



## **BOWLING BALL ANNOUNCEMENT FAQ**

April 2022

- The USBC Equipment Specifications and Certifications Manual governs bowling balls. This is a collaborative effort between both USBC and manufacturers. Manufacturers can provide input, and then agree to follow the manual.
- The bowling ball approval process is based on trust and good faith. Manufacturers voluntarily submit ball model samples for approval. As part of that, each company agrees to manufacture future production balls the same as the sample and within USBC specifications.
- USBC only asks for two sample balls of each model for approval. USBC approves approximately 300 balls each year, so this keeps the costs down for the manufacturers and also the members.
- After a ball is approved, the process also involves verification that balls in the market are in specification through spot-checking. Spot-checking allows USBC to confirm manufacturers are making the same ball that was approved and identify unintentional errors or mistakes.
- USBC's spot-checking process first identified the Storm Spectre ball as being out of specification and approval of that ball was revoked.
- The spot-checking process then identified that six additional models of Storm Products manufactured balls measured out of USBC specifications. USBC shared this information with Storm. USBC determined prohibiting these balls from USBC national tournaments was the best outcome for USBC members as opposed to revoking from all certified competition. Storm agreed to this approach and agreed to offer owners of the affected balls the option to exchange their balls for a new product.
- While USBC had the authority to revoke all six ball models, USBC determined the number of USBC members impacted was so large, the disruption of a full revocation for USBC members and leagues was not the best path. Additionally, the potential competitive advantage of a ball below USBC's hardness specification is less significant on a typical league shot compared to elite or professional competition.
- It is unfortunate the issue occurred during the USBC Open Championships and USBC Masters. Once USBC determined the models were out of specification, they needed to be immediately removed from these competitions.
- USBC rules allow leagues and tournaments flexibility to govern themselves in various ways. This result gives USBC membership the ability to be involved in choosing what is best for bowlers in their events.

### **INSPECTION PROCESS**

#### **1. What is the current process to approve a bowling ball?**

Each manufacturer is required to send two bowling balls to USBC for a new model the manufacturer seeks approval. Our equipment specifications and certifications team takes the balls through a 13-point inspection process that takes approximately five hours per model to complete.



If the balls meet specifications and are not close to certain limits, no further testing is required, and the balls are approved.

**2. Do the manufacturers receive their approval data from USBC?**

Yes. USBC includes all details regarding the measurements of their approved bowling balls in the form of a report.

**3. What is the process used to spot-check balls?**

USBC takes four models from different active brands every quarter for verification. Four samples from each chosen ball are inspected for any specification that was close to the limit at the time of approval.

If the four samples still are near the limit, an additional four samples are gathered. If the batch of eight samples predicts non-conformance greater than 0.6% or any bowling ball is found outside of specification, 24 additional samples are acquired and tested to estimate the predicted non-conformance percentage using globally accepted statistical calculation methods for quality assessment.

**4. Why would USBC approve a bowling ball and later remove it from competitions?**

USBC measures the approval samples sent by manufacturers. USBC then relies on manufacturers to produce production balls the same as the samples. Of course, USBC does not and cannot dictate manufacturing processes or quality check in the plant. USBC can only test balls in the marketplace.

Manufacturers have agreed to this process and been aware of it for years. Manufacturers are encouraged to produce products with a "cushion" greater than the specification, to allow for variance in their manufacturing process. The industry is well aware that manufacturing close to the specification could result in later non-compliance determination if a ball is tested and falls out of specification.

The manual states if spot-checking indicates balls for sale in the marketplace test above a 5% non-conformance rate, the ball can be removed from competitions. The affected Storm balls were recently identified out of specification through a spot-check process.

On a quarterly basis, USBC tests a sampling of each manufacturers products to ensure ongoing compliance with the specifications.

**5. What is the Equipment Specifications and Certifications Manual and why is it important?**

The manual is a constantly evolving governance document. It is a joint effort involving USBC staff, the Equipment Specifications Committee, the manufacturers and external technical advisors. Ongoing changes to the manual involve communication with the parties and formal comments from manufacturers. Manufacturers then may choose to voluntarily submit equipment for USBC approval and governance according to the manual.

**6. USBC test data projects these Storm balls are outside of specification, but I heard stories of people testing the affected balls and getting readings over 73D?**

The tool used to measure hardness is called a durometer. USBC measures all bowling balls in our lab with the same durometer in the exact same conditions. Our measurement process follows guidelines specified by ASTM (American Society for Testing and Materials) and involves regularly calibrating the durometer through the gauge manufacturer and internal baseline tests to insure consistency. Temperature is controlled and recorded, and a



positioning stand is used. The measurements of USBC’s approval durometer in USBC’s lab are the standard for approval or potential revocation.

Measurements conducted outside USBC’s lab with other durometers are not applicable as durometer readings can vary tool to tool by up to 2D, and alignment of the ball and durometer indenter, along with testing temperature, can greatly affect results.

USBC offers manufacturers the opportunity to cross-check their durometers with the USBC approval durometer quarterly.

**7. Storm published a statement that their testing has shown many factors, including differences in surface finish, can cause variances in durometer readings. Does this matter?**

The manual states: *"It is the manufacturers responsibility to ensure that all USBC approved balls comply with all specifications at time of manufacture."* The manual also states that spot-checking balls will be purchased from distribution. Manufacturers know balls will be tested out of the box.

The manufacturer is solely responsible for the surface finishing process and any influence surface finishing may have on specification measurement. If a manufacturer believes its finishing process will cause variance in specification measurement, then it’s the manufacturer’s responsibility to account for the variance.

Even if surface finish alone caused a ball to measure out of specification, per the manual, the ball is out of specification and subject to removal.

With regard to the affected Storm Products balls, below is the spot-check data for balls out of the box (USBC shared this data with Storm):

BRAND	MODEL	HARDNESS AVG (D)	PROJECTED OUT OF SPEC
900 Global	Wolverine	71.8	98.2%
900 Global	Altered Reality	71.1	100%
Storm	Phaze 4	71.8	99.9%
Roto Grip	UFO Alert	72.3	91.2%
Storm	Trend 2	72.5	NA - Testing paused after agreement
Storm	Electrify Solid	72.7	NA -Testing paused after agreement

USBC testing does confirm that removing the surface finish polish by sanding will cause the balls to measure harder.

However, even if the manual called for sanding balls for hardness testing, (which it does not) the hardness measurement does not increase enough to bring all samples to within specification.

USBC stands behind its data and determination. USBC reiterates the statement approved by Storm on March 29, 2022: *"USBC identified the models having a percentage of balls produced below USBC minimum 73D hardness specification."*

## **NATIONAL TOURNAMENTS**

### **8. Why was USBC testing bowling balls at the Masters?**

The testing at the USBC Masters was unrelated to the Storm Products issue. The testing was for ongoing research of how urethane balls measure over time.

At the Masters, USBC was continuing urethane hardness testing in the field that started two years ago. Players were asked if they would volunteer to bring urethane bowling balls to USBC's designated testing area for the project. It was not required, and USBC staff explained the process to the players.

A total of 114 urethane balls were evaluated, 13 of which were checked two years ago. USBC plans to publish the data as part of a future research report.

### **9. Why did USBC not allow players to view the testing, and why was it done behind a curtain?**

Each ball test can take 3-5 minutes. If the tester is having a conversation with the player during the test, it would take much longer.

The curtain is used simply to provide a workspace without distraction or interruptions for the staff completing the hardness tests. The integrity of the results also requires a similar environment from test to test. Additionally, it would be unfair to ask players to submit their equipment for research, and then allow the public and other competitors to view the results.

### **10. Did these tests have anything to do with the issues with the Storm Products balls?**

No. They are not related. None of the six affected Storm Products balls were tested at the USBC Masters. No reactive balls of any brand were tested.

These tests were being conducted for USBC to research the effects of hardness in urethane balls over time.

### **11. Why did USBC decide to remove these bowling balls in the middle of two national tournaments?**

When USBC determined the balls were out of specification, they needed to be immediately removed from national tournament competitions. Rule 312 gives USBC this authority.

### **12. How is it fair that someone may have competed early in the USBC Open Championships with one of these bowling balls?**

The balls were approved for competition until they were identified as out of specification. The rules require scores to stand when bowled with equipment deemed compliant equipment at the time of being used.

## **BOWLER IMPACT**

### **13. Why not revoke all affected Storm Products bowling balls from all USBC competitions?**

USBC determined prohibiting these balls from USBC national tournaments was the best outcome for USBC members as opposed to revoking from all certified competition. Storm agreed to this approach and agreed to offer owners of the affected balls the option to exchange their balls for a new product.



Therefore, these balls are approved for all other USBC-certified leagues and tournaments, unless your league or the tournament rules prohibit these balls from future use in those competitions.

USBC allows leagues to govern themselves in many ways. If you are concerned that this does not seem fair, you can address this in a league meeting, in which a vote can take place, and the balls can either be approved for ongoing use or prohibited for that competition.

About 97% of all USBC-certified leagues are contested on house conditions that typically provide bowlers with more area to hit the pocket. In these cases, the impact of the hardness specification is less significant.

**14. Why is this not as impactful as on typical USBC league house condition?**

Ongoing USBC testing among ball performance has identified 13 categories that impact reaction characteristics. Hardness is number nine on that list, which has less impact overall.

House conditions inherently are more forgiving. The area a player has is greater on house conditions, and the reaction of a ball is more predictable from a variety of angles. The impact of a bowling ball being softer is not as great.

On demanding Sport conditions, where down lane reaction is more severe, a bowling ball which is softer may provide a more predictable reaction, and potentially an advantage.

**15. If I own one of the six affected bowling balls and want to keep it, can I?**

Yes. You get the choice. You can keep it or take part in the exchange program Storm Products is providing its customers. We encourage bowlers using these balls to check with league and tournament officials to confirm if their competitions will continue to allow the balls to be used.

If you want to return one of the affected balls, Storm Products will have information on how to exchange your bowling ball for another approved product in all competitions by visiting [www.stormbowling.com](http://www.stormbowling.com).

**16. If a bowler shoots an honor score in certified competition with one of these bowling balls, will USBC still recognize it?**

Yes. Honor scores bowled in local or state certified competitions where the balls are allowed to be used will be recognized, as long as the competition (league or tournament) did not choose to prohibit it from competition in its rules.

**USBC DATA ANALYSIS AND EQUIPMENT VERIFICATION**

**17. What does the data analysis for USBC's testing?**

USBC has professional staff and a contracted technical advisor. On staff, USBC has a Six Sigma Black Belt certified through ASQ with a degree in physics. ASQ is globally recognized as the leader in quality methods and includes divisions for Measurements, Statistics and Six Sigma.

USBC's technical advisor has over 20 years of experience as a Six Sigma Master Black Belt. He is recognized by both ASQ and ASA (American Statistical Association) for excellence in applied statistics and quality methods and has a degree in engineering. He is also involved



with ASQ's statistics division and is past chair of their Six Sigma division.

**18. What is done to confirm the durometer is accurate?**

USBC uses the testing method specified by ASTM (American Society for Testing and Materials). The durometer type used is the only instrument appropriate for use on materials with a hardness range for bowling balls.

The gauge is calibrated every six months by the manufacturer. USBC performs internal trending studies with baseline balls (using a paired-t- test) to determine if our durometer is drifting since the last calibration. USBC use a durometer stand that positively locates the ball such that the indenter is positioned directly over the center of the ball and perpendicular to the ball surface when testing.

USBC's approval durometer is the durometer that is used to determine all manufacturers balls meets specifications. The durometer has gone through multiple gauge R&R studies to determine uncertainty and improvements to the SOP to reduce that uncertainty. This includes signal averaging through multiple measurements on the ball over different colors, replication of operator actions, among other things.

Whenever the USBC approval durometer is sent for calibration, the manufacturers are notified and invited to determine what bias exist between their durometer and the USBC approval durometer. Manufacturers are expected to adjust their internal specification limits to make sure they are meeting the specifications set by USBC and measured with our durometer, because the USBC approval durometer is the final say.

**19. What analysis method is used by USBC?**

The USBC spot-check process starts by testing four random balls from a model collected from a ball distributor. If the first four spot-check samples are within a range close to the specification limit (boundaries determined knowing typical manufacturer variance), then four additional samples are collected.

We calculate the mean and standard deviation from these eight to determine if the projected distribution of balls would exceed the 0.6% non-conformance rate which is allowable as stated in the Equipment Specifications Manual. We assume a normal distribution at this point because the Anderson-Darling normality test is not robust under sample sizes of about 12-15.

A sample size of eight is enough samples to only make a very preliminary assessment, and the results from these eight balls are used to determine whether more samples are needed to better characterize the distribution of balls in the field. A sample size of eight may be prone to sampling risk, such as all balls being from one batch or unluckily pulling random samples that are only from the high or low end of what was made instead of better representing the entire production.

If one of the original four spot-check balls is found out of spec, then 24 additional are tested. Additionally, if either one or more of the first eight balls is out of specification or the projected DPMO (Defects Per Million Opportunities) is greater than 6000 (0.6% non-conformance), then 24 more balls are collected from multiple manufacturing batches. Therefore, the full sample size when a decision is made is 28 or 32. This random sampling from multiple batches allows the use of inferential statistics to characterize the distribution of balls in the field.



In order to do so, we minimize the uncertainty around the mean and standard deviation of the measures. This uncertainty is mathematically related to the inverse of the square root of the sample size. The uncertainty mathematically levels off at about 30 samples, which means that collecting more samples than 30 does not significantly further improve the estimation of the population statistical measures. Therefore, with multiple batches represented in the larger sample, along with a sample size adequate to minimize uncertainty, the analysis of the data can proceed.

The analysis for non-conformance includes (but is not limited to) the following:

- Anderson-Darling Normality Test
- Check for multi-modality
- Johnson transformation (if required, with failure of the A-D normality test)
- Distribution identification method (if required, with failure of both the A-D normality test and failure of the Johnson Transform)
- ANOVA and Hsu's MCB for batch-to-batch assessment of similarity
- Process capability for normal data/non-normal data to determine expected DPMO
- Assessment of Cpk/Ppk for shift and drift assessment between batches (non-conforming percentage)

For additional questions, please email [\*\*specifications@bowl.com\*\*](mailto:specifications@bowl.com).

To learn more about the Equipment Specifications and Certifications Manual, please go [\*\*here\*\*](#).