

**LABORATORY PROCEDURAL
GUIDE FOR CERTIFYING
NEWLY MANUFACTURED
BASEBALLS**

NOCSAE DOC (ND)127-18

Prepared By



**NATIONAL OPERATING COMMITTEE
ON STANDARDS FOR ATHLETIC EQUIPMENT**

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1 Scope

- 1.1 This procedural guide establishes recommended practices for the certification of baseballs.
- 1.2 **All testing and requirements of this standard specification must be in accordance with NOCSAE DOC 001 and NOCSAE DOC 021, NOCSAE DOC 027.**
- 1.3 *This recommended practice does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this recommended practice to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2 Referenced Documents

- 2.1. NOCSAE DOC (ND) 001: *Standard Test Method and Equipment Used in Evaluating the Performance Characteristics of Headgear/Equipment*
- 2.2. NOCSAE DOC (ND) 021: *Standard Projectile Impact Test Method and Equipment Used in Evaluating the Performance Characteristics of Protective Headgear/Projectiles*
- 2.3. ASTM F 1888: *Standard test method for compression-displacement of baseballs and softballs*
- 2.4. ASTM F 1887: *Standard test method for measuring the coefficient of restitution (COR) of baseballs and softballs*
- 2.5. NOCSAE DOC (ND) 027: *Standard Performance Specification for Newly Manufactured Baseballs*

3 Test Equipment Required

- 3.1 Scale with minimum of 0.005 ounce accuracy.
- 3.2 Height gage with minimum of 0.0005 inch accuracy.
- 3.3 Precision Circumference Rule with a minimum of 0.005 inch tolerance.
- 3.4 Flat level measuring table surface
- 3.5 Ball Propelling Device (as shown in Figure 1, NOCSAE DOC 021)
- 3.6 Light gate assembly capable of measuring inbound and rebound velocities
- 3.7 Compression Displacement measuring device
- 3.8 Miscellaneous hand tools.

4 Laboratory Environment

- 4.1 See Section 12, NOCSAE DOC 001

5 Sample Preparation

- 5.1 See Section 4, NOCSAE DOC 027.
- 5.2 For certification testing, verify that at least one dozen (12) balls of each model are available to test. With a marker, number each balls sequentially starting with the number 1.

6 Sample Selection

- 6.1 See Section 11, NOCSAE DOC 001.
- 6.2 Each certifier must test an adequate and representative sample size in order to be reasonably sure that samples released to use, but not actually tested, will meet the requirements as set out in NOCSAE DOC 001 and NOCSAE DOC 027. Certifiers may be faced with processing samples manufactured from variable raw materials. Sample selection **must** be random yet demonstrate that raw material variability's have been accounted for.
- 6.3 All of the submitted balls shall be measured for mass and circumference. No less than 6 samples of submitted balls will be measured for either C-D or COR. None of the submitted balls shall be tested for both C-D and COR.

7 Testing Procedure

7.1 Measuring Ball Mass

- 7.1.1 Obtain a scale device.
- 7.1.2 Zero the scale, if a ball holder is used, tare the scale with the ball holder in place.
- 7.1.3 Place the first ball to be weighed on the center of the scale, allow the scale reading to stabilize, record the weight of the ball in ounces, and remove the ball from the holder. Ensure that the scale has returned to zero, if not re-zero the scale, with the ball holder in place if used.
- 7.1.4 Repeat steps until all ball samples have been weighed

7.2 Method 1, Measuring Ball Circumference¹

- 7.2.1 The following steps will facilitate measuring the circumference of a baseball in three axes, two measurements will be without seams and one measurement is with seams included. These values will be averaged to obtain the circumference of the baseball.
- 7.2.2 Use a height gauge measuring device and place it on a flat level measuring surface.
- 7.2.3 Zero the height gauge measuring device by touching off on the flat level surface applying a steady light pressure to the reference surface of the moveable jaw.
- 7.2.4 Extend the moveable jaw, position the ball so that it is directly between the

¹ Use of method 1 or method 2 to measure the circumference of the ball is at the discretion of the laboratory.

reference surface of the moveable jaw and the measuring surface. The ball is oriented so that the measurement is taken with the seams of the ball not being measured.

- 7.2.5 Touch off on the ball by applying a light steady pressure to the moveable jaw until the reference surface of the moveable jaw just comes into contact with the ball. The measurement is made through the center of the ball. The widest dimension in this ball orientation is obtained by moving the ball slightly. Record the result to the nearest 0.0005 inch as the ball's first diameter off-seam.
- 7.2.6 Compute the circumference of the ball off the seam by multiplying the off-seam diameter (obtained in 7.2.5) by pi. Record the result as the first off-seam ball circumference.
- 7.2.7 Rotate the ball approximately $90\pm 5^\circ$ from the orientation used to obtain the first off-seam value. Zero the height gauge measuring device by touching off on the flat level surface applying a steady light pressure to the reference surface of the moveable jaw.
- 7.2.8 Extend the moveable jaw, position the ball so that it is directly between the reference surface of the moveable jaw and the measuring surface. The ball is oriented so that the measurement is taken with the seams of the ball not being measured.
- 7.2.9 Touch off on the ball by applying a light steady pressure to the moveable jaw until the reference surface of the moveable jaw just comes into contact with the ball. The measurement is made through the center of the ball. The widest dimension in this ball orientation is obtained by moving the ball slightly. Record the result to the nearest 0.0005 inch as the ball's second diameter off-seam.
- 7.2.10 Compute the circumference of the ball off the seam by multiplying the off-seam diameter (obtained in 7.2.9) by pi. Record the result as the second off-seam ball circumference.
- 7.2.11 Zero the height gauge measuring device by touching off on the flat level surface applying a steady light pressure to the reference surface of the moveable jaw.
- 7.2.12 Extend the moveable jaw, position the ball so that it is directly between the reference surface of the moveable jaw and the measuring surface. The ball is oriented so that the measurement is taken with the seams of the ball being measured.
- 7.2.13 Touch off on the ball's seam by applying a light steady pressure to the moveable jaw until the reference surface of the moveable jaw just comes into contact with the ball's seam. The measurement is made through the center of the ball in line with the ball's seams. The widest dimension in this ball orientation is obtained by moving the ball slightly. Record the result to the nearest 0.0005 inch as the ball's diameter on the seam.
- 7.2.14 Compute the circumference of the ball on the seam by multiplying the on seam diameter (obtained in 7.2.8) by pi. Record the result as the ball seam circumference.

7.2.15 Average the three measurements taken above, record this as the ball's circumference.

7.2.16 Repeat the steps above until all ball samples have been measured.

7.3 **Method 2, Measuring Ball Circumference²**

7.3.1 The following steps will facilitate measuring the circumference of a baseball twice through 2 seams and once through 4 seams, these values will be averaged to obtain the circumference of the baseball.

7.3.2 Obtain a Precision Circumference Rule.

7.3.3 Wrap the circumference rule around the middle of the ball to measure the circumference over two seams. The tape is held as evenly around the middle of the ball's circumference as possible while pulling the tape taut with 2 lbs. \pm 1 oz. of force applied. Record the ball's circumference to the nearest 0.001 inch, this value is the first 2 seam measurement.

7.3.4 Rotate the ball approximately $90\pm 5^\circ$, wrap the circumference rule around the middle of the ball to measure the circumference over the other two seams. The tape is held as evenly around the middle of the ball's circumference as possible while pulling the tape taut with 2 lbs. \pm 1 oz. of force applied. Record the ball's circumference to the nearest 0.001 inch, this value is the second 2 seam measurement.

7.3.5 Rotate the ball approximately $90\pm 5^\circ$, wrap the circumference rule around the middle of the ball to measure the circumference over four seams. The tape is held as evenly around the middle of the ball's circumference as possible while pulling the tape taut with 2 lbs. \pm 1 oz. of force applied. Record the ball's circumference to the nearest 0.001 inch, this value is the 4 seam measurement.

7.3.6 Average the three measurements taken above, record this value as the ball's circumference.

7.3.7 Repeat the steps above until all ball samples have been measured.

7.4 **Measuring Ball C-D**

7.4.1 Have readily available the current version of ASTM F 1888, Test Method for Compression-Displacement of Baseballs and Softballs.

7.4.2 Determine if the expected C-D value for the ball sample to be tested is greater or less than 150 pounds force.

7.4.3 If the expected C-D value for the ball sample is less than 150 pounds force, verify that the preload of 1 lb. \pm 1 oz. will be applied prior to compression.

7.4.4 If the expected C-D value for the ball sample is greater than 150 pounds force, verify that the preload of 4 lbs. \pm 1 oz. will be applied prior to compression.

7.4.5 Orient the ball in the compression tester so that the measurement is taken off of the seams. Note the ball's orientation by using any reference markings on the ball so that the ball can be rotated approximately $90\pm 5^\circ$ after this first measurement

² Use of method 1 or method 2 to measure the circumference of the ball is at the discretion of the laboratory.

is taken for a second measurement.

- 7.4.6 Activate the compression device so that the ball is compressed to 0.25 ± 0.01 , record this result.
- 7.4.7 Repeat above steps with the ball oriented approximately $90 \pm 5^\circ$ from the first measurement and is taken off of the seams of the ball.
- 7.4.8 Repeat steps until at least 6 ball samples have been measured, balls that have been tested for C-D are not tested for COR.

7.5 Measuring Ball COR

- 7.5.1 Have readily available the current version of ASTM F 1887, Standard Test Method for Measuring the Coefficient of Restitution of Baseballs and Softballs.
- 7.5.2 Position the light gates and cannon according to sections 7.2-7.4 of ASTM F1887.
- 7.5.3 Velocities of ball samples should be in accordance with section 5.4 of ND 027.
- 7.5.4 Ball impacts should be in accordance with section 5.4 of ND 027.
- 7.5.5 Record the inbound and outbound velocities of each ball tested and compute the COR to obtain 6 values for each ball tested.
- 7.5.6 Repeat steps until at least 6 ball samples have been measured, balls that have been tested for COR are not tested for C-D.

8 Reports

- 8.1 All reports must comply with Section 14, NOCSAE DOC 001.