

# ASTM A500

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## ● Production Standard of ASTM A500

### ● ASTM A500

ASTM A500 is a standard specification published by the American Society for Testing and Materials (ASTM) that covers cold-formed welded and seamless carbon steel structural tubing in round, square, rectangular, and “special” shapes. It is frequently used in construction projects, such as bridges and buildings, due to its high strength and low weight.

The standard includes four grades of steel based on their strength. The most common grade of steel used in construction is ASTM A500 Grade B, which has a minimum yield strength of 42000 psi. ASTM A500 Grade C is also commonly used, ASTM A500 Grade C minimum yield strength of 46000 psi. Also, heat treatment is required for Grade D. By meeting the requirements of the ASTM A500 standard, construction projects can ensure that they are using high-quality materials that will meet their needs.

## ● Dimensions and Sizes of ASTM A500

Nominal Pipe Size		Outside Diameter (mm)	Nominal Wall Thickness Schedule											
NP S	DN		OD	SC H 5	SCH 10	SCH 20	SCH 30	SCH Sth	SCH 40	SCH 60	SCH XS	SCH 80	SCH 100	SCH 120

1/8	6	10.3		1.24		1.45	1.73	1.73		2.41	2.41			
1/4	8	13.7		1.65		1.85	2.24	2.24		3.02	3.02			
3/8	10	17.1		1.65		1.85	2.31	2.31		3.2	3.2			
1/2	15	21.3	1.6 5	2.11		2.41	2.77	2.77		3.73	3.73			
3/4	20	26.7	1.6 5	2.11		2.41	2.87	2.87		3.91	3.91			
1	25	33.4	1.6 5	2.77		2.9	3.38	3.38		4.55	4.55			
1 1/4	32	42.2	1.6 5	2.77		2.97	3.56	3.56		4.85	4.85			
1 1/2	40	48.3	1.6 5	2.77		3.18	3.68	3.68		5.08	5.08			
2	50	60.3	1.6 5	2.77		3.18	3.91	3.91		5.54	5.54			
2 1/2	65	73	2.1 1	3.05		4.78	5.16	5.16		7.01	7.01			
3	80	88.9	2.1 1	3.05		4.78	5.49	5.49		7.62	7.62			
3 1/2	90	101.6	2.1 1	3.05		4.78	5.74	5.74		8.08	8.08			
4	10 0	114.3	2.1 1	3.05		4.78	6.02	6.02		8.56	8.56		11.13	
5	12 5	141.3	2.7 7	3.4			6.55	6.55		9.53	9.53		12.7	
6	15 0	168.3	2.7 7	3.4			7.11	7.11		10.9 7	10.9 7		14.27	
8	20 0	219.1	2.7 7	3.76	6.35	7.04	8.18	8.18	10.3 1	12.7	12.7	15.0 9	18.26	20.62
10	25 0	273	3.4	4.19	6.35	7.8	9.27	9.27	12.7	12.7	15.0 9	18.2 6	21.44	25.4
12	30 0	323.8	3.9 6	4.57	6.35	8.38	9.53	10.3 1	14.2 7	12.7	17.4 8	21.4 4	25.4	
14	35 0	355.6	3.9 6	6.35	7.92	9.53	9.53	11.1 3	15.0 9	12.7	19.0 5	23.8 3		
16	40 0	406.4	4.1 9	6.35	7.92	9.53	9.53	12.7	16.6 6	12.7	21.4 4			
18	45 0	457	4.1 9	6.35	7.92	11.1 3	9.53	14.2 7	19.0 5	12.7	23.8 3			
20	50	508	4.7	6.35	9.53	12.7	9.53	15.0	20.6	12.7				

	0		8					9	2								
22	550	559	4.78	6.35	9.53	12.7	9.53		22.23	12.7							
24	600	610	5.54	6.35	9.53	14.27	9.53	17.48	24.61	12.7							
26	650	660		7.92	12.7		9.53			12.7							
28	700	711		7.92	12.7	15.88	9.53			12.7							
30	750	762	6.35	7.92	12.7	15.88	9.53			12.7							
32	800	813		7.92	12.7	15.88	9.53	17.48		12.7							
34	850	864		7.92	12.7	15.88	9.53	17.48		12.7							
36	900	914		7.92	12.7	15.88	9.53	19.05		12.7							
38	950	965					9.53			12.7							
40	1000	1016					9.53			12.7							
42	1050	1067					9.53			12.7							
44	1100	1118					9.53			12.7							
46	1150	1168					9.53			12.7							
48	1200	1219					9.53			12.7							
52	1300	1321	9.53	10.31	11.13	11.91	12.7	14.27	15.88	17.48	19.05	20.62	22.23	23.83	25.4		
56	1400	1422	9.53	10.31	11.13	11.91	12.7	14.27	15.88	17.48	19.05	20.62	22.23	23.83	25.4		
60	1500	1524	9.53	10.31	11.13	11.91	12.7	14.27	15.88	17.48	19.05	20.62	22.23	23.83	25.4		
64	1600	1626	9.53	10.31	11.13	11.91	12.7	14.27	15.88	17.48	19.05	20.62	22.23	23.8	25.4		

														3	
68	17 00	1727	9.5 3	10.3 1	11.1 3	11.9 1	12.7	14.2 7	15.8 8	17.4 8	19.0 5	20.6 2	22.23	23 .8 3	25. 4
72	18 00	1829					12.7	14.2 7	15.8 8	17.4 8	19.0 5	20.6 2	22.23	23 .8 3	25. 4
76	19 00	1930					12.7	14.2 7	15.8 8	17.4 8	19.0 5	20.6 2	22.23	23 .8 3	25. 4
80	20 00	2032						14.2 7	15.8 8	17.4 8	19.0 5	20.6 2	22.23	23 .8 3	25. 4
84		2134													
88		2235													

### ●Chemical Composition of ASTM A500

Chemical Requirements				
Element	Composition, %			
	Grades B and D		Grade C	
	Heat	Product	Heat	Product
	Analysis	Analysis	Analysis	Analysis
Carbon, maxA	0.26	0.30	0.23	0.27
Manganese, maxA	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, minB	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.

## ●Mechanical Properties Tensile Strength and Yield Strength of ASTM A500

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### –Round structural tubing

Steel Grade	Tensile Strength		Yield Strength		Elongation in 50.8mm
	psi	Mpa	psi	Mpa	Min
ASTM A500 Gr. A	45,000	310	33,000	228	25%
ASTM A500 Gr. B	58,000	400	42,000	290	23%
ASTM A500 Gr. C	62,000	427	46,000	317	21%
ASTM A500 Gr. D	58,000	400	36,000	250	23%

### –Shaped structural tubing

Steel Grade	Tensile Strength		Yield Strength		Elongation in 50.8mm
	psi	Mpa	psi	Mpa	Min
ASTM A500 Grade A	45,000	310	39,000	269	25%
ASTM A500 Grade B	58,000	400	46,000	317	23%
ASTM A500 Grade C	62,000	427	50,000	345	21%
ASTM A500 Grade D	58,000	400	36,000	250	23%