



**Designation: A 99-82 (Reapproved 2000) Designation: A 99 - 03 (Reapproved 2009)**

## Standard Specification for Ferromanganese<sup>1</sup>

This standard is issued under the fixed designation A 99; 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.

*This standard has been approved for use by agencies of the Department of Defense. This specification replaces Federal Specification QQ-F-145.*

### 1. Scope

1.1 This specification covers ten grades of ferromanganese, designated as follows:

Standard ferromanganese	Grade A Grade B Grade C
Medium-carbon ferromanganese	Grades A,B,C, and D Nitrided
Low-carbon ferromanganese	Grade A Grade B

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

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

A 1025 [Specification for Ferroalloys and Other Alloying Materials, General Requirements](#)

E 11 [Specification for Wire-Cloth Sieves for Testing Purposes](#)

E 29 [Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)<sup>2</sup>

E 31 [Methods for Chemical Analysis of Ferroalloys](#)

~~E 32 Practices for Sampling Ferroalloys and Steel Additives for Determination of Chemical Composition~~<sup>3</sup> [Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)

### 3. Basis of Purchase

3.1 Orders for material under this specification shall include the following information:

3.1.1 Quantity;

3.1.2 Name of material;

3.1.3 ASTM Designation: A 99;

3.1.4 Grade;

3.1.5 Size, and

3.1.6 Requirements for packing, analysis reports, etc., as appropriate.

3.2 The customary basis of payment for standard ferromanganese is per pound of ferroalloy, rather than per pound of contained manganese. Although low- and medium-carbon ferromanganese are ordered by total net weight, the customary basis of payment is per pound of contained manganese.

NOTE 1—The term “weight” is temporarily used in this specification because of established trade usage. The word is used to mean both “force” and “mass,” and care must be taken to determine which is meant in each case (SI unit for force = newton and for mass = kilogram). General Conditions for Delivery

3.1 Materials furnished to this specification shall conform to the requirements of Specification A 1025, including any

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee A-1/A01 on Steel, Stainless Steel, 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*, Vol 14.02, volume information, refer to the standard's Document Summary page on the ASTM website.

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 material shall conform to the requirements as to chemical composition specified in Table 1 and ~~2~~.
- 4.2 The manufacturer shall furnish an analysis of each shipment showing the percentage of each element specified.

#### 5. Size

- 5.1 The various grades are available in sizes as listed in Table 2.
- 4.2 The manufacturer shall furnish an analysis of each shipment showing the manganese, carbon, and silicon content and, when required, such of the other elements specified in Table 1.
- 4.3 The values shown in
- 5.2 The sizes and friability ratings listed in Table 2 are expected maximums. Upon request by 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.

#### 5. Size

- 5.1 The various grades are available in sizes as listed in Table 3 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 code system has been developed. Therefore, for this purpose, 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.
- 5.2 The sizes and friability ratings listed in Table 3 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 code system has been developed. Therefore, for this purpose, a number rating for each product type is shown in the last column of Table 3. Definitions applicable to these code numbers are given in Appendix X1.

#### 6. Sampling

- 6.1 The material shall be sampled in accordance with Practices E32.
- 6.2 Other methods of sampling mutually agreed upon by the manufacturer and the purchaser may be used; however, in case of discrepancy, Practices E32 shall be used for referee.

#### 7. Chemical Analysis

- 7.1 The chemical analysis of the material shall be made in accordance with the procedure for ferromanganese as described in Methods E31, or alternative methods which will yield equivalent results.

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

	Standard Ferromanganese			Medium Carbon Ferromanganese				Nitrided Medium Carbon Ferroman- ganese	Low Carbon Ferro- manganese	
	Grade A	Grade B	Grade C	Grade A	Grade B	Grade C	Grade D		Grade A	Grade B
Manganese, B %	78.0 to	76.0 to	74.0 to	80.0 to	80.0 to	80.0 to	80.0 to	75 to 80 <sup>C</sup>	-85.0 to	80.0 to
Manganese, %	78.0 to 82.0	76.0 to 78.0	74.0 to 76.0	80.0 to 85.0	80.0 to 85.0	80.0 to 85.0	80.0 to 85.0	75 to 80 <sup>A</sup>	85.0 to 90.0	80.0 to 85.0
Carbon, max, %	-7.5 <sup>D</sup>	-7.5 <sup>D</sup>	-7.5 <sup>D</sup>	85.0	-1.5	-1.5	-1.5	1.5 <sup>C</sup>	-As speci-	-0.75
Carbon, max, %	7.5	7.5	7.5	1.5	1.5	1.5	1.5	1.5 <sup>A</sup>	As speci- fied <sup>E</sup>	0.75
Silicon, max, %	-1.2	-1.2	-1.2	-1.5	-1.0	-0.70	-0.35	1.5 <sup>C</sup>	-2.0	-5.0 to
Silicon, max, %	1.2	1.2	1.2	1.5	1.0	0.70	0.35	1.5 <sup>A</sup>	2.0	5.0 to 7.0
Phosphorus, max, %	0.35	0.35	0.35	0.30	0.30	0.30	0.30	0.3	0.20	0.30
Sulfur, max, %	0.050	0.050	0.050	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Nitrogen, %								4% min		

<sup>A</sup>For purpose of determining conformance with this specification, the reported analysis shall be rounded to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding method of Practice E29.

<sup>B</sup>For purposes of determining the manganese content of any shipment, manganese shall be reported to the nearest 0.01%, applying the same rounding procedure as prescribed in Footnote A.

<sup>C</sup>Based on metallic content.

<sup>D</sup>Carbon values shown are maximum; with normal silicon content, carbon will typically be in the range 6.9 to 7.2%.

<sup>E</sup>Grade A low carbon material may be obtained with the following maximum percentage of carbon 0.75, 0.50, and 0.10.