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Designation: A 268/A 268M – 00a

An American National Standard

Standard Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service[1]

This standard is issued under the fixed designation A 268/A 268M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification[2] covers a number of grades of nominal-wall-thickness, stainless steel tubing for general corrosion-resisting and high-temperature service. Most of these grades are commonly known as the "straight-chromium" types and are characterized by being ferromagnetic. Two of these grades, TP410 and UNS S 41500 (Table 1), are amenable to hardening by heat treatment, and the high-chromium, ferritic alloys are sensitive to notch-brittleness on slow cooling to ordinary temperatures. These features should be recognized in the use of these materials. Grade TP439 is used primarily for hot-water tank service and does not require post-weld heat treatment to prevent attack of the heat affected zone.

NOTE 1—TP329 (S32900) formerly in this specification, has been transferred to Specifications A 789/A 789M and A 790/A 790M.

1.2 An optional supplementary requirement is provided, and when desired, shall be so stated in the order.

NOTE 2—For tubing smaller than ½ in. [12.7 mm] in outside diameter, the elongation values given for strip specimens in Table 2 shall apply. Mechanical property requirements do not apply to tubing smaller than ⅛ in. [3.2 mm] in outside diameter or with walls thinner than 0.015 in. [0.4 mm].

1.3 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification. The inch-pound units shall apply unless the "M" designation of this specification is specified in the order.

2. Referenced Documents

2.1 *ASTM Standards:*

A 450/A 450M Specification for General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes[3]

A 480/A 480M Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip[4]

A 763 Practices for Detecting Susceptibility to Intergranular Attack in Ferritic Stainless Steels[4]

A 789/A 789M Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service[3]

A 790/A 790M Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe[3]

A 941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys[3]

E 213 Practice for Ultrasonic Examination of Metal Pipe and Tubing[5]

E 273 Practice for Ultrasonic Examination of Longitudinal Welded Pipe and Tubing[5]

E 527 Practice for Numbering Metals and Alloys (UNS)[3]

2.2 *Other Standard:*

SAE J1086 Practice for Numbering Metals and Alloys (UNS)[6]

3. Terminology

3.1 For definitions of terms used in this specification, refer to Terminology A 941.

4. Ordering Information

4.1 Orders for material under this specification should include the following, as required, to describe the desired material adequately:

4.1.1 Quantity (feet, metres, or number of lengths),

4.1.2 Name of material (seamless or welded tubes),

4.1.3 Grade (Table 1),

4.1.4 Size (outside diameter and nominal wall thickness),

4.1.5 Length (specific or random),

4.1.6 Optional requirements (hydrostatic or electric test, 14.7),

[1] This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.10 on Stainless and Aloy Steel Tubular Products.

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[2] For ASME Boiler and Pressure Vessel Code applications see related Specification SA-268 in Section II of that Code.

[3] *Annual Book of ASTM Standards*, Vol 01.01.

[4] *Annual Book of ASTM Standards*, Vol 01.03.

[5] *Annual Book of ASTM Standards*, Vol 03.03.

[6] Available from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

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TABLE 1 Chemical Requirements

NOTE 1— TP329 (S32900), formerly part of this specification, has been transferred to A 789/A 789M and A 790/A 790M.

Grade	TP405	TP410	TP429	TP430	TP443	TP446–1	TP446–2[A]	. . .	TP409
UNS Designation[B]	S40500	S41000	S42900	S43000	S44300	S44600	S44600	S40800	S40900
Element	Composition, %								
C, max	0.08	0.15	0.12	0.12	0.20	0.20	0.12	0.08	0.08
Mn, max	1.00	1.00	1.00	1.00	1.00	1.50	1.50	1.00	1.00
P, max	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.045	0.045
S, max	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.045	0.030
Si, max	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ni	0.50 max	. . .	. . .	. . .	0.75 max	0.75 max	0.50 max	0.80 max	0.50 max
Cr	11.5–14.5	11.5–13.5	14.0–16.0	16.0–18.0	18.0–23.0	23.0–27.0	23.0–27.0	11.5–13.0	10.5–11.7
Mo	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Al	0.10–0.30	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Cu	. . .	. . .	. . .	. . .	0.90–1.25	. . .	. . .	. . .	. . .
N	. . .	. . .	. . .	. . .	. . .	0.25	0.25	. . .	. . .
Ti	. . .	. . .	. . .	. . .	. . .	. . .	. . .	12 × C min; 1.10 max	6 × C min; 0.75 max

Grade	TP439	. . .	TP430 Ti	TP XM-27	TP XM-33[A]	18Cr-2Mo	29-4	29-4-2	26-3-3	25-4-4	...[B]	. . .
UNS Designation	S43035	S41500[C]	S43036	S44627	S44626	S44400	S44700	S44800	S44660	S44635	S44735	S32803
Element	Composition, %											
C, max	0.07	0.05	0.10	0.01[A]	0.06	0.025	0.010	0.010	0.030	0.025	0.030	0.015[D]
Mn, max	1.00	0.5–1.0	1.00	0.40	0.75	1.00	0.30	0.30	1.00	1.00	1.00	0.5
P, max	0.040	0.03	0.040	0.02	0.040	0.040	0.025	0.025	0.040	0.040	0.040	0.020
S, max	0.030	0.03	0.030	0.02	0.020	0.030	0.020	0.020	0.030	0.030	0.030	0.005
Si, max	1.00	0.60	1.00	0.40	0.75	1.00	0.20	0.20	1.00	0.75	1.00	0.50
Ni	0.50 max	3.5–5.5	0.75 max	0.5[E] max	0.50 max	1.00 max	0.15 max	2.0–2.5	1.0–3.50	3.5–4.5	1.00 max	3.0–4.0
Cr	17.00–19.00	11.5–14.0	16.00–19.50	25.0–27.5	25.0–27.0	17.5–19.5	28.0–30.0	28.0–30.0	25.0–28.0	24.5–26.0	28.00–30.00	28.0–29.0
Mo	...	0.5–1.0	...	0.75–1.50	0.75–1.50	1.75–2.50	3.5–4.2	3.5–4.2	3.0–4.0	3.5–4.5	3.60–4.20	1.8–2.5
Al, max	0.15	. . .	...	...	...	...	...	...	...	...	...	. . .
Cu, max	...	. . .	...	0.2	0.20	...	0.15	0.15	...	...	...	. . .
N, max	0.04	. . .	...	0.015	0.040	0.035	0.020[F]	0.020[F]	0.040	0.035	0.045	0.020
Ti	0.20 + 4 (C + N) min; 1.10 max	. . .	5 × C min; 0.75 max	...	7 × (C + N) but no less than 0.20 min; 1.00 max	(Ti + Cb) 0.20 + 4 (C + N) min; 0.80 max	...	...	(Ti + Cb) = 0.20–1.00 and 6 × C + N) min	(Ti + Cb) = 0.20 + 4 (C + N) min to 0.80 max	(Ti + Cb) 0.20 1.00 with 6 (C + N) min	. . .
Cb	...	. . .	...	0.05–0.20	...	...	...	...	...	...	...	0.15–0.50[G]

[A] For small diameter or thin walls, or both, tubing, where many drawing passes are required, a carbon maximum of 0.015 % is necessary. Small outside diameter tubes are defined as those less than 0.500 in. [12.7 mm] in outside diameter and light wall tubes as those less than 0.049 in. [1.2 mm] in average wall thickness (0.040 in. [1 mm] in minimum wall thickness).

[B] When intergranular corrosion testing is specified, the test will be Practices A 763, using samples prepared as agreed upon between the seller and the purchaser.

[C] Plate version of CA6NM.

[D] Carbon plus nitrogen = 0.30 max.

[E] Nickel plus copper.

[F] Carbon plus nitrogen = 0.025 % max.

[G] Cb/(C + N) = 12 min.

TABLE 2 Number of Tubes in a Lot Heat Treated by the Continuous Process

Size of Tube	Size of Lot
2 in. [50.8 mm] and over in outside diameter and 0.200 in. [5.1 mm] and over in wall thickness	not more than 50 tubes
Less than 2 in. [50.8 mm] but over 1 in. [25.4 mm] in outside diameter or over 1 in. [25.4 mm] in outside diameter and under 0.200 in. [5.1 mm] in wall thickness	not more than 75 tubes
1 in. [25.4 mm] or less in outside diameter	not more than 125 tubes

4.1.7 Test report required (Certification Section of Specification A 450/A 450M),

4.1.8 Specification designation, and

4.1.9 Special requirements.

5. General Requirements

5.1 Material furnished under this specification shall conform to the applicable requirements of Specification A 450/A 450M unless otherwise provided herein.

6. Manufacture

6.1 The tubes shall be made by the seamless or welded process with no filler metal added.

7. Heat Treatment

7.1 As a final heat treatment, tubes shall be reheated to a temperature of 1200°F [650°C] or higher and cooled (as

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