8 (uniform loads). For structures other than houses Φ = 0.75 (MGP) & 0.85 (LVL), for k_1 refer to AS 1720.1
9. The modulus of rigidity G above is for Aust. pine and LVL, imported timbers may have a different value
10. Flange bearing is based on the strength group SD6 f'_p = 12 MPa

Note: Updates may be made to this document without notice, please check the web site for the latest issue:

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