Designation: E 382 – 97

Standard Test Method for Determination of Crushing Strength of Iron Ore Pellets[1]

This standard is issued under the fixed designation E 382; 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 test method describes a method for determining the crushing strength of fired iron ore pellets. Cylindrical agglomerates, briquettes, and reduced pellets are not covered by this test method.

1.2 The values as stated in SI units are to be regarded as the standards. The values in parentheses are given for information only.

1.3 *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:*

E 389 Test Method for Particle Size or Screen Analysis at No. 4 (4.75-mm) Sieve and Coarser for Metal-Bearing Ores and Related Materials[2]

E 877 Practice for Sampling and Sample Preparation of Iron Ores and Related Materials[2]

3. Terminology

3.1 *Definition:*

3.1.1 *crushing strength*—maximum compressive load at which a pellet is broken.

4. Summary of Test Method

4.1 A load is applied on a single pellet at a specified speed of the compressive platen until the pellet is broken. This procedure is repeated on all pellets of the test sample.

5. Significance and Use

5.1 The crushing strength aids the pellet producer in the determination of quality problems associated with the production of pellets.

5.2 The crushing strength is often used by the pellet consumer as a quality indicator for performance in the blast furnace.

6. Apparatus

6.1 *Loading Unit*:

6.1.1 The loading capacity shall be 1000 kgf or more (1000 kgf = 9.806 kN).

6.1.2 The compressive platens shall be installed in parallel planes. The surface of the platens that are in contact with the sample shall be made of surface-hardened steel.

6.1.3 A device for setting the speed of the compressive platen at 0.25 ± 0.08 mm/s over the entire test period shall be used.

NOTE 1—If the platen speed is not constant during the test cycle, results may differ depending upon the test machine used.

6.2 *Indicating Unit*, consists of a load transfer device and a load indicator.

6.2.1 *Load Transfer Device*:

6.2.1.1 The transfer of the applied load to the load indicator shall be by a load cell or by a lever.

6.2.1.2 The capacity of the load cell shall be at least 1000 kg.

6.2.2 *Load Indicator*:

6.2.2.1 The applied load shall be indicated either by an electric indicator (recording chart, meter with needle rider, or other suitable device) for the load cell type, or by a mechanical indicator (gage equipped with needle rider or other suitable device) for the lever type.

6.2.2.2 When using a load cell, the chart recorder response time shall be 1.0 s or less for a full-scale deflection.

6.2.2.3 The minimum graduation shall be 1/100 of the full scale.

6.2.2.4 The testing machine shall be calibrated periodically.

6.3 *Sieves*—Square mesh sieves 12.5 mm (½ in.) and 9.5 mm (⅜ in.) are recommended; however, others may be used in agreement between parties.

7. Sample

7.1 The test sample for determining the crushing strength shall be obtained at random by riffling a sample taken and prepared in accordance with Practice E 877.

7.2 Sixty or more pellets, or a number agreed upon between the parties concerned, shall be tested for each sample.

NOTE 2—The following equation may be applied to determine the exact number of pellets to be used to obtain a specific precision.

$$n = \left(\frac{2\sigma}{B}\right)^2$$

[1] This test method is under the jurisdiction of ASTM Committee E-1 on Analytical Chemistry for Metals, Ores, and Related Materials and is the direct responsibility of Subcommittee E01.02 on Ores, Concentrates, and Related Metallurgical Materials.

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[2] *Annual Book of ASTM Standards*, Vol 03.06.