ASTM A789 S32205 Technical Datasheet

Prepared from ASTM A789/A789M-22

1. Basic designation

Standard	UNS designation	Product form	Manufacturing process	Scope
ASTM A789/A789M-22	S32205	Seamless and welded ferritic/austenitic stainless steel tubing	No filler metal added in welded tubing	General service requiring general corrosion resistance, with particular emphasis on resistance to stress corrosion cracking

2. Chemical composition (%)

C	Mn	P	S	Si	Ni	Cr	Mo	N	Cu	Others
≤0.030	≤2.00	≤0.030	≤0.020	≤1.00	4.5–6.5	22.0–23.0	3.0–3.5	0.14–0.20	—	—

3. Heat treatment

Heat-treating temperature	Quench / cooling requirement
1870–2010 °F [1020–1100 °C]	rapid cooling in water or by other means

All tubes shall be furnished in the heat-treated condition. For seamless tubes, immediately following hot forming, tubes may be individually quenched in water or rapidly cooled by other means when the temperature is not less than the specified minimum solution treatment temperature.

4. Tensile and hardness properties

Condition / size note	Tensile strength, min	Yield strength, min	Elongation, min %	Brinell HBW max	Rockwell HRC max	Vickers HV max
Standard	95 [655]	70 [485]	25	290	30	290

For tubing smaller than 1/2 in. [12.7 mm] in outside diameter, the elongation values given for strip specimens in Table 4 apply. Mechanical property requirements do not apply to tubing smaller than 1/8 in. [3.2 mm] in outside diameter or with walls thinner than 0.015 in. [0.4 mm].

5. Lot definition for continuous process or direct quench after hot forming

Size of tube	Size of lot
2 in. [50.8 mm] and over OD and 0.200 in. [5.1 mm] and over wall	Not more than 50 tubes
Less than 2 in. [50.8 mm] but over 1 in. [25.4 mm] OD, or over 1 in. [25.4 mm] OD and under 0.200 in. [5.1 mm] wall	Not more than 75 tubes
1 in. [25.4 mm] or less in outside diameter	Not more than 125 tubes

6. Permissible variations in dimensions

Group	Size, outside diameter	OD variation	Average wall variation	Minimum wall over	Minimum wall under	Cut length variation	Thin-walled tubes note
1	Up to 1/2 in. [12.7 mm], excl	±0.005 [0.13]	±15	30	0	1/8 [3] over / 0 under	—
2	1/2 to 1-1/2 in. [12.7 to 38.1 mm], excl	±0.005 [0.13]	±10	20	0	1/8 [3] over / 0 under	Thin wall: <0.065 in. [1.6 mm] specified
3	1-1/2 to 3-1/2 in. [38.1 to 88.9 mm], excl	±0.010 [0.25]	±10	20	0	3/16 [5] over / 0 under	Thin wall: <0.095 in. [2.4 mm] specified
4	3-1/2 to 5-1/2 in. [88.9 to 139.7 mm], excl	±0.015 [0.38]	±10	20	0	3/16 [5] over / 0 under	Thin wall: <0.150 in. [3.8 mm] specified
5	5-1/2 to 8 in. [139.7 to 203.2 mm], incl	±0.030 [0.76]	±10	20	0	3/16 [5] over / 0 under	Thin wall: <0.150 in. [3.8 mm] specified

Special dimension notes: (1) When tubes as ordered require wall thicknesses 3/4 in. [19 mm] or over, or an inside diameter 60% or less of the outside diameter, a wider wall variation is permitted: average wall ±12.5%, or minimum wall +25.0% / -0%. (2) For tubes less than 1/2 in. [12.7 mm] in inside diameter that cannot be successfully drawn over a mandrel, average wall may vary ±15%, or minimum wall may vary +30% / -0%. (3) These cut-length tolerances apply up to

and including 24 ft [7.3 m]. For longer lengths, the over-tolerances increase by 1/8 in. [3 mm] for each 10 ft [3 m] or fraction thereof over 24 ft, or 1/2 in. [13 mm], whichever is less. (4) Ovality provisions apply to thin-walled tubes; the maximum and minimum diameters at any cross section may deviate from the nominal diameter by not more than twice the OD tolerance, provided the mean diameter remains within the tolerance.

7. Required inspection and testing

Requirement	Details
Manufacture	Tubing shall be made by the seamless or welded process with no filler metal added.
Tension tests	One specimen for lots of not more than 50 tubes; two tubes for lots of more than 50 tubes.
Flaring test (seamless)	One test from one end of one tube from each lot of finished tubes; minimum inside diameter expansion 10%.
Flange test (welded)	One test from one end of one tube from each lot of finished tubes.
Hardness test	Brinell or Rockwell hardness tests on specimens from two tubes from each lot.
Vickers alternative	For tubing <0.354 in. [9.00 mm] ID and wall <0.065 in. [1.65 mm], Vickers may be used instead of Brinell or Rockwell.
Reverse flattening (welded)	One reverse flattening test on a specimen from each 1500 ft [450 m] of finished tubing.
Hydrostatic or NDE electric test	Each tube shall be subjected to nondestructive electric test or hydrostatic test, at manufacturer option unless otherwise specified.
Hydrostatic formula note	In the hydrostatic test pressure calculation, 64000 (441.2) is substituted for 32000 (220.6).
Surface condition	All tubes shall be free of excessive mill scale, suitable for inspection.
Marking	Marking shall indicate whether tubing is seamless or welded and the wall designation (average wall or minimum wall).

8. Optional supplementary requirement

Supplementary requirement	Summary
S1 Pneumatic test	When specified by the purchaser, tubing shall be examined by a pneumatic test (either air underwater or pneumatic leak test) per ASTM A1016/A1016M.

9. Purchase order description example

Example wording
ASTM A789/A789M, UNS S32205, seamless or welded tubing, OD 25.4 mm × WT 2.11 mm (or 1 in. × 0.083 in.), average wall unless minimum wall is specified, heat treated in accordance with ASTM A789 Table 2, hydrostatic test or nondestructive electric test, test report required, special requirements if any.