

ASTM A500 Cold Formed Welded Square Tubes

Nominal dimensions and sectional properties of square hollow sections

Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls	Size (BXB)		Wall Thickness (T)		Mass per unit length		Pieces/bdls
in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
1 3/5 x 1 3/5	40 x 40	0.059	1.50	1.81	1.216	81	2 1/3 x 2 1/3	60 x 60	0.197	5.00	8.42	5.659	25
		0.079	2.00	2.37	1.593	81			0.236	6.00	9.87	6.633	20
		0.098	2.50	2.92	1.962	64	2 1/2 x 2 1/2	63.5 x 63.5	0.059	1.50	2.90	1.949	49
		0.118	3.00	3.45	2.319	64			0.079	2.00	3.80	2.554	49
		0.157	4.00	4.46	2.997	49			0.118	3.00	5.60	3.763	36
		0.197	5.00	5.28	3.548	49			0.157	4.00	7.20	4.839	25
		0.236	6.00	6.96	4.677	36			0.197	5.00	8.70	5.847	25
0.059	1.50	2.28	1.532	64	2 5/9 x 2 5/9	65 x 65	0.236	6.00	10.30	6.922	20		
0.079	2.00	2.96	1.989	49			0.059	1.50	3.03	2.036	49		
0.098	2.50	3.71	2.493	49			0.079	2.00	4.05	2.722	49		
0.118	3.00	4.28	2.876	49			0.118	3.00	5.98	4.019	36		
0.157	4.00	5.51	3.703	36			0.157	4.00	7.85	5.276	25		
0.197	5.00	6.85	4.603	36			0.197	5.00	9.61	6.458	25		
0.236	6.00	7.99	5.370	25			0.236	6.00	11.30	7.594	20		
2 1/3 x 2 1/3	60 x 60	0.059	1.50	2.71	1.821	49	3 x 3	75 x 75	0.059	1.50	3.49	2.345	36
		0.079	2.00	3.56	2.392	49			0.079	2.00	4.51	3.031	36
		0.098	2.50	4.47	3.004	36			0.098	2.50	5.63	3.784	36
		0.118	3.00	5.19	3.488	36			0.118	3.00	6.60	4.435	36
		0.157	4.00	6.71	4.509	25			0.157	4.00	8.60	5.780	25
		0.177	4.50	7.82	5.255	25			0.177	4.50	9.90	6.653	25

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in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
3 x 3	75 x 75	0.197	5.00	10.49	7.050	20	3 ^{6/11} x 3 ^{6/11}	90 x 90	0.157	4.00	10.70	7.191	25
		0.236	6.00	12.30	8.266	20			0.197	5.00	13.30	8.938	20
3 ^{1/7} x 3 ^{1/7}	80 x 80	0.079	2.00	4.83	3.246	36	4 x 4	100 x 100	0.236	6.00	15.50	10.417	16
		0.098	2.50	6.01	4.039	36			0.315	8.00	20.10	13.508	12
		0.118	3.00	7.18	4.825	25			0.079	2.00	6.20	4.167	25
		0.157	4.00	9.41	6.324	25			0.098	2.50	7.55	5.074	25
		0.177	4.50	10.60	7.124	25			0.118	3.00	9.03	6.069	20
		0.197	5.00	11.60	7.796	20			0.157	4.00	12.17	8.179	20
		0.236	6.00	13.60	9.140	16			0.177	4.50	13.37	8.985	16
		0.315	8.00	17.50	11.761	12			0.197	5.00	14.80	9.946	16
		3 ^{1/2} x 3 ^{1/2}	89 x 89	0.079	2.00	5.40			3.629	25	4 ^{11/15} x 4 ^{11/15}	120 x 120	0.217
0.098	2.50			6.70	4.503	25	0.236	6.00	17.28	11.613			12
0.118	3.00			8.00	5.376	25	0.315	8.00	22.60	15.188			9
0.157	4.00			10.40	6.989	20	0.394	10.00	27.40	18.414			9
0.197	5.00			12.70	8.535	16	0.472	12.00	32.10	21.573			8
0.236	6.00			15.00	10.081	16	0.118	3.00	11.20	7.527			20
0.315	8.00			18.70	12.567	12	0.157	4.00	14.40	9.677			16
3 ^{6/11} x 3 ^{6/11}	90 x 90	0.079	2.00	5.50	3.696	36	4 ^{11/15} x 4 ^{11/15}	120 x 120	0.197	5.00	17.80	11.962	12
		0.098	2.50	6.80	4.570	36			0.236	6.00	21.20	14.247	12
		0.118	3.00	8.10	5.444	36			0.315	8.00	27.60	18.548	9

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in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
		0.394	10.00	33.70	22.648	9			0.472	12.00	50.80	34.140	4
		0.472	12.00	39.50	26.546	8					0.157	4.00	19.30
5 x 5	125 x 125	0.118	3.00	11.61	7.802	20	$6^{3/10} \times 6^{3/10}$	160 x 160			0.197	5.00	24.10
		0.157	4.00	15.10	10.148	16			0.236	6.00	28.70	19.288	6
		0.197	5.00	18.60	12.500	12			0.315	8.00	37.60	25.269	6
		0.236	6.00	22.10	14.852	12			0.394	10.00	46.30	31.116	4
		0.315	8.00	28.90	19.422	9			0.472	12.00	54.60	36.694	4
		0.394	10.00	35.30	23.723	8			0.157	4.00	21.78	14.637	9
		0.472	12.00	41.40	27.823	8							
		$5^{12/23} \times 5^{12/23}$	140 x 140	0.157	4.00	17.00			11.425	12	$7^{3/32} \times 7^{3/32}$	180 x 180	0.236
0.197	5.00			21.00	14.113	9	0.315	8.00	42.70	28.696			4
0.236	6.00			24.90	16.734	9	0.394	10.00	52.50	35.282			4
0.315	8.00			32.60	21.909	6	0.472	12.00	62.10	41.734			4
0.394	10.00			40.00	26.882	6	0.157	4.00	24.90	16.734			6
0.472	12.00			47.00	31.586	4							
6 x 6	150 x 150	0.157	4.00	18.55	12.466	12	8 x 8	200 x 200	0.236	6.00	36.20	24.328	4
		0.197	5.00	22.60	15.188	9			0.315	8.00	47.70	32.056	4
		0.236	6.00	26.80	18.011	9			0.394	10.00	58.80	39.516	4
		0.315	8.00	35.10	23.589	6			0.472	12.00	69.60	46.774	2
		0.394	10.00	43.10	28.965	6			10 x 10	250 x 250	0.197	5.00	38.30

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in	mm	in	mm	kg/m	lb/ft		in	mm	in	mm	kg/m	lb/ft	
10 x 10	250 x 250	0.236	6.00	45.70	30.712	4	10 x 10	250 x 250	0.394	10.00	74.50	50.067	2
		0.315	8.00	60.30	40.524	4			0.472	12.00	88.50	59.476	2

TOLERANCES ON SHAPE AND MASS:

Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
		OD Flat dimensions in. (mm)	Permissible Variations over and under flat dimensions (a) in.[mm]
External dimensions	± 0.75% of the specified outside diameter	2 1/2 [65] or under	0.020 [0.5]
		Over 2 1/2 - 3 1/2 [65 - 90]	0.025 [0.6]
		Over 3 1/2 - 5 1/2 [90 - 140]	0.030 [0.8]
		Over 5 1/2 [140]	0.01 times large flat dimension
Thickness(T)	±10% of the specified wall thickness.		
Squareness of sides(∅)	90° ± 2°		
External corner profile	--	The radius of each outside corner of the section shall not exceed three times the specified wall thickness	
Twist	--	OD Flat dimensions in. (mm)	Max. Permissible Variations in Twist per meter of length in.(mm)
		1 1/2 [40] and under	0.05 [1.3]
		Over 1 1/2 - 2 1/2 [40 - 65]	0.062 [1.6]
		Over 2 1/2 - 4 [65 - 100]	0.075 [1.9]
		Over 4 - 6 [100 - 150]	0.087 [2.2]
		Over 6 - 8 [150 - 200]	0.100 [2.5]
		Over 8 [200]	0.112 [2.8]

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Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
		OD Flat dimensions in. (mm)	Permissible Variations over and under flat dimensions (a) in.[mm]
Straightness	0.20% of total length [10mm x length (in meters) divided by 5]		
Length	-0/+20mm		
<p>(a) The permissible variations include allowances for convexity and concavity. For rectangular tubing having a ratio of outside large to small flat dimension less than 1.5, and for square tubing, the permissible variations in small flat dimension shall be identical to the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension in the range of 1.5 to 3.0 inclusive, the permissible variations in small flat dimension shall be 1.50 times the permissible variations in large flat dimension. For rectangular tubing having a ratio of outside large to small flat dimension greater than 3.0, the permissible variations in small flat dimension shall be 2.0 times the permissible variations in large flat dimension</p>			

CHEMICAL COMPOSITION:

Element	Composition%			
	Grades A & B		Grade C	
	Heat Analysis	Product Analysis	Heat Analysis	Product Analysis
Carbon , max ^A	0.26	0.3	0.23	0.27
Manganese, max ^A	1.35	1.4	1.35	1.4
Phosphorus, max	0.035	0.045	0.035	0.045
Sulfur, max	0.035	0.045	0.035	0.045
Copper, min ^B	0.2	0.18	0.2	0.18
<p>A) For each reduction of 0.01 percentage point below the specified maximum for carbon, an increase of 0.06 percentage point above the specified maximum for manganese is permitted, up to a maximum of 1.50% by heat analysis and 1.60% by product analysis.</p> <p>B) If copper-containing steel is specified in the purchase order.</p>				

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MECHANICAL PROPERTIES :

Round Structural Tubing			
	Grades A	Grades B	Grades C
Tensile strength, min, psi [MPa]	45 000 [310]	58 000 [400]	62 000 [425]
Yield strength, min, psi [MPa]	33 000 [230]	42 000 [290]	46 000 [315]
Elongation in 2 in. [50 mm] min%	25 ^A	25 ^B	25 ^C
Shaped Structural Tubing			
	Grades A	Grades B	Grades C
Tensile strength , min ,psi [MPa]	45 000 [310]	58 000 [400]	62 000 [425]
Yield strength , min ,psi [MPa]	39 000 [270]	46 000 [315]	50 000 [345]
Elongation in 2 in. [50 mm] min%	25 ^A	23 ^B	21 ^C

A) Applies to specified wall thicknesses (t) equal to or greater than 0.120 in. [3.05mm]. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by the formula: percent elongation in 2 in. [50 mm] = 0.56t + 17.5, rounded to the nearest percent. For A500M use the following formula: 2.2t + 17.5, rounded to the nearest percent.

B) Applies to specified wall thicknesses (t) equal to or greater than 0.180 in. [4.57 mm]. For lighter specified wall thicknesses, the minimum elongation values shall be calculated by the formula: percent elongation in 2 in. [50 mm] = 0.61t + 12, rounded to the nearest percent. For A500M use the following formula: 2.4t + 12, rounded to the nearest percent.

C) Applies to specified wall thicknesses (t) equal to or greater than 0.120 in. [3.05mm]. For lighter specified wall thicknesses, the minimum elongation values shall be by agreement with the manufacturer.

Workmanship : Free from overlap, lamination, tool/roll marks, pin holes, open seam & other harmful defect.

Packing : Hexagonal Type

Marking : Online stenciling as per the standard & customer requirement.