

Concrete Cylinder



Due Date: Paper must be received by March 1. Email your submission to ASCEConference2015@gmail.com

Overview

Design a concrete cylinder with the highest compressive strength with maximum mass of 1100 grams. The cylinder dimensions are: 3in diameter x 6in height = 42.4in³. The tolerance on each cylinder dimension is +/- 0.05.

Eligibility

A total of four (4) students will be allowed to participate in the competition with the option of one (1) of the four being a graduate student.

Logistics

- Portland cement must meet ASTM C150, but may be any subtype.
- A maximum of 50% of the mass of the total cementitious material can be Portland cement.
- Other cementitious materials must be made up of one or more of the following: Fly Ash/Natural Pozzolans (ASTM C618) Slag Cement (ASTM C989), or Silica Fume (ASTM C1240). Additions of non-ASTM C150 cements as part of the cementitious materials are not permitted.
- The water to cement (w/c) ratio must not fall below 0.35 (This does not include aggregates presoaked in water).
- All aggregates must pass the #8 sieve, and be retained on the #200 sieve.
- At least one of the aggregate types must be a sustainable or recyclable aggregates.



- Chopped fiber assimilated in the mix design must not exceed 2% by volume.
- The chopped fibers must be greater than 0.5 inches and less than 1.5 inches in length.
- Any other material used to better the structural integrity of the cylinder is prohibited.
- A mix design spreadsheet (Figure 1) must be submitted.

Mix Design Spreadsheet

University Name	Competition Name (Concrete Cylinder)	Column 1: Amount per Ball	Column 2: Specific Gravity (SSD for Agg.)	Column 3: Proportions
Cementitious Materials	Portland Cement	lb	Unitless	lb/cy
	Cement Replacer	lb	"	lb/cy
	Cement Replacer	lb	"	lb/cy
	Cement Replacer	lb	"	lb/cy
Aggregates	Sustainable Aggregate - Recycled	lb	"	lb/cy
	Aggregate	lb	"	lb/cy
	Aggregate	lb	"	lb/cy
	Aggregate	lb	"	lb/cy
Fluids	Water	lb	"	lb/cy
	Chemical Admixture	oz	1	oz/cy
	Chemical Admixture	oz	"	oz/cy
Reinforcement	0.5"-1.5" Chopped Fibers	lb	"	lb/cy

1. Estimated Total Wet Weight (lb)	Sum of Column 1.
2. Estimated Cylinder Volume (ft ³)	Calculated using Specific Gravities
3. Estimated Density (pcf)	Weight/Volume (1./2.)

Figure 1



Submittals

- Teams must have their cylinders constructed upon arrival to the 2015 conference.
- A mix design spreadsheet of the cylinders must be submitted via email to ASCEconference2015@gmail.com with the university name and competition (Concrete Cylinder) no later than March 1st, 2015 (11:59:59PM).

Scoring

The teams will be scored based on:

- Compressive strength (psi) / mass (g) ratio (300 Points).
- Report preparation (professionalism and aesthetics) (150 Points).
- Creativity in mix design (implementation of novel materials and additives) 75 Points

Weighted scoring	1 st	2 nd	3 rd	4 th	... N th place
Compressive strength/mass ratio	300	290	280	270	310-(10N)
Report Preparation	150	145	140	135	155-(5N)
Mix design creativity	75	72.5	70	67.5	77.5-(2.5N)

Note: point values will not fall below zero. In the event of a tie both teams will be rewarded equal points in that specific category..

One (1) student must be present during the testing of the schools respective cylinder.

Disqualifications

Cylinders with a mass exceeding 1100 grams or not meeting the dimensional requirements will be disqualified.

