Designation: A 610 – 79 (Reapproved 2004)

Standard Test Methods for Sampling and Testing Ferroalloys for Determination of Size[1]

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1. Scope

1.1 These test methods cover procedures for the sampling and testing of the various ferroalloys for sizing, either before or after shipment from the plants of the manufacturers.

1.2 They are designed to give results representative of each lot that will be comparable with the manufacturer's certified analysis for the same lot.

1.3 The purchaser may use any sampling procedure he desires, but the results obtained on such samples shall not be a basis for complaint or rejection, unless the procedure followed is of an accuracy equivalent to that prescribed in these test methods.

1.4 The values stated in inch-pound units are to be regarded as the standard. The SI equivalents of inch-pound units may be approximate.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

E 11 Specification for Wire Cloth and Sieves for Testing Purposes

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

3. Unit Quantities for Sampling and Testing

3.1 Each shipment, except as otherwise agreed upon by the purchaser and the manufacturer, shall constitute a unit for sampling and testing. It is recommended that shipments of any alloy exceeding 100 tons (91 000 kg) be divided into smaller lots for sampling according to some plan best adapted to the material and conditions, such as each cast, each carload, each ladleful or each binful. The division of samples should be in accordance with Practices E 32.

4. Sampling for Size Analysis

4.1 *Lumps*—Conformance of lump material to sizing standards normally shall be judged by visual examination. The inspection judgment shall be made on an increment selected at random. Unless otherwise required, the increment shall be the contents of a unit container of 2000 lb (910 kg) minimum quantity. When more precise data are required for checking on the visual examination, a sizing test shall be made on material from a unit container (usually 2000 to 3000 lb (910 to 1360 kg) of alloy) selected at random.

4.2 *Crushed or Plates*—Sampling for conformance of crushed or plates material to size requirements shall be in accordance with Practices E 32 or by alternative methods which are demonstrated to yield equivalent results. A representative portion of the lot sample (before any reduction in particle size) shall be obtained for screen testing. If necessary, the percentage of sample taken shall be increased to provide sufficient sample in the half reserved for screen testing.

4.2.1 Table 1 lists the amount of material that is to be used for size analysis.

4.2.2 If the top size of the material is 2 in. (50.8 mm) or smaller, the portion for screen test shall be taken from the lot sample by riffling; in larger sizes, by mixing and quartering. Prior to riffling, the starting amount each time must be mixed by coning at least twice.

5. Testing for Size Analysis

5.1 Samples used for screen testing must be dry. If there is a question as to whether the material is suitably dry, a criterion of 0.25 % loss in weight at 230°F (110°C) applies.

5.2 With respect to size characteristics, ferroalloys are usually classified as either "lump" or "crushed" sizes. Although the line of demarcation may vary somewhat, the crushed category refers usually to those sizes that have an upper limit of 4 in. (102 mm) or less. The lump sizes involve all of the other categories that are coarser than 4 in. in top size.

5.3 *Lumps*—Using either weight or lineal measurements as criterion, hand select all pieces from the container that exceed the upper limit of this size category. Determine the total weight percent of the oversize material for conformance against the maximum permitted by these test methods. Determine the

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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.

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TABLE 1 Amount of Material Required for Testing

Upper Limit of Size Category, in. (mm)	Amount for Testing
Larger than 2 in. (50.8 mm)	200 lb (91 kg) (min)
½ to 2 in. (12.7 to 50.8 mm)	50 to 100 lb (23 to 45 kg)[A]
¼ to ½ in. (6.35 to 12.7 mm)	25 to 50 lb (12 to 23 kg)[A]
4 mesh	700 to 1000 g[A]
20 mesh	300 to 500 g[A]
48 mesh	100 to 300 g[A]
100 mesh	50 to 150 g[A]
200 mesh	50 to 100 g[A]

[A] The larger amounts are to be used for testing alloys of high specific gravity (50 % ferrosilicon and higher density); the smaller amounts are to be used for light alloys and metals (for example, calcium silicon and silicon metal).

amount of undersize by accumulating all pieces from the original container that pass through a grid with an opening the same as the dimension given as the lower limit for the size under test. Then compare the weight percent of this undersize with the test method requirements.

5.4 *Crushed or Plates*:

5.4.1 *Equipment*—Screens used in size analysis shall be in conformance with Specification E 11.

5.4.2 *Procedure*:

5.4.2.1 It is customary practice to use a nest of screens that divides the sample into several size fractions. For coarse sizes, the next is usually rocked by hand about 25 times, removing the top screen, and weighing the amount retained each time. Mechanically driven screen vibrators may be used provided the time is kept to an absolute minimum in the case of the more friable alloys to prevent excessive formation of fines from abrasion. For sizes less than ¼ in. (6.35 mm), the test is usually made on a machine that causes particle movement relative to the screens by circular motion and intermittent tapping. A sieving time of 10 min or more is required. In determining sieving time or end point, the criterion is that an additional period of testing does not change the results on any sieve used in the analysis by more than 2 % of the previous value. Each sieve is to be checked for complete sieving.

5.4.2.2 Intermediate fractions, that is, those between the oversize and undersize amounts, are not covered by specifications, but the use of intermediate screens helps prevent overloading the bottom screen. It may be necessary to add the sample in several increments or empty the various screens one or more times during the operation, or both. Excessive times for completion of screening are usually the result of overloading one or more screens.

6. Keywords

6.1 crushed; ferroalloys; lump; plates; sampling; sieving; size; sizing

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