Designation: A 101 – 04

Standard Specification for Ferrochromium[1]

This standard is issued under the fixed designation A 101; 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 two types of ferrochromium designated as high carbon and low carbon, the latter including nitrogen-bearing and vacuum grades.

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 1025 Specification for Ferroalloys, Common Requirements

E 363 Test Methods for Chemical Analysis of Chromium and Ferrochromium

3. General Conditions for Delivery

3.1 Materials furnished to this specification shall conform to the requirements of Specification A 1025, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A 1025 constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A 1025, this specification shall prevail.

4. Chemical Composition

4.1 The grades shall conform to the requirements as to chemical composition specified in Table 1. The manufacturer shall furnish an analysis of each shipment showing the elements specified in Table 1.

5. Size

5.1 The various grades are available in sizes as listed in Table 2.

5.2 The sizes listed in Table 2 are typical, as shipped from the manufacturer's plant. These alloys exhibit varying degrees of friability; therefore, some attrition may be expected in transit, storage, and handling. A quantitative test is not available for rating relative friability of ferroalloys. A code system has been developed, therefore, for this purpose, and a number rating for each product type is shown in the last column of Table 2. Definitions applicable to these code numbers are given in Specification A 1025.

6. Chemical Analysis

6.1 The chemical analysis method shall be agreed upon by the purchaser and supplier.

6.2 In cases of discrepancy, Test Methods E 363 shall be used for referee purposes.

7. Keywords

7.1 ferroalloys; ferrochromium; high carbon; low carbon; nitrogen-bearing; vacuum low carbon

[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.**

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TABLE 1 Chemical Requirements

Type Ferrochromium	Grade	Composition, %					
		Chromium	Carbon	Silicon	Sulfur, max	Phosphorus, max	Nitrogen
High carbon	A	51.0–56.0	6.0–8.0	6.0 max	0.040	0.030	. . .
	B	56.0–62.0	6.0–8.0	8.0–14.0	0.050	0.030	. . .
	C	62.0 min	6.0–8.0	3.0 max	0.050	0.030	. . .
Low carbon	A	60.0–67.0	0.025 max	1.0–8.0	0.025	0.030	. . .
	B	67.0–75.0	0.025 max	1.0 max	0.025	0.030	. . .
	C	67.0–75.0	0.050 max	1.0 max	0.025	0.030	. . .
	D	67.0–75.0	0.75 max	1.0 max	0.025	0.030	. . .
Vacuum low carbon	E	66.0–70.0	0.015 max	2.0 max	0.030	0.030	. . .
	G	63.0–68.0	0.050 max	2.0 max	0.030	0.030	5.0–6.5
Nitrogen bearing		62.0–70.0	0.10 max	1.0 max	0.025	0.030	1.0–5.0

TABLE 2 Standard Sizes and Tolerances

Product	Standard Sizes	Tolerances		Friability Ratings
Ferrochromium:				
High-carbon	8 in. (200 mm) by 4 in. (100 mm)	10 in. (250 mm), max	10 %, max, passing 4-in. (100-mm) sieve	4
	6 in. (150 mm) by down	10 %, max, retained on 6-in. (150-mm) sieve		
	5 in. (125 mm) by 2 in. (50 mm)	10 %, max, retained on 5-in. (125-mm) sieve	10 %, max, passing 2-in. (50-mm) sieve	
	4 in. (100 mm) by in. (12.5 mm)	10 %, max, retained on 4-in. (100-mm) sieve	10 %, max, passing ½-in. (12.5-mm) sieve	
	3 in. (75 mm) by 1 in. (25 mm)	10 %, max, retained on 3-in. (75-mm) sieve	10 %, max, passing 1-in. (25-mm) sieve	
	3 in. (75 mm) by ¼ in. (6.3 mm)	10 %, max, retained on 3-in. (75-mm) sieve	10 %, max, passing ¼-in. (6.3-mm) sieve	
	¼ in. (6.3 mm) by down	5 %, max, retained on ¼-in. (6.3-mm) sieve		
	8 mesh (2.36 mm) by down	5 %, max, retained on U.S. No. 8 (2.36-mm) sieve		
Low-carbon	8 in. (200 mm) by down	10 in. (250 mm), max		1
	8 in. (200 mm) by 4 in. (100 mm)	10 %, max, retained on 8-in. (200-mm) sieve	5 %, max, passing 4-in. (100-mm) sieve	
	4 in. (100 mm) by down	10 %, max, retained on 4-in. (100-mm) sieve		
	3 in. (75 mm) by 1 in. (25 mm)	10 %, max, retained on 3-in. (75-mm) sieve	10 %, max, passing 1-in. (25-mm) sieve	
	8 mesh (2.36 mm) by down	5 %, max, retained on U.S. No. 8 (2.36-mm) sieve		
	brick or pellet	designated by manufacturer		
Vacuum low carbon				

SUPPLEMENTARY REQUIREMENTS

The composition shall be limited to the requirements of Table S1.1 in addition to those in Table 1. Upon request of the purchaser, the manufacturer shall furnish an analysis for any of these elements on a cumulative basis over a period mutually agreed upon by the manufacturer and the purchaser.

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TABLE S1.1 Supplementary Chemical Requirements

Type	Composition, max, %					
	High Carbon		Low Carbon	Vacuum Low Carbon[A]		Nitrogen Bearing
Grade	A, B	C	All Grades	E	G	—
Nitrogen	0.050	0.050	0.12	0.050		
Manganese	0.75	0.75	0.75	0.75	0.75	0.75
Nickel	0.50	0.50	0.50	0.50	0.50	0.50
Vanadium	0.50	0.50	0.50	0.50	0.50	0.50
Copper	0.050	0.050	0.050	0.050	0.050	0.050
Molybdenum	0.050	0.050	0.050	0.050	0.050	0.050
Columbium	0.050	0.050	0.050	0.050	0.050	0.050
Tantalum	0.050	0.050	0.050	0.050	0.050	0.050
Cobalt	0.10	0.10	0.10	0.10	0.10	0.10
Aluminum	0.25	0.25	0.10	0.10	0.10	0.10
Titanium	0.50	0.30	0.050	0.050	0.050	0.050
Zirconium	0.050	0.050	0.01	0.01	0.01	0.01
Antimony	0.01	0.01	0.01	0.01	0.01	0.01
Arsenic	0.005	0.005	0.005	0.005	0.005	0.005
Lead	0.005	0.005	0.005	0.005	0.005	0.005
Tin	0.005	0.005	0.005	0.005	0.005	0.005
Zinc	0.005	0.005	0.005	0.005	0.005	0.005
Boron	0.005	0.005	0.005	0.005	0.005	0.005
Silver	0.005	0.005	0.005	0.005	0.005	0.005
Bismuth	0.005	0.005	0.005	0.005	0.005	0.005

[A]The inert oxide (SiO_2 + CaO + MgO + Al_2O_3) content of vacuum low-carbon ferrochromium shall be specified as 3.50 % max.

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last version (A 101 – 93 (2000)) that may impact the use of this standard.

(1) Practice E 29, Test Methods E 31, and Practices E 32 were removed from 2.
(2) Specification A 1025 was added to 2.
(3) Changed Ordering Information to General Conditions for Delivery.
(4) Revised 4 and 5.
(5) Removed sections on Sampling, Inspection, Rejection, and Packaging.
(6) Added Supplementary Requirements.
(7) Moved Table S1.1 into the Supplementary Requirements section and renumbered other tables appropriately.

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