Designation: A 213/A 213M – 03

Used in USDOE-NE standards

Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes[1]

This standard is issued under the fixed designation A 213/A 213M; 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 minimum-wall-thickness, seamless ferritic and austenitic steel boiler, superheater, and heat-exchanger tubes, designated Grades T5, TP304, etc. These steels are listed in Tables 1 and 2.

1.2 Grades containing the letter, H, in their designation, have requirements different from those of similar grades not containing the letter, H. These different requirements provide higher creep-rupture strength than normally achievable in similar grades without these different requirements.

1.3 The tubing sizes and thicknesses usually furnished to this specification are ⅛ in. [3.2 mm] in inside diameter to 5 in. [127 mm] in outside diameter and 0.015 to 0.500 in. [0.4 to 12.7 mm], inclusive, in minimum wall thickness. Tubing having other dimensions may be furnished, provided such tubes comply with all other requirements of this specification.

1.4 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 262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels[3]

A 450/A 450M Specification for General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes[4]

A 941 Terminology Relating to Steel, Stainless Steel, Related Alloys and Ferroalloys[4]

E 112 Test Methods for Determining Average Grain Size[5]

E 527 Practice for Numbering Metals and Alloys (UNS)[4]

2.2 *Other Standard:*

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

3. Terminology

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

4. Ordering Information

4.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for products under this specification. Such requirements to be considered include, but are not limited to, the following:

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

4.1.2 Name of material (seamless tubes),

4.1.3 Grade (Tables 1 and 2),

4.1.4 Condition (hot finished or cold finished),

4.1.5 Controlled structural characteristics (see 6.3),

4.1.6 Size (outside diameter and minimum wall thickness),

4.1.7 Length (specific or random),

4.1.8 Hydrostatic Test or Nondestructive Electric Test (see 10.1),

4.1.9 Specification designation and year of issue,

4.1.10 Increased sulfur (for machinability, see Note A, Table 1, and 14.3), and

4.1.11 Special requirements and any supplementary requirements selected.

5. General Requirements

5.1 Material furnished to this specification shall conform to the requirements of Specification A 450/A 450M, including any supplementary requirements that are indicated in the

[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 Alloy Steel Tubular Products.

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[2] For ASME Boiler and Pressure Vessel Code applications see related Specification SA-213 in Section II of that Code.

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

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

[5] *Annual Book of ASTM Standards*, Vol 03.01.

[6] Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001.

***A Summary of Changes section appears at the end of this standard.**

TABLE 1 Chemical Requirements for Ferritic Steel

Grade	Composition, %									Other Elements
	Carbon	Manganese	Phosphorus, max	Sulfur, max	Silicon	Chromium	Molybdenum	Titanium	Vanadium, min	
T2[A]	0.10–0.20	0.30–0.61	0.025	0.025	0.10–0.30	0.50–0.81	0.44–0.65	...	...	
T5	0.15 max	0.30–0.60	0.025	0.025	0.50 max	4.00–6.00	0.45–0.65	...	...	
T5b	0.15 max	0.30–0.60	0.025	0.025	1.00–2.00	4.00–6.00	0.45–0.65	...	...	
T5c	0.12 max	0.30–0.60	0.025	0.025	0.50 max	4.00–6.00	0.45–0.65	[B]	...	
T9	0.15 max	0.30–0.60	0.025	0.025	0.25–1.00	8.00–10.00	0.90–1.10	...	...	
T11	0.05 min–0.15 max	0.30–0.60	0.025	0.025	0.50–1.00	1.00–1.50	0.44–0.65	...	...	
T12[A]	0.05 min–0.15 max	0.30–0.61	0.025	0.025	0.50 max	0.80–1.25	0.44–0.65	...	...	
T17	0.15–0.25	0.30–0.61	0.025	0.025	0.15–0.35	0.80–1.25	...	...	0.15	
T21	0.05 min–0.15 max	0.30–0.60	0.025	0.025	0.50 max	2.65–3.35	0.80–1.06	...	...	
T22	0.05 min–0.15 max	0.30–0.60	0.025	0.025	0.50 max	1.90–2.60	0.87–1.13	...	...	
T23	0.04-0.10	0.10–0.60	0.030	0.010	0.50 max	1.90-2.60	0.05-0.30	...	0.20-0.30	W 1.45-1.75 Cb 0.02-0.08 B 0.0005-0.006 N 0.030 max Al 0.030 max
T24	0.05–0.10	0.30–0.70	0.020	0.010	0.15–0.45	2.20–2.60	0.70–1.10	0.06–0.10	0.20–0.30	B 0.0015–0.0020 N 0.012 max Al 0.020 max
T91	0.08–0.12	0.30–0.60	0.020	0.010	0.20–0.50	8.00–9.50	0.85–1.05	...	0.18–0.25	Cb 0.06–0.1 N 0.030–0.070 Ni 0.40 max Al 0.04 max
T92	0.07–0.13	0.30–0.60	0.020	0.010	0.50 max	8.50–9.50	0.30–0.60	. . .	0.15–0.25	W 1.5–2.00 Cb 0.04–0.09 B 0.001–0.006 N 0.03–0.07 Ni 0.40 max Al 0.04 max
T122	0.07-0.14	0.70 max	0.020	0.010	0.50 max	10.00-12.50	0.25-0.60	...	0.15-0.30	W 1.50-2.50 Cu 0.30-1.70 Cb 0.04-0.10 B 0.0005-0.005 N 0.040-0.100 Ni 0.50 max Al 0.040 max
T911	0.09–0.13	0.30–0.60	0.020	0.010	0.10–0.50	8.50–10.50	0.90–1.10	...	0.18–0.25	Ni 0.40 max Cb 0.060–0.10 B 0.0003–0.006 N 0.04–0.09 Al 0.04 max W 0.90–1.10
18Cr-2Mo	0.025 max	1.00 max	0.040	0.030	1.00 max	17.5–19.5	1.75–2.50	[C]	...	N max 0.035 Ni + Cu max 1.00

[A] It is permissible to order T2 and T12 with 0.045 max Sulfur.
[B] Grade T5c shall have a titanium content of not less than four times the carbon content and not more than 0.70 %.
[C] Grade 18Cr-2Mo shall have Ti + Cb = 0.20 + 4 (C + N) min, 0.80 max.

purchase order. Failure to comply with the general requirements of Specification A 450/A 450M constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A 450/A 450M, this specification shall prevail.

6. Materials and Manufacture

6.1 *Manufacture and Condition*—Tubes shall be made by the seamless process and shall be either hot finished or cold finished, as specified. Grade TP347HFG shall be cold finished.

6.2 *Heat Treatment*:

6.2.1 *Ferritic Alloy and Ferritic Stainless Steels*—The ferritic alloy and ferritic stainless steels shall be reheated for heat treatment in accordance with the requirements of Table 3. Heat treatment shall be carried out separately and in addition to heating for hot forming.

6.2.2 *Austenitic Stainless Steels*—All austenitic tubes shall be furnished in the heat-treated condition. and shall be heat treated in accordance with the requirements of Table 3. Alternatively, immediately after hot forming, while the temperature of the tubes is not less than the specified minimum solution treatment temperature, tubes may be individually quenched in water or rapidly cooled by other means.

6.3 If any controlled structural characteristics are required, these shall be so specified in the order as to be a guide as to the most suitable heat treatment.

TABLE 2 Chemical Requirements of Austenitic Steel

Grade	TP201	TP202	TP304	TP 304H	. . .	TP 304N	TP 304LN	TP 304L	TP 309Cb	TP 309H	TP 309HCb	TP 309S	. . .	TP 310Cb	TP 310H	TP 310HCb	TP 310HCbN	TP 310S		TP316	TP 316H
UNS Designation[A]	S20100	S20200	S30400	S30409	S30432	S30451	S30453	S30403	S30940	S30909	S30941	S30908	S31002	S31040	S31009	S31041	S31042	S31008	S31272	S31600	S31609
Carbon	0.15 max	0.15 max	0.08 max	0.04–0.10	0.07–0.13	0.08 max	0.035 max[B]	0.035 max[B]	0.08 max	0.04–0.10	0.04–0.10	0.08 max	0.015 max	0.08 max	0.04–0.10	0.04–0.10	0.04–0.10	0.08 max	0.08–0.12	0.08 max	0.04–0.10
Manganese, max	5.50–7.50	7.50–10.0	2.00	2.00	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.5–2.0	2.00	2.00
Phosphorus, max	0.060	0.060	0.040	0.040	0.045	0.040	0.040	0.040	0.045	0.045	0.045	0.045	0.020	0.045	0.040	0.045	0.030	0.045	0.030	0.040	0.040
Sulfur, max	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.015	0.030	0.030	0.030	0.030	0.030	0.015	0.030	0.030
Silicon	1.00 max	1.00 max	0.75 max	0.75 max	0.30 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.15 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.3–0.7	0.75 max	0.75 max
Nickel	3.50–5.50	4.00–6.00	8.00–11.0	8.00–11.0	7.50–10.50	8.00–11.0	8.00–11.0	8.00–13.0	12.00–16.00	12.00–15.00	12.00–16.00	12.00–15.00	19.0–22.0	19.00–22.00	19.0–22.00	19.0–22.00	17.00–23.00	19.00–22.00	14.0–16.0	11.0–14.0	11.0–14.0
Chromium	16.0–18.0	17.0–19.0	18.0–20.0	18.0–20.0	17.00–19.00	18.0–20.0	18.0–20.0	18.0–20.0	22.00–24.00	22.00–24.00	22.00–24.00	22.00–24.00	24.0–26.0	24.00–26.00	24.00–26.00	24.00–26.00	24.00–26.00	24.00–26.00	14.0–16.0	16.0–18.0	16.0–18.0
Molybdenum	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.75 max	0.75 max	0.75 max	0.75 max	0.10 max	0.75 max	. . .	0.75 max	. . .	0.75 max	1.0–1.4	2.00–3.00	2.00–3.00
Titanium		. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.3–0.6	. . .	. . .
Columbium + tantalum	. . .	. . .	. . .	. . .	0.20–0.80	. . .	. . .	. . .	10× C min, 1.10 max	. . .	10 × C min, 1.10 max	. . .	. . .	10× C min, 1.10 max	. . .	10 × C min, 1.10 max	0.20–0.60	. . .	. . .	. . .	. . .
Tantalum, max	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Nitrogen[C]	0.25 max	0.25 max	. . .	. . .	0.05–0.12	0.10–0.16	0.10–0.16	. . .	. . .	. . .	. . .	. . .	0.10 max	. . .	. . .	. . .	0.15–0.35	. . .	. . .	. . .	. . .
Cerium	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Others	. . .	. . .	. . .	. . .	B 0.001–0.010 Al 0.003–0.030 Cu 2.5–3.5	. . .	. . .	. . .		. . .			. . .		. . .		. . .		B 0.004–0.008	. . .	

TABLE 2 *Continued*

Grade	TP316L	TP316N	TP 316LN	TP317	TP317L	TP321	TP 321H	TP347	TP 347H	TP 347LN	TP 347HFG	TP348	TP 348H
UNS Designation[A]	S31603	S31651	S31653	S31700	S31703	S32100	S32109	S34700	S34709	S34751		S34800	S34809
Carbon	0.035 max[B]	0.08 max	0.035 max[B]	0.08 max	0.035 max	0.08 max	0.04–0.10	0.08 max	0.04–0.10	0.005–0.020	0.06–0.10	0.08 max	0.04–0.10
Manganese, max	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Phosphorus, max	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Sulfur, max	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Silicon	0.75 max[C]	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max	0.75 max
Nickel	10.0–15.0	11.0–14.0	11.0–14.0	11.0–14.0	11.0–15.0	9.00–13.0	9.00–13.0	9.00–13.0	9.00–13.0	9.0–13.0	9.00–13.0	9.00–13.0	9.00–13.0
Chromium	16.0–18.0	16.0–18.0	16.0–18.0	18.0–20.0	18.0–20.0	17.0–20.0	17.0–20.0	17.0–20.0	17.0–20.0	17.0 20.0	17.0–20.0	17.0–20.0	17.0–20.0
Molybdenum	2.00–3.00	2.00–3.00	2.00–3.00	3.00–4.00	3.00–4.00	. . .	. . .	. . .	. . .	. . .		. . .	. . .
Titanium	. . .	. . .	. . .	. . .	. . .	[D]	[E]	. . .	. . .	. . .	. . .	. . .	. . .
Columbium + tantalum	. . .	. . .	. . .	. . .	. . .	. . .	. . .	[F]	[G]	0.2–0.5[H]	8×c–1.0	[F]	[G]
Tantalum, max	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .		0.10	0.10
Nitrogen[I]	. . .	0.10–0.16	0.10–0.16	. . .	. . .	. . .	. . .	. . .	. . .	0.06–0.10		. . .	. . .
Cerium	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .		. . .	. . .
Others	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .		. . .	. . .

TABLE 2 *Continued*

Grade	XM-15								. . .	XM-19	. . .	. . .	. . .
UNS Designation[A]	S38100	S30615	S30815	S31050	S21500	S31725	S31726	S32615	S33228	S20910	S25700	S32050	S34565
Carbon	0.08 max	0.016–0.24	0.05–0.10	0.025	0.06–0.15	0.03 max	0.03 max	0.07 max	0.04–0.08	0.06 max	0.02 max	0.030 max	0.030 max
Manganese, max	2.00	2.00	0.80	2.00	5.50–7.0	2.00	2.00	2.00	1.0	4.00–6.00	2.0	1.50	5.0–7.0
Phosphorus, max	0.030	0.030	0.040	0.020	0.040	0.040	0.040	0.045	0.020	0.04	0.025	0.035	0.030
Sulfur, max	0.030	0.030	0.030	0.015	0.030	0.030	0.030	0.030	0.015	0.03	0.010	0.020	0.010
Silicon	1.50–2.50	3.2-4.0	1.40–2.00	0.4	0.2–1.0	0.75	0.75	4.8-6.0	0.30	1.00 max	6.5–8.0	1.00 max	1.00 max
Nickel	17.5–18.5	13.5–16.0	10.0–12.0	20.5–23.5	9.00–11.0	13.5–17.5	13.5–17.5	19.0–22.0	31.0–33.0	11.5–13.5	22.0–25.0	20.0–22.0	16.0–18.0
Chromium	17.0–19.0	17.0–19.5	20.0–22.0	24.0–26.0	14.0–16.0	18.0–20.0	17.0–20.0	16.5–19.5	26.0–28.0	20.5–23.5	8.0–11.0	22.0–24.0	23.0–25.0
Molybdenum	. . .	. . .	. . .	1.6–2.6	0.8–1.20	4.0–5.00	4.0–5.00	0.3–1.5	. . .	1.50–3.00	0.50 max	6.0–6.8	4.0–5.0
Titanium	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Columbium + tantalum	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.6–1.0	0.10–0.30	. . .	. . .	. . .
Tantalum, max	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Nitrogen[I]	. . .	. . .	0.14–0.20	0.09–0.15	. . .	0.10 max	0.10–0.20	. . .	. . .	0.20–0.40	. . .	0.21–0.32	0.40–0.60
Cerium	. . .	. . .	0.03–0.08	. . .	. . .	. . .	. . .	. . .	0.05–0.10	. . .	. . .	. . .	. . .
Others	. . .	Al 0.8–1.5	. . .		Cb 0.75–1.25 V 0.15–0.40 B 0.003–0.009	Cu 0.75 max	Cu 0.75 max	Cu 1.5–2.5	Al 0.025 max	V 0.10–0.30	. . .	Cu 0.40 max	Cb 0.10 max

[A] New designation established in accordance with Practice E 527 and SAE J1086.

[B] For small diameter or thin walls, or both, where many drawing passes are required, a carbon maximum of 0.040 % is necessary in grades TP304L and TP316L. Small outside diameter tubes are defined as those less than 0.500 in. [12.7 mm] in outside diameter and light wall tubes are those less than 0.049 in. [1.2 mm] in average wall thickness (0.044 in. [1.1 mm] in minimum wall thickness).

[C] For seamless TP316L tubes, the silicon maximum shall be 1.00 %.

[D] Grade TP321 shall have a titanium content of not less than five times the carbon content and not more than 0.60 %.

[E] Grade TP321H shall have a titanium content of not less than four times the carbon content and not more than 0.60 %.

[F] Grades TP347 and TP348 shall have a columbium plus tantalum content of not less than ten times the carbon content and not more than 1.00 %.

[G] Grades TP347H and TP348H shall have a columbium plus tantalum content of not less than eight times the carbon content and not more than 1.0 %.

[H] Grade TP347LN shall have a columbium (niobium) plus tantalum content of not less than 15 times the carbon content.

[I] The method of analysis for nitrogen shall be a matter of agreement between the purchaser and manufacturer.

7. Chemical Composition

7.1 *Composition Requirements*:

7.1.1 The alloy steels shall conform to the chemical requirements prescribed in Table 1.

7.1.2 The stainless steels shall conform to the chemical requirements prescribed in Table 2.

7.2 *Product Analysis*:

7.2.1 An analysis of either one billet or one tube shall be made from each heat. The chemical composition thus determined shall conform to the requirements specified.

7.2.2 If the original test for product analysis fails, retests of two additional billets or tubes shall be made. Both retests, for the elements in question shall meet the requirements of the specification; otherwise all remaining material in the heat or lot (as described in Section 13) shall be rejected or, at the option of the producer, each billet or tube may be individually tested for acceptance. Billets or tubes that do not meet the requirements of the specification shall be rejected.

8. Grain Size

8.1 Grain size shall be as prescribed in Table 3, as determined in accordance with Test Methods E 112.

8.2 Grain size determinations, to demonstrate compliance with 8.1, shall be made on one end of one finished tube from each lot. See 13.1.

9. Mechanical Properties

9.1 *Tensile Requirements*:

9.1.1 The material shall conform to the requirements as to tensile properties prescribed in Table 4.

9.1.2 Table 5 gives the computed minimum elongation values for each 1⁄32-in. [0.8-mm] decrease in wall thickness. Where the wall thickness lies between two values shown above, the minimum elongation value shall be determined by the following equations. For Grades T23, T24, T91, T92, T122, T911, and TP444: $E = 32t + 10.00$ [$E = 1.25t + 10.00$]. For all other ferritic alloy grades: $E = 48t + 15.00$ [$E = 1.87t + 15.00$].

where:
E = elongation in 2 in. or 50 mm, %, and
t = actual thickness of specimen, in. [mm].

9.1.3 One tension test shall be made on a specimen from one tube for lots of not more than 50 tubes. Tension tests shall be made on specimens from two tubes for lots of more than 50 tubes. See 13.2.

9.2 *Hardness Requirements*:

9.2.1 The material shall conform to the hardness requirements prescribed in Table 4. See 13.2.

9.2.2 Brinell, Vickers, or Rockwell hardness tests shall be made on specimens from two tubes from each lot. See 13.2.

9.3 *Flattening Test*—One flattening test shall be made on specimens from each end of one finished tube, not the one used for the flaring test, from each lot. See 13.1.

9.4 *Flaring Test*—One flaring test shall be made on specimens from each end of one finished tube, not the one used for the flattening test, from each lot. See 13.1.

9.5 Mechanical property requirements do not apply to tubing thinner than 1⁄8 in. [3.2 mm].

10. Hydrostatic or Nondestructive Electric Test

10.1 Each tube shall be subjected to the nondestructive electric test or the hydrostatic test. The type of test to be used shall be at the option of the manufacturer, unless otherwise specified in the purchase order.

11. Forming Operations

11.1 Tubes, when inserted in a boiler or tube sheet, shall stand expanding and beading without showing cracks or flaws. Superheater tubes when properly manipulated shall stand all forging, welding, and bending operations necessary for application without developing defects. See Note 1.

NOTE 1—Certain of the ferritic steels covered by this specification will harden if cooled rapidly from above their critical temperature. Some will air harden, that is, become hardened to an undesirable degree when cooled in air from high temperatures, particularly chromium-containing steels with chromium of 4 % and higher. Therefore, operations that involve heating such steels above their critical temperatures, such as welding, flanging, and hot bending, should be followed by suitable heat treatment.

12. Surface Condition

12.1 Ferritic alloy cold-finished steel tubes shall be free of scale and suitable for inspection. A slight amount of oxidation is not considered scale.

12.2 Ferritic alloy hot-finished steel tubes shall be free of loose scale and suitable for inspection.

12.3 Stainless steel tubes shall be pickled free of scale. When bright annealing is used, pickling is not necessary.

12.4 Any special finish requirement shall be subject to agreement between the supplier and the purchaser.

13. Sampling

13.1 For flattening, flaring, and grain size requirements, he term lot applies to all tubes, prior to cutting, of the same size (see 4.1.6) that are produced from the same heat of steel. When final heat treatment is in a batch-type furnace, a lot shall include only those tubes of the same size and from the same heat that are heat treated in the same furnace charge. When the final heat treatment is in a continuous furnace or when the heat-treated condition is obtained directly by quenching after hot forming, the number of tubes of the same size and from the same heat in a lot shall be determined from the size of the tubes as prescribed in Table 6.

13.2 For tensile and hardness test requirements, the term lot applies to all tubes prior to cutting, of the same size (see 4.1.6) that are produced from the same heat of steel. When final heat treatment is in a batch-type furnace, a lot shall include only those tubes of the same size and the same heat that are heat treated in the same furnace charge. When the final heat treatment is in a continuous furnace, or when the heat-treated condition is obtained directly by quenching after hot forming, a lot shall include all tubes of the same size and heat, heat treated in the same furnace at the same temperature, time at heat, and furnace speed; or all tubes of the same size and heat, hot formed and quenched in the same production run, except as prescribed in 9.1.3.