Concrete Bowling Ball Overview

Competition Description:

Teams will manufacture two bowling balls within the required design specifications. Scoring will be determined by several factors, including adhering to design and structural requirements, developing an overall aesthetic design theme, and of course- bowling!

Eligible Students:

Only one team per school may participate. A team should bring at least five members. Exactly five members may bowl. Smaller teams are only permitted if a school is unable to produce five available members.

Supplies Needed:

- Two structurally-identical spherical concrete bowling balls
  - Must adhere to design requirements
  - Must have distinct aesthetic designs but a common theme
  - At random, one will be used to bowl and the other for testing.
- Two copies of mix design used
- Prepared list of your team's bowling line-up

Concrete Bowling Ball Rules

Mix Design:

Resins, expoies, and pre-packaged concrete mixes are not allowed. Fibers are required and must be unaltered and of uniform length before mixing. Any amount of fibers may be used. Not adhering to these requirements will result in disqualification. Mix designs must be submitted by email to ASCESymposium2027@gmail.com by the end of the day on **FRIDAY, MARCH 25, 2027**.

Dimension Requirements:

The mix design and dimension of the bowling balls should be identical in all aspects. The bowling balls should be as spherical as possible. The mass of both bowling balls must be **between 5,600 and 6,400 g**. The diameter of both bowling balls must be **between 210 and 240 mm**. The target mass and diameter are **6,000 g and 225 mm** respectively. Variance from the target specifications and between the two bowling balls are considered in scoring.

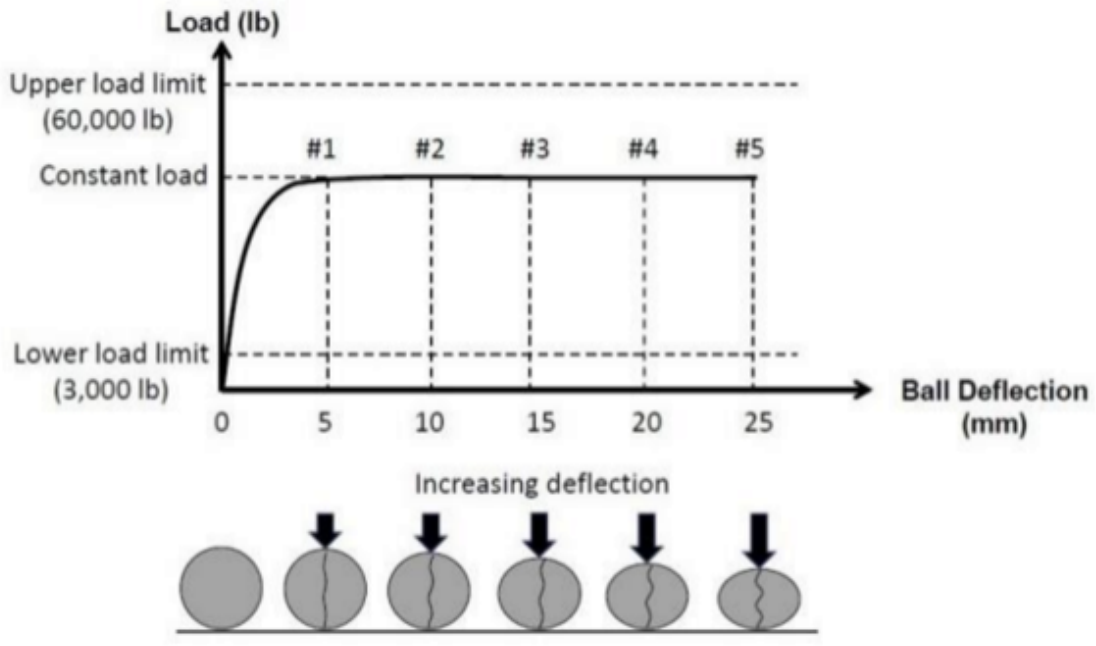
Concrete Bowling Ball Rules

Compression Test:

One bowling ball at random will be selected for testing. Displacement loads are measured every 5 mm up to 25 mm and must be between 3,000 and 60,000 lb and they must average between 5,000 and 50,000 lb. The displacement rate will be set at a constant rate of between 5.0 and 12.5 mm/min. Highest score is awarded by minimizing the coefficient of variation (COV) between the deflection loads. A COV of 0% represents all 5 loads measured being equal, or linear elasto-plastic behavior. See diagram for clarification.

Aesthetic Design:

Pigment powders, paints (such as latex-based paints), and surface treatments are allowed if they don't violate structural composition limits. There should be a clear and cohesive theme among the bowling balls, however, they should not be identical.



Concrete Bowling Ball Rules

Bowling:

Exactly five team members will bowl using the bowling ball not used for testing. Teams unable to produce five may have less members. The bowling line-up must be provided to the attendants before the start of the game. Each member will bowl in the order provided in the line-up and the list will cycle once all members have bowled. Each member will bowl an entire frame before continuing to the next person. Ideally, each member will bowl two frames.

Standard bowling rules apply. If a ball becomes unable to roll, then all remaining frames are forfeited. The bowling lane is 8 meters long and one meter wide and has bumpers. A net or tarp will be used to catch the ball; if additional pins are knocked down retrieval, these pins are not counted. The ball will be weighed before and after bowling, points will be awarded if the ball retains 90% of its original weight.

Concrete Bowling Ball Scoring Rubric

Design Requirements (5 pts)

- **Mix Design Submitted On Time (5/5)**
- *Mix design requirements violated (disqualifiction)*

Dimension Requirements (25 pts)

- **Mass Requirement (2.5/25) and Precision (up to 5/25)**
- **Diameter Requirement (2.5/25) and Precision (up to 5/25)**
- **Sphericality (up to 5/25)**
- **Consistency (up to 5/25)**

Compression Testing (25 pts)

- **Deflection Load Requirement (5/25)**
- **Deflection Load COV (lowest 20/25, highest 0/25)**

Bowling (35 pts)

- **90% of Weight Retained (5/35)**
- **Final Bowling Score (highest 30/35, lowest 0/35)**

Aesthetic Design (10 pts)

- **Creativity (up to 10/10)**
- *Significantly affects structural composition (disqualification)*

MAXIMUM SCORE: 100 pts

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MID-AMERICA STUDENT SYMPOSIUM
BENEDICTINE COLLEGE KU THE UNIVERSITY OF KANSAS
2027

Concrete Bowling Ball Team Registration Form

School Name: _____

Team Captain: _____

Faculty Advisor: _____

List of Potential Bowlers:

1. _____
2. _____
3. _____
4. _____
5. _____

Additional Members:

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