

# ASTM A312 TP316/316L Stainless Steel Pipe

## Specification

Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes. ASTM A312 pipe is common use stainless pipe for industries. It covers diameters from 1/8" to 24" and thickness from SCH 5S to SCH 80S. General use material grades are TP316/316L. Intended for high-temperature and general corrosive service.

Property	Description
Standard	ASTM A312 / ASME SA312
Grade	TP316/TP316L (Low Carbon version of 316)
Material Type	Austenitic Stainless Steel
UNS Number	S31600/S31603
Common Name	316/316L Stainless Steel
Form	Seamless / Welded / Heavily Cold Worked Pipes
Specification Scope	Covers seamless, straight-seam welded, and cold-worked welded austenitic stainless steel pipe for high-temperature and general corrosive service.

---

## 2. Chemical Composition (% by weight)

### Chemical Composition (% by weight)

Element	TP316	TP316L
Carbon (C)	≤ 0.08	≤ 0.035
Manganese (Mn)	≤ 2.00	≤ 2.00
Phosphorus (P)	≤ 0.045	≤ 0.045
Sulfur (S)	≤ 0.030	≤ 0.030
Silicon (Si)	≤ 1.00	≤ 1.00
Chromium (Cr)	16.0 - 18.0	16.0 - 18.0
Nickel (Ni)	10.0 - 14.0	10.0 - 14.0
Molybdenum (Mo)	2.00 - 3.00	2.00 - 3.00
Iron (Fe)	Balance	Balance

## Mechanical Properties

Property	TP316	TP316L
Tensile Strength	≥ 515 MPa (75 ksi)	≥ 485 MPa (70 ksi)
Yield Strength (0.2% offset)	≥ 205 MPa (30 ksi)	≥ 170 MPa (25 ksi)
Elongation (in 2")	≥ 35%	≥ 35%

## 4. Dimensions & Tolerances

- **Outside Diameter (OD):**  
1/8" NPS to 48" NPS (10.3 mm to 1219 mm)
- **Wall Thickness:**  
SCH 5S, 10S, 40S, 80S, 160S, XXS, etc.  
Tolerances as per **ASTM A999**
- **Length:**  
Single Random (SRL), Double Random (DRL), or Fixed Length (as per order)
- Pipe shall be in single-random lengths of 15 to 24 ft. When pipe is ordered in double-random lengths of 35 to 42 ft. Lengths longer than single-random, and heavier wall than Sch 40S are subject to negotiation.

## 5. Manufacturing Types

Type	Description
Seamless (SMLS)	Hot or cold finished, no welding
Welded (ERW or EFW)	Electric-resistance or electric-fusion welded
Heavily Cold Worked (HCW)	Cold-worked welded pipe for increased strength

---

## 6. Heat Treatment

- **TP316/TP316L pipes must be solution annealed** at 1900° F (1040° C) or higher followed by rapid cooling.
- For **welded pipes**, heat treatment is mandatory unless welding is done with filler metal and corrosion resistance is not impaired.

## • 7. Testing Requirements

Test Type	Requirement
Hydrostatic Test	Required for each length (unless waived by purchaser)
Nondestructive Test (NDT)	Eddy Current / Ultrasonic / Air Underwater Test (for welded pipes)
Mechanical Testing	Flattening test, Flare test, Hardness test
Intergranular Corrosion (IGC) Test	When specified (e. g., as per ASTM A262 Practice E)

Flattening Test: For material heat treated in batch furnace, 5% of steel pipe should be taken from each heat treated lot material flattening test. For material heat treated in the continuous furnace, sufficient number of pipe to constitute 5% of the lot, but in any case not less 2 lengths for flattening test.

## 8. Marking & Traceability

- Pipes must be clearly marked with:
  - ASTM A312
  - Grade: TP316/TP316L
  - Size and Schedule
  - Heat number
  - Manufacturer' s name/logo
  - “SMLS” or “Welded”

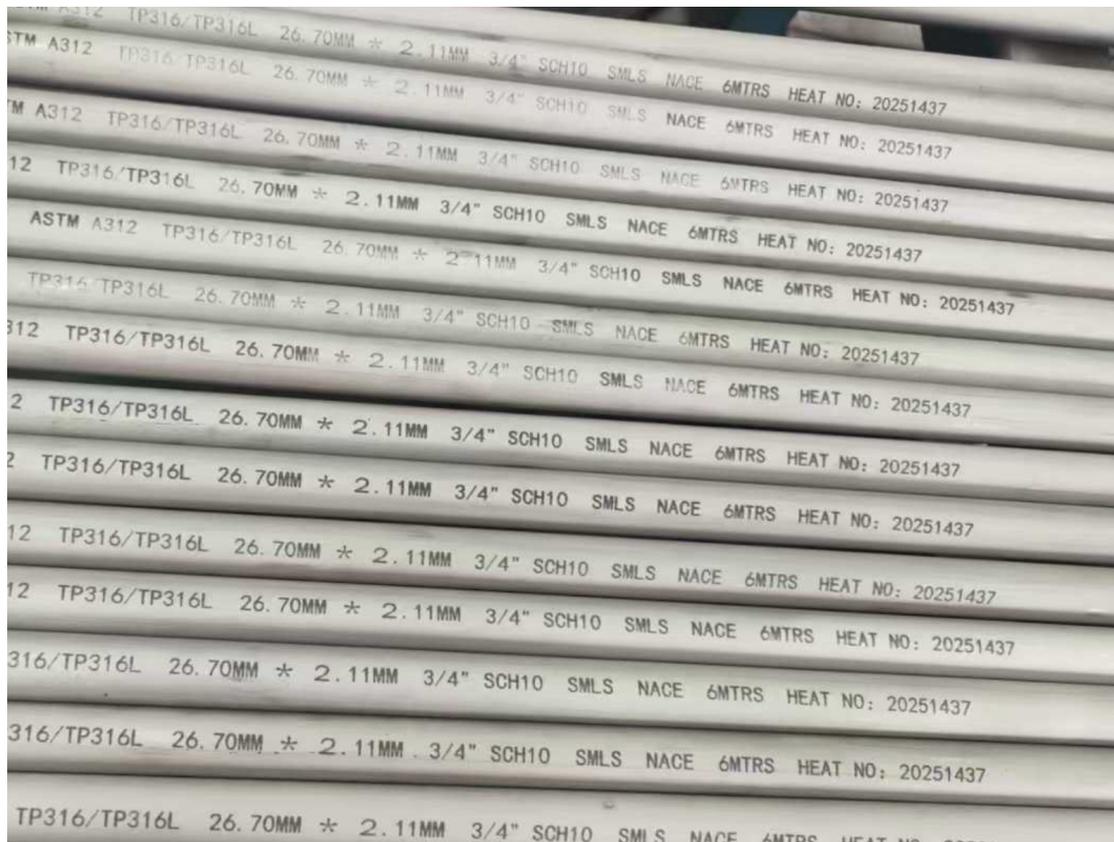
Full **MTC (Mill Test Certificate)** in accordance with EN 10204 3.1 or 3.2 must be provided.

## 9. Common Applications

- Chemical and petrochemical processing
- Food and beverage piping
- Marine and coastal environments
- Pharmaceutical and biotech industries
- Heat exchangers and condensers
- High-purity water systems

### Applicable Standards

- ASTM A312 - Austenitic SS Pipes
- ASTM A999 - General requirements for SS pipe
- ASME B36.19M / B36.10M - Pipe dimensions
- EN 10216-5 (Optional European equivalent)
- NACE MR0175 / ISO 15156 - Optional for sour service



Pipe Size (In.)	O.D. In Inches	5S	5	10S	10	20	30	40	40S STD.	60	80	80S XH	100	120	140	160	DBL XXH
1/8	0.405		0.035	0.049	0.049			0.068	0.068		0.095	0.095					
			0.1383	0.1863	0.1863			0.2447	0.2447		0.3145	0.3145					
1/4	0.54		0.049	0.065	0.065			0.088	0.088		0.119	0.119					
			0.257	0.3297	0.3297			0.4248	0.4248		0.5351	0.5351					
3/8	0.675		0.049	0.065	0.065			0.091	0.091		0.126	0.126					
			0.3276	0.4235	0.4235			0.5676	0.5676		0.7388	0.7388					
1/2	0.84	0.065	0.065	0.083	0.083			0.109	0.109		0.147	0.147				0.187	0.294
		0.5383	0.5383	0.671	0.671			0.851	0.851		1.088	1.088				1.304	1.714
3/4	1.05	0.065	0.065	0.083	0.083			0.113	0.113		0.154	0.154				0.218	0.308
		0.6838	0.6838	0.8572	0.8572			1.131	1.131		1.474	1.474				1.937	2.441
1	1.315	0.065	0.065	0.109	0.109			0.133	0.133		0.179	0.179				0.25	0.358
		0.8678	0.8678	1.404	1.404			1.679	1.679		2.172	2.172				2.844	3.659
1-1/4	1.66	0.065	0.065	0.109	0.109			0.14	0.14		0.191	0.191				0.25	0.382
		1.107	1.107	1.806	1.806			2.273	2.273		2.997	2.997				3.765	5.214
1-1/2	1.9	0.065	0.065	0.109	0.109			0.145	0.145		0.2	0.2				0.281	0.4
		1.274	1.274	2.085	2.085			2.718	2.718		3.361	3.361				4.859	6.408
2	2.375	0.065	0.065	0.109	0.109			0.154	0.154		0.218	0.218				0.343	0.436
		1.604	1.604	2.638	2.638			3.653	3.653		5.022	5.022				7.444	9.029
2-1/2	2.875	0.083	0.083	0.12	0.12			0.203	0.203		0.276	0.276				0.375	0.552
		2.475	2.475	3.531	3.531			5.793	5.793		7.661	7.661				10.01	13.7
3	3.5	0.083	0.083	0.12	0.12			0.216	0.216		0.3	0.3				0.438	0.6
		3.029	3.029	4.332	4.332			7.576	7.576		10.25	10.25				14.32	18.58
3-1/2	4	0.083	0.083	0.12	0.12			0.226	0.226		0.318	0.318					0.636
		3.472	3.472	4.973	4.973			9.109	9.109		12.51	12.51					22.85
4	4.5	0.083	0.083	0.12	0.12			0.237	0.237	0.281	0.337	0.337		0.438		0.531	0.674
		3.915	3.915	5.613	5.613			10.79	10.79	12.66	14.98	14.98		19.01		22.51	27.54
4-1/2	5							0.247	0.247		0.355	0.355					0.71
																	32.53
5	5.563	0.109	0.109	0.134	0.134			0.258	0.258		0.375	0.375		0.5		0.625	0.75
		6.349	6.349	7.77	7.77			14.62	14.62		20.78	20.78		27.04		32.96	38.55
6	6.625	0.109	0.109	0.134	0.134			0.28	0.28		0.432	0.432		0.562		0.719	0.864
		7.585	7.585	9.29	9.289			18.97	18.97		28.57	28.57		36.39		45.3	73.882
7	7.625							0.301	0.301		0.5	0.5					
								23.57	23.57		38.05	38.05					
8	8.625	0.109	0.109	0.148	0.148	0.25	0.277	0.322	0.322	0.406	0.5	0.5	0.594	0.719	0.812	0.906	0.875
		9.914	9.914	13.4	13.4	22.36	24.7	28.55	28.55	35.64	43.39	43.39	50.87	60.63	67.76	74.69	73.88
9	9.625							0.342	0.342		0.5	0.5					
								33.9	33.9		48.72	48.72					
10	10.75	0.134	0.134	0.165	0.165	0.25	0.307	0.365	0.365	0.5	0.593	0.5	0.719	0.844	1	1.125	1
		15.19	15.19	18.85	18.7	28.04	34.24	40.48	40.48	54.74	64.33	64.33	76.93	89.2	104.1	115.7	104.1
11	11.75							0.375	0.375		0.5	0.5					
								45.55	45.55		60.07	60.07					
12	12.75	0.156	0.165	0.18	0.18	0.25	0.33	0.406	0.375	0.562	0.687	0.5	0.844	1	1.125	1.312	1
		21.07	22.18	24.2	24.2	33.38	43.77	53.53	49.56	73.16	88.5	65.42	107.2	125.5	139.7	160.3	125.5
14	14	0.156		0.188	0.25	0.312	0.375	0.438	0.375	0.594	0.75	0.5	0.938	1.094	1.25	1.406	
		23.07		27.73	36.71	45.68	54.57	63.37	54.57	84.91	106.1	72.09	130.7	150.7	170.2	189.1	
16	16	0.165		0.188	0.25	0.312	0.375	0.5	0.375	0.656	0.843	0.5	1.031	1.219	1.438	1.594	
		27.9		31.75	42.05	52.36	62.58	72.77	62.58	107.5	136.5	82.77	164.8	192.3	223.5		
18	18	0.165		0.188	0.25	0.312	0.437	0.562	0.375	0.75	0.937	0.5	1.156	1.375	1.562	1.781	
		31.43		35.76	47.39	59.03	82.15	104.8	70.59	138.2	170.8	93.45	208	244.1	274.2	308.5	
20	20	0.188		0.218	0.25	0.375	0.5	0.594	0.375	0.812	1.031	0.5	1.28	1.5	1.75	1.969	
		39.78		46.05	52.73	78.6	104.13	122.9	78.6	166.4	208.9	104.1	256.1	296.4	341.1	379.17	
24	24	0.218		0.25	0.25	0.375	0.562	0.687	0.375	0.968	1.218	0.5	1.531	1.812	2.062	2.344	
		55.37		63.41	63.41	94.62	140.8	171.2	94.62	238.1	296.4	125.5	367.4	429.4	483.1	542.13	