ASTM A312 Stainless Steel Pipe specifications

ASTM A312 specifications define high-quality seamless and heavily cold-worked austenitic stainless steel pipes. These pipes are designed for excellent corrosion resistance, high tensile strength, and durability in demanding applications, including chemical processing, oil and gas, and marine industries.

Materials and Manufacture

Manufacture:
he pipe shall be manufactured by one of the following processes:
Seamless (SML) pipe shall be made by a process that does not involve welding at any stage of production.
Welded (WLD) pipe shall be made using an automatic welding process with no addition of filler metal during the welding process

Heat Treatment—All pipe shall be furnished in the heat-treated condition in accordance with the requirements of Table 2. Alternatively, for seamless pipe, immediately following hot forming while the temperature of the pipes is not less than the minimum solution treatment temperature specified in Table 2, pipes shall be individually quenched in water or rapidly cooled by other means (direct quenched).

Chemical Composition

Grade	UNS Designation [4]	Carbon	Manganese	Phosphorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Titanium	Niobium [M]	Tantalum, max	Nitrogen [c]
TP304	S30400	0.08	2	0.045	0.03	1	18.0—20.0	8.0—11.0					
TP304L	S30403	0.035 [5]	2	0.045	0.03	1	18.0—20.0	8.0—13.0					
TP304H	S30409	0.04—0.10	2	0.045	0.03	1	18.0—20.0	8.0—11.0					
TP304N	S30451	0.08	2	0.045	0.03	1	18.0—20.0	8.0—11.0					0.10—0.16
TP310S	S31008	0.08	2	0.045	0.03	1	24.0—26.0	19.0—22.0	0.75				
TP310H	S31009	0.04—0.10	2	0.045	0.03	1	24.0—26.0	19.0—22.0					
TP316	S31600	0.08	2	0.045	0.03	1	16.0—18.0	10.0—14.0	2.00—3.00				
TP316L	S31603	0.035 [5]	2	0.045	0.03	1	16.0—18.0	10.0—14.0	2.00—3.00				
TP316H	S31609	0.04—0.10	2	0.045	0.03	1	16.0—18.0	10.0—14.0	2.00—3.00				
TP316Ti	S31635	0.08	2	0.045	0.03	0.75	16.0—18.0	10.0—14.0	2.00—3.00	5x(C+N)—0.70			0.1
TP316N	S31651	0.08	2	0.045	0.03	1	16.0—18.0	10.0—14.0	2.00—3.00				0.10—0.16
TP317	S31700	0.08	2	0.045	0.03	1	18.0—20.0	11.0—15.0	3.0—4.0				
TP317L	S31703	0.035	2	0.045	0.03	1	18.0—20.0	11.0—15.0	3.0—4.0				
TP321	S32100	0.08	2	0.045	0.03	1	17.0—19.0	9.0—12.0		[f]			0.1
TP321H	S32109	0.04—0.10	2	0.045	0.03	1	17.0—19.0	9.0—12.0		4(C+N) min; 0.70 max			0.1
TP347	S34700	0.08	2	0.045	0.03	1	17.0—19.0	9.0—13.0			[g]		
TP347H	S34709	0.04—0.10	2	0.045	0.03	1	17.0—19.0	9.0—13.0			[h]		

Product Analysis

8.1 At the request of the purchaser, the manufacturer shall conduct an analysis:

- For billets or flat-rolled stock: one piece from each heat.
- For pipes: two pipes from each lot.

A **lot of pipe** is defined by the number of lengths (same size and wall thickness) from one steel heat, as follows:

NPS Designator	Lengths of Pipe in Lot
Under 2	400 or fraction thereof
2 to 5	200 or fraction thereof
6 and over	100 or fraction thereof

8.2 The manufacturer shall report the analysis results to the purchaser or their representative, and these results must meet the requirements in Section 7.

8.3 If the analysis of one test (per 8.1) fails to meet Section 7's requirements, the manufacturer may analyze each billet or pipe from the same heat or lot. All billets or pipes that meet the requirements shall be accepted.

TABLE 4 Tensile Requirements

Grade	UNS Designation	Tensile Strength, min (ksi [MPa])	Yield Strength, min (ksi [MPa])
TP304	S30400	75 [515]	30 [205]
TP304L	S30403	70 [485]	25 [170]
TP304H	S30409	87 [600]	42 [290]
TP304N	S30451	75 [515]	30 [205]
TP310S	S31008	75 [515]	30 [205]
TP310H	S31009	95 [655]	45 [310]
TP310Cb	S31040	75 [515]	30 [205]
TP316	S31600	75 [515]	30 [205]
TP316L	S31603	70 [485]	25 [170]
TP316H	S31609	75 [515]	30 [205]
TP316N	S31635	75 [515]	30 [205]
TP316LN	S31653	80 [550]	35 [240]
TP317	S31700	92 [635]	45 [310]
TP317L	S31703	75 [515]	30 [205]
TP321	S32053	93 [640]	43 [295]
TP347	S34700	75 [515]	30 [205]
TP347H	S34709	75 [515]	30 [205]

Lengths

13.1 Pipe lengths shall be in accordance with the following regular practice:

13.1.1 Unless otherwise agreed upon, all sizes from NPS to and including NPS 8 are available in a length up to 24 ft with the permitted range of 15 to 24 ft. Short lengths are acceptable and the number and minimum length shall be agreed upon between the manufacturer and the purchaser.

13.1.2 If definite cut lengths are desired, the lengths required shall be specified in the order. No pipe shall be under the specified length and no pipe shall be more than 1⁄8 in. [6 mm] over the specified length.

13.1.3 No jointers are permitted unless otherwise specified.

Most Common grade of ASTM A312 Pipes

ASTM A312 TP321 Pipes

ASTM A312 TP316L Pipes

ASTM A312 TP304L Pipes

Pipe Dimensions

Nominal Pipe Size		Outside Diameter (mm)	Wall Thickness (mm)															
			Stainless Steel				Carbon Steel											
DN	NPS		Sch 5S	Sch 10S	Sch 40S	Sch 80S	Sch 10	Sch 20	Sch 30	Sch 40	STD	Sch 60	Sch 80	XS	Sch 100	Sch 120	Sch 140	Sch 160	XXS
6	⅛	10.3		1.24	1.73	2.41	1.24		1.45	1.73	1.73		2.41	2.41					
8	¼	13.7		1.65	2.24	3.02	1.65		1.85	2.24	2.24		3.02	3.02					
10	⅜	17.1		1.65	2.31	3.20	1.65		1.85	2.31	2.31		3.20	3.20					
15	½	21.3	1.65	2.11	2.77	3.73	2.11		2.41	2.77	2.77		3.73	3.73				4.78	7.47
20	¾	26.7	1.65	2.11	2.87	3.91	2.11		2.41	2.87	2.87		3.91	3.91				5.56	7.82
25	1	33.4	1.65	2.77	3.38	4.55	2.77		2.90	3.38	3.38		4.55	4.55				6.35	9.09
32	1¼	42.2	1.65	2.77	3.56	4.85	2.77		2.97	3.56	3.56		4.85	4.85				6.35	9.70
40	1½	48.3	1.65	2.77	3.68	5.08	2.77		3.18	3.68	3.68		5.08	5.08				7.14	10.15
50	2	60.3	1.65	2.77	3.91	5.54	2.77		3.18	3.91	3.91		5.54	5.54				8.74	11.07
65	2½	73.0	2.11	3.05	5.16	7.01	3.05		4.78	5.16	5.16		7.01	7.01				9.53	14.02
80	3	88.9	2.11	3.05	5.49	7.62	3.05		4.78	5.49	5.49		7.62	7.62				11.13	15.24
90	3½	101.6	2.11	3.05	5.74	8.08	3.05		4.78	5.74	5.74		8.08	8.08					
100	4	114.3	2.11	3.05	6.02	8.56	3.05		4.78	6.02	6.02		8.56	8.56		11.13		13.49	17.12
125	5	141.3	2.77	3.40	6.55	9.53	3.40			6.55	6.55		9.53	9.53		12.70		15.88	19.05
150	6	168.3	2.77	3.40	7.11	10.97	3.40			7.11	7.11		10.97	10.97		14.27		18.26	21.95
200	8	219.1	2.77	3.76	8.18	12.70	3.76	6.35	7.04	8.18	8.18	10.31	12.70	12.70	15.09	18.26	20.62	23.01	22.23
250	10	273.1	3.40	4.19	9.27	12.70	4.19	6.35	7.80	9.27	9.27	12.70	15.09	12.70	18.26	21.44	25.40	28.58	25.40
300	12	323.9	3.96	4.57	9.53	12.70	4.57	6.35	8.38	10.31	9.53	14.27	17.48	12.70	21.44	25.40	28.58	33.32	25.40
350	14	355.6	3.96	4.78	9.53	12.70	6.35	7.92	9.53	11.13	9.53	15.09	19.05	12.70	23.83	27.79	31.75	35.71	
400	16	406.4	4.19	4.78	9.53	12.70	6.35	7.92	9.53	12.70	9.53	16.66	21.44	12.70	26.19	30.96	36.53	40.49	
450	18	457	4.19	4.78	9.53	12.70	6.35	7.92	11.13	14.27	9.53	19.05	23.83	12.70	29.36	34.93	39.67	45.24	
500	20	508	4.78	5.54	9.53	12.70	6.35	9.53	12.70	15.09	9.53	20.62	26.19	12.70	32.54	38.10	44.45	50.01	
550	22	559	4.78	5.54			6.35	9.53	12.70		9.53	22.23	28.58	12.70	34.93	41.28	47.63	53.98	
600	24	610	5.54	6.35	9.53	12.70	6.35	9.53	14.27	17.48	9.53	24.61	30.96	12.70	38.89	46.02	52.37	59.54	
650	26	660					7.92	12.70			9.53			12.70					
700	28	711					7.92	12.70	15.88		9.53			12.70					
750	30	762	6.35	7.92			7.92	12.70	15.88		9.53			12.70					

These dimensions are nominal – substantial tolerances apply to both OD and WT – refer to the standards for details. Stainless steel pipe nominal dimensions based on ASTM A312M and ASME B36.19M-2004. Carbon steel pipe nominal dimensions based on ASTM A106M and ASME B36.10M-2004. For other wall thicknesses and for sizes of carbon steel pipe above DN 750 consult ASME B36.10M.