

SEAMLESS & WELDED • GENERAL SERVICE

ASTM A269

Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service

1. Scope & Application

ASTM A269 is the go-to standard for austenitic stainless steel tubing in **general corrosion-resisting and low/high-temperature service**. Unlike A213/A249 (boiler-specific), A269 covers broad industrial applications.



Product Types

Both **seamless** and **welded** austenitic stainless steel tubing. At the manufacturer's option, tubing may be hot-finished or cold-finished.



Size Range

From **1/4 in. (6.4 mm)** inside diameter and larger, with wall thickness of **0.020 in. (0.51 mm)** and heavier.



Target Applications

General industrial service — process piping, instrumentation lines, hydraulic tubing, chemical transfer. Also suitable for ASME B31.3 process piping (additional testing may apply).



Mechanical Note

Mechanical property requirements (hardness) do not apply to tubes smaller than **1/8 in. ID (3.2 mm)** or thinner than **0.015 in. (0.38 mm)**. Such tubes should be tension-tested per A632.



Units

Inch-pound units are the standard. ASME B31.3 applications may require additional testing beyond the base specification.



Supplementary Options

4 optional supplementary requirements: S1 stress-relieved annealed, S2 air underwater pressure test, S3 stabilizing heat treatment, S4 IGC test.

2. Grade Overview

ASTM A269 covers 24 austenitic stainless steel grades, ranging from standard 300-series to super-austenitic alloys. All can be supplied as seamless or welded.

Standard 300-Series — The Workhorses

Most Popular

TP304

S30400

18Cr-8Ni baseline. Excellent general corrosion resistance. The most widely specified grade across all industries.

Top Pick

TP304L

S30403

Low-carbon ($C \leq 0.030$). Eliminates sensitization risk after welding. Preferred for welded fabrications without PWHT.

TP304LN

S30453

Low carbon + nitrogen. Combines 304L weldability with enhanced strength (N-strengthened).

Corrosion

TP316L

S31603

2–3% Mo addition. Superior pitting resistance. The standard choice for chloride-containing chemical environments.

TP316LN

S31653

Low carbon + nitrogen 316. Weldable, stronger, and corrosion-resistant. Ideal for structural chemical equipment.

TP317

S31700

3–4% Mo. Enhanced pitting and crevice resistance for aggressive chemical process environments.

Stabilized Grades — Welding Without Worry

Welding

TP321

S32100

Ti-stabilized ($Ti \geq 5 \times (C+N)$). Immune to sensitization in the 800–1500°F range. The classic stabilized grade for welded assemblies.

TP347

S34700

Nb-stabilized ($Nb \geq 10 \times C, \leq 1.10\%$). Alternative to 321 with better high-temperature strength. Widely used in refinery service.

TP348

S34800

Nb+Ta-stabilized with restricted Ta/Co for nuclear applications. Low cobalt variant ($Co \leq 0.20\%$).

High-Strength & Specialty Grades

High Strength

TPXM-19

S20910

Nitronic 50®. 22Cr-13Ni-2Mo-N-V-Nb. Twice the yield strength of 304. Excellent for high-pressure service.

High Strength

TPXM-29

S24000

Nitronic 33®. High Mn (11.5–14.5) nitrogen-strengthened. Excellent strength + low magnetic permeability.

TPXM-10

S21900

Nitronic 30®. 20Cr-6Ni-N. High strength with improved wear and galling resistance.

TPXM-15

S38100

18Cr-18Ni high-alloy austenitic. Balanced corrosion + heat resistance for demanding applications.

Super-Austenitic & High-Alloy

Premium

S31254

S31254

254 SMO®. 6% Mo super-austenitic. PREN $\geq$ 43. The benchmark for seawater and FGD environments.

N08367

N08367

AL-6XN®. 6% Mo, 20Cr-24Ni-N. Exceptional chloride SCC resistance. Seawater-cooled process equipment.

N08904

N08904

904L. 20Cr-25Ni-4.5Mo-Cu. Outstanding general + pitting resistance. Sulfuric/phosphoric acid service.

N08926

N08926

1925hMo. 20Cr-25Ni-6.5Mo-N-Cu. Higher PREN than 904L. Chemical tankers, FGD, seawater.

S32654

S32654

654 SMO®. 7% Mo, 24Cr-22Ni-N-Cu. Maximum pitting resistance among standard grades (PREN $\geq$ 56).

S24565

S24565

High-nitrogen, high-Mo alloy. 23Cr-17Ni-4.5Mo-N. Ultra-high strength + corrosion combination.

3. Chemical Composition

Heat analysis per Table 1. All values are max unless a range is shown. Full chemistry for all 24 grades available in the official standard.

Grade	UNS	C	Mn	Cr	Ni	Mo	N	Other
S32654	S32654	0.020	2.0–4.0	24.0– 25.0	21.0– 23.0	7.0–8.0	0.45– 0.55	Cu 0.30–0.60

Key Chemical Notes

- **P & S limits:** Most grades: P ≤ 0.045%, S ≤ 0.030%. Si ≤ 1.00% for standard grades.
- **L-grade carbon:** TP304L and TP316L have C ≤ 0.030% for improved weldability and IGC resistance.
- **Product analysis tolerance:** Per A480/A480M A1.1. Carbon tolerance not applicable when specified maximum is ≤ 0.04%.
- For small-diameter or thin-wall tubes defined as OD < 0.500 in. [12.7 mm] and wall < 0.049 in. [1.2 mm], the carbon maximum for TP304L and TP316L is 0.040% when required for drawing passes.

4. Hardness Requirements

Unlike A213/A312 which specify tensile properties, A269 uses hardness as the primary quality metric. Hardness test is not required for tubes < ¼ in. ID or < 0.020 in. wall.

Grade Group	Grades Included	HB max	HV max	HRB max	HRC max
Standard Austenitic	TP304, TP304L, TP304LN, TP316, TP316L, TP316LN, TP317, TP321, TP347, TP348, S31725, S31726, S30600, N08904, S35045	192	200	90	—
XM-Nitronic High-Strength	TPXM-10, TPXM-11, TPXM-19	269	285	—	25
High-Mn Austenitic	TPXM-29	256	270	100	—
6% Mo Super-Austenitic	S24565, N08367, N08926	256	270	100	—
254 SMO®	S31254	220	230	96	—
654 SMO®	S32654	250	263	100	—

Thin-Wall Hardness Testing

- For tubing with wall thickness < **0.065 in. (1.65 mm)**, Rockwell superficial or Vickers hardness may be used:
- Standard grades: $30T \leq 74$ or $15T \leq 88$
- TPXM-29: $30T \leq 80$ or $15T \leq 92$
- TPXM-10/11/19: $30N \leq 46$ or $15N \leq 73$
- S31254: $30T \leq 79$ or $15T \leq 91$

5. Heat Treatment

All material shall be furnished in the solution-annealed condition. For seamless tubes, quenching directly after hot forming is permitted if the temperature is not below the minimum solution temperature.

Grade	Solution Annealing Temperature
Standard grades (TP304, 304L, 316, 316L, 317, 321, 347, 348, XM-grades, etc.)	1900°F [1040°C] min
S31254, S32654	2100°F [1150°C] min
S24565	2050–2140°F [1120–1170°C]
N08904 (904L)	2000°F [1100°C] min
N08926	2010°F [1100°C] min
N08367 (AL-6XN®)	2025°F [1107°C] min
S35045	2000°F [1093°C] min
Custom (below 1900°F)	As agreed

⚠ Stabilization Warning

For **TP321, TP347, and TP348**: solution annealing above 1950°F [1065°C] may impair resistance to intergranular corrosion after subsequent exposure to sensitizing conditions. When this is a concern, specify **Supplementary S3 (Stabilizing Heat Treatment)** — a second, lower-temperature anneal after the main solution treatment.

6. Testing & Inspection

A269 has a simpler testing regime than boiler standards. Hardness is the primary mechanical check; no tensile test is required for standard production.

Test	Frequency	Applies To	Notes
Flaring Test	1 per lot (1 end of 1 tube)	Seamless tubes	Per A1016/A1016M; demonstrates ductility and freedom from defects
Flange Test	1 per lot (1 end of 1 tube)	Welded tubes	Per A1016/A1016M; verifies weld integrity flanged end
Reverse Flattening Test	1 per 1500 ft [460 m]	Welded tubes	Weld split 90° each side, bent back. Coils > 1500 ft sampled at both ends. No circumferential butt welds in coils.
Hardness Test	2 tubes per lot	All (except <¼ in. ID / <0.020 in. wall)	Brinell, Rockwell, or superficial. Per Section 11 values.
Hydrostatic or NDT Electric	Each tube (100%)	All	Manufacturer's option unless purchase order specifies otherwise. NDT tubes marked "NDE".
Product Analysis	1 per heat	All	From billet/flat-rolled stock/tube. Re-test additional if initial fails.

7. Supplementary Requirements

Apply only when specified on the purchase order.

S1

Stress-Relieved Annealed Tubes

For chlorides where SCC may occur. Heat treat 1550–1650°F [845–900°C] after roll straightening. Air or slow cool. No mechanical straightening afterward. For TP304L, TP316L, TP321, TP347, TP348.

S2

Air Underwater Pressure Test

Alternative leak-tightness verification. Tubing examined by air underwater pressure test when specified.

S3

Stabilizing Heat Treatment

Second lower-temperature anneal after solution treatment for TP321, TP347, TP348. Restores IGC resistance when initial anneal exceeded 1950°F [1065°C]. Temperature agreed between purchaser and vendor.

S4

Intergranular Corrosion (IGC) Test

Per ASTM A262 Practice E. Sensitized testing for L/stabilized grades. S3 stabilization may be required to pass.

| 8. Dimensions & Tolerances

Permissible variations per Table 3. Size groups determine OD tolerance; wall thickness is $\pm 10\%$ for most sizes.

Group	OD Range	OD Tolerance in. [mm]	Wall Tolerance	Length Tolerance in. [mm]	Thin-Wall Definition
1	Up to ½ in.	±0.005 [0.13]	±15%	+⅛ [3.2] / -0	—
2	½ to 1½ in. excl	±0.005 [0.13]	±10%	+⅛ [3.2] / -0	< 0.065 in. (1.65 mm) not
3	1½ to 3½ in. excl	±0.010 [0.25]	±10%	+3/16 [4.8] / -0	< 0.095 in. (2.41 mm) not
4	3½ to 5½ in. excl	±0.015 [0.38]	±10%	+3/16 [4.8] / -0	< 0.150 in. (3.81 mm) not
5	5½ to 8 in. excl	±0.030 [0.76]	±10%	+3/16 [4.8] / -0	< 0.150 in. (3.81 mm) not
6	8 to 12 in. excl	±0.040 [1.01]	±10%	+3/16 [4.8] / -0	< 0.200 in. (5.08 mm) not
7	12 to 14 in. excl	±0.050 [1.26]	±10%	+3/16 [4.8] / -0	< 0.220 in. (5.59 mm) not

Special Dimensional Rules

- **Wall ≥ ¾ in. or ID ≤ 60% of OD:** wall tolerance widens to **±12.5%**.
- **ID < ½ in.** (cannot draw over mandrel): wall tolerance **±15%**.
- **Length > 24 ft:** over-tolerance increases by +⅛ in. per 10 ft beyond 24 ft, or +½ in. max.
- **Thin-walled ovality:** max and min diameters at any cross section may deviate by ≤ **2× OD tolerance**; mean diameter must stay within the given tolerance.

9. Ordering Information

Orders should include the following to describe the material adequately.

✓ Required Information

1. Quantity (feet, metres, or number of lengths)
2. Material type: **seamless** or **welded**
3. Grade (e.g., TP304, TP316L, TP321, etc.)
4. Size: outside diameter × nominal wall thickness
5. Length (specific cut lengths or random)
6. Hydrostatic or NDT electric test preference (if not accepting manufacturer's option)
7. Test report required (certification)
8. Specification designation: A269

Optional Requirements

- Custom heat treatment temperature (below 1900°F)
- Supplementary S1 — stress-relieved annealed
- Supplementary S2 — air underwater pressure test
- Supplementary S3 — stabilizing heat treatment
- Supplementary S4 — IGC test (A262 Practice E)
- ASME B31.3 compliance (may require additional testing)
- Special packaging / end finish / marking

Example Order – Seamless:

1,000 ft seamless TP316L stainless steel tubing,
1.000 in. OD × 0.065 in. nominal wall, cut to 20 ft lengths,
NDT electric test, with certification, per ASTM A269.

Example Order – Welded:

500 pcs welded TP304L stainless steel tubing,
25.4 mm OD × 1.65 mm wall, random lengths 6–8 m,
hydrostatic test, IGC test per S4, per ASTM A269.

| 10. Key Takeaways for Buyers

Seamless or Welded — You Choose

A269 accepts **both processes**. Seamless is traditional for high-pressure integrity; welded offers tighter tolerances and cost advantages. Both are equally code-compliant under this standard.

Hardness = Quality

Unlike boiler standards that require tensile tests, A269 uses **hardness as the primary mechanical check**. Soft, ductile material ($\leq$ HRB 90 for standard grades) ensures good formability and corrosion resistance.

Supplement for Critical Service

The base standard is intentionally simple for general service. Need chloride SCC resistance? Add **S1**. Welding stabilized grades? Add **S3**. Need IGC proof? Add **S4**. Don't assume they're included by default.

ASME B31.3 Awareness

If your tubing goes into ASME B31.3 process piping, **additional testing may be required beyond A269**. The standard itself notes this caveat (Note 1). Consult your piping engineer and specify accordingly.

This guide is a simplified summary of ASTM A269 – 04 for customer reference.

For the complete standard, refer to the official ASTM International publication at www.astm.org.

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