



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 provides a relative measure of the resistance of iron ore pellets and sinter to degradation by impact and by abrasion.

1.2 The values as stated in SI units are to be regarded as the standard. 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 135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials²

E 276 Test Method for Particle Size or Screen Analysis at No. 4 (4.75-mm) Sieve and Finer for Metal-Bearing Ores and Related Materials²

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 Materials³

E 877 Practice for Sampling and Sample Preparation of Iron Ores and Related Materials³

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory³

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology E 135.

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.

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 03.05.

³ *Annual Book of ASTM Standards*, Vol 03.06.

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 E 882.

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 by 50.8 by 6.35 mm (2 by 2 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 attached to the ends of the drum by means of flanges welded or bolted so as to provide smooth inner surfaces. The apparatus shall be fitted with a revolution counter and, preferably, with an automatic device to stop the drum after 200 revolutions.

6.2 *Sieves*—Square-mesh sieves having the following designations are needed: 2-in. (50-mm); $1\frac{1}{2}$ -in. (37.5-mm); $\frac{3}{4}$ -in. (19.0-mm); $\frac{1}{2}$ -in. (12.5-mm); $\frac{3}{8}$ -in. (9.5-mm); $\frac{1}{4}$ -in. (6.3-mm); and No. 30 (600- μ m).

6.3 *Scales*—The scales used for weighing the sample shall be sensitive to 23 g (0.05 lb).

6.4 *Riffle*, having a 37.5-mm ($1\frac{1}{2}$ -in.) opening.