

ASTM A312 TP 904L Stainless Steel Pipe Specification

This specification covers ASTM A312 TP 904L austenitic stainless steel pipes for high-temperature, corrosive, and general service applications.

1. ASTM A312 Overview

ASTM A312 is the standard specification for seamless and welded austenitic stainless steel pipes intended for high-temperature and general corrosive service. It includes grades such as TP 304, TP 316, TP 321, TP 347, and high-alloy grades like TP 904L.

2. TP 904L Material Introduction

TP 904L (UNS N08904) is a super austenitic stainless steel with high nickel, chromium, molybdenum, and copper content. It provides excellent resistance to pitting, crevice corrosion, and stress corrosion cracking, especially in sulfuric acid and chloride-containing environments.

3. Chemical Composition (TP 904L)

Element	Composition (%)
Carbon (C)	≤ 0.020
Manganese (Mn)	≤ 2.00
Phosphorus (P)	≤ 0.045
Sulfur (S)	≤ 0.035
Silicon (Si)	≤ 1.00
Chromium (Cr)	19.0 – 23.0
Nickel (Ni)	23.0 – 28.0
Molybdenum (Mo)	4.0 – 5.0
Copper (Cu)	1.0 – 2.0
Iron (Fe)	Balance

4. Mechanical Properties (Room Temperature)

Property	Requirement
Tensile Strength	≥ 70 ksi (485 MPa)
Yield Strength (0.2% offset)	≥ 31 ksi (215 MPa)
Elongation	≥ 35 %

5. Heat Treatment

ASTM A312 TP 904L pipes are supplied in the solution annealed condition. Heat treatment typically involves heating to approximately 1100 °C followed by rapid quenching to restore corrosion resistance.

6. Testing Requirements

Required tests include chemical analysis, tensile test, flattening test, hydrostatic test or non-destructive electric test, and dimensional inspection in accordance with ASTM A312.

7. Size Range

Outside Diameter: 1/8" – 30" (Seamless typically up to 8", welded up to 30")

Wall Thickness: SCH 5S – SCH XXS

Length: Random, double random, or cut-to-length

8. Dimensional Tolerances

Item	Tolerance Requirement
Outside Diameter (OD)	± 0.5% of specified OD
Wall Thickness	+20% / -12.5% of nominal thickness
Length – Random	+75 mm / -0 mm
Length – Cut Length	± 6 mm (unless otherwise specified)
Ovality & Straightness	As per ASTM A999/A999M
End Finish	Square cut unless otherwise specified

9. Typical Applications

Chemical processing equipment, offshore oil and gas systems, heat exchangers, acid handling pipelines, desalination plants, and power generation facilities.

ASTM A312 TP 904L vs EN 10216-5 1.4539 Comparison

Item	ASTM A312 TP 904L	EN 10216-5 1.4539
Standard	ASTM A312 / A999	EN 10216-5
UNS / EN No.	UNS N08904	1.4539
Pipe Type	Seamless & Welded	Seamless
Chemical Control	ASTM limits	EN limits
Heat Treatment	Solution Annealed	Solution Annealed
OD Tolerance	ASTM A999	EN 10266
Typical Application	Oil & Gas, Chemical	Chemical, Pressure Equipment

