2.4 SPECIFIC DESIGN – TOP NOTCH PURLINS

2.4.1 INTRODUCTION

Dimond Top Notch Purlin Systems have been designed to comply with AS/NZS 4600:1996. Appropriate design limit state load combinations should be determined in accordance with AS/NZS 1170:2002.

Top Notch Purlin Systems are typically used as purlins and girts in farm buildings, light commercial sheds, and garages.

2.4.2 DESIGN CONSIDERATIONS

Data presented in this section is intended for use by structural engineers. Load situations other than uniformly distributed loads will require specific design.

Design capacities in the limit state format have been derived by the application of a capacity factor, f_b = 0.90 for bending.

A design yield stress as outlined in Section 2.4.9 has been used for Top Notch Purlins.

Uniformly loaded bending capacities (kN/m) are given for Top Notch purlins and girts for Inward and Outward cases.

The serviceability linear load, W_s (kN/m), is the load at which the midspan deflection equates to span/150. As deflection is proportional to loading, W_s loads may be factored by the deflection ratio for any deflection within the limit of the linear load capacities.

These tables are intended for use where roofing or cladding provides full restraint to the top flange of the Top Notch purlin or girt. Loads are assumed to be applied about the major axis of symmetry (X-X). Loads for intermediate spans may be calculated by linear interpolation.

The fixing type and size is critical to achieve the outward design loads. Refer Section 2.4.7 Fasteners.

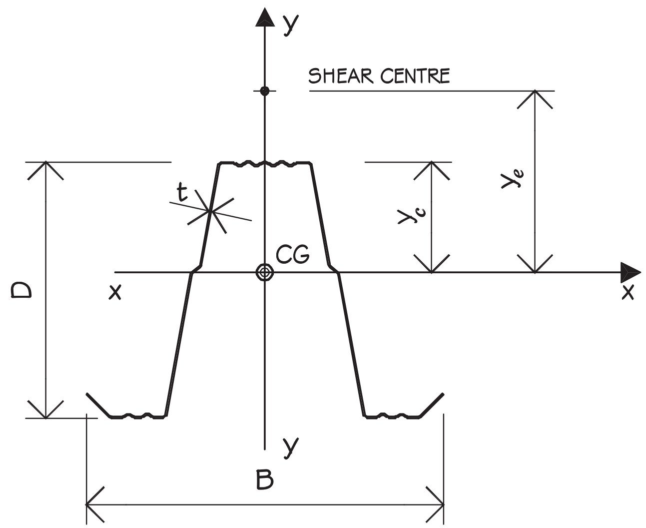
Dimond Top Notch do not require bracing to provide restraint. Therefore the loads are represented as inward and outward cases.

However bracing battens can be screwed transversely along the underside of the purlins to enhance the performance of the Top Notch purlins and are recommended where supports/restraints are further than 30 times the Top Notch depth apart.

Gravity type loads can be assumed to act perpendicular to the roof plane for pitches up to 10 degrees. For pitches greater than 10 degrees, load components about the minor axis of symmetry (Y-Y) should also be considered.

When designing Top Notch to be used as girts, it is assumed cladding and girt gravity loads are taken by a stiff eaves member such as a DHS Purlin.

2.4.3 TOP NOTCH SECTION PROPERTIES



Top Notch Section	Depth D mm	Width B mm	Thickness t mm	Area A mm^2	Mass per unit length kg/m	Second Moment of Area (Full Section) I_x 10^6mm^4	Second Moment of Area (Full Section) I_y 10^6mm^4	Section Modulus (Full Section) z_x 10^3mm^3	Section Modulus (Full Section) z_y 10^3mm^3	Radius of Gyration r_x mm	Radius of Gyration r_y mm	Centre of Gravity y_c mm	Shear Centre y_e mm	Torsion Constant J mm^4	Warping Constant I_w 10^6mm^6	Monosymmetry Constant b_x mm
60 x 0.75	60	108	0.75	150	1.24	0.077	0.122	2.57	2.26	22.6	28.5	31.5	44.2	28.2	16.0	111
60 x 0.95	60	108	0.95	191	1.56	0.097	0.155	3.23	2.87	22.6	28.5	31.5	44.2	57.3	20.3	111
100 x 0.75	100	163	0.75	248	2.04	0.340	0.450	6.80	5.52	37.0	42.6	55.2	67.4	46.5	238.6	163
100 x 0.95	100	163	0.95	314	2.56	0.430	0.570	8.60	6.99	37.0	42.6	55.2	67.4	94.5	302.2	163
120 x 0.75	120	170	0.75	278	2.28	0.530	0.546	8.83	6.42	43.7	44.3	65.6	82.3	52.1	363.3	190
120 x 0.95	120	170	0.95	352	2.86	0.671	0.691	11.18	8.13	43.6	44.3	65.6	82.3	106.0	460.2	190
150 x 0.95	150	183	0.95	411	3.34	1.166	0.920	15.55	10.05	53.3	47.3	81.0	103.9	123.5	758.4	231
150 x 1.15	150	183	1.15	497	4.02	1.411	1.114	18.81	12.17	53.3	47.3	81.0	103.9	219.1	918.0	231

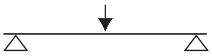
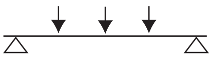
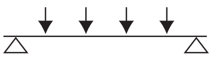
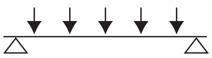
Note: Mass assumes a total coated weight for the standard zinc coating of 275 g/m^2.

2.4.4 CONVERSION FORMULAE FROM POINT LOADS TO EQUIVALENT UNIFORM BENDING LOADS

For Top Notch – Ultimate Strength

Formula $W = F \times \frac{P}{L}$

Where W = Uniform bending load
F = Factor “F” from table below
P = Point load ↓
L = Length of span

Type	**Symbol**	**Factor “F”**			
		Simple	End Span	Lapped End	Lapped Internal
One equidistant point load		2	2.25	2.25	2
One eccentric point load		1.5	2	2	1.5
Two equidistant point loads		2.67	3.25	3.25	2.25
Three equidistant point loads		4	4.25	4.25	3.5
Four equidistant point loads		4.8	5.5	5.5	4.25
Five equidistant point loads		6	6.75	6.75	5.5

The formula is only applicable to Top Notch Purlins. Refer to the DHS Purlins Section 2.3.5 for DHS formulae.

The formula assumes all point loads are equal in magnitude.

These factors “F” are an approximation to the pure derivation and are to be used as a guide only.

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