

ASTM A500 ERW Round Steel Pipes

Nominal dimensions and sectional properties of circular hollow sections

Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	mm	inch	kg/m	lb/ft	
114.3	0.098	2.50	6.89	4.632	19
	0.118	3.00	8.23	5.534	19
	0.157	4.00	10.88	7.312	14
	0.197	5.00	13.48	9.057	14
	0.236	6.00	16.02	10.769	10
	0.248	6.30	16.78	11.276	10
	0.315	8.00	20.97	14.093	10
	0.394	10.00	25.72	17.285	7
139.7	0.118	3.00	10.11	6.796	14
	0.157	4.00	13.39	8.996	14
	0.197	5.00	16.61	11.162	10
	0.236	6.00	19.78	13.295	10
	0.248	6.30	20.72	13.928	7
	0.315	8.00	25.98	17.461	7
	0.394	10.00	31.98	21.495	7
	0.472	12.00	37.79	25.396	7
141.3	0.118	3.00	10.23	6.876	14
	0.157	4.00	13.54	9.102	14
	0.197	5.00	16.81	11.294	10
	0.236	6.00	20.02	13.454	10

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	mm	inch	kg/m	lb/ft	
141.3	0.248	6.30	20.97	14.095	7
	0.315	8.00	26.30	17.673	7
	0.394	10.00	32.38	21.760	7
	0.472	12.00	38.26	25.714	7
165.1	0.118	3.00	11.99	8.059	10
	0.157	4.00	15.89	10.679	10
	0.197	5.00	19.74	13.266	10
	0.236	6.00	23.54	15.820	7
	0.248	6.30	24.67	16.580	7
	0.315	8.00	30.99	20.828	7
	0.394	10.00	38.25	25.704	7
	0.472	12.00	45.31	30.447	4
168.3	0.118	3.00	12.23	8.218	10
	0.157	4.00	16.21	10.892	10
	0.197	5.00	20.13	13.532	10
	0.236	6.00	24.01	16.138	7
	0.248	6.30	25.17	16.914	7
	0.315	8.00	31.62	21.253	7
	0.394	10.00	39.04	26.234	4
	0.472	12.00	46.25	31.084	4

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Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	mm	inch	kg/m	lb/ft	
177.8	0.157	4.00	17.14	11.521	7
	0.197	5.00	21.31	14.319	7
	0.236	6.00	25.42	17.083	4
	0.248	6.30	26.64	17.906	4
	0.315	8.00	33.50	22.512	4
	0.394	10.00	41.38	27.809	4
	0.472	12.00	49.06	32.973	4
193.7	0.157	4.00	18.71	12.575	7
	0.197	5.00	23.27	15.636	7
	0.236	6.00	27.77	18.664	7
	0.248	6.30	29.11	19.566	7
	0.315	8.00	36.63	24.620	4
	0.394	10.00	45.30	30.444	4
	0.472	12.00	53.77	36.135	4
219.1	0.157	4.00	21.22	14.259	4
	0.197	5.00	26.40	17.741	4
	0.236	6.00	31.53	21.190	4
	0.248	6.30	33.06	22.218	4
	0.315	8.00	41.65	27.988	4
	0.394	10.00	51.56	34.653	4

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Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	mm	inch	kg/m	lb/ft	
219.1	0.472	12.00	61.29	41.186	4
244.5	0.157	4.00	23.72	15.943	4
	0.197	5.00	29.53	19.846	4
	0.236	6.00	35.29	23.715	4
	0.248	6.30	37.01	24.870	4
	0.315	8.00	46.66	31.355	2
	0.394	10.00	57.83	38.863	2
	0.472	12.00	68.80	46.238	2
273.1	0.157	4.00	26.54	17.839	2
	0.197	5.00	33.06	22.216	2
	0.236	6.00	39.52	26.559	2
	0.248	6.30	41.45	27.856	2
	0.315	8.00	52.30	35.147	2
	0.394	10.00	64.88	43.602	2
	0.472	12.00	77.26	51.925	2
323.9	0.197	5.00	39.32	26.425	2
	0.236	6.00	47.04	31.611	2
	0.248	6.30	49.34	33.160	2
	0.315	8.00	62.32	41.882	2
	0.394	10.00	77.41	52.021	2

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Outside Diameter	Wall Thickness (T)		Mass per unit length		Pieces/bdls
	mm	inch	mm	kg/m	
323.9	0.472	12.00	92.30	62.028	2

TOLERANCES ON SHAPE AND MASS

Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
External dimensions	± 0.75% of the specified outside diameter	OD Flat dimensions in. (mm)	Permissible Variations over and under flat dimensions (a) in.[mm]
		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 Variation 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]

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Characteristic	Circular hollow sections	Outside flat Dimensions for Square and Rectangular hollow sections	
		Over 6 - 8 [150 - 200]	Over 8 [200]
Twist	--	Over 6 - 8 [150 - 200]	0.100 [2.5]
		Over 8 [200]	0.112 [2.8]
Straightness	0.20 % of total length [10mm x length (in meters) divided by 5]		
Length	-0/+20mm		

(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.



CHEMICAL COMPOSITION:

Element	Composition, %			
	Grades A & B		Grade C	
	Heat Analysis	Product Analysis	Heat Analysis	Product Analysis
Carbon, max ^A	0.26	0.30	0.23	0.27
Manganese, max ^A	1.35	1.40	1.35	1.40
Phosphorus, max	0.035	0.045	0.035	0.045
Sulfur, max	0.035	0.045	0.035	0.045
Copper, min ^B	0.20	0.18	0.20	0.18

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.

B) If copper-containing steel is specified in the purchase order.

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MECHANICAL PROPERTIES :

Round Structural Tubing			
	Grades A	Grades B	Grade 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	Grade 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.

Flattening Test

: The flattening test shall be made on round structural tubing only, keep the weld located 90°, the first step for ductility of the weld and flatten upto 66% of OD, no cracks or break on the weld. For the second step, no cracks or breaks on the parent material and the third step for soundness, full flatten for evidence of laminated or unsound material.

Surface Protection

: Black & Galvanizing coating as per customer requirement.

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.