

CH YODOFORM SDN BHD

Purlin 16



Project: Gamco Hangar, Abu Dhabi, UAE



Project: Haeco Aircraft Maintenance Hangar No. 2 Hong Kong



MRT C701, North Line Depot Sengkang Avenue, Singapore



Project: Lufthansa Technik Hangar, Philippines

PURLIN

INTRODUCTION

CH YODOFORM SDN. BHD. with its cold roll forming manufacturing facility at Jalan Kapar, Klang Selangor is strategically located to provide technical advice and service to meet production order for both local and overseas markets. All YODOFORM sections are precisely cold-formed from imported high tensile zinc coated steel which conform to all international standards.

YODOFORM Zed and C-Sections are supplied cut-to-length and pre-punched holes. This obviate any fabrication and painting at site. Thus the sections are ready for immediate erection upon delivery. Due to lightweight, high strength of the steel and the zinc coated surface, YODOFORM sections are versatile, economical and requires minimal maintenance throughout the life span of the building. Design aids and load tables are provided to enable designers to make quick selections and section properties details analysis. Our technical representatives are readily at your convenience to solve problems and to assist with design services. Quality control at our factory remain rigid - your assurance that YODOFORM will always be complied to your specific requirements.

MATERIAL SPECIFICATIONS

Base Steel Thickness	: 1.6mm, 2.0mm, 2.5mm and 3.0mm.
Steel Grade	: High Tensile AS1397 G450.
Yield Stress	: 450 MPa minimum.
Tensile Strength	: 500 MPa minimum.
Zinc / Zinc Aluminium Coating	: minimum 275 g/m ² Coating mass. (both sides)
Surface Finishing	: Regular spangle, minimize spangle and zero spangle.

TOLERANCES

Depth	: ± 1mm
Flange Width	: ± 2mm
Length	: ± 3mm
Holes Centres	: ± 1.5mm
Lips	: ± 2mm

PACKING

YODOFORM steel purlins are supplied in strapped bundles. Actual numbers vary with section size and length but bundle mass is limited to approximately one tonne.

HANDLING AND STORAGE

YODOFORM C & Z purlins should not be allowed to get wet. They should be stacked clear off the ground and protected by waterproof covering to prevent water and / or condensation becoming trapped between adjacent surfaces. If bundles become wet, the purlins should be separated, wiped with a dry cloth and placed so that air circulation completes the drying. These procedures are recommended to avoid unsightly damage to the coating which could reduce the life of the product.

Care must be taken when handling long length bundles. Lifting should only be carried out using a suitable beam with lifting points and carefully located slings.

PURLIN

ANALYSIS AND DESIGN PRINCIPLES

The limit state capacity tables are compiled based on the following assumptions:

- a) Purlins bend about the axis perpendicular to the web;
- b) At laps, the purlins are continuous. In the finite element flexural-torsional buckling analysis, lapped regions are modeled by adding the section properties of the two sections;
- c) The bridging is assumed to provide a lateral torsional restraint and a lateral translational restraint at the points of attachment to the purlins;
- d) The roof sheeting which is screw-fastened to the top flange of the purlins is assumed to provide a continuous diaphragm shear restraint against minor axis rotation.

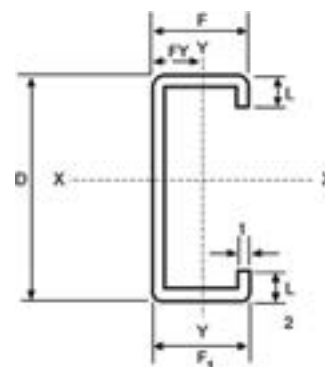
The purlin capacity tables are computed based on the Australian and New Zealand Standard, *AS/NZS 4600 - Cold-Formed Steel Structures*, 2005.

DEFLECTION

There are no specific rules governing permissible deflections or the load types which should be considered in calculations. You need to consider the specific application conditions of the purlins to decide on a acceptable deflection limit. The structures codes leave the choice of deflections to design engineers who give consideration to the nature of a building and its specific application conditions consequently, for loads less than the safe load limit, alternative deflection ratios may be determinate by proportion from the load which produces deflection of span / 150.

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C-SECTION

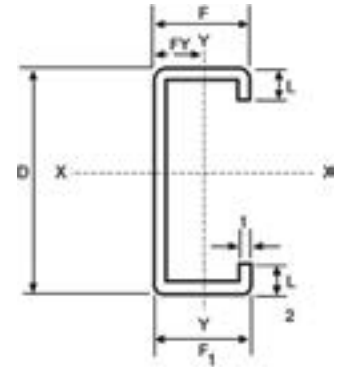


D = DEPTH
F = FLANGE
L = LIPPED
t = THICKNESS

C Section Identification	Section Dimensions				Mass Per Unit Length kg/m	Full Section Properties							
						Area	Second Moment of Area		Second Modulus		Radius of Gyration		Centroid
	D mm	F mm	L mm	t mm		A mm ²	I _x x 10 ⁶ mm ⁴	I _y x 10 ⁶ mm ⁴	Z _x x 10 ³ mm ³	Z _y x 10 ³ mm ³	R _x mm	R _y mm	X mm
YCP 1016	102	51	16.0	1.6	3.05	357	0.595	0.132	11.85	4.05	40.84	19.20	16.94
YCP 1020	102	51	16.0	2.0	3.72	442	0.730	0.160	14.60	4.95	40.64	19.01	16.74
YCP 1025	102	51	16.0	2.5	4.60	546	0.892	0.193	17.92	6.01	40.40	18.78	16.48
YCP 1030	102	51	16.0	3.0	5.29	648	1.045	0.223	21.11	7.01	40.15	18.53	16.23
YCP 1216	127	51	16.0	1.6	3.20	397	0.990	0.142	15.79	4.15	49.96	18.91	15.24
YCP 1220	127	51	16.0	2.0	3.94	492	1.218	0.172	19.48	5.07	49.76	18.72	15.04
YCP 1225	127	51	16.0	2.5	4.89	609	1.491	0.208	23.95	6.16	49.49	18.48	14.79
YCP 1230	127	51	16.0	3.0	5.90	723	1.753	0.240	28.27	7.19	49.23	18.23	14.54
YCP 1516	153	66	16.0	1.6	4.01	486	1.808	0.281	23.88	6.25	60.97	24.06	19.38
YCP 1520	153	66	16.0	2.0	4.92	604	2.230	0.344	29.54	7.67	60.77	23.86	19.18
YCP 1525	153	66	16.0	2.5	6.01	749	2.741	0.417	36.43	9.36	60.50	23.61	18.92
YCP 1530	153	66	16.0	3.0	7.35	891	3.235	0.486	43.13	10.97	60.25	23.36	18.67
YCP 1716	175	71	16.0	1.6	4.27	538	2.588	0.351	29.85	7.10	69.39	25.56	19.93
YCP 1720	175	71	16.0	2.0	5.26	668	3.197	0.430	36.96	8.72	69.19	25.36	19.73
YCP 1725	175	71	16.0	2.5	6.67	829	3.936	0.523	45.64	10.66	68.91	25.11	19.48
YCP 1730	175	71	16.0	3.0	8.08	987	4.652	0.610	54.09	12.51	68.64	24.86	19.23
YCP 2016	203	71	16.0	1.6	4.70	582	3.654	0.368	36.29	7.21	79.22	25.12	18.40
YCP 2020	203	71	16.0	2.0	5.74	724	4.517	0.450	44.95	8.85	78.99	24.92	18.20
YCP 2025	203	71	16.0	2.5	7.13	899	5.568	0.547	55.54	10.82	78.71	24.67	17.96
YCP 2030	203	71	16.0	3.0	8.79	1071	6.589	0.639	65.89	12.70	78.44	24.42	17.72
YCP 2216	225	78	18.0	1.6	5.28	646	4.988	0.498	44.66	8.89	87.85	27.76	20.33
YCP 2220	225	78	18.0	2.0	6.55	804	6.174	0.611	55.37	10.93	87.63	27.56	20.13
YCP 2225	225	78	18.0	2.5	8.16	999	7.621	0.745	68.51	13.40	87.35	27.31	19.89
YCP 2230	225	78	18.0	3.0	9.80	1191	9.031	0.872	81.36	15.76	87.08	27.06	19.65
YCP 2520	250	78	18.0	2.0	6.69	854	7.907	0.630	63.77	11.04	96.22	27.16	18.96
YCP 2525	250	78	18.0	2.5	8.34	1061	9.767	0.769	78.93	13.54	95.95	26.91	18.72
YCP 2530	250	78	18.0	3.0	10.20	1266	11.58	0.900	93.78	15.92	95.64	26.66	18.49
YCP 3020	300	96	25.0	2.0	8.63	1054	14.25	1.250	95.64	18.03	116.3	34.44	24.70
YCP 3025	300	96	25.0	2.5	10.84	1311	17.64	1.533	118.6	22.20	116.0	34.20	24.47
YCP 3030	300	96	25.0	3.0	12.10	1566	20.97	1.804	141.2	26.23	115.7	33.94	24.23
YCP 3520	350	121	28.0	2.0	9.92	1274	23.97	2.451	137.7	28.30	137.2	43.86	32.41
YCP 3525	350	121	28.0	2.5	12.37	1586	29.72	3.018	171.1	34.96	136.9	43.62	32.17
YCP 3530	350	121	28.0	3.0	15.07	1896	35.39	3.566	204.0	41.43	136.6	43.37	31.93

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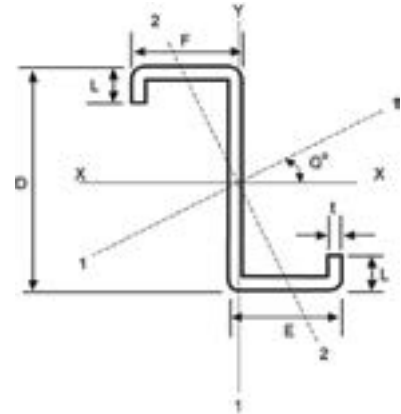


Full Section Properties				Section Modulus	Area	C Section Identification
Shear Centre	Torsion Constant	Warping Constant	Monosymmetry Section Constant			
X_o mm	J mm ⁴	I _w x 10 ⁶ mm ⁶	β_y mm	Z _{xe} x 10 ³ mm ³	A _e mm ²	
42.10	304	307	122.4	10.23	252	YCP 1016
41.62	589	369	121.6	13.92	363	YCP 1020
41.02	1138	437	120.7	17.27	500	YCP 1025
40.42	1945	497	119.7	20.49	633	YCP 1030
38.95	339	479	138.7	13.74	255	YCP 1216
38.48	656	576	138.1	18.28	369	YCP 1220
37.89	1268	685	137.4	23.19	513	YCP 1225
37.31	2170	783	136.7	27.60	656	YCP 1230
49.04	415	1305	172.5	18.90	266	YCP 1516
48.57	805	1581	171.9	24.43	374	YCP 1520
47.97	1560	1900	171.2	32.36	539	YCP 1525
47.38	2674	2191	170.4	40.00	713	YCP 1530
50.87	459	2079	194.1	22.92	269	YCP 1716
50.40	891	2525	193.6	29.97	380	YCP 1720
49.81	1727	3044	192.9	39.26	545	YCP 1725
49.22	2962	3522	192.3	49.51	738	YCP 1730
47.99	497	2884	219.8	26.41	271	YCP 2016
47.54	965	3508	219.5	36.90	383	YCP 2020
46.96	1873	4235	219.1	48.19	550	YCP 2025
46.39	3214	4907	218.7	60.62	747	YCP 2030
53.05	552	4833	243.2	30.52	285	YCP 2216
52.59	1072	5894	242.9	44.10	400	YCP 2220
52.02	2081	7142	242.5	57.77	567	YCP 2225
51.45	3574	8304	242.1	72.64	772	YCP 2230
50.32	1139	7457	270.4	48.65	402	YCP 2520
49.76	2211	9044	270.2	67.05	570	YCP 2525
49.20	3799	10530	270.1	84.14	776	YCP 2530
65.10	1405	21890	321.2	66.07	462	YCP 3020
64.54	2732	26720	320.9	93.83	642	YCP 3025
63.98	4699	31290	320.7	119.9	846	YCP 3030
84.38	1699	58630	376.7	84.78	511	YCP 3520
83.81	3305	71880	376.3	118.4	706	YCP 3525
83.24	5689	84580	375.8	158.3	926	YCP 3530

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Z-SECTION

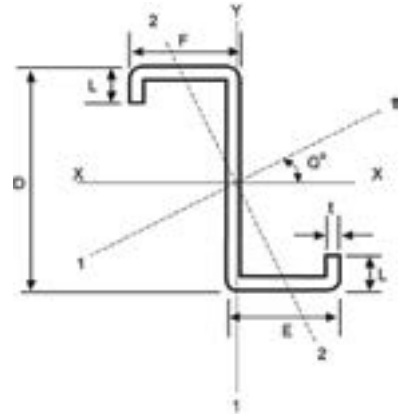


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Z Section Identification	Section Dimensions					Mass Per Unit Length kg/m	Full Section Properties					
							Principle Axes					
	Area	Second Moment of Area		Section Modulus	Radius of Gyration							
D mm	E mm	F mm	L mm	t mm	A mm ²	I _x x 10 ⁶ mm ⁴	I _y x 10 ⁶ mm ⁴	Z _y x 10 ³ mm ³	R _y mm	α		
YZP 1016	102	57	51	16.0	1.6	3.05	366	0.805	0.087	2.98	15.37	30.62°
YZP 1020	102	57	51	16.0	2.0	3.72	454	0.985	0.105	3.65	15.23	30.44°
YZP 1025	102	57	51	16.0	2.5	4.60	561	1.199	0.127	4.44	15.06	30.23°
YZP 1030	102	57	51	16.0	3.0	5.29	666	1.402	0.148	5.19	14.88	30.01°
YZP 1216	127	57	51	16.0	1.6	3.20	406	1.198	0.102	3.25	15.81	23.28°
YZP 1220	127	57	51	16.0	2.0	3.94	504	1.471	0.124	3.98	15.67	23.12°
YZP 1225	127	57	51	16.0	2.5	4.89	624	1.797	0.150	4.84	15.48	22.91°
YZP 1230	127	57	51	16.0	3.0	5.90	741	2.108	0.173	5.66	15.29	22.70°
YZP 1516	153	68	62	16.0	1.6	4.01	483	2.066	0.169	4.51	18.68	22.50°
YZP 1520	153	68	62	16.0	2.0	4.92	600	2.544	0.206	5.54	18.53	22.36°
YZP 1525	153	68	62	16.0	2.5	6.01	744	3.120	0.250	6.77	18.34	22.18°
YZP 1530	153	68	62	16.0	3.0	7.35	885	3.673	0.292	7.93	18.15	22.00°
YZP 1716	175	74	68	16.0	1.6	4.27	538	2.931	0.221	5.36	20.29	20.89°
YZP 1720	175	74	68	16.0	2.0	5.26	668	3.615	0.271	6.58	20.14	20.76°
YZP 1725	175	74	68	16.0	2.5	6.67	829	4.443	0.330	8.05	19.95	20.60°
YZP 1730	175	74	68	16.0	3.0	8.08	987	5.242	0.385	9.46	19.75	20.44°
YZP 2016	203	74	68	16.0	1.6	4.70	582	3.977	0.241	5.58	20.34	17.15°
YZP 2020	203	74	68	16.0	2.0	5.74	724	4.912	0.295	6.86	20.19	17.04°
YZP 2025	203	74	68	16.0	2.5	7.13	899	6.046	0.359	8.40	19.99	16.89°
YZP 2030	203	74	68	16.0	3.0	8.79	1071	7.144	0.420	9.86	19.79	16.74°
YZP 2216	225	78	72	18.0	1.6	5.28	637	5.257	0.300	6.52	21.70	16.30°
YZP 2220	225	78	72	18.0	2.0	6.55	792	6.500	0.368	8.03	21.55	16.20°
YZP 2225	225	78	72	18.0	2.5	8.16	984	8.012	0.448	9.84	21.35	16.06°
YZP 2230	225	78	72	18.0	3.0	9.80	1173	9.480	0.525	11.57	21.15	15.93°
YZP 2520	250	78	72	20.0	2.0	6.69	850	8.294	0.403	8.62	21.79	14.34°
YZP 2525	250	78	72	20.0	2.5	8.34	1056	10.24	0.492	10.57	21.59	14.22°
YZP 2530	250	78	72	20.0	3.0	10.20	1260	12.12	0.577	12.44	21.39	14.10°
YZP 3020	300	100	93	25.0	2.0	8.71	1056	15.37	0.845	14.25	28.29	15.80°
YZP 3025	300	100	93	25.0	2.5	10.84	1314	19.01	1.037	17.55	28.09	15.70°
YZP 3030	300	100	93	25.0	3.0	12.10	1569	22.57	1.221	20.75	27.90	15.61°
YZP 3520	350	129	121	28.0	2.0	9.92	1290	26.85	1.730	23.12	36.62	18.02°
YZP 3525	350	129	121	28.0	2.5	12.37	1606	33.27	2.131	28.57	36.43	17.94°
YZP 3530	350	129	121	28.0	3.0	15.07	1920	39.58	2.521	33.89	36.24	17.86°

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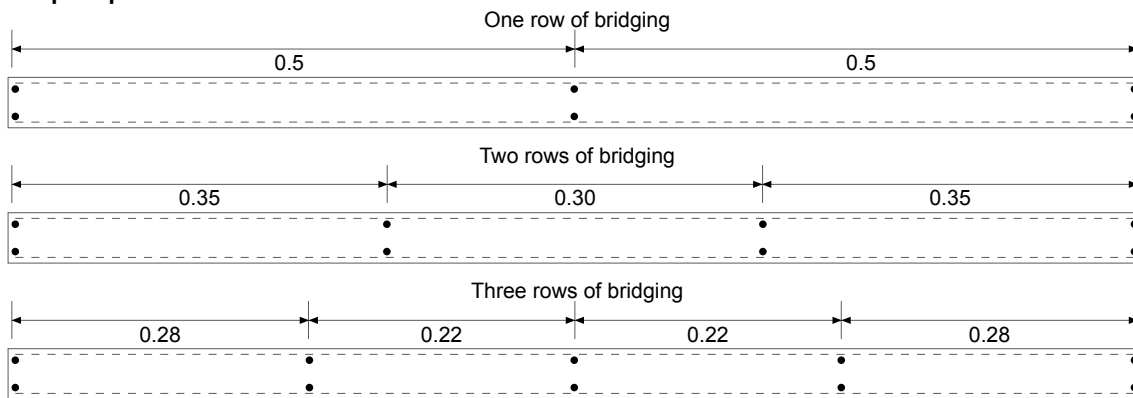
Full Section Properties							Column Properties		Effective Section Properties at Yield Stress		Z Section Identification
Axes Perpendicular and Parallel to Web									Section Modulus	Area	
Second Moment of Area		Product of Moment of Area	Section Modulus		Radius of Gyration		Torsion Constant	Warping Constant			
Ix' x 10 ⁶ mm ⁴	Iy' x 10 ⁶ mm ⁴	Ix' y' x 10 ⁶ mm ⁴	Zx' x 10 ³ mm ³	Zy' x 10 ³ mm ³	Rx' mm	Ry' mm			J mm ⁴	Iw x 10 ⁶ mm ⁶	
0.618	0.273	0.315	12.00	5.08	41.09	27.29	313	447	10.34	253	YZP 1016
0.759	0.331	0.384	14.79	6.22	40.90	27.01	605	538	13.81	363	YZP 1020
0.928	0.399	0.466	18.16	7.56	40.65	26.66	1169	641	17.56	499	YZP 1025
1.088	0.461	0.543	21.40	8.82	40.41	26.31	1999	732	21.36	651	YZP 1030
1.027	0.273	0.398	16.00	5.07	50.28	25.92	347	723	13.90	256	YZP 1216
1.263	0.331	0.487	19.74	6.20	50.06	25.64	672	872	18.47	369	YZP 1220
1.548	0.399	0.591	24.28	7.54	49.82	25.30	1300	1042	23.51	512	YZP 1225
1.820	0.461	0.689	28.66	8.80	49.55	24.95	2224	1194	28.69	674	YZP 1230
1.788	0.447	0.671	23.17	6.88	60.84	30.40	412	1703	18.83	265	YZP 1516
2.206	0.544	0.823	28.64	8.44	60.64	30.12	800	2065	24.32	373	YZP 1520
2.711	0.659	1.003	35.32	10.31	60.37	29.77	1550	2484	32.29	539	YZP 1525
3.199	0.766	1.175	41.80	12.07	60.11	29.42	2656	2868	39.64	709	YZP 1530
2.587	0.566	0.903	29.31	7.98	69.38	32.44	459	2845	22.92	269	YZP 1716
3.195	0.691	1.108	36.29	9.80	69.16	32.16	891	3459	29.97	380	YZP 1720
3.934	0.839	1.355	44.80	11.98	68.90	31.81	1727	4176	39.26	545	YZP 1725
4.650	0.977	1.589	53.10	14.05	68.63	31.46	2962	4837	49.51	738	YZP 1730
3.652	0.566	1.053	35.68	7.97	79.19	31.17	497	3965	26.41	271	YZP 2016
4.515	0.691	1.293	44.20	9.79	78.97	30.90	965	4826	36.90	383	YZP 2020
5.566	0.839	1.581	54.61	11.96	78.69	30.55	1873	5831	48.19	550	YZP 2025
6.586	0.977	1.855	64.77	14.03	78.42	30.21	3214	6762	60.62	747	YZP 2030
4.867	0.691	1.336	42.92	9.20	87.43	32.93	543	6038	30.44	284	YZP 2216
6.022	0.845	1.642	53.21	11.31	87.20	32.66	1056	7364	43.97	398	YZP 2220
7.433	1.028	2.011	65.81	13.85	86.92	32.32	2050	8922	57.41	567	YZP 2225
8.805	1.200	2.364	78.13	16.28	86.64	31.98	3520	10370	72.24	772	YZP 2230
7.810	0.887	1.893	62.10	11.88	95.86	32.31	1133	9826	49.91	412	YZP 2520
9.647	1.080	2.320	76.86	14.55	95.58	31.98	2201	11920	68.02	583	YZP 2525
11.44	1.262	2.728	91.31	17.11	95.29	31.65	3781	13880	85.67	796	YZP 2530
14.29	1.922	3.805	94.65	19.93	116.3	42.66	1408	30280	66.09	462	YZP 3020
17.69	2.354	4.683	117.4	24.53	116.0	42.33	2737	36980	93.87	642	YZP 3025
21.03	2.767	5.533	139.7	28.98	115.8	41.99	4708	43340	120.1	847	YZP 3030
24.45	4.134	7.390	138.8	33.04	137.7	56.61	1720	86660	84.80	511	YZP 3520
30.32	5.086	9.126	172.4	40.81	137.4	56.27	3347	106400	118.6	707	YZP 3525
36.10	6.006	10.82	205.5	48.38	137.1	55.93	5761	125300	158.6	929	YZP 3530

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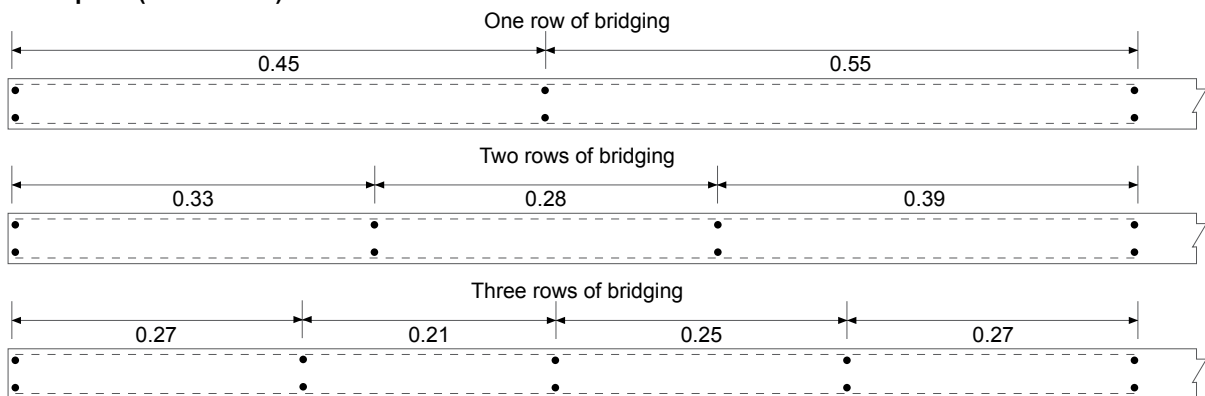
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RECOMMENDED LOCATION OF BRIDGING HOLES

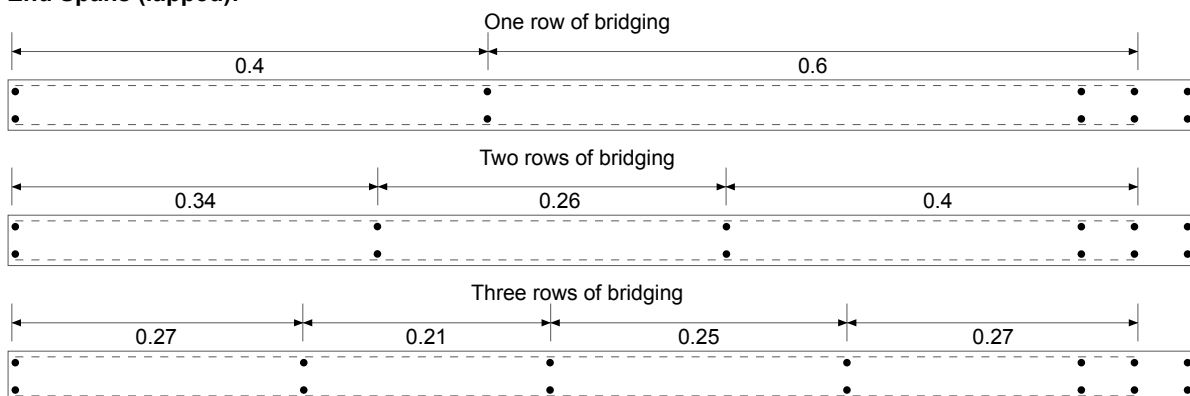
Simple Spans:



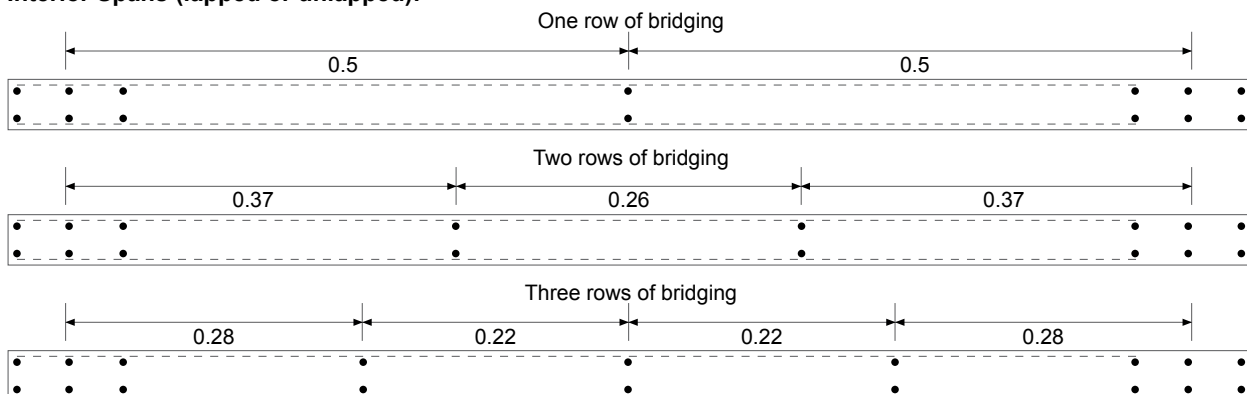
End Spans (continuous):



End Spans (lapped):



Interior Spans (lapped or unlapped):



PURLIN

POINT LOADS

LEGEND

P	= Single Point Load (kN)
L	= Span (m)
a	= Larger Distance from Support (m)
b	= Smaller Distance from Support (m)
w	= Equivalent Uniform Load (kN/m)
N	= Number of Point Load Over One Span (for 6 or more loads)

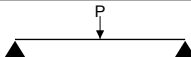
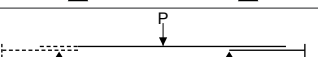
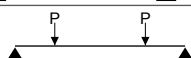
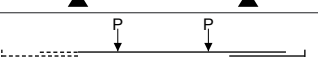
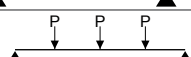
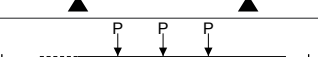
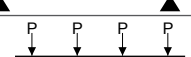
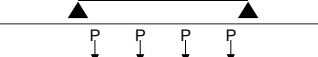
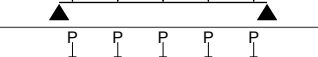
Loading conditions and formula shown give accurate conversion of Point Loads into Uniform Loads for determination of Load carrying capacity of simple spans only.

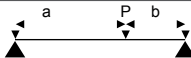
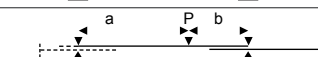
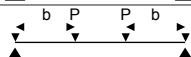
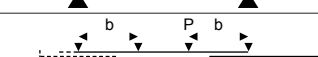
For lapped spans, the conversion depends upon the number of spans, the position of span in the continuity, and the lapping ratio. The lapped span formula shown have been devised for the worst loading condition and can be safely used for end spans, interior spans and any lapping ratio (greater than 0.10).

A separate set of conversion formulae would be required for deflection determination.

The formulae shown will give conservative (safe) conversion with a margin of error between 3.7% and 25%.

CONVERSION OF POINT LOADS INTO EQUIVALENT UNIFORM LOADS

Symmetrical Equidistant Point Loads		
Loading Condition	Diagrams	Conversion Formula
SINGLE LOAD	Simple 	$W = \frac{2P}{L}$
	Lapped 	$W = \frac{2.22P}{L}$
2 LOADS	Simple 	$W = \frac{2.67P}{L}$
	Lapped 	$W = \frac{3.16P}{L}$
3 LOADS	Simple 	$W = \frac{4P}{L}$
	Lapped 	$W = \frac{3.78P}{L}$
4 LOADS	Simple 	$W = \frac{4.80P}{L}$
	Lapped 	$W = \frac{5.12P}{L}$
5 LOADS	Simple 	$W = \frac{6P}{L}$
	Lapped 	$W = \frac{6.65P}{L}$
6 OR MORE LOADS	Simple 	$W = \frac{1.14NP}{L}$
	Lapped 	$W = \frac{1.22NP}{L}$

Single Eccentric and Two Symmetrical Point Loads		
Loading Condition	Diagrams	Conversion Formula
SINGLE ECCENTRIC POINT LOAD	Simple 	$W = \frac{8abP}{L^3}$
	Lapped 	$W = \frac{17.76ab^2P}{L^4}$
TWO SYMMETRICAL POINT LOAD	Simple 	$W = \frac{8bP}{L^2}$
	Lapped 	$W = \frac{9.45b(2L-3b)P}{L^3}$

PURLIN

CH YODOFORM BRIDGING CONNECTION DETAILS COMPONENTS

DESCRIPTION	CODE	DIMENSION	GAUDE
Bridging Channel	CHY-B4	100mm x 50mm x 15mm	1.6mm
Connection Angle	CHY-A5	62mm x 62mm x 100mm	1.6mm

ALTERNATE BRIDGING AND THE RODS

