ASTM A270 TP304 (S30400) Technical Datasheet

Prepared from ASTM A270/A270M-15

1. Basic designation

Standard	Grade	UNS	Product forms	Scope
ASTM A270/A270M-15	TP304	S30400	Seamless / Welded / HCW sanitary tubing	Dairy, food, and sanitary service; pharmaceutical quality by supplementary requirement S2

2. Chemical composition (%)

C	Mn	P	S	Si	Ni	Cr	Mo	N	Cu
≤0.08	≤2.00	≤0.045	≤0.030	≤1.00	8.0–11.0	18.0–20.0	—	—	—

3. Mechanical properties

ASTM A270 main body does not publish a general grade-by-grade tensile table. The following values are the supplementary pharmaceutical quality requirements from Table S2.1.

Tensile strength min	Yield strength min	Elongation in 2 in. min, %	Rockwell hardness max
75 [515]	30 [205]	35	B90

4. Heat treatment

Requirement	Details
Heat treatment condition	Min 1900 °F [1040 °C], water quench or rapid cooling.

5. Inspection and testing requirements

Requirement	Details
Manufacture	SML: no welding. WLD: automatic welding with no filler. HCW: ≥35% reduction of both wall and weld before final anneal, no filler, and 100% RT before cold work.
Product analysis	One length of flat-rolled stock or one tube from each heat; product analysis tolerances per A480/A480M when requested.
Mechanical test required	Reverse flattening test for welded tubes: one specimen from each 1500 ft [450 m] of finished tubing.
Hydrostatic or NDE electric test	Each tube shall be subjected to NDE electric test or hydrostatic test, at manufacturer option unless PO specifies otherwise.
Wall thickness tolerance	At any point, wall thickness shall not vary more than 12.5% from specified wall thickness.
Additional ovality rule	For OD > 4 in. [100 mm] and wall < 0.150 in. [3.8 mm], additional ovality may be required; max/min OD at any section may deviate by not more than twice OD tolerance, while mean OD must still be within tolerance.
Marking	Marking shall include SML, WLD, or HCW, plus surface finish.
Packaging	Unless otherwise specified, tubing protected by bundling, wrapping, or boxing at manufacturer discretion.

6. Permissible variations in dimensions

OD size range	OD over	OD under	Cut length over	Cut length under
1.000 in. [25 mm] and under	+0.005 in. [0.13 mm]	-0.005 in. [0.13 mm]	+1/8 in. [3 mm]	0
Over 1 to 2 in. [25 to 50 mm]	+0.008 in. [0.20 mm]	-0.008 in. [0.20 mm]	+1/8 in. [3 mm]	0
Over 2 to 3 in. [50 to 75 mm]	+0.010 in. [0.25 mm]	-0.010 in. [0.25 mm]	+1/8 in. [3 mm]	0
Over 3 to 4 in. [75 to 100 mm]	+0.015 in. [0.38 mm]	-0.015 in. [0.38 mm]	+1/8 in. [3 mm]	0
Over 4 to 5-1/2 in. [100 to 140 mm], excl.	+0.015 in. [0.38 mm]	-0.015 in. [0.38 mm]	+3/16 in. [5 mm]	0
5-1/2 to 8 in. [140 to 200 mm], excl.	+0.030 in. [0.75 mm]	-0.030 in. [0.75 mm]	+3/16 in. [5 mm]	0
8 to 12 in. [200 to 300 mm]	+0.050 in. [1.25 mm]	-0.050 in. [1.25 mm]	+3/16 in. [5 mm]	0

General dimensional notes: For specified wall thickness below 0.049 in. [1.24 mm], OD tolerances are by agreement between manufacturer and purchaser. Wall thickness at any point shall not vary more than 12.5% from specified wall thickness. Pharmaceutical quality tubing S2 tightens wall thickness tolerance to ±10%.

7. Surface finish options

Finish option	Requirement / description
Mill finish	No additional polishing or smoothing operation intended to smooth the surface.
No. 80	Ground finish produced using No. 80 grit abrasive media.
No. 120	Ground finish produced using No. 120 grit abrasive media.
No. 180	Ground finish produced using No. 180 grit abrasive media.
No. 240	Ground finish produced using No. 240 grit abrasive media.
Electropolished	Bright reflective finish produced by electropolishing; pre-polishing may be used.
Max Ra specified	Purchaser may specify a maximum Ra on I.D., O.D., or both; measured per ASME B46.1.
Longitudinal polish	Usually used on inside surface only.
Circumferential / rotary polish	May be applied on I.D., O.D., or both.

8. Supplementary requirements

Supplementary requirement	Summary
S1 Intergranular corrosion	A262 Practice E for austenitic; A923 Practice C for duplex alloys S31803, S32205, or S32750.
S2 Pharmaceutical quality tubing	Adds chemistry, tensile, hardness, manipulation, packaging, and dimension requirements.
S2 chemistry special limit	For S31600 and S31603, sulfur restricted to 0.005–0.017%.
S2 manipulation	One flattening test and one flange test from each end of one finished tube per lot, using different tubes.
S2 finish	Surface finish requirements must be stated on the purchase order.
S2 packaging	Unless otherwise specified, all tubing shall be end capped, plastic sleeved, and boxed.
S2 dimensions	Wall thickness tolerance tightened to ±10%; cut length over tolerance max 2 in. [50 mm], under tolerance 0.
S3 Chemical cleaning (passivation)	When specified, tubing chemically cleaned per ASTM A967 after final polishing or final finishing operation.

9. Purchase order description example

Example wording
ASTM A270/A270M, Grade TP304, UNS S30400, sanitary tubing, SML / WLD / HCW as required, OD 2.000 in. × WT 0.065 in., cut length 6000 mm, finish No. 180 ID / mill finish OD (or as specified), heat treated per ASTM A270 Section 7, hydrostatic test or NDE electric test, test report required, supplementary requirements as specified.