Designation: A 495 – 94 (Reapproved 2000)

Standard Specification for Calcium-Silicon Alloys[1]

This standard is issued under the fixed designation A 495; 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 a standard grade of calcium-silicon, a standard grade of calcium-manganese-silicon, a standard grade of calcium-silicon-barium and a standard grade of ferro-calcium-silicon.

2. Referenced Documents

2.1 *ASTM Standards:*

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[2]

E 31 Methods for Chemical Analysis of Ferroalloys[3]

E 32 Practices for Sampling Ferroalloys and Steel Additives for Determination of Chemical Composition[3]

3. Ordering Information

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,

3.1.4 Size, and

3.1.5 Special requirements for packaging, analysis reports, etc., as appropriate.

3.2 The customary basis of payment for calcium-silicon and for calcium-manganese-silicon is per pound of ferroalloy, rather than per pound of contained elements.

4. Chemical Requirements

4.1 The material shall conform to the requirements as to chemical composition specified in Table 1 and Table 2.

4.2 *Calcium-Silicon*—The manufacturer shall furnish an analysis of each shipment showing the calcium, silicon, and aluminum content.

4.3 *Calcium-Manganese-Silicon*—The manufacturer shall furnish an analysis of each shipment showing the calcium, manganese, and silicon content.

TABLE 1 Chemical Requirements

Element	Composition, %			
	CaSi	CaSiMn	CaSiBa	FeCaSi
Calcium	28.0 to 32.0	16.0 to 20.0	14.0 to 20.0	14.0 to 18.0
Silicon	60.0 to 65.0	53.0 to 59.0	55.0 to 60.0	53.0 to 59.0
Manganese	. . .	14.0 to 18.0	. . .	. . .
Barium	. . .	. . .	14.0 to 18.0	. . .
Iron	5.0 max	10.0 max	5.0 max	14.0 to 18.0

4.4 . *Calcium-Silicon-Barium*—The manufacturer shall furnish an analysis of each shipment showing the calcium, silicon and barium contents.

4.5 *Ferro-Calcium-Silicon*—The manufacturer shall furnish an analysis of each shipment showing the calcium, silicon and iron contents.

4.6 The values shown in Table 2 are expected maximums. Upon request of the purchaser, the manufacturer shall furnish an analysis for any of the elements on a cumulative basis over a period mutually agreed upon by the manufacturer and the purchaser.

5. Size

5.1 Calcium-silicon alloys are available in sizes as listed in Table 3.

5.2 The sizes listed in Table 3 are typical as shipped from the manufacturer's plant. These alloys are friable and some attrition can be expected in transit, storage, and handling. The friability rating for these alloys is Code No. 6, the most friable rating on the scale.

TABLE 2 Supplemental Chemical Requirements[A]

Element	Composition, Max %			
	CaSi	CaSiMn	CaSiBa	FeCaSi
Carbon	1.00	1.00	1.0	1.0
Sulfur	0.070	0.025	0.050	0.050
Phosphorus	0.050	0.035	0.050	0.050
Titanium	0.20	0.20	0.20	0.20
Aluminum	1.5	1.5	1.5	1.5

[A] The composition of calcium-silicon alloys shall be within these limits; however, an analysis of each lot is not required. The manufacturer shall supply upon request the results of an analysis for these elements on a cumulative basis over a period mutually agreed upon by the manufacturer and the purchaser.

[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.

Current edition approved Aug. 15, 1994. Published October 1994. Originally published as A 495 – 63 T. Last previous edition A 495 – 76 (1992).

[2] *Annual Book of ASTM Standards*, Vol 14.02.

[3] *Annual Book of ASTM Standards*, Vol 03.05.

TABLE 3 Standard Sizes and Tolerances

Product	Standard Size	Tolerance	
Calcium-silicon	6 × 2 in. (152 × 50.8 mm)	25 lb lump max	10 % max, passing 2 in. (50 mm) sieve
	3 in. (76.2 mm) × down	10 % max, retained on 3 in. (75 mm) sieve	15 % max, passing ¼ in. (6.3 mm) sieve
	2 in. (50.8 mm) × down	10 % max, retained on 2 in. (50 mm) sieve	15 % max, passing No. 8 (2.36 mm) sieve
	1 in. (25.4 mm) × down	5 % max, retained on 1 in. (25.0 mm) sieve	25 % max, passing No. 8 (2.36 mm) sieve
	8 × 100 mesh (2.38 × 150 mm) sieve	5 % max, retained on No. 8 (2.36 mm) sieve	3 % max, passing No. 100 (150 µm) sieve
	8 mesh (2.38 mm) × down	5 % max, retained on No. 8 (2.36 mm) sieve	
	30 × 325 mesh (0.59 mm × 0.044 mm) sieve	5 % max, retained on 30 mesh	10 % max, passing 325 mesh (0.044 mm)
Calcium-manganese-silicon and Calcium-silicon-barium	6 × 2 in. (152 × 50.8 mm)	25 lb lump max	10 % max, passing 2 in. (50 mm) sieve
	2 in. (50.8 mm) × down	10 % max, retained on 2 in. (50 mm) sieve	25 % max, passing No. 8 (2.36 mm) sieve
	1 in. (25.4 mm) × down	5 % max,, retained on 1 in. (25.0 mm) sieve	25 % max, passing No. 8 (2.36 mm) sieve
	8 mesh (2.38 mm) × down	5 % max, retained on No. 8 (2.36 mm) sieve	
	30 × 325 mesh (0.59 mm × 0.044 mm) sieve	5 % max, retained on 30 mesh (0.59 mm) sieve	10 % max, passing 326 mesh (60.044 mm) sieve
Calcium-silicon-iron	6 × 2 in. (152 × 50.8 mm)	25 lb lump max	10 % max, passing 2 in. (50 mm) sieve
	3 in. (26.2 mm) × down	10 % max, retained on 2 in. (50 mm) sieve	15 % max, passing ¼ in. (6.3 mm) sieve
	2 in. (50.8 mm) × down	10 % max, retained on 2 in. (50 mm) sieve	15 % max, passing No. 8 (2.36 mm) sieve
	1 in. (25.4 mm) × down	5 % max, retained on No. 8 (2.36 mm) sieve	3 % max, passing No. 100 (0.149 mm) sieve
	8 mesh (2.38 mm) sieve × down	5 % max, retained on No. 8 (2.36 mm) sieve	

6. Sampling

6.1 The material shall be sampled in accordance with Practices E 32.

6.2 Other methods of sampling mutually agreed upon by the manufacturer and the purchaser may be used; however, in case of discrepancy, Practices E 32 shall be used for referee.

7. Chemical Analysis

7.1 The chemical analysis of the material shall be made in accordance with the procedures for calcium-silicon alloys as described in Methods E 31 or alternative methods that will yield equivalent results.

7.2 If alternative methods of analysis are used, in case of discrepancy, procedures described in Methods E 31 shall be used for referee.

7.3 Where no procedure is given in Methods E 31 for the analysis for a particular element, the analysis shall be made in accordance with a procedure agreed upon by the manufacturer and the purchaser.

7.4 For purposes 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 E 29.

8. Inspection

8.1 The manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge, to satisfy him that the material is being furnished in accordance with the specification.

9. Rejection

9.1 Any claims or rejections shall be made to the manufacturer within 45 days from receipt of material by the purchaser.

10. Packaging

10.1 Calcium-silicon alloys shall be packaged in sound containers, or shipped in bulk, in such manner that none of the product is lost or contaminated in shipment.