



Standard Test Method for Determination of Abrasion Resistance of Iron Ore Pellets and Sinter by the Tumbler Test¹

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1. Scope

1.1 This test method covers a relative measure of the resistance of iron ore pellets and sinter to degradation by impact and by abrasion.

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

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:*²

[E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials](#)

[E276 Test Method for Particle Size or Screen Analysis at No. 4 \(4.75-mm\) Sieve and Finer for Metal-Bearing Ores and Related Materials](#)

[E389 Test Method for Particle Size or Screen Analysis at No. 4 \(4.75-mm\) Sieve and Coarser for Metal-Bearing Ores and Related Materials](#)

[E877 Practice for Sampling and Sample Preparation of Iron Ores and Related Materials for Determination of Chemical Composition](#)

[E882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory](#)

¹ This test method is under the jurisdiction of ASTM Committee E01 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 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.

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology [E135](#).

4. Summary of Test Method

4.1 The sample is placed in a tumbler drum which is rotated. The tumbled material is removed and screened to determine the degradation.

5. Significance and Use

5.1 This test method is a comparative method intended primarily to test materials for compliance with compositional specifications or for monitoring. It is assumed that all who use these procedures will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is expected that work will be performed in a properly equipped laboratory and that proper waste disposal procedures will be followed. Appropriate quality control practices must be followed such as those described in Guide [E882](#).

5.2 This test method is used to monitor the feed to blast furnaces for process control.

6. Apparatus

6.1 *Tumbler Apparatus*, as shown in [Fig. 1](#), shall be a circular drum 914 mm (36 in.) in inside diameter and 457 mm (18 in.) in inside length constructed of steel plate at least 6.3 mm ($\frac{1}{4}$ in.) in thickness. The drum shall be replaced whenever the thickness of the plate is reduced by wear to 3.18 mm ($\frac{1}{8}$ in.) in any area. Two equally spaced steel angle lifters, 50.8 mm by 50.8 mm by 6.35 mm (2 in. by 2 in. by $\frac{1}{4}$ in.) shall be solidly attached longitudinally inside the drum by riveting in such a manner as to prevent accumulation of material between the lifter and drum. Preferably, one of the lifters shall be attached to the door for ease of sample removal. The lifters shall be fastened so that the attached legs point away from the direction of rotation, thus giving a clear unobstructed shelf for lifting the sample. The lifters shall be replaced when the wear is such that the shelf measures less than 47.6 mm ($1\frac{7}{8}$ in.). The door shall be so constructed as to fit into the drum to form a smooth inner surface and during the test shall be rigidly fastened to prevent any loss of the sample. The drum shall be rotated on stub axles about 38.1 mm ($1\frac{1}{2}$ in.) in diameter