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**STANDARD SPECIFICATION FOR MOLDS FOR FORMING CONCRETE TEST
CYLINDERS VERTICALLY
IN ACCORDANCE WITH
ASTM C 470 - 15**

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BACKGROUND

Six cylinder molds were delivered to our laboratory in October, 2016, in three boxes; two molds per box. Each cylinder mold was packaged with a self-adhesive label and cylinder cap. Cylinders and cylinder caps were made from expanded polystyrene insulation board (EPS) with a bottom and side lining of high impact molded polystyrene (HIPS).

Cylinder molds were nominal 4 inches diameter by 8 inches high. The HIPS lining was approximately 10 mils in thickness. EPS was approximately 0.75 inches thick along the sides and 0.50 inches along the bottom. EPS lids were formed with collared sides to fit over the outside dimension of the cylinder. See attached photolog.

OBJECTIVE

Evaluate cylinder molds for compliance with ASTM C 470-15, Standard Specification for Molds for Forming Concrete Test Cylinders Vertically.

TEST PROCEDURE

All six cylinder molds were evaluated for dimensional tolerances according to ASTM C 470. In addition, all six molds were subjected to dry rodding of aggregate meeting ASTM C 33. Three of the molds, K-1, K-2, and K-3, were evaluated for absorption and leaks, by weighing each mold prior to filling 90 - 95% with water. Each mold was allowed to sit for a three hour period, after which time each mold was observed for leaks. The molds were emptied and weighed. Percent water absorption was determined by the ratio of the weight difference to the initial weight.

Cores K-4, K-5, and K-6 were used to cast concrete samples in accordance with ASTM C 31 after each of the molds was subjected to 24 hours at 10 degrees Fahrenheit. Casting of molds included rodding of the concrete in two lifts at 25 strokes per lift. Once set up, the molds were stripped from the cores by cutting vertically at opposite sides of the molds. The cast cylinders were measured for dimensional tolerances specified in ASTM C 39.

TEST RESULTS

All cylinder molds comply with the requirements and intent of ASTM C 470-15. See following results table.

ASTM C 470 - 15 Molds for Forming Concrete Test Cylinders Vertically – Results Table

CBIS Korfil

*ASTM C 31 - 2 layers, 25 strokes per layer using 3/8 rod per layer: 10 - 15 blows/layer

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Single Use Molds

Sample ID	Nom Ht (in)	Nom Diam (in)	Measured Ht (in)	Measured Diameter from Top 180 Apart (in)	Perpendicular Variation in Top and Bot Plates <0.5%	Planar Variations in Bot < .06" in 6"	Water Abs of Plastic Lining < 0.5%	Fracture after 24 h at 10 °F and after C 31*	Deleterious Effects after Dry Rod Coarse Agg (C 192)?	Absorption and Leakage Test (3 hrs with 90 - 95% Fill)
K-1	8	4	H1 = 7.957	D1 = 3.987	Run (in) 24	Yes	Yes	No	No	Weight (init) 68.04
			H2 = 7.975	D2 = 3.994	Rise (in) 0.03937		As published for			Weight (final) 70.31
			Avg. = 7.966	Avg. = 3.9905	Less than 0.5%? Yes		High Impact Polystyrene			Less than 11 g? Yes
			Within 2% of Nom? Yes	Within 1% of Nom? All D within 2% of each other? Yes						Leakage? None

Sample ID	Nom Ht (in)	Nom Diam (in)	Measured Ht (in)	Measured Diameter from Top 180 Apart (in)	Perpendicular Variation in Top and Bot Plates <0.5%	Planar Variations in Bot < .06" in 6"	Water Abs of Plastic Lining < 0.5%	Fracture after 24 h at 10 °F and after C 31*	Deleterious Effects after Dry Rod Coarse Agg (C 192)?	Absorption and Leakage Test (3 hrs with 90 - 95% Fill)
K-2	8	4	H1 = 7.977	D1 = 3.996	Run (in) 24	Yes	Yes	No	No	Weight (init) 68.04
			H2 = 8.01	D2 = 3.991	Rise (in) 0		As published for			Weight (final) 70.31
			Avg. = 7.9935	Avg. = 3.9935	Less than 0.5%? Yes		High Impact Polystyrene			Less than 11 g? Yes
			Within 2% of Nom? Yes	Within 1% of Nom? All D within 2% of each other? Yes						Leakage? None

Sample ID	Nom Ht (in)	Nom Diam (in)	Measured Ht (in)	Measured Diameter from Top 180 Apart (in)	Perpendicular Variation in Top and Bot Plates <0.5%	Planar Variations in Bot < .06" in 6"	Water Abs of Plastic Lining < 0.5%	Fracture after 24 h at 10 °F and after C 31*	Deleterious Effects after Dry Rod Coarse Agg (C 192)?	Absorption and Leakage Test (3 hrs with 90 - 95% Fill)
K-3	8	4	H1 = 7.956	D1 = 3.994	Run (in) 24	Yes	Yes	No	No	Weight (init) 65.77
			H2 = 7.968	D2 = 3.994	Rise (in) 0		As published for			Weight (final) 70.31
			Avg. = 7.962	Avg. = 3.994	Less than 0.5%? Yes		High Impact Polystyrene			Less than 11 g? Yes
			Within 2% of Nom? Yes	Within 1% of Nom? All D within 2% of each other? Yes						Leakage? None

Sample ID	Nom Ht (in)	Nom Diam (in)	Measured Ht (in)		Measured Diameter from Top 180 Apart (in)		Perpendicular Variation in Top and Bot Plates <0.5%		Planar Variations in Bot < .06" in 6"	Water Abs of Plastic Lining < 0.5%	Fracture after 24 h at 10F and after C31*	Deleterious Effects after Dry Rod Coarse Agg (C192)?	Dim's After C 31 in Compliance?	
K-4	8	4	H1 =	7.974	D1 =	3.994	Run (in)	24	Yes	Yes	No	No	D1 =	3.984
			H2 =	7.938	D2 =	3.993	Rise (in)	0.07874	As published for				D2 =	3.983
			Avg. =	7.956	Avg. =	3.9935	Less than 0.5%?	Yes	High Impact Polystyrene				Avg. =	3.9835
			Within 2% of Nom?	Yes	Within 1% of Nom? All D within 2% of each other?	Yes			Within 1% of Nom?				Yes	All D within 2% of each other?

Sample ID	Nom Ht (in)	Nom Diam (in)	Measured Ht (in)	Measured Diameter from Top 180 Apart (in)	Perpendicular Variation in Top and Bot Plates <0.5%	Planar Variations in Bot < .06" in 6"	Water Abs of Plastic Lining < 0.5%	Fracture after 24 h at 10F and after C 31*	Deleterious Effects after Dry Rod Coarse Agg (C192)?	Dim's After C31 in Compliance?
K-5	8	4	H1 = 7.959	D1 = 3.997	Run (in) 24	Yes	Yes	No	No	D1 = 3.992
			H2 = 7.964	D2 = 3.995	Rise (in) 0.03937		As published for			D2 = 3.996
			Avg. = 7.9615	Avg. = 3.996	Less than 0.5%? Yes		High Impact Polystyrene			Avg. = 3.994
			Within 2% of Nom? Yes	Within 1% of Nom? All D within 2% of each other? Yes						Within 1% of Nom? Yes
										All D within 2% of each other? Yes

Sample ID	Nom Ht (in)	Nom Diam (in)	Measured Ht (in)	Measured Diameter from Top 180 Apart (in)	Perpendicular Variation in Top and Bot Plates <0.5%	Planar Variations in Bot < .06" in 6"	Water Abs of Plastic Lining < 0.5%	Fracture after 24 h at 10F and after C 31*	Deleterious Effects after Dry Rod Coarse Agg (C 192)?	Dim's After C 31 in Compliance?
K-6	8	4	H1 = 7.964	D1 = 3.998	Run (in) 24	Yes	As published for High Impact Polystyrene	No	No	D1 = 4.008
			H2 = 7.967	D2 = 3.999	Rise (in) 0.03937				D2 = 3.999	
			Avg. = 7.9655	Avg. = 3.9985	Less than 0.5%? Yes				Avg. = 4.0035	
			Within 2% of Nom? Yes	Within 1% of Nom? All D within 2% of each other? Yes				Within 1% of Nom? Yes	All D within 2% of each other? Yes	

Figure 1

Callouts:

1. High Impact Molded Polystyrene (HIPS)
2. Expanded Polystyrene (EPS) Lid
3. EPS Cylinder Mold

Comments:

High impact molded polystyrene (HIPS) sheet is inserted into core to prevent bonding of concrete to expanded polystyrene (EPS) form. HIPS is also used at the bottom of the mold. See Figure 3.



1026002

Title:

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Typical Korfil 4"x8" Cylinder Mold

Figure 2

Callouts:

1. HIPS Lining Partially Removed

Comments:

HIPS sheet is inserted into core to prevent bonding of concrete to EPS form.



1026004

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Cylinder Mold with HIPS Lining Partially Removed

Figure 3

Callouts:

1. HIPS Lining at Bottom of Mold

Comments:

HIPS sheet is inserted at the bottom of the form to prevent bonding of concrete to EPS.



1026005

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Title:

Top View of Typical Cylinder Mold Showing HIPS Lining at Bottom of Mold

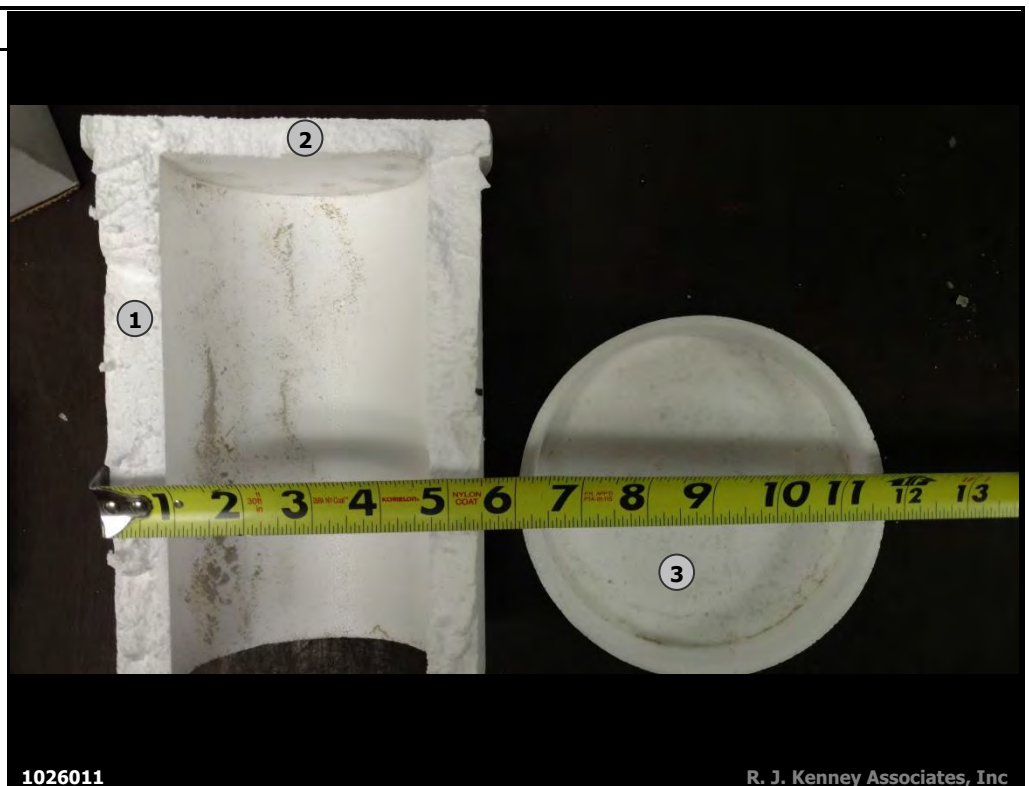
Figure 4

Callouts:

1. Approximate 3/4" EPS Side Wall
2. Approximate 1/2" Thick EPS Bottom
3. Approximate 1/2" Thick EPS Lid

Comments:

Typical mold is shown after splitting to remove cast concrete.



1026011

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Title:

Typical Cylinder Mold

Figure 5

Callouts:

Comments:

Cast concrete is removed by cutting the EPS mold vertically on opposite sides and splitting.



1026008

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Title:

Cast Sample Shown Split

Figure 6

Callouts:

Comments:

Concrete cylinders, resulting from use of the Korfil EPS molds with HIPS lining, were easily removed from the forms and were within all ASTM dimensional tolerances. No damage to the interior mold surfaces was noted after cylinder removal.



1026010

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Title:

Typical Concrete Sample