

ASTM A312 and **ASME SA312** is a standard specification for seamless, straight-seam welded, and heavily cold-worked welded austenitic stainless steel pipe. It is one of the most widely used stainless steel pipe specifications across industrial, chemical, and process industries.

APP STOCKS A FULL RANGE OF STAINLESS PIPE IN:

- ✓ Grades TP304/L & TP316/L
- ✓ Seamless & EFW
- ✓ NPS 1/4" to 24" OD
- ✓ Schedules 10 through 80S

MANUFACTURING FORMS

- ✓ **SEAMLESS (SMLS)** - Extruded without a weld seam; highest integrity, used in critical service
- ✓ **WELDED (EFW)** - Straight seam welded; more economical, suitable for most general service
- ✓ **HEAVILY COLD - WORKED WELDED** - Welded then cold-worked to enhance mechanical properties

KEY CHARACTERISTICS

All grades under **A312** are austenitic, meaning they have a face-centered cubic crystal structure achieved through high chromium and nickel content. This delivers:

- ✓ **Excellent corrosion resistance** - across a wide range of environments
- ✓ **Non-magnetic** - in the annealed condition
- ✓ **No hardening by heat treatment** - only by cold working
- ✓ **Strength at cryogenic temps** - doesn't become brittle at low temps unlike carbon or alloy steels
- ✓ **Good oxidation resistance** - at elevated temperatures

OUR VALUE-ADDED SERVICES

- ✓ Saw & Torch Cutting, Miter Cutting, Pipe Profiling
- ✓ Pipe Beveling, Roll-Grooving & Threading
- ✓ ID & OD Cleaning
- ✓ Coating (FBE, Galvanizing & Prime/Paint)
- ✓ Boring, Honing, OD Turning, Heat Treating & Plating
- ✓ In-House or 3rd Party Testing

* This information is provided for quick references, always consult applicable ASME, ASTM and Manufacture's standards.



PRIMARY APPLICATIONS & INDUSTRIES

- ✓ **CHEMICAL & PETROCHEMICAL PROCESSING** - The dominant use. Process piping handling acids, caustics, solvents, and corrosive process streams where carbon steel would rapidly corrode. **316/316L** is favored where chlorides or sulfuric/phosphoric acids are present.
- ✓ **PHARMACEUTICAL & BIOTECHNOLOGY** - High-purity piping systems for process water, purified water (PW), water for injection (WFI), and product transfer lines. Requires smooth internal finish (often electropolished) to prevent bacterial harborage and ensure cleanability.
- ✓ **FOOD & BEVERAGE PROCESSING** - Piping for dairy, brewing, beverage, and food production where hygiene, cleanability, and corrosion resistance are mandatory. **304** and **316L** are the standard materials.
- ✓ **POWER GENERATION** - Condensate, feedwater, and auxiliary piping in nuclear and conventional power plants. **SA312** designation is used in ASME-code nuclear and fossil fuel plant construction.
- ✓ **PULP & PAPER INDUSTRY** - Handling of bleaching chemicals (chlorine dioxide, caustic), black liquor, and other aggressive process streams that would destroy carbon steel rapidly.
- ✓ **CRYOGENIC SERVICE** - Storage and transfer of liquefied gases - LNG, liquid nitrogen, liquid oxygen, liquid argon. Austenitic stainless retains excellent toughness and ductility down to cryogenic temperatures (-425°F / -254°C), unlike carbon steels which become brittle.
- ✓ **OIL & GAS/OFFSHORE** - Topside process piping on offshore platforms, particularly in seawater-exposed environments. **316L** is preferred due to its superior resistance to chloride pitting from seawater.
- ✓ **SEMICONDUCTOR & ELECTRONICS MANUFACTURING** - Ultra-high-purity gas and chemical distribution systems. Requires electropolished internal surfaces and stringent cleanliness standards.
- ✓ **WATER TREATMENT** - Seawater desalination, high-purity water systems, and wastewater treatment where corrosion resistance is needed.
- ✓ **ARCHITECTURE & CONSTRUCTION** - Exposed structural and decorative piping in buildings, bridges, and facades where aesthetics and corrosion resistance are both required.

HEAT TREATMENT

All pipe shall be furnished in the heat-treated condition.

Heat treat temperature for **304/L** and **316/L** is 1900 deg F (1040 deg C) minimum and then quenched in water or rapidly cooled.

CHEMICAL REQUIREMENTS

GRADE	UNS #	CONTENT % BY WEIGHT							
		CARBON	MANGANESE	PHOSPHORUS	SULFUR	SILICON	CHROMIUM	NICKEL	MOLYBDENUM
TP304	S30400	0.08	2.00	0.045	0.030	1.00	18 - 20	8 - 11	X
TP304L	S30403	0.035	2.00	0.045	0.030	1.00	18 - 20	8 - 13	X
TP316	S31600	0.08	2.00	0.045	0.030	1.00	16 - 18	10 - 14	2 - 3
TP316L	S31603	0.035	2.00	0.045	0.030	1.00	16 - 18	10 - 14	2 - 3

304/304L and **316/316L** account for the vast majority of **A312** usage in practice.

TENSILE REQUIREMENTS

	GRADE 304	GRADE 304L	GRADE 316	GRADE 316L
TENSILE STRENGTH, MIN., PSI	75,000	70,000	75,000	70,000
YIELD STRENGTH, MIN., PSI	30,000	25,000	30,000	25,000

PERMITTED VARIATIONS IN WALL THICKNESS

NPS DESIGNATOR	TOLERANCE, % FROM NOMINAL	
	OVER	UNDER
1/8 to 2 1/2 incl., all t/D ratios	20.0	12.5
3 to 18 incl., t/D up to 5% incl.	22.5	12.5
3 to 18 incl., t/D > 5% incl.	15.0	12.5
20 and larger, welded, all t/D ratios	17.5	12.5
20 and larger, seamless, t/D up to 5% incl.	22.5	12.5
20 and larger, seamless, t/D > 5%	15.0	12.5

t = Nominal Wall Thickness D = Ordered Outside Diameter • Exception for welded pipe: the weld area shall not be limited by the "Over" tolerance

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