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Standard Specification for Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application¹

This standard is issued under the fixed designation A297/A297M; 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.

1. Scope*

1.1 This specification covers iron-chromium and iron-chromium-nickel alloy castings for heat-resistant service. The grades covered by this specification are general purpose alloys and no attempt has been made to include heat-resisting alloys used for special production application.

NOTE 1—For heat-resisting alloys used for special product application, reference should be made to Specification A351/A351M, A217/A217M, and A447/A447M.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

2. Referenced Documents

2.1 ASTM Standards:²

A217/A217M Specification for Steel Castings, Martensitic Stainless and Alloy, for Pressure-Containing Parts, Suitable for High-Temperature Service

A351/A351M Specification for Castings, Austenitic, for Pressure-Containing Parts

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A447/A447M Specification for Steel Castings, Chromium-Nickel-Iron Alloy (25-12 Class), for High-Temperature Service

A781/A781M Specification for Castings, Steel and Alloy, Common Requirements, for General Industrial Use

A957 Specification for Investment Castings, Steel and Alloy, Common Requirements, for General Industrial Use

3. General Conditions for Delivery

3.1 Except for investment castings, material furnished to this specification shall conform to the requirements of Specification A781/A781M, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A781/A781M constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A781/A781M, this specification shall prevail.

3.2 Investment castings furnished to this specification shall conform to the requirements of Specification A957, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A957 constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A957, Specification A957 shall prevail.

4. Ordering Information

4.1 The inquiry and order should include or indicate the following:

4.1.1 A description of the casting by pattern number or drawing (dimensional tolerances shall be included on the casting drawing),

4.1.2 Grade of steel,

4.1.3 Options in the specification, and

4.1.4 The supplementary requirements desired including the standards of acceptance.

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 A01.18 on Castings.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

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

5. Process

5.1 Alloys shall be made by the following processes: electric-arc, electric-induction, or other approved processes.

TABLE 1 Chemical Requirements

Grade	Type	Composition, % (max, except where range is given)								
		Carbon	Manganese	Silicon	Phosphorus	Sulfur	Chromium	Nickel	Molybdenum ^A	Other ^B
HF	19 Chromium, 9 Nickel	0.20–0.40	2.00	2.00	0.04	0.04	18.0–23.0	8.0–12.0	0.50	
HH	25 Chromium, 12 Nickel	0.20–0.50	2.00	2.00	0.04	0.04	24.0–28.0	11.0–14.0	0.50	
HI	28 Chromium, 15 Nickel	0.20–0.50	2.00	2.00	0.04	0.04	26.0–30.0	14.0–18.0	0.50	
HK	25 Chromium, 20 Nickel	0.20–0.60	2.00	2.00	0.04	0.04	24.0–28.0	18.0–22.0	0.50	
HE	29 Chromium, 9 Nickel	0.20–0.50	2.00	2.00	0.04	0.04	26.0–30.0	8.0–11.0	0.50	
HT	15 Chromium, 35 Nickel	0.35–0.75	2.00	2.50	0.04	0.04	15.0–19.0	33.0–37.0	0.50	
HU	19 Chromium, 39 Nickel	0.35–0.75	2.00	2.50	0.04	0.04	17.0–21.0	37.0–41.0	0.50	
HW	12 Chromium, 60 Nickel	0.35–0.75	2.00	2.50	0.04	0.04	10.0–14.0	58.0–62.0	0.50	
HX	17 Chromium, 66 Nickel	0.35–0.75	2.00	2.50	0.04	0.04	15.0–19.0	64.0–68.0	0.50	
HC	28 Chromium	0.50 max	1.00	2.00	0.04	0.04	26.0–30.0	4.00	0.50	
HD	28 Chromium, 5 Nickel	0.50 max	1.50	2.00	0.04	0.04	26.0–30.0	4.0–7.0	0.50	
HL	29 Chromium, 20 Nickel	0.20–0.60	2.00	2.00	0.04	0.04	28.0–32.0	18.0–22.0	0.50	
HN	20 Chromium, 25 Nickel	0.20–0.50	2.00	2.00	0.04	0.04	19.0–23.0	23.0–27.0	0.50	
HP	26 Chromium, 35 Nickel	0.35–0.75	2.00	2.50	0.04	0.04	24–28	33–37	0.50	
HG10	19 Chromium,	0.07–0.11	3.0–5.0	0.70	0.040	0.03	18.5–20.5	11.5–13.5	0.25–0.45	Cu 0.50
MNN	12 Nickel,									Nb(Cb) ^C N
J92604	4 Manganese									0.20–0.30
CT15C	20 Chromium, 33 Nickel, 1 Niobium	0.05– 0.15	0.15– 1.50	0.15– 1.50	0.03	0.03	19.0–21.0	31.0–34.0	...	Nb 0.50– 1.50

^A Castings having a specified molybdenum range agreed upon by the manufacturer and the purchaser may also be furnished under these specifications.

^B Niobium (Nb) and Columbium (Cb) both designate element 41.

^C Grade HG10MNN shall have a niobium content of not less than 8 times the carbon, but not over 1.00 %.

6. Heat Treatment

6.1 Castings for heat-resistant service may be shipped in the as-cast condition without heat treatment. If heat treatment is required, the treatment shall be established by mutual agreement between the manufacturer and the purchaser and shall be so specified in the inquiry, contract, or order.

7. Chemical Composition

7.1 Alloys shall conform to the requirements as to chemical composition prescribed in Table 1.

8. Repair by Welding

8.1 Except for Grade HG10MNN, the composition of the deposited weld metal shall be similar to the composition of the casting. For Grade HG10MNN, the filler metal to be used shall be established by mutual agreement between the manufacturer and the purchaser. All weld repairs shall be subjected to the same inspection standards as the casting.

8.2 Castings with major weld repairs shall be heat treated in accordance with Section 6.

8.3 Weld repairs shall be considered major when the depth of the cavity after preparation for repair exceeds 20 % of the actual wall thickness, or 1 in. [25 mm], whichever is smaller, or when the extent of the cavity exceeds approximately 10 in.² [65 cm²].

8.3.1 When Supplementary Requirement S7 is specified on the purchase order, or inquiry, major weld repairs shall be subject to the prior approval of the purchaser.

8.4 All other weld repairs shall be considered minor and may be made at the discretion of the manufacturer without prior approval of the purchaser.

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall not apply unless specified in the purchase order. A