

Standard Operating Procedure: SOP-BALL-5

Hardness of a Bowling Ball

<u>Rev</u>	<u>Date</u>	<u>Staff Member</u>	<u>Purpose</u>
5	1/14/2022	A. Stanton	Durometer verification procedure clarification
4	6/17/2020	A. Stanton	Added bowling ball temp to procedure
3	11/20/2019	A. Stanton	Add calibration procedure
2	9/10/2019	J. Milligan	Add stand information, temp range to match ASTM spec requirement, and re-test requirements
1	02/12/09	N. Mours	number of samples and clarification
Origination date: 10/29/07		Originator: T. Robben	

Purpose: To determine the average hardness of a bowling ball

Materials:

- Bowling Ball to be tested
- REX Model DD-3 Digital Durometer
- REX Model OS-1 Operating Stand (With bowling ball cup base and two weights totaling 4.5 -5 kilograms)
- REX TBK-D Type D Test Block Kit
- ETEKCITY Lasergrip 800 Infrared Thermometer
- Rex Gauge Company Calibration Block – TB-1 Type D (≈ 80 D)



Set Up Procedure:

1. Using the allen wrench, loosen the two screws on the gauge clamp, and carefully place the Rex durometer in the clamp. It is recommended that the clamp be secured on the large diameter section of your Rex durometer called the connector. To prevent damage to the gauge, take care not to over-tighten the screws- only use enough force to secure the gauge.
2. Place a ball in ball cup on stand.
3. The stand had an insert in the specimen support platform to hold the ball. Care must be taken to align the indenter of the durometer to the center of the insert, or the point at which the indenter is to contact the ball.
4. To set the travel, first loosen the column lock knob and raise the arm assembly high enough so that a ball can be placed under the indenter of the gauge, onto the ball cup. Then lower the arm assembly until the foot of the gauge is approximately 3/8" above the ball. At this point, re-tighten the column lock knob.
5. To perform a test, fully depress the lever. The foot of the gauge should be in full contact with the ball and the weight shaft assembly should have moved upward in the arm assembly. If the travel has been properly set, it will not be possible to obtain different readings by pressing harder on the lever once the foot of the gauge contacts the ball.
6. Remove ball from ball insert. (NOTE: Durometer should be high enough for the ball to easily clear without touching it when placing the ball in or taking the ball out of the ball cup, but it needs to be low enough that you can depress the durometer to the breakaway when taking your sample).

Test Procedure:

1. Using the infrared thermometer, measure the temperature of the ball's surface in 4 different locations around the ball.
(NOTE: Testing is to be conducted when ball is within the ambient temperature window of 70-77 °F and ball shell has had time to acclimate to that temperature.)
2. If the average of the 4 temperatures is not within the 70-77 °F range, set ball aside to acclimate to temperature before trying again. If the ball is within the temperature range, proceed to step 3.
3. Push the "ON/CLR" button on the durometer.

4. Push the “HOLD” button on the durometer once so the displayed reading will be the maximum value. (NOTE: Readout should now indicate “MAX”.)
5. Place the bowling ball to be measured in the ball cup under the durometer. Be sure that any logos, serial numbers, or other identification markings are avoided when taking a hardness reading.
6. Press “ON/CLR” key to zero the durometer.
7. Using even pressure and a slow pace, pull down the handle on the right side of the durometer stand until the durometer hits the bowling ball and you cannot push the handle down anymore. Then allow the handle to return to the starting position.
8. Record the hardness reading from the digital display.
9. Rotate the bowling ball in the ball cup under the durometer, so the next reading can be taken on another random location on the bowling ball. Again, be sure to avoid any logos, serial numbers, or other identification markings on the bowling ball.
10. Repeat Test Procedure steps **3-9** until 10 different locations on the bowling ball have been tested. A good sample of the bowling ball should include a wide range of locations around the bowling ball that includes all the colors on the bowling ball.
11. The overall hardness of the bowling ball will be displayed as an average of the 10 readings taken on the ball.

If ball results indicate the hardness is below the minimum:

1. Take out the Rex calibration block and measure the temperature of the surface in 2 different locations with the infrared thermometer.
(NOTE: Testing is to be conducted when calibration block is within the ambient temperature window of 70-77 °F and the surface has had time to acclimate to that temperature, same as we test bowling balls.)
2. If the average of the 2 temperatures is not within the 70-77 °F range, set calibration block aside to acclimate to temperature before trying again. If the calibration block is within the temperature range, proceed to step 3.
3. Place calibration block beneath the durometer needle and push the “ON/CLR” and “HOLD” buttons.
(NOTE: Calibration block may need to be placed on a platform or block to reach the durometer height.)



4. Verify that the durometer is operating correctly by taking 3 readings from different locations on the calibration block surface. The results should fall within the range specified with the test block (normally +/-2 of the listed value for the test block).
5. If durometer passes the test block requirements, re-do Test Procedure steps **1-11**.
6. If durometer does not pass the test block test, send durometer out to be repaired by a certified calibration company.

Calibration:

Durometers are to be calibrated every 6 months by a professional calibration company.

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