1 Scope at a Glance

Product	Small-diameter austenitic stainless steel tubing — **seamless or welded**, cold finished.
Size Range	OD under 1/2 in. down to 0.050 in. (12.7 – 1.27 mm); wall under 0.065 in. down to 0.005 in. (1.65 – 0.13 mm).
Service	General corrosion-resisting, low- or high-temperature service. Suitable for cryogenic use down to –325°F (–200°C) **without impact testing**.
Heat Treatment	Furnished heat treated: min. 1800°F (980°C), then water quenched or rapidly cooled.
Seamless or Welded	**Both are permitted** and carry identical tensile requirements. Seamless: no longitudinal weld — preferred for high pressure and coiled lines. Welded: better concentricity and economics in thin walls, weld tested over the seam.
Base Standard	ASTM A1016/A1016M applies for general requirements.

2 Chemical Requirements (Table 1, %)

Grade	TP304	TP304L	TP310	TP316	TP316L	TP317	TP321	TP347	TP348
UNS	S30400	S30403	S31000	S31600	S31603	S31700	S32100	S34700	S34800
C, max	0.08	0.030	0.15	0.08	0.030	0.08	0.08	0.08	0.08
Mn, max	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P, max	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
S, max	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Si, max	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Ni	8.0–11.0	8.0–13.0	19.0–22.0	11.0–14.0	10.0–15.0	11.0–14.0	9.0–13.0	9.0–13.0	9.0–13.0
Cr	18.0–20.0	18.0–20.0	24.0–26.0	16.0–18.0	16.0–18.0	18.0–20.0	17.0–20.0	17.0–20.0	17.0–20.0
Mo	—	—	—	2.00–3.00	2.00–3.00	3.00–4.00	—	—	—
Ti	—	—	—	—	—	—	5×C min	—	—
Cb+Ta	—	—	—	—	—	—	—	10×C min	10×C min

TP321: Ti ≥ 5×C (0.60 max). | TP347/348: Cb+Ta ≥ 10×C (1.0 max). | Welded TP316: Ni 10.0–14.0 %. | Seamless TP316L: Si 1.00 % max.

3 Tensile Requirements (Table 2)

Property	All standard grades	TP304L / TP316L
Tensile strength, min	**75 ksi (515 MPa)**	**70 ksi (485 MPa)**
Yield strength, min	**30 ksi (205 MPa)**	**25 ksi (170 MPa)**
Elongation in 2 in. / 50 mm, min	**35 %**	**35 %**

Valid for tubing ≥ 1/8 in. (3.2 mm) OD with wall ≥ 0.015 in. (0.38 mm). For smaller or thinner sizes yield strength is not normally determined and minimum elongation is 25 %.

4 Ordering Information

To describe the material adequately, an order should state: quantity (feet or number of lengths) · product name (seamless or welded tube) · grade (see Table 1) · size (any two of OD, ID and average wall) · length (specific or random) · optional requirements (product analysis, hydrostatic / air underwater / NDE) · test report required · specification designation and year-date · any supplementary requirement selected.

5 Permissible Variations in Dimensions (Table 3)

Outside diameter range	OD tolerance	ID tolerance	Wall, +/–
Under 3/32 in. (2.38 mm)	**+0.002 / –0.000 in. (0.05 mm)**	**+0.000 / –0.002 in. (0.05 mm)**	**±10 %**
3/32 – under 3/16 in. (2.38 – 4.76 mm)	**+0.003 / –0.000 in. (0.08 mm)**	**+0.000 / –0.003 in. (0.08 mm)**	**±10 %**
3/16 – under 1/2 in. (4.76 – 12.70 mm)	**+0.004 / –0.000 in. (0.10 mm)**	**+0.000 / –0.004 in. (0.10 mm)**	**±10 %**

6 Testing & Inspection

- **Pressure / NDE on every tube** — hydrostatic (≤ 1000 psi / 6.89 MPa), air-underwater, or nondestructive electric test detecting defects deeper than 10 % of wall or 0.002 in.
- **Flaring test** — 2 tubes per 100-tube lot, flared with a 60° tool to 21–68 % ID expansion (by ID/OD ratio) without cracking.
- **Tension test** — one specimen per lot up to 50 tubes; two tubes for larger lots.
- **Welds** — made **without the addition of filler metal** (per A1016) unless specified; welded tube is tested including the weld seam.
- **Finish** — pickled free of scale; pickling waived when bright annealing is used.

7 How A632 Compares with Related Standards

Standard	Difference — when to choose it
A 269	General-service tubing with a **much wider size range** (OD ≥ 1/2 in.) — for larger tubing.
A 213 / A213M	Tubing for **boilers, superheaters and heat exchangers** — oriented to pressure-part service.
A 249 / A249M	**Welded** high-pressure boiler / heat-exchanger tubing — stricter weld and NDE requirements.

8 Supplementary Requirements (only when specified on the order)

Code	Requirement
S1	Dye penetrant inspection of every tube per ASTM E 165.
S2	Intergranular corrosion test per ASTM A 262, Practice E.
S3	Thermocouple-clean bore, capped or protected for shipment.
S4	Unstraightened (coil) tubing — yield strength reduced by 5 ksi, suffix “U” (e.g. 304-U).

Typical Applications

Instrumentation and control lines · heat-exchanger and condenser tubes · thermocouple protection sheaths · medical and laboratory equipment · semiconductor gas lines · food and dairy processing · aerospace hydraulic lines.

Documentation Supplied with Each Lot

- **EN 10204 3.1 mill test certificate** — chemistry and mechanical properties per heat, with the year-date of the specification invoked.
- **Test reports** — hydrostatic / NDE, flaring and tension results traceable to lot numbers; PMI (XRF) reports on request.
- **Third-party inspection** — SGS, BV, TÜV or customer-appointed inspectors welcome before shipment.

All ASTM A632 tubing is supplied with EN 10204 3.1 Mill Test Certificates, with grade, heat number, chemical analysis and mechanical properties traceable to each lot.