



Standard Test Method for Measuring the Coefficient of Restitution (COR) of Baseballs and Softballs¹

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1. Scope

1.1 This procedure is intended to standardize a method of measuring the coefficient of restitution (COR) of baseballs and softballs.

1.2 This procedure is established to provide a single, repeatable, and uniform test method.

1.3 This procedure is for a ball that is intended for use in the game of baseball or softball.

1.4 The test method is based on ball speed measurements before and after impact with either of two test surfaces: wood or metal.

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:

D 1054 Test Method for Rubber Property—Resilience Using a Rebound Pendulum²

F 1888 Test Method for Compression-Displacement of Baseballs and Softballs³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *baseball and softball, n*—any ball defined by the rules for the game of baseball or softball.

3.1.2 *coefficient of restitution (COR), n*—a numerical value determined by the exit speed of the ball after contact divided by the incoming speed of the ball before contact with a massive, rigid, flat wall of either wood or metal.

4. Summary of Test Method

4.1 *Method A*—The strike plate is a rigid metal surface, and ball speed is measured before and after impact with the strike plate.

4.2 *Method B*—The strike plate is a rigid wood surface, and

ball speed is measured before and after impact with the strike plate.

5. Significance and Use

5.1 The ball coefficient of restitution is a ball dynamic property of relative velocity change caused by impact with a rigid wall.

5.2 This test method is suitable for obtaining data in research and development, quality control, and classifying balls by liveliness.

5.3 Sports associations can use coefficient of restitution standards in specifications for official baseballs and softballs.

5.4 This same test procedure can be utilized at impact speeds other than that prescribed in this procedure and so noted in any reported test results.

6. Apparatus

6.1 Strike Plate, Method A:

6.1.1 *Material*, 5.08-cm (2-in.) thick steel.

6.1.2 *Size*, 60.96-cm² (24-in.²).

6.1.3 *Mounting*, secured flush to a massive rigid wall of cinder block or concrete, minimally 20.3-cm (8-in.) thick, and bolted at all four corners sufficiently secure to prevent movement during ball impact.

6.2 Strike Plate, Method B:

6.2.1 *Material*, 10.2-cm (4-in.) thick northern white ash wood with moisture content between 10 and 15 % with a flat smooth surface.

6.2.2 Same as 6.1.2.

6.2.3 Same as 6.1.3.

6.3 *Ball Throwing Device*⁴—A ball throwing device capable of delivering the ball through the electronic speed monitor at 26.82 m/s (60 mph) with a maximum tolerance of ± 0.30 m/s. The machine should be calibrated using the electronic speed monitor.

6.4 *Electronic Speed Monitors*⁵—An electronic ball speed measuring system consisting of two vertical light screens mounted 30.48 cm (12 in.) apart with a tolerance of ± 0.32 cm, and a photoelectric sensor located at each screen that triggers

¹ These test methods are under the jurisdiction of ASTM Committee F-08 on Sports Equipment and Facilities and is the direct responsibility of Subcommittee F08.26 on Baseball and Softball Equipment and Facilities.

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² *Annual Book of ASTM Standards*, Vol 09.01.

³ *Annual Book of ASTM Standards*, Vol 15.07.

⁴ ATEC, Model “Casey” or equivalent, or a suitable air cannon device, available from Athletic Training Equipment Co., Sparks, NV.

⁵ Oehler Research Chronograph, Model 35x2, or equivalent; Oehler Research Skyscreens, Model 55, or equivalent; available from Oehler Research Inc., Austin, TX.