



Designation: A297/A297M – 14

# Standard Specification for Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application<sup>1</sup>

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 ( $\epsilon$ ) 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:<sup>2</sup>

[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/A957M](#) Specification for Investment Castings, Steel and Alloy, Common Requirements, for General Industrial Use

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## 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/A957M](#), including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification [A957/A957M](#) constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification [A957/A957M](#), Specification [A957/A957M](#) 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.

## 5. Process

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

## 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.

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

**TABLE 1 Chemical Requirements<sup>A</sup>**

Grade/ UNS Number	Type	Composition, % (max, except where range is given)									
		Carbon	Manganese	Silicon	Phosphorus	Sulfur	Chromium	Nickel	Molybdenum <sup>B</sup>	Other <sup>C</sup>	
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		
J92603	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		
J93503	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		
HI	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		
J94003	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		
HK	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		
J94224	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		
HE	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		
J93403	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		
HT	28 Chromium	0.50 max	1.00	2.00	0.04	0.04	26.0–30.0	4.00	0.50		
N08605	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		
HU	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		
N08004	20 Chromium, 20 Nickel	0.20–0.50	2.00	2.00	0.04	0.04	19.0–23.0	23.0–27.0	0.50		
HW	26 Chromium, 35 Nickel	0.35–0.75	2.00	2.50	0.04	0.04	24–28	33–37	0.50		
N08001	19 Chromium, 12 Nickel	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	
HX	4 Manganese										Nb(Cb) <sup>D</sup> N 0.20–0.30
N06006	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

<sup>A</sup>Where ellipses (...) appear in this table there is no requirement, and the element need not be analyzed or reported.

<sup>B</sup>Castings having a specified molybdenum range agreed upon by the manufacturer and the purchaser may also be furnished under these specifications.

<sup>C</sup>Niobium (Nb) and Columbium (Cb) both designate element 41.

<sup>D</sup>Grade HG10MNN shall have a niobium content of not less than 8 times the carbon, but not over 1.00 %.

## 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.<sup>2</sup> [65 cm<sup>2</sup>].

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.