



Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application¹

This standard is issued under the fixed designation A 743/A 743M; 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.

^{ε1} NOTE—Section S12 was corrected editorially in May 1999.

1. Scope

1.1 This specification covers iron-chromium and iron-chromium-nickel alloy castings for general corrosion-resistant application. The grades covered by this specification represent types of alloy castings suitable for broad ranges of application which are intended for a wide variety of corrosion environments.

NOTE 1—For alloy castings for severe corrosion-resistant service, reference should be made to Specification A 744/A 744M. For general heat-resistant alloy castings, reference should be made to Specification A 297/A 297M. For nickel alloy castings for corrosion-resistant service, reference should be made to Specification A 494/A 494M.

1.2 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. Inch-pound units are applicable for material ordered to Specification A 743 and SI units for material ordered to Specification A 743M.

2. Referenced Documents

2.1 ASTM Standards:

- A 262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels²
- A 297/A297M Specification for Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat-Resistant, for General Application³
- A 370 Test Methods and Definitions for Mechanical Testing of Steel Products²

¹ This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.18 on Castings.

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² Annual Book of ASTM Standards, Vol 01.03.

³ Annual Book of ASTM Standards, Vol 01.02.

A 447/A447M Specification for Steel Castings, Chromium-Nickel-Iron Alloy (25-12 Class), for High-Temperature Service³

A 494/A494M Specification for Castings, Nickel and Nickel Alloy³

A 744/A744M Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service³

A 781/A781M Specification for Castings, Steel and Alloy, Common Requirements, for General Industrial Use³

3. General Conditions for Delivery

3.1 Material furnished to this specification shall conform to the requirements of Specification A 781/A 781M, including any supplementary requirements that are indicated on the purchase order. Failure to comply with the general requirements of Specification A 781/A 781M constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A 781/A 781M, this specification shall prevail.

4. Ordering Information

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

- 4.1.1 Description of the casting by pattern number or drawing,
- 4.1.2 Grade,
- 4.1.3 Heat treatment,
- 4.1.4 Options in the specification, and
- 4.1.5 Supplementary requirements desired, including the standards of acceptance.

5. Process

5.1 The steel shall be made by the electric furnace process with or without separate refining such as argon-oxygen decarburization (AOD).

6. Heat Treatment

6.1 Castings shall be heat treated in accordance with the requirements in Table 1.

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TABLE 1 Heat Treatment Requirements

Grade	Heat Treatment
CF-8, CG-3M (J92999), CG-8M, CG-12, CF-20, CF-8M, CF-8C, CF-16F, CF-16Fa, CH-10, CH-20, CE-30, CK-20	Heat to 1900°F [1040°C] minimum, hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means. Heat to 2000°F [1093°C] minimum, hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means.
CA-15, CA-15M, CA-40, CA-40F	(1) Heat to 1750°F [955°C] minimum, air cool and temper at 1100°F [595°C] minimum, or (2) Anneal at 1450°F [790°C] minimum.
CB-30, CC-50	(1) Heat to 1450°F [790°C] minimum, and air cool, or (2) Heat to 1450°F [790°C] minimum, and furnace cool.
CF-3, CF-3M, CF-3MN	(1) Heat to 1900°F [1040°C] minimum, hold for sufficient time to heat casting to temperature, and cool rapidly. (2) As cast if corrosion resistance is acceptable.
CN-3M (J94652)	Heat to 2150°F [1175°C] minimum, hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means.
CN-3MN	Heat to 2100°F [1150°C] minimum, hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means.
CN-7M, CG-6MMN	Heat to 2050°F [1120°C] minimum, hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means.
CN-7MS	Heat to 2100°F [1150°C] minimum, 2150°F [1180°C] maximum, hold for sufficient time (2 h minimum) to heat casting to temperature and quench in water.
CA-6NM	Heat to 1850°F [1010°C] minimum, air cool to 200°F [95°C] or lower prior to any optional intermediate temper and prior to the final temper. The final temper shall be between 1050°F [565°C] and 1150°F [620°C].
CA-6N (J91541)	Heat to 1900°F [1040°C], air cool, reheat to 1500°F [815°C], air cool, and age at 800°F [425°C], holding at each temperature sufficient time to heat casting uniformly to temperature.
CF10SMnN	Heat to 1950°F [1065°C] minimum, hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means.
CA-28MwV	(1) Heat to 1875–1925°F [1025–1050°C], quench in air or oil, and temper at 1150°F [620°C] minimum, or (2) Anneal at 1400°F [760°C] minimum.
CK-3MCuN	Heat to 2100°F [1150°C] minimum, hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means.
CK-35MN	Heat to 2100–2190F [1150–1200C], hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means.
CB-6 (J91804)	Heat between 1800°F [980°C] and 1920°F [1050°C], forced air, cool to 120°F [50°C] maximum, and temper between 1100°F and 1160°F [595°C and 625°C].

TABLE 2 Chemical Requirements

NOTE 1—CD-4MCu has been deleted from A 743/A 743M and added to A 890/A 890M. CD-4MCu may now be supplied and purchased in compliance with A 890/A 890M. The chemical and mechanical property requirements of CD-4MCu were identical in A 743/A 743M and A 890/A 890M at the time of removal from A 743/A 743M.

Grade	Type	Composition, %													
		Carbon, max	Manganese, max	Silicon, max	Phosphorus, max	Sulfur, max	Chromium	Nickel	Molybdenum	Columbium	Selenium	Copper	Tungsten, max	Vanadium, max	Nitrogen
CF-8	19 Chromium, 9 Nickel	0.08	1.50	2.00	0.04	0.04	18.0–21.0	8.0–11.0	...	...	...	...	...	...	...
CG-12	22 Chromium, 12 Nickel	0.12	1.50	2.00	0.04	0.04	20.0–23.0	10.0–13.0	...	...	...	...	...	...	...
CF-20	19 Chromium, 9 Nickel	0.20	1.50	2.00	0.04	0.04	18.0–21.0	8.0–11.0	...	...	...	...	...	...	...
CF-8M	19 Chromium, 10 Nickel, with Molybdenum	0.08	1.50	2.00	0.04	0.04	18.0–21.0	9.0–12.0	2.0–3.0	...	...	...	...	...	...
CF-8C	19 Chromium, 10 Nickel, with Columbium	0.08	1.50	2.00	0.04	0.04	18.0–21.0	9.0–12.0	...	A	...	...	...	...	...
CF-16F	19 Chromium, 9 Nickel, Free Machining	0.16	1.50	2.00	0.17	0.04	18.0–21.0	9.0–12.0	1.50 max	...	0.20–0.35	...	...	...	...
CF-16Fa	19 Chromium, 9 Nickel, Free Machining	0.16	1.50	2.00	0.04	0.20–0.40	18.0–21.0	9.0–12.0	0.40–0.80	...	...	...	...	...	...
CH-10	25 Chromium, 12 Nickel	0.10	1.50	2.00	0.04	0.04	22.0–26.0	12.0–15.0	...	...	...	...	...	...	...
CH-20	25 Chromium, 12 Nickel	0.20	1.50	2.00	0.04	0.04	22.0–26.0	12.0–15.0	...	...	...	...	...	...	...
CK-20	25 Chromium, 20 Nickel	0.20	2.00	2.00	0.04	0.04	23.0–27.0	19.0–22.0	...	...	...	...	...	...	...
CE-30	29 Chromium, 9 Nickel	0.30	1.50	2.00	0.04	0.04	26.0–30.0	8.0–11.0	...	...	...	...	...	...	...
CA-15	12 Chromium	0.15	1.00	1.50	0.04	0.04	11.5–14.0	1.00 max	0.50 max	...	...	...	...	...	...

TABLE 2 Continued

Grade	Type	Composition, %													
		Carbon, max	Manganese, max	Silicon, max	Phosphorus, max	Sulfur, max	Chromium	Nickel	Molybdenum	Columbium	Selenium	Copper	Tungsten, max	Vanadium, max	Nitrogen
CA-15M	12 Chromium	0.15	1.00	0.65	0.040	0.040	11.5–14.0	1.0 max	0.15–1.0	...	...	...	...	...	...
CB-30	20 Chromium	0.30	1.00	1.50	0.04	0.04	18.0–21.0	2.00 max	...	...	...	^B	...	...	...
CC-50	28 Chromium	0.50	1.00	1.50	0.04	0.04	26.0–30.0	4.00 max	...	...	...	...	...	...	...
CA-40	12 Chromium	0.20–0.40	1.00	1.50	0.04	0.04	11.5–14.0	1.0 max	0.5 max	...	...	...	...	...	...
CA-40F	12 Chromium, Free Machining	0.20–0.40	1.00	1.50	0.04	0.20–0.40	11.5–14.0	1.0 max	0.5 max	...	...	...	...	...	...
CF-3	19 Chromium, 9 Nickel	0.03	1.50	2.00	0.04	0.04	17.0–21.0	8.0–12.0	...	...	...	...	...	...	...
CF10SMnN	17 Chromium, 8.5 Nickel with Nitrogen	0.10	7.00–9.00	3.50–4.50	0.060	0.030	16.0–18.0	8.0–9.0	...	...	...	...	...	...	0.08–0.18
CF-3M	19 Chromium, 10 Nickel, with Molybdenum	0.03	1.50	1.50	0.04	0.04	17.0–21.0	9.0–13.0	2.0–3.0	...	...	...	...	...	...
CF-3MN	19 Chromium, 10 Nickel, with Molybdenum, and Nitrogen	0.03	1.50	1.50	0.040	0.040	17.0–22.0	9.0–13.0	2.0–3.0	...	...	...	...	...	0.10–0.20
CG6MMN		0.06	4.00–6.00	1.00	0.04	0.03	20.5–23.5	11.5–13.5	1.50–3.00	0.10–0.30	...	...	...	0.10–0.30	0.20–0.40
CG-3M (J92999)	19 Chromium, 11 Nickel, with Molybdenum	0.03	1.50	1.50	0.04	0.04	18.0–21.0	9.0–13.0	3.0–4.0	...	...	...	...	...	...
CG-8M	19 Chromium, 11 Nickel, with Molybdenum	0.08	1.50	1.50	0.04	0.04	18.0–21.0	9.0–13.0	3.0–4.0	...	...	...	...	...	...
CN-3M (J94652)		0.03	2.0	1.0	0.03	0.03	20.0–22.0	23.0–27.0	4.5–5.5	...	...	...	...	...	...
CN-3MN	21 Chromium, 24 Nickel with Molybdenum and Nitrogen	0.03	2.00	1.00	0.040	0.010	20.0–22.0	23.5–25.5	6.0–7.0	...	...	0.75 max	...	...	0.18–0.26
CN-7M	20 Chromium, 29 Nickel, with Copper and Molybdenum	0.07	1.50	1.50	0.04	0.04	19.0–22.0	27.5–30.5	2.0–3.0	...	...	3.0–4.0	...	...	...
CN-7MS	19 Chromium, 24 Nickel, with Copper and Molybdenum	0.07	1.00	2.50–3.50	0.04	0.03	18.0–20.0	22.0–25.0	2.5–3.0	...	...	1.5–2.0	...	...	...
CA-6NM	12 Chromium, 4 Nickel	0.06	1.00	1.00	0.04	0.03	11.5–14.0	3.5–4.5	0.40–1.0	...	...	...	...	...	...
CA6N	11 Chromium, 7 Nickel	0.06	0.50	1.00	0.02	0.02	10.5–12.5	6.0–8.0	...	...	...	...	...	...	...
CA-28MWV	12 Chromium, with Molybdenum, Tungsten and Vanadium	0.20–0.28	0.50–1.00	1.0	0.030	0.030	11.0–12.5	0.50–1.00	0.90–1.25	...	...	...	0.90–1.25	0.20–0.30	...
CK-3MCuN	20 Chromium 18 Nickel, with Copper and Molybdenum	0.025	1.20	1.00	0.045	0.010	19.5–20.5	17.5–19.5	6.0–7.0	...	...	0.50–1.00	...	...	0.180–0.240
CK-35MN	23 Chromium, 21 Nickel, with Molybdenum and Nitrogen	0.035	2.00	1.00	0.035	0.020	22.0–24.0	20.0–22.0	6.0–6.8	...	...	0.40	...	...	0.21–0.32
CB-6 (J91804)	16 Chromium, 4 Nickel	0.06	1.00	1.00	0.04	0.03	15.5–17.5	3.5–5.5	0.5 max	...	...	...	...	...	...

^A Grade CF-8C shall have a columbium content of not less than eight times the carbon content and not more than 1.0%. If a columbium-plus-tantalum alloy in the approximate Cb:Ta ratio of 3:1 is used for stabilizing this grade, the total columbium-plus-tantalum content shall not be less than nine times the carbon content and shall not exceed 1.1%.

^B For Grade CB-30 a copper content of 0.90 to 1.20% is optional.