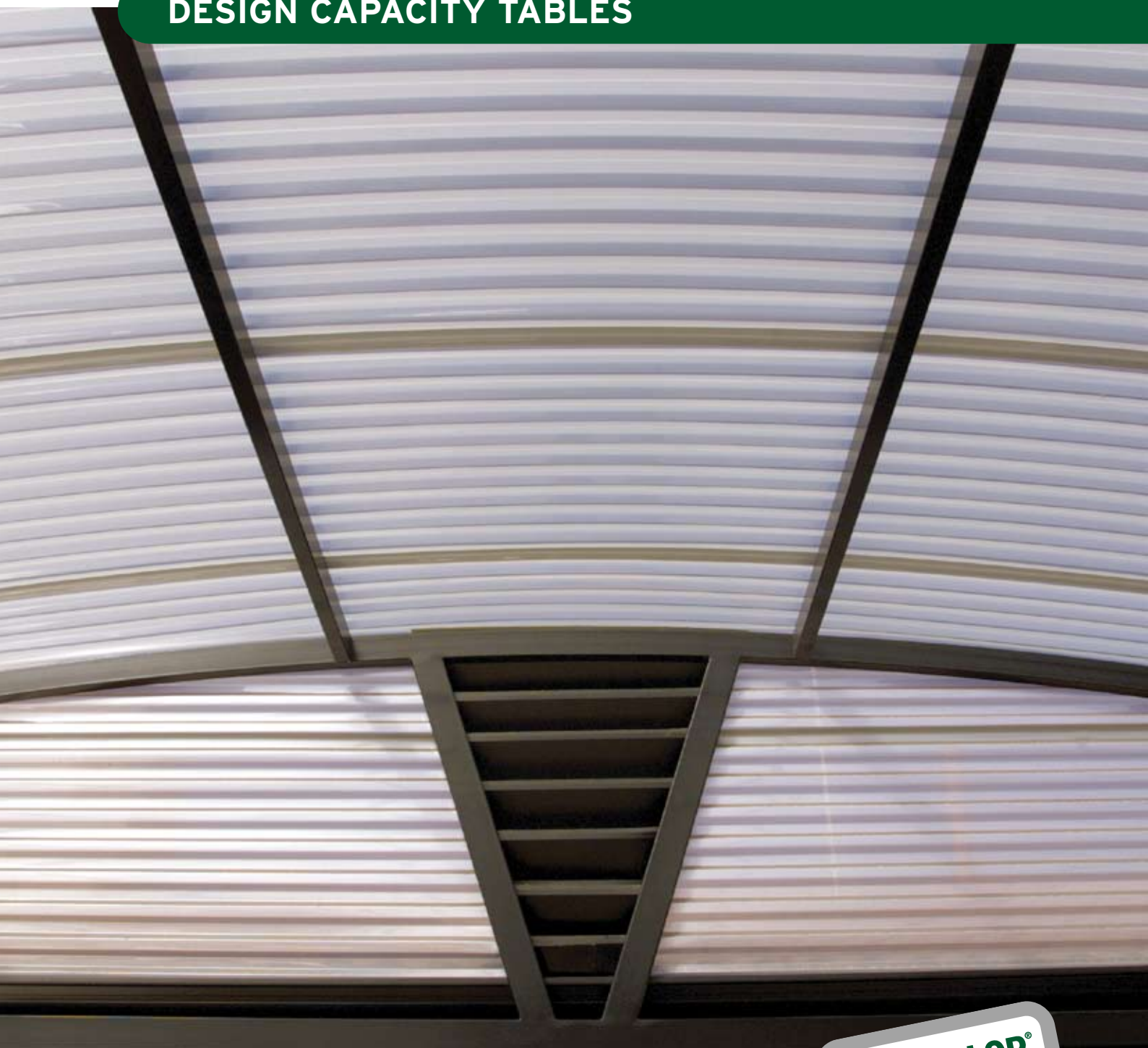


Proudly
Manufactured
in WA

TUBECOLOR®

DESIGN CAPACITY TABLES



TUBECOLOR®
exclusive
7year
warranty

onesteel

CONTENTS

DIMENSIONS & PROPERTIES

Rectangular Hollow Sections: Grade C450L0	T2
Rectangular Hollow Sections: Grade C300L0	T2
Square Hollow Sections: Grade C450L0	T3

Members Subject to AXIAL COMPRESSION

Rectangular Hollow Sections: Grade C450L0 - buckling about x- axis	T4
Rectangular Hollow Sections: Grade C300L0 - buckling about x- axis	T4
Rectangular Hollow Sections: Grade C450L0 - buckling about y- axis	T5
Rectangular Hollow Sections: Grade C300L0 - buckling about y- axis	T5
Square Hollow Sections: Grade C450L0 - buckling about x- and y- axis	T6

Simply Supported Beams with Full Lateral Restraint

Rectangular Hollow Sections: Grade C450L0 - Strength and Serviceability	T7
Square Hollow Sections: Grade C450L0 - Strength and Serviceability	T9

Continuous Beams with Full Lateral Restraint

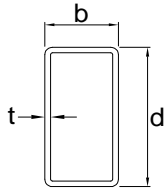
Rectangular Hollow Sections: Grade C450L0 - Strength and Serviceability	T10
Rectangular Hollow Sections: Grade C300L0 - Strength and Serviceability	T11
Square Hollow Sections: Grade C450L0 - Strength and Serviceability	T12

Fixed End Beams with Full Lateral Restraint

Rectangular Hollow Sections: Grade C450L0 - Strength and Serviceability	T13
Rectangular Hollow Sections: Grade C300L0 - Strength and Serviceability	T14
Square Hollow Sections: Grade C450L0 - Strength and Serviceability	T15

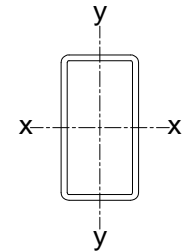
Cantilever Beams with Full Lateral Restraint

Rectangular Hollow Sections: Grade C450L0 - Strength and Serviceability	T16
Rectangular Hollow Sections: Grade C300L0 - Strength and Serviceability	T17
Square Hollow Sections: Grade C450L0 - Strength and Serviceability	T18



DIMENSIONS AND PROPERTIES

Tubecolor® RECTANGULAR HOLLOW SECTIONS: AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)



DIMENSIONS AND RATIOS							FULL SECTION PROPERTIES										PROPERTIES FOR DESIGN TO AS 4100								
Designation			Mass per Metre kg/m	External Surface Area		$\frac{b-2t}{t}$	$\frac{d-2t}{t}$	Gross Section Area A_g mm ²	About x- axis				About y- axis				Torsion Constant J 10 ⁶ mm ⁴	Torsion Constant C 10 ³ mm ³	Form Factor k_f	About x- axis		About y- axis			
d	b	t		per metre	per tonne				I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y				λ_{ox}	Comp-actness	Z_{ox}	λ_{oy}	Comp-actness	Z_{oy}
mm	mm	mm		m ² /m	m ² /t				10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm				10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³			10 ³ mm ³
150x	50x	2.0RHS	6.07	0.393	64.7	23.0	73.0	774	2.08	27.7	35.3	51.8	0.372	14.9	16.3	21.9	1.04	26.9	0.553	30.9	N	31.6	97.9	S	7.64
		1.6RHS	3.64	0.295	81.0	29.3	60.5	463	0.613	12.3	15.0	36.4	0.211	8.43	9.33	21.3	0.501	14.5	0.661	39.2	N	12.5	81.2	S	5.19

Note: 1. For Grade C450L0 $f_y = 450$ MPa and $f_u = 500$ MPa. f_y = yield stress used in design; f_u = tensile strength used in design; as defined in AS 4100.

2. Grade C450L0 to AS 1163 is cold formed and therefore is allocated the CF residual stresses classification in AS 4100.

3. C = Compact Section; N = Non-compact Section; S = Slender Section; as defined in AS 4100.

Tubecolor® RECTANGULAR HOLLOW SECTIONS: TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)

DIMENSIONS & RATIOS							FULL SECTION PROPERTIES										EFFECTIVE SECTION PROPERTIES						
Designation			Mass per Metre kg/m	External Surface Area		$\frac{b-2r}{t}$	$\frac{d-2r}{t}$	Full Section Area A_g mm ²	About x-axis				About y-axis				Torsion Constant J 10 ⁶ mm ⁴	Torsion Modulus C 10 ³ mm ³	Effective Section Area A_e mm ²	About x-axis		About y-axis	
d	b	t		per metre	per tonne				I_x	Z_x	S_x	r_x	I_y	r_y	Z_y	S_y				I_{ox}	Z_{ox}	I_{oy}	Z_{oy}
mm	mm	mm		m ² /m	m ² /t				mm ²	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	mm	10 ³ mm ³				10 ³ mm ³	10 ⁶ mm ⁴	10 ³ mm ³	mm ²
90x	38x	2.0RHS	3.83	0.251	69.0	16.1	43.4	463	0.465	10.3	13.0	31.7	0.122	16.2	6.39	7.14	0.316	11.3	416	0.465	10.3	0.114	5.68
76x	38x	2.0RHS	3.39	0.223	69.3	16.1	36.1	411	0.307	8.06	10.0	27.3	0.105	16.0	5.49	6.19	0.254	9.49	398	0.307	8.06	0.103	5.30
		1.6RHS	2.75	0.225	87.2	21.4	46.8	328	0.249	6.54	8.07	27.6	0.0854	16.1	4.48	5.00	0.205	7.73	287	0.249	6.54	0.078	3.86
		1.2RHS	2.09	0.226	118	30.6	65.3	244	0.188	4.94	6.04	27.8	0.0648	16.3	3.40	3.75	0.153	5.86	185	0.188	4.94	0.053	2.47
64x	38x	1.6RHS	2.44	0.200	87.5	21.3	38.7	291	0.162	5.07	6.17	23.6	0.0727	15.8	3.83	4.31	0.160	6.43	276	0.162	5.07	0.070	3.60

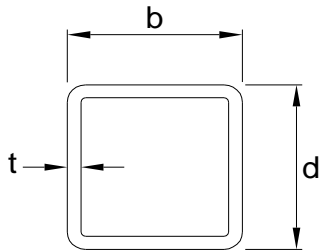
Notes: 1. This product is to BTM specification TS30, $f_y=300$ MPa and $f_u = 350$ MPa. Minimum elongation is equal to 15%

2. Effective Section Properties are calculated in accordance with AS/NZS 4600.

3. The designation thicknesses have been used to calculate the nominal mass per metre and external surface areas.

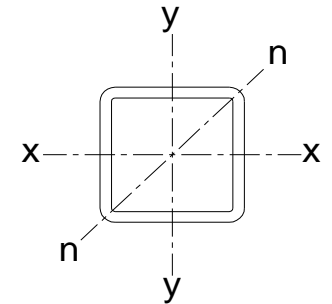
4. Actual thickness of 1.1, 1.3, 1.5, and 1.9mm, instead of designated thicknesses of 1.2, 1.4, 1.6 and 2.0mm, have been used to calculate the ratios, the full and effective sectional properties.

5. For Square and Rectangular Hollow Sections, the outside corner radius r used in calculating the section properties is equal to $2t$ for sections with $t \leq 3.0$ mm and $2.5t$ for sections with $t > 3.0$ mm.



DIMENSIONS AND PROPERTIES

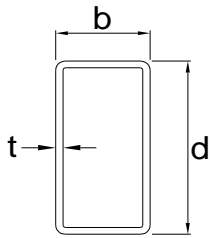
**TubeColor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)**



DIMENSIONS AND RATIOS								FULL SECTION PROPERTIES						EFFECTIVE SECTION PROPERTIES					
Designation			Mass per Metre kg/m	External Surface Area per metre per tonne		$\frac{b-2t}{t}$	$\frac{d-2t}{t}$	Gross Section Area A_g mm ²	About x-, y- and n- axis					Torsion Constant J 10 ⁹ mm ⁴	Torsion Constant C 10 ³ mm ³	Form Factor k_f	About x- and y- axis		
d	b	t		m ² /m	m ² /t				I_x 10 ⁶ mm ⁴	Z_x 10 ³ mm ³	Z_n 10 ³ mm ³	S_x 10 ³ mm ³	r_x mm				λ_{ex}	Comp- actness	Z_{ex} 10 ³ mm ³
90x	90x	2.0SHS	5.45	0.353	64.8	43.0	43.0	694	0.889	19.7	14.3	22.8	35.8	1.38	29.6	0.696	57.7	S	16.0

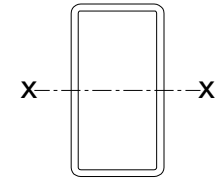
2. Grade C450L0 to AS 1163 is cold formed and therefore is allocated the CF residual stresses classification in AS 4100.

3. C = Compact Section; N = Non-compact Section; S = Slender Section; as defined in AS 4100.



Members Subject to AXIAL COMPRESSION

**Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
buckling about x - axis**



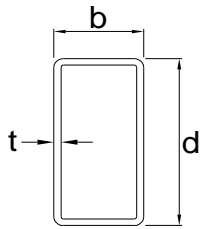
Designation			Mass per Metre	Design Load Capacities for Axial Compression ϕN_c (kN)													
d	b	t		Effective Length (L_e) in metres													
mm	mm	mm	kg/m	0.0	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0	8.0	10.0	12.0
150x	50x	2.0RHS	6.07	173	172	168	164	158	151	143	133	109	85.1	66.1	52.1	34.3	24.2
100x	50x	2.0RHS	4.50	173	167	158	146	129	109	89.0	72.1	48.5	34.5	25.7	19.8	12.8	8.99

- Notes : 1. $\phi = 0.9$
 2. $\phi N_c = \phi \alpha_c N_s$ (Clause 6.3.3 of AS 4100)
 3. $\alpha_b = -0.5$ (Table 6.3.3 of AS 4100)

**Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)
buckling about x - axis**

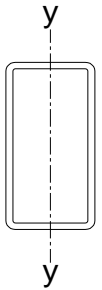
Designation			Mass per Metre	ϕN_s	Design Capacities for Axial Compression ϕN_c (kN)												
d	b	t			Effective Length (L_e) in metres												
mm	mm	mm	kg/m	kN	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00
90x	38x	2.0RHS	3.83	106	106	105	103	101	98.1	94.8	91.0	86.8	77.4	66.8	42.8	27.4	19.0
76x	38x	2.0RHS	3.39	102	101	99.8	97.6	94.7	91.0	86.5	80.7	74.5	61.5	48.7	28.2	18.1	12.5
		1.6RHS	2.75	73.3	73.0	72.1	70.6	68.6	66.1	63.1	59.7	56.1	48.1	39.4	22.9	14.7	10.2
		1.2RHS	2.09	47.1	46.9	46.3	45.4	44.1	42.6	40.7	38.6	36.4	31.4	26.3	17.0	11.1	7.69
64x	38x	1.6RHS	2.44	70.5	70.1	68.8	66.8	64.1	60.8	56.9	52.4	47.0	36.4	26.5	14.9	9.55	6.63

- Notes: 1. $\phi_c = 0.85$ for axial compression. AS/NZS 4600 Table 1.6
 2. $\phi_c N_c = \phi_c A_g f_n$
 3. $f_n = (0.658^{\lambda_c^2}) f_y$ for $\lambda_c \leq 1.5$ or $f_n = (0.877/\lambda_c^2) f_y$ for $\lambda_c > 1.5$
 4. $\lambda_c = (f_y/f_{oc})^{1/2}$
 5. $f_{oc} = \pi^2 E / (l_e/r_x)^2$
 6. Values are not listed when the effective length exceeds $300r_x$.
 7. Values shaded have effective lengths that exceed $200r_x$.
 8. Sectional properties are calculated in accordance with AS/NZS 4600.



Members Subject to AXIAL COMPRESSION

Tubecolor® RECTANGULAR HOLLOW SECTIONS: AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100) *buckling about y- axis*



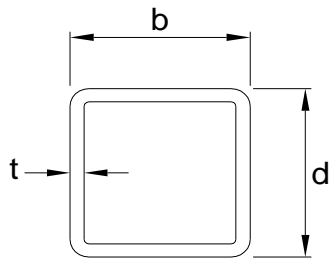
Designation			Mass per Metre	Design Load Capacities for Axial Compression ϕN_c (kN)													
d	b	t		Effective Length (L_e) in metres													
mm	mm	mm	kg/m	0.0	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0	8.0	10.0	12.0
150x	50x	2.0RHS	6.07	173	160	142	116	87.2	64.8	49.1	38.3	25.0	17.5	13.0	10.0	6.47	4.52
100x	50x	2.0RHS	4.50	173	154	127	92.1	64.4	46.3	34.7	26.9	17.4	12.2	9.05	6.97	4.49	3.14

- Notes : 1. $\phi = 0.9$
 2. $\phi N_c = \phi \alpha_c N_s$ (Clause 6.3.3 of AS 4100)
 3. $\alpha_b = -0.5$ (Table 6.3.3 of AS 4100)

Tubecolor® RECTANGULAR HOLLOW SECTIONS: TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600) *buckling about y - axis*

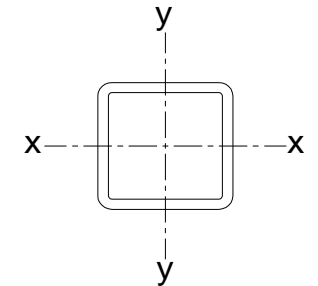
Designation			Mass per Metre	ϕN_s	Design Capacities for Axial Compression ϕN_c (kN)												
d	b	t			Effective Length (L_e) in metres												
mm	mm	mm	kg/m	kN	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00
90x	38x	2.0RHS	3.83	106	105	101	95.3	87.6	78.5	68.5	56.3	44.8	28.7	19.9	11.2	-	-
76x	38x	2.0RHS	3.39	102	100	96.5	90.4	81.6	70.9	59.7	48.7	38.5	24.6	17.1	9.62	-	-
		1.6RHS	2.75	73.3	72.4	69.8	65.7	60.3	54.0	47.1	39.6	31.4	20.1	14.0	7.85	-	-
		1.2RHS	2.09	47.1	46.5	44.9	42.4	39.0	35.1	30.9	26.5	22.1	15.3	10.6	5.96	-	-
64x	38x	1.6RHS	2.44	70.5	69.6	66.9	62.6	57.0	49.9	41.9	34.0	26.7	17.1	11.9	6.69	-	-

- Notes: 1. $\phi_c = 0.85$ for axial compression. AS/NZS 4600 Table 1.6
 2. $\phi_c N_c = \phi_c A_e f_n$
 3. $f_n = (0.658^{\lambda_c}) f_y$ for $\lambda_c \leq 1.5$ or $f_n = (0.877/\lambda_c^2) f_y$ for $\lambda_c > 1.5$
 4. $\lambda_c = (f_y/f_{oc})^{1/2}$
 5. $f_{oc} = \pi^2 E / (l_e/r_y)^2$
 6. Values are not listed when the effective length exceeds $300r_y$.
 7. Values shaded have effective lengths that exceed $200r_y$.
 8. Sectional properties are calculated in accordance with AS/NZS 4600.



Members Subject to AXIAL COMPRESSION

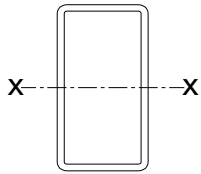
**Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)**
buckling about x - and y - axis



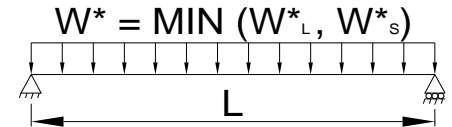
Designation			Mass per Metre	Design Load Capacities for Axial Compression ϕN_c (kN)													
d	b	t		Effective Length (L_e) in metres													
mm	mm	mm	kg/m	0.0	0.50	1.0	1.50	2.0	2.50	3.0	3.50	4.0	4.5	5.0	6.0	7.0	8.0
90x	90x	2.0SHS	5.45	196	195	189	179	166	148	126	104	84.7	69.3	57.3	40.7	30.3	23.4

2. $\phi N_c = \phi \alpha_c N_s$ (Clause 6.3.3 of AS 4100)

3. $\alpha_c = -0.5$ (Table 6.3.3 of AS 4100)



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR SIMPLY SUPPORTED BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**



W^*_{L1} = Maximum Design Load on Design Moment Capacity

W^*_{L2} = Maximum Design Load based on Design Shear Capacity

Maximum Design Load W^*_L is the LESSER of W^*_{L1} and W^*_{L2}

Designation			Mass per Metre	W^*_{L1} (kN)														W^*_{L2}	FLR
d	b	t		Span of Beam (L) in metres															
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	kN	m
150x	50x	2.0RHS	6.07	103	51.3	34.2	25.6	20.5	17.1	14.6	12.8	11.4	10.3	9.32	8.54	7.89	7.32	264	7.58
100x	50x	2.0RHS	4.50	59.0	29.5	19.7	14.7	11.8	9.83	8.43	7.37	6.55	5.90	5.36	4.92	4.54	4.21	178	8.41

FLR = Segment length for full lateral restraint ($\phi M_{bx} = \phi M_{sx}$)

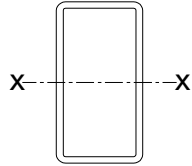
2. $\phi = 0.9$
3. $\alpha_m = 1.0$
4. $\alpha_s = 1.0$
5. $W^*_{L1} = 8\phi M_g/L$
6. $W^*_{L2} = 2.0\phi V_v$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR SIMPLY SUPPORTED BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**

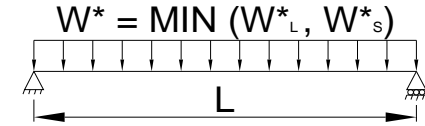
W^*_{S1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{S1} (kN)													
d	b	t		Span of Beam (L) in metres													
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
150x	50x	2.0RHS	6.07	128	31.9	14.2	7.97	5.10	3.54	2.60	1.99	1.57	1.28	1.05	0.885	0.754	0.651
100x	50x	2.0RHS	4.50	46.1	11.5	5.12	2.88	1.84	1.28	0.940	0.720	0.569	0.461	0.381	0.320	0.273	0.235

Note: 1 Serviceability $W^*_{S1} = 76.8EI/(250L^2)$



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR SIMPLY SUPPORTED BEAMS WITH FULL LATERAL RESTRAINT**
**Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)**
bending about x - axis



W^*_{L1} = Maximum Design Load based on Design Moment Capacity
 W^*_{L2} = Maximum Design Load based on Design Shear Capacity
 W^*_{L3} = Maximum Design Load based on Combined Bending and Shear Capacity
 Maximum Design Load W^*_L is LESSER OF W^*_{L1} , W^*_{L2} OR W^*_{L3}

Designation			Mass per Metre	$W^*_{L1, L3}$ (kN)													W^*_{L2}	FLR C_b 1.14
d	b	t		Span of Beam (L) in metres														
mm	mm	mm	kg/m	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00	kN	m
90x	38x	2.0RHS	3.83	94.3 B	47.2 B	31.4 B	23.6 B	18.9 B	15.7 B	13.5 B	11.8 B	9.43 B	7.86 B	5.90 B	4.72 B	3.93 B	108	10.3
76x	38x	2.0RHS	3.39	73.5 B	36.7 B	24.5 B	18.4 B	14.7 B	12.2 B	10.5 B	9.18 B	7.35 B	6.12 B	4.59 B	3.67 B	3.06 B	90.1	11.0
		1.2RHS	2.09	45.0 B	22.5 B	15.0 B	11.3 B	9.00 B	7.50 B	6.43 B	5.63 B	4.50 B	3.75 B	2.81 B	2.25 B	1.88 B	49.9	11.0
64x	38x	1.6RHS	2.44	46.3 B	23.1 B	15.4 B	11.6 B	9.25 B	7.71 B	6.61 B	5.78 B	4.63 B	3.86 B	2.89 B	2.31 B	1.93 B	60.1	11.6

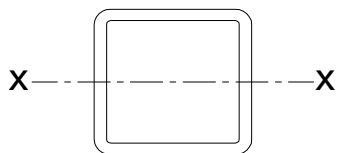
- Notes: 1. $\phi_b = 0.95$ for bending, $\phi_v = 0.9$ for shear. AS/NZS 4600 Table 1.6
 2. $W^*_{L1} = \phi_b Z_{ex} f_y / L$
 3. $W^*_{L2} = 2\phi_v V_v$
 4. $\phi_v V_v = 2\phi_v 0.64 f_y d_1 t_w$ for $d_1/t_w \leq (E k_v / f_y)^{1/2}$, $\phi_v V_v = 2\phi_v 0.64 f_y t_w^2 (E k_v / f_y)^{1/2}$ for $(E k_v / f_y)^{1/2} < d_1/t_w \leq 1.415 (E k_v / f_y)^{1/2}$, $\phi_v V_v = 2\phi_v 0.905 E k_v t_w^3 / d_1$ for $d_1/t_w > 1.415 (E k_v / f_y)^{1/2}$
 5. $k_v = 5.34$
 6. $W^*_{L3} = (M^* / \phi_b M_{sx})^2 + (V^* / \phi_v V_v)^2 \leq 1$
 7. 'B' Indicates that bending only (W^*_{L1}) governs, while 'S' indicates that combined bending and shear (W^*_{L3}) governs
 8. FLR = $0.6^2 C_{br} (E G J A_g)^{1/2} / f_y Z_x$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR SIMPLY SUPPORTED BEAMS WITH FULL LATERAL RESTRAINT**
**Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)**
bending about x - axis

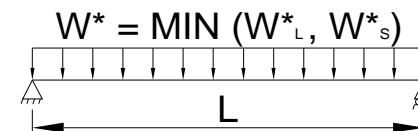
W^*_{S1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{S1} (kN)												
d	b	t		Span of Beam (L) in metres												
mm	mm	mm	kg/m	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00
90x	38x	2.0RHS	3.83	458	114	50.8	28.6	18.3	12.7	9.34	7.15	4.58	3.18	1.79	1.14	0.794
76x	38x	2.0RHS	3.39	302	75.4	33.5	18.9	12.1	8.38	6.16	4.71	3.02	2.10	1.18	0.754	0.524
		1.6RHS	2.75	245	61.3	27.2	15.3	9.80	6.81	5.00	3.83	2.45	1.70	0.957	0.613	0.425
		1.2RHS	2.09	185	46.2	20.5	11.6	7.39	5.13	3.77	2.89	1.85	1.28	0.722	0.462	0.321
64x	38x	1.6RHS	2.44	160	39.9	17.7	9.97	6.38	4.43	3.26	2.49	1.60	1.11	0.623	0.399	0.277

- Notes: 1. Serviceability Load $W_{S1} = k_d * E * I / (250 * L^2)$
 2. $k_d = 384/5$
 3. Spans should always be selected as the lesser value of W_S and W_L
 4. Loads given in the above table maybe prorated for other deflection limits. ie. Load for SPAN/500 is determined by $W^*_{S1} * 250/500$ provided that the strength limit state capacity for the member is not exceeded.
 5. Deflection loads given in the above table are calculated using the gross second moment of area I_x .
 All sections in the tables are fully effective when Serviceability Limit State/Strength Limit State load combinations to AS1170.1 are considered.



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR SIMPLY SUPPORTED BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**



W^*_{L1} = Maximum Design Load on Design Moment Capacity

W^*_{L2} = Maximum Design Load based on Design Shear Capacity

Maximum Design Load W^*_L is the LESSER of W^*_{L1} and W^*_{L2}

Designation			Mass per Metre	W^*_{L1} (kN)														W^*_{L2}
d	b	t		Span of Beam (L) in metres														
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	kN
90x	90x	2.0SHS	5.45	51.8	25.9	17.3	13.0	10.4	8.64	7.41	6.48	5.76	5.18	4.71	4.32	3.99	3.70	165

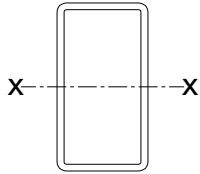
- Notes:
- $FLR = 0.436(\pi^2 E I_y G J / M_{sx}^2)^{1/2}$
FLR = Segement length for full lateral restraint ($\phi M_{bx} = \phi M_{sx}$)
 - $\phi = 0.9$
 - $\alpha_m = 1.0$
 - $\alpha_s = 1.0$
 - $W^*_{L1} = 8\phi M_s / L$
 - $W^*_{L2} = 2\phi V_v$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR SIMPLY SUPPORTED BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**

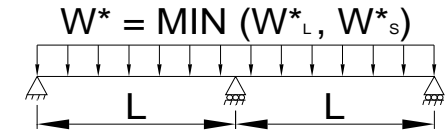
W^*_{S1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{S1} (kN)													
d	b	t		Span of Beam (L) in metres													
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
90x	90x	2.0SHS	5.45	54.6	13.6	6.07	3.41	2.18	1.52	1.11	0.853	0.674	0.546	0.451	0.379	0.323	0.279

Note: 1 Serviceability $W^*_{S1} = 76.8EI / (250L^2)$



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR CONTINUOUS BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**



W^*_{L1} = Maximum Design Load on Design Moment Capacity

W^*_{L2} = Maximum Design Load based on Design Shear Capacity

Maximum Design Load W^*_L is the LESSER of W^*_{L1} and W^*_{L2}

Designation			Mass per Metre	W^*_{L1} (kN)														W^*_{L2}	FLR
d	b	t		Span of Beam (L) in metres															
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	kN	m
150x	50x	2.0RHS	6.07	103	51.3	34.2	25.6	20.5	17.1	14.6	12.8	11.4	10.3	9.32	8.54	7.89	7.32	211	31.4
100x	50x	2.0RHS	4.50	59.0	29.5	19.7	14.7	11.8	9.83	8.43	7.37	6.55	5.90	5.36	4.92	4.54	4.21	142	34.9

FLR = Segement length for full lateral restraint ($\phi M_{bx} = \phi M_{sx}$)

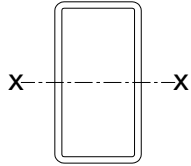
2. $\phi = 0.9$
3. $\alpha_m = 1.0$
4. $\alpha_s = 1.0$
5. $W^*_{L1} = 8\phi M_s/L$
6. $W^*_{L2} = 8/5\phi V_v$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR SIMPLY SUPPORTED BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**

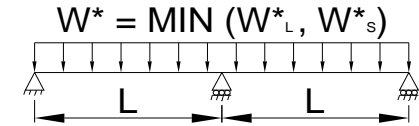
W^*_{S1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{S1} (kN)													
d	b	t		Span of Beam (L) in metres													
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
150x	50x	2.0RHS	6.07	307	76.8	34.1	19.2	12.3	8.53	6.27	4.80	3.79	3.07	2.54	2.13	1.82	1.57
100x	50x	2.0RHS	4.50	111	27.7	12.3	6.94	4.44	3.08	2.26	1.73	1.37	1.11	0.917	0.771	0.657	0.566
		1.6RHS	3.64	90.7	22.7	10.1	5.67	3.63	2.52	1.85	1.42	1.12	0.907	0.750	0.630	0.537	0.463

Note: 1 Serviceability $W^*_{S1} = 185EI/(250L^2)$



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR CONTINUOUS BEAMS WITH FULL LATERAL RESTRAINT**
**Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)**
bending about x - axis



W^*_{L1} = Maximum Design Load based on Design Moment Capacity
 W^*_{L2} = Maximum Design Load based on Design Shear Capacity
 W^*_{L3} = Maximum Design Load based on Combined Bending and Shear Capacity
 Maximum Design Load W^*_L is LESSER OF W^*_{L1} , W^*_{L2} OR W^*_{L3}

Designation			Mass per Metre	$W^*_{L1, L3}$ (kN)													W^*_{L2}	FLR C_b 2.08
d	b	t		Span of Beam (L) in metres														
mm	mm	mm	kg/m	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00	kN	m
90x	38x	2.0RHS	3.83	63.8 S	41.4 S	29.6 S	22.8 S	18.4 S	15.5 S	13.3 S	11.7 S	9.38 S	7.83 S	5.88 S	4.71 S	3.93 S	86.6	18.8
76x	38x	2.0RHS	3.39	51.4 S	32.7 S	23.2 S	17.8 S	14.4 S	12.1 S	10.4 S	9.11 S	7.31 S	6.10 S	4.58 S	3.67 S	3.06 S	72.1	20.0
		1.2RHS	2.09	29.9 S	19.6 S	14.0 S	10.8 S	8.78 S	7.37 S	6.35 S	5.57 S	4.47 S	3.73 S	2.81 S	2.25 S	1.87 S	39.9	20.0
64x	38x	1.6RHS	2.44	33.3 S	20.8 S	14.7 S	11.2 S	9.09 S	7.61 S	6.55 S	5.74 S	4.60 S	3.84 S	2.89 S	2.31 S	1.93 S	48.1	21.1

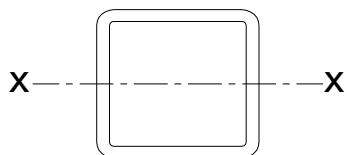
- Notes: 1. $\phi_b = 0.95$ for bending, $\phi_v = 0.9$ for shear. AS/NZS 4600 Table 1.6
 2. $W^*_{L1} = \phi_b 8 Z_{ex} f_y / L$
 3. $W^*_{L2} = 8 / 5 \phi_v V_v$
 4. $\phi_v V_v = 2 \phi_v 0.64 f_y d_1 t_w$ for $d_1 / t_w \leq (E k_v / f_y)^{1/2}$, $\phi_v V_v = 2 \phi_v 0.64 f_y t_w^2 (E k_v / f_y)^{1/2}$ for $(E k_v / f_y)^{1/2} < d_1 / t_w \leq 1.415 (E k_v / f_y)^{1/2}$, $\phi_v V_v = 2 \phi_v 0.905 E k_v t_w^3 / d_1$ for $d_1 / t_w > 1.415 (E k_v / f_y)^{1/2}$
 5. $k_v = 5.34$
 6. $W^*_{L3} = (M^* / \phi_b M_{sx})^2 + (V^* / \phi_v V_v)^2 \leq 1$
 7. 'B' Indicates that bending only (W^*_{L1}) governs, while 'S' indicates that combined bending and shear (W^*_{L3}) governs
 8. FLR = $0.6^2 C_b r_y (E G J A_g)^{1/2} / f_y Z_x$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR CONTINUOUS BEAMS WITH FULL LATERAL RESTRAINT**
**Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)**
bending about x - axis

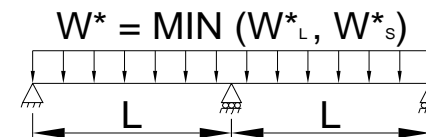
W^*_{S1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{S1} (kN)												
d	b	t		Span of Beam (L) in metres												
mm	mm	mm	kg/m	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00
90x	38x	2.0RHS	3.83	1102	276	122	68.9	44.1	30.6	22.5	17.2	11.0	7.65	4.31	2.76	1.91
76x	38x	2.0RHS	3.39	727	182	80.8	45.4	29.1	20.2	14.8	11.4	7.27	5.05	2.84	1.82	1.26
		1.6RHS	2.75	590	148	65.6	36.9	23.6	16.4	12.0	9.22	5.90	4.10	2.31	1.48	1.02
		1.2RHS	2.09	445	111	49.5	27.8	17.8	12.4	9.09	6.96	4.45	3.09	1.74	1.11	0.773
64x	38x	1.6RHS	2.44	384	96.1	42.7	24.0	15.4	10.7	7.84	6.01	3.84	2.67	1.50	0.961	0.667

- Notes: 1. Serviceability Load $W_{S1} = k_d E^* I / (250 L^2)$
 2. $K_d = 185 / 1$
 3. Spans should always be selected as the lesser value of W_S and W_L
 4. Loads given in the above table maybe prorated for other deflection limits. ie. Load for SPAN/500 is determined by $W^*_{S1} * 250 / 500$ provided that the strength limit state capacity for the member is not exceeded.
 5. Deflection loads given in the above table are calculated using the gross second moment of area I_x .
 All sections in the tables are fully effective when Serviceability Limit State/Strength Limit State load combinations to AS1170.1 are considered.



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR CONTINUOUS BEAMS WITH FULL LATERAL RESTRAINT**
Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis



W^*_{L1} = Maximum Design Load on Design Moment Capacity
 W^*_{L2} = Maximum Design Load based on Design Shear Capacity
 Maximum Design Load W^*_L is the LESSER of W^*_{L1} and W^*_{L2}

Designation			Mass per Metre	W^*_{L1} (kN)														W^*_{L2}
d	b	t		Span of Beam (L) in metres														
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	kN
90x	90x	2.0SHS	5.45	51.8	25.9	17.3	13.0	10.4	8.64	7.41	6.48	5.76	5.18	4.71	4.32	3.99	3.70	132

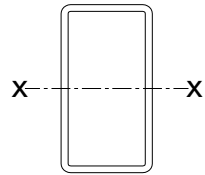
- Notes: 1. $FLR = 0.436(\pi^2 EI_y GJ / M_{sx}^2)^{1/2}$
 FLR = Segment length for full lateral restraint ($\phi M_{bx} = \phi M_{sx}$)
 2. $\phi = 0.9$
 3. $\alpha_m = 1.0$
 4. $\alpha_s = 1.0$
 5. $W^*_{L1} = 8\phi M_s / L$
 6. $W^*_{L2} = 8/5\phi V_v$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR CONTINUOUS BEAMS WITH FULL LATERAL RESTRAINT**
Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis

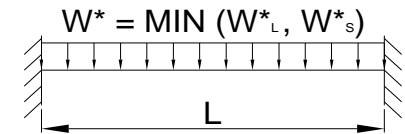
W^*_{s1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{s1} (kN)													
d	b	t		Span of Beam (L) in metres													
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
90x	90x	2.0SHS	5.45	132	32.9	14.6	8.22	5.26	3.65	2.68	2.05	1.62	1.32	1.09	0.913	0.778	0.671

Note: 1 Serviceability $W^*_{s1} = 185EI / (250L^2)$



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR FIXED END BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**



W^*_{L1} = Maximum Design Load on Design Moment Capacity

W^*_{L2} = Maximum Design Load based on Design Shear Capacity

Maximum Design Load W^*_L is the LESSER of W^*_{L1} and W^*_{L2}

Designation			Mass per Metre	W^*_{L1} (kN)														W^*_{L2}	FLR
d	b	t		Span of Beam (L) in metres															
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	kN	m
150x	50x	2.0RHS	6.07	154	76.9	51.3	38.4	30.8	25.6	22.0	19.2	17.1	15.4	14.0	12.8	11.8	11.0	264	34.2
100x	50x	2.0RHS	4.50	88.5	44.2	29.5	22.1	17.7	14.7	12.6	11.1	9.83	8.85	8.04	7.37	6.81	6.32	178	38.0

FLR = Segement length for full lateral restraint ($\phi M_{bx} = \phi M_{sx}$)

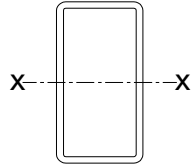
2. $\phi = 0.9$
3. $\alpha_m = 1.0$
4. $\alpha_s = 1.0$
5. $W^*_{L1} = 12\phi M_S/L$
6. $W^*_{L2} = 2\phi V_V$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR FIXED END BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**

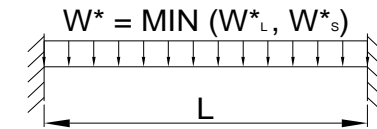
W^*_{S1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{S1} (kN)													
d	b	t		Span of Beam (L) in metres													
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
150x	50x	2.0RHS	6.07	638	159	70.8	39.8	25.5	17.7	13.0	9.96	7.87	6.38	5.27	4.43	3.77	3.25
100x	50x	2.0RHS	4.50	230	57.6	25.6	14.4	9.21	6.40	4.70	3.60	2.84	2.30	1.90	1.60	1.36	1.18

Note: 1 Serviceability $W^*_{S1} = 384EI/(250L^2)$



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR FIXED END BEAMS WITH FULL LATERAL RESTRAINT**
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)
bending about x - axis



W_{L1}^* = Maximum Design Load based on Design Moment Capacity
 W_{L2}^* = Maximum Design Load based on Design Shear Capacity
 W_{L3}^* = Maximum Design Load based on Combined Bending and Shear Capacity
 Maximum Design Load W_L^* is LESSER OF W_{L1}^* , W_{L2}^* OR W_{L3}^*

Designation			Mass per Metre	$W_{L1, L3}^*$ (kN)													W_{L2}^* kN	FLR	
d	b	t		Span of Beam (L) in metres														C _b	2.38
mm	mm	mm	kg/m	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00		m	
90x	38x	2.0RHS	3.83	86.0 S	59.2 S	43.2 S	33.6 S	27.4 S	23.0 S	19.9 S	17.5 S	14.0 S	11.7 S	8.81 S	7.06 S	5.89 S	108	21.5	
76x	38x	2.0RHS	3.39	69.7 S	47.0 S	34.0 S	26.3 S	21.4 S	18.0 S	15.5 S	13.6 S	10.9 S	9.14 S	6.87 S	5.50 S	4.59 S	90.1	22.9	
		1.2RHS	2.09	40.1 S	28.0 S	20.5 S	16.0 S	13.0 S	11.0 S	9.47 S	8.32 S	6.69 S	5.59 S	4.20 S	3.37 S	2.81 S	49.9	22.9	
64x	38x	1.6RHS	2.44	45.4 S	30.1 S	21.6 S	16.7 S	13.5 S	11.4 S	9.78 S	8.58 S	6.89 S	5.76 S	4.33 S	3.46 S	2.89 S	60.1	24.2	

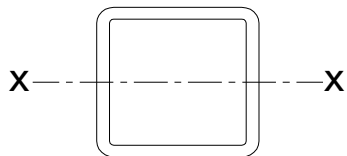
- Notes: 1. $\phi_b = 0.95$ for bending, $\phi_v = 0.9$ for shear. AS/NZS 4600 Table 1.6
 2. $W_{L1}^* = \phi_b 12Z_{ex} f_y / L$
 3. $W_{L2}^* = 2\phi_v V_v$
 4. $\phi_v V_v = 2\phi_v 0.64f_y d_1 t_w$ for $d_1/t_w \leq (E k_v / f_y)^{1/2}$, $\phi_v V_v = 2\phi_v 0.64f_y t_w^2 (E k_v / f_y)^{1/2}$ for $(E k_v / f_y)^{1/2} < d_1/t_w \leq 1.415(E k_v / f_y)^{1/2}$, $\phi_v V_v = 2\phi_v 0.905 E k_v t_w^3 / d_1$ for $d_1/t_w > 1.415(E k_v / f_y)^{1/2}$
 5. $k_v = 5.34$
 6. $W_{L3}^* = (M^* / \phi_b M_{sx})^2 + (V^* / \phi_v V_v)^2 \leq 1$
 7. 'B' Indicates that bending only (W_{L1}^*) governs, while 'S' indicates that combined bending and shear (W_{L3}^*) governs
 8. $FLR = 0.6^2 C_b r_y (E G J A_g)^{1/2} / f_y Z_x$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR FIXED END BEAMS WITH FULL LATERAL RESTRAINT**
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)
bending about x - axis

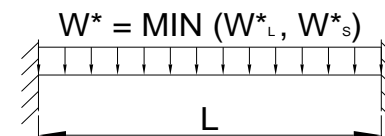
W_{S1}^* = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W_{S1}^* (kN)												
d	b	t		Span of Beam (L) in metres												
mm	mm	mm	kg/m	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00
90x	38x	2.0RHS	3.83	2288	572	254	143	91.5	63.5	46.7	35.7	22.9	15.9	8.94	5.72	3.97
76x	38x	2.0RHS	3.39	1509	377	168	94.3	60.3	41.9	30.8	23.6	15.1	10.5	5.89	3.77	2.62
		1.6RHS	2.75	1225	306	136	76.6	49.0	34.0	25.0	19.1	12.3	8.51	4.79	3.06	2.13
		1.2RHS	2.09	924	231	103	57.8	37.0	25.7	18.9	14.4	9.24	6.42	3.61	2.31	1.60
64x	38x	1.6RHS	2.44	798	199	88.6	49.9	31.9	22.2	16.3	12.5	7.98	5.54	3.12	1.99	1.39

- Notes: 1. Serviceability Load $W_{S1}^* = k_d E^* I / (250 L^2)$
 2. $K_d = 384/1$
 3. Spans should always be selected as the lesser value of W_S and W_L .
 4. Loads given in the above table maybe prorated for other deflection limits. ie. Load for SPAN/500 is determined by $W_{S1}^* * 250/500$ provided that the strength limit state capacity for the member is not exceeded.
 5. Deflection loads given in the above table are calculated using the gross second moment of area I_x .
 All sections in the tables are fully effective when Serviceability Limit State/Strength Limit State load combinations to AS1170.1 are considered.



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR FIXED END BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**



W^*_{L1} = Maximum Design Load on Design Moment Capacity
 W^*_{L2} = Maximum Design Load based on Design Shear Capacity
 Maximum Design Load W^*_L is the LESSER of W^*_{L1} and W^*_{L2}

Designation			Mass per Metre	W^*_{L1} (kN)														W^*_{L2}
d	b	t		Span of Beam (L) in metres														
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	kN
90x	90x	2.0SHS	5.45	77.8	38.9	25.9	19.4	15.6	13.0	11.1	9.72	8.64	7.78	7.07	6.48	5.98	5.56	165

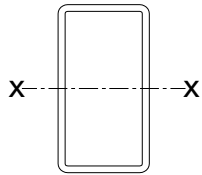
- Notes: 1. $FLR = 0.436(\pi^2 E I_y G J / M_{sx})^{1/2}$
 FLR = Segment length for full lateral restraint ($\phi M_{bx} = \phi M_{sx}$)
 2. $\phi = 0.9$
 3. $\alpha_m = 1.0$
 4. $\alpha_s = 1.0$
 5. $W^*_{L1} = 12\phi M_s / L$
 6. $W^*_{L2} = 2\phi V_v$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR FIXED END BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**

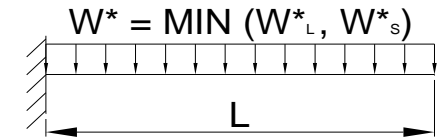
W^*_{s1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{s1} (kN)													
d	b	t		Span of Beam (L) in metres													
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
90x	90x	2.0SHS	5.45	273	68.2	30.3	17.1	10.9	7.58	5.57	4.27	3.37	2.73	2.26	1.90	1.62	1.39

Note: 1 Serviceability $W^*_{s1} = 384EI / (250L^2)$



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR CANTILEVER BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**



W^*_{L1} = Maximum Design Load on Design Moment Capacity

W^*_{L2} = Maximum Design Load based on Design Shear Capacity

Maximum Design Load W^*_L is the LESSER of W^*_{L1} and W^*_{L2}

Designation			Mass per Metre	W^*_{L1} (kN)														W^*_{L2}	FLR
d	b	t		Span of Beam (L) in metres															
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	kN	m
150x	50x	2.0RHS	6.07	25.6	12.8	8.54	6.41	5.13	4.27	3.66	3.20	2.85	2.56	2.33	2.14	1.97	1.83	132	31.4
100x	50x	2.0RHS	4.50	14.7	7.37	4.92	3.69	2.95	2.46	2.11	1.84	1.64	1.47	1.34	1.23	1.13	1.05	88.9	34.9

FLR = Segement length for full lateral restraint ($\phi M_{bx} = \phi M_{sx}$)

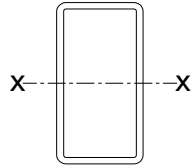
2. $\phi = 0.9$
3. $\alpha_m = 1.0$
4. $\alpha_s = 1.0$
5. $W^*_{L1} = 2\phi M_S/L$
6. $W^*_{L2} = \phi V_V$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR CANTILEVER BEAMS WITH FULL LATERAL RESTRAINT
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis**

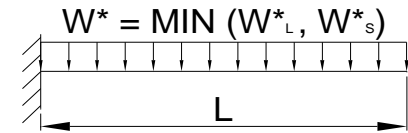
W^*_{S1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{S1} (kN)													
d	b	t		Span of Beam (L) in metres													
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
150x	50x	2.0RHS	6.07	13.30	3.32	1.48	0.830	0.531	0.369	0.271	0.208	0.164	0.133	0.110	0.0922	0.0786	0.0678
100x	50x	2.0RHS	4.50	4.80	1.20	0.533	0.300	0.192	0.133	0.0979	0.0750	0.0592	0.0480	0.0397	0.0333	0.0284	0.0245

Note: 1 Serviceability $W^*_{S1} = 8EI/(250L^2)$



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR CANTILEVER BEAMS WITH FULL LATERAL RESTRAINT**
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)
bending about x - axis



W_{L1}^* = Maximum Design Load based on Design Moment Capacity
 W_{L2}^* = Maximum Design Load based on Design Shear Capacity
 W_{L3}^* = Maximum Design Load based on Combined Bending and Shear Capacity
 Maximum Design Load W_L^* is LESSER OF W_{L1}^* , W_{L2}^* OR W_{L3}^*

Designation			Mass per Metre	$W_{L1, L3}^*$ (kN)													W_{L2}^*	FLR
d	b	t		Span of Beam (L) in metres														
mm	mm	mm	kg/m	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00	kN	1.00
90x	38x	2.0RHS	3.83	21.6 S	11.5 S	7.78 S	5.86 S	4.70 S	3.92 S	3.36 S	2.94 S	2.36 S	1.96 S	1.47 S	1.18 S	0.982 S	54.1	9.05
76x	38x	2.0RHS	3.39	17.0 S	9.00 S	6.07 S	4.57 S	3.66 S	3.05 S	2.62 S	2.29 S	1.84 S	1.53 S	1.15 S	0.918 S	0.765 S	45.0	9.64
		1.2RHS	2.09	10.3 S	5.49 S	3.71 S	2.80 S	2.24 S	1.87 S	1.60 S	1.40 S	1.12 S	0.937 S	0.703 S	0.562 S	0.469 S	25.0	9.63
64x	38x	1.6RHS	2.44	10.8 S	5.68 S	3.82 S	2.88 S	2.31 S	1.92 S	1.65 S	1.44 S	1.16 S	0.963 S	0.723 S	0.578 S	0.482 S	30.1	10.2

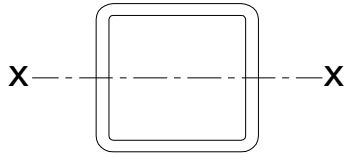
- Notes: 1. $\phi_b = 0.95$ for bending, $\phi_v = 0.9$ for shear. AS/NZS 4600 Table 1.6
 2. $W_{L1}^* = \phi_b 2Z_{ex} f_y / L$
 3. $W_{L2}^* = \phi_v V_v$
 4. $\phi_v V_v = 2\phi_v 0.64 f_y d_1 t_w$ for $d_1/t_w \leq (E k_v / f_y)^{1/2}$, $\phi_v V_v = 2\phi_v 0.64 f_y t_w^2 (E k_v / f_y)^{1/2}$ for $(E k_v / f_y)^{1/2} < d_1/t_w \leq 1.415 (E k_v / f_y)^{1/2}$, $\phi_v V_v = 2\phi_v 0.905 E k_v t_w^3 / d_1$ for $d_1/t_w > 1.415 (E k_v / f_y)^{1/2}$
 5. $k_v = 5.34$
 6. $W_{L3}^* = (M^* / \phi_b M_{sx})^2 + (V^* / \phi_v V_v)^2 \leq 1$
 7. 'B' Indicates that bending only (W_{L1}^*) governs, while 'S' indicates that combined bending and shear (W_{L3}^*) governs
 8. $FLR = 0.6^2 C_{bf} (E G J A_g)^{1/2} / f_y Z_x$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR CANTILEVER BEAMS WITH FULL LATERAL RESTRAINT**
Tubecolor® RECTANGULAR HOLLOW SECTIONS:
TS30 GRADE C300L0 (FOR DESIGN TO AS/NZS 4600)
bending about x - axis

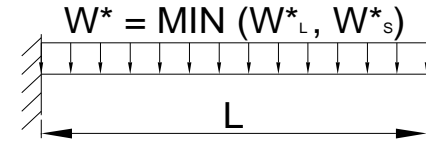
W_{S1}^* = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W_{S1}^* (kN)												
d	b	t		Span of Beam (L) in metres												
mm	mm	mm	kg/m	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	4.00	5.00	6.00
90x	38x	2.0RHS	3.83	47.7	11.9	5.30	2.98	1.91	1.32	0.973	0.745	0.477	0.331	0.186	0.119	0.083
76x	38x	2.0RHS	3.39	31.4	7.86	3.49	1.96	1.26	0.873	0.641	0.491	0.314	0.218	0.123	0.079	0.055
		1.6RHS	2.75	25.5	6.38	2.84	1.60	1.02	0.709	0.521	0.399	0.255	0.177	0.100	0.064	0.044
		1.2RHS	2.09	19.3	4.81	2.14	1.20	0.770	0.535	0.393	0.301	0.193	0.134	0.075	0.048	0.033
64x	38x	1.6RHS	2.44	16.6	4.16	1.85	1.04	0.665	0.462	0.339	0.260	0.166	0.115	0.065	0.042	0.029

- Notes: 1. Serviceability Load $W_{S1}^* = k_d E I / (250 L^2)$
 2. $K_d = 8/1$
 3. Spans should always be selected as the lesser value of W_S and W_L
 4. Loads given in the above table maybe prorated for other deflection limits. ie. Load for SPAN/500 is determined by $W_{S1}^* 250/500$ provided that the strength limit state capacity for the member is not exceeded.
 5. Deflection loads given in the above table are calculated using the gross second moment of area I_x .
 All sections in the tables are fully effective when Serviceability Limit State/Strength Limit State load combinations to AS1170.1 are considered.



**STRENGTH LIMIT STATE MAXIMUM DESIGN LOADS
FOR CANTILEVER BEAMS WITH FULL LATERAL RESTRAINT**
Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis



W^*_{L1} = Maximum Design Load on Design Moment Capacity
 W^*_{L2} = Maximum Design Load based on Design Shear Capacity
 Maximum Design Load W^*_L is the LESSER of W^*_{L1} and W^*_{L2}

Designation			Mass per Metre	W^*_{L1} (kN)														W^*_{L2}
d	b	t		Span of Beam (L) in metres														
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	kN
90x	90x	2.0SHS	5.45	13.0	6.48	4.32	3.24	2.59	2.16	1.85	1.62	1.44	1.30	1.18	1.08	0.997	0.926	82.6

- Notes:
1. $FLR = 0.436(\pi^2 E I_y G J / M_{sx})^{2,1/2}$
 FLR = Segement length for full lateral restraint ($\phi M_{bx} = \phi M_{sx}$)
 2. $\phi = 0.9$
 3. $\alpha_m = 1.0$
 4. $\alpha_s = 1.0$
 5. $W^*_{L1} = 2\phi M_s / L$
 6. $W^*_{L2} = \phi V_v$

**SERVICEABILITY LIMIT STATE MAXIMUM DESIGN LOADS
FOR CANTILEVER BEAMS WITH FULL LATERAL RESTRAINT**
Tubecolor® SQUARE HOLLOW SECTIONS:
AS1163 GRADE C450L0 (FOR DESIGN TO AS 4100)
bending about x-axis

W^*_{S1} = Maximum Serviceability Design Load based on Deflection Limit of SPAN / 250

Designation			Mass per Metre	W^*_{S1} (kN)													
d	b	t		Span of Beam (L) in metres													
mm	mm	mm	kg/m	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
90x	90x	2.0SHS	5.45	5.69	1.42	0.632	0.355	0.227	0.158	0.116	0.0889	0.0702	0.0569	0.0470	0.0395	0.0337	0.0290

Note: 1 Serviceability $W^*_{S1} = 8EI / (250L^2)$



ONESTEEL DIRECT

Freecall 1800 178 335

Website www.onesteel.com

Freefax 1800 101 141

Email onesteeldirect@onesteel.com

Postal address

Locked Bag 8825

Wollongong DC

NSW 2500 Australia

This publication has been prepared by OneSteel, (OneSteel Trading Pty Limited ABN 50 007 519 646). Please note that the specifications and technical data are subject to change without notice and to ensure accuracy users of this publication are requested to check the information to satisfy themselves and not to rely on the information without first doing so. Unless required by law the company cannot accept any responsibility for any loss, damage or consequence resulting from the use of this publication. Photographs shown are representative only of typical applications, current at October 2007. This brochure is not an offer to trade and shall not form any part of the trading terms in any transaction. Issue 2 October 2007. Copyright 2004-07. OneSteel Trading Pty Limited ABN 50 007 519 646
Registered Trademarks: Tubecolor®, TS0357



DISTRIBUTED BY