



# STYROFOAM™ Brand Square Edge Insulation

## 1. PRODUCT NAME

STYROFOAM™ Brand Extruded Polystyrene Foam (XPS) Square Edge Insulation

## 2. MANUFACTURER

The Dow Chemical Company  
Dow Building Solutions  
200 Larkin Center,  
Midland, MI 48674  
1-866-583-BLUE (2583)  
Fax 1-989-832-4465

dowbuildingsolutions.com

## 3. PRODUCT DESCRIPTION

STYROFOAM™ Brand Square Edge Insulation is an extruded polystyrene foam insulation board that meets the needs of the commercial foundation and building floor slab market. This insulation can also be used for attics, foundations/slabs and crawl spaces in residential applications.

STYROFOAM™ Brand Square Edge Extruded Polystyrene Foam (XPS) Insulation has more than 60 years of proven performance in wet environments. The closed-cell structure of STYROFOAM™ Brand Square Edge Extruded Polystyrene Foam (XPS) Insulation resists water pickup, enabling it to retain a high R-value\* over time – a necessary property in wet, below-grade commercial foundation applications.

### Basic Use

STYROFOAM™ Brand Square Edge Extruded Polystyrene Foam (XPS) Insulation helps protect foundation damp-proofing and waterproofing, especially during backfilling. It also provides a secondary barrier against groundwater leakage. With STYROFOAM™ Brand Square Edge Insulation, freeze-thaw cycling of the foundation wall is minimized, reducing the potential for cracking. And a warmer foundation can reduce the potential for condensation.

STYROFOAM™ Brand Square Edge Insulation can be used against commercial interior walls and exterior foundation walls in above- and below-grade applications. STYROFOAM™ Brand Square Edge Insulation can be used under the slab or over the deck or subfloor. STYROFOAM™ Brand Square Edge Insulation is suitable for use in pervious, semi-pervious and practically impervious soils.

### Sizes

Square Edge

Width and length: 2' x 8' and 4' x 8'

Thickness: .75", 1", 1.5", 2", 2.5", 3", 4"

Not all product sizes are available in all parts of the country. Contact your local Dow representative for details.

## 4. TECHNICAL DATA

### Applicable Standards

STYROFOAM™ Brand Square Edge Insulation meets ASTM C578, Type IV – Standard Specification for Rigid Cellular Polystyrene Thermal Insulation. Applicable standards include:

- C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

- D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics
- E96 – Standard Test Methods for Water Vapor Transmission of Materials
- D696 – Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer
- C203 – Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation
- D2126 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
- C272 – Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions

### Code Compliances

STYROFOAM™ Brand Square Edge Insulation complies with the following codes:

- International Residential Code (IRC) and International Building Code (IBC) See ESR-2142
- Underwriters Laboratories, Inc. (UL) Classified, see Classification Certificate D369

TABLE 1: Physical Properties of STYROFOAM™ Brand Square Edge Insulation

Property And Test Method	Value
Thermal Resistance <sup>(1)</sup> per inch, ASTM C518, ft <sup>2</sup> •h•°F/Btu, R-value, min.	
@ 75°F mean temp.	5.0
@ 40°F mean temp.	5.4
@ 25°F mean temp.	5.6
Compressive Strength <sup>(2)</sup> ASTM D1621, psi, min.	25
Water Absorption, ASTM C272, % by volume, max.	0.3
Water Vapor Permeance <sup>(3)</sup> ASTM E96, perm, max.	1.5
Maximum Use Temperature, °F	165
Coefficient of Linear Thermal Expansion, ASTM D696, in/in•°F	3.5 × 10 <sup>-5</sup>
Flexural Strength, ASTM C203, psi, min.	50

(1) R-values are consistent with criteria of ASTM C578 and the requirements of the FTC R-value rule (16 CFR Part 460).

(2) Vertical compressive strength is measured at 10 percent deformation or at yield, whichever occurs first.

(3) Based on 1" thickness.

\*R means resistance to heat flow. The higher the R-value, the greater the insulating power. R-value determined by ASTM C518.

- Calif. Std. Reg. # CA T064 Florida Building Code FL 3835
- Factory Mutual Approved – Subject to conditions of approval as a roof insulation when installed as described in the current edition of the FM Approval Guide

Contact your local Dow sales representative or local authorities for state and local building code requirements and related acceptances.

#### Physical Properties

STYROFOAM™ Brand Square Edge Insulation exhibits the physical properties indicated in Table 1 when tested as represented.

#### Environmental Data

STYROFOAM™ Brand Square Edge Insulation is hydrochlorofluorocarbon (HCFC) free with zero ozone depletion potential. STYROFOAM™ Brand Square Edge Insulation is reusable in many applications.

STYROFOAM™ Brand Insulation products produced in North America contain an average of 20% pre-consumer recycled content certified by UL Environment Inc.

#### Fire Information

STYROFOAM™ Brand Square Edge Insulation is combustible; protect from high heat sources. A protective barrier or thermal barrier may be required as

specified in the local building codes. For more information, consult MSDS, call Dow at 1-866-583-BLUE (2583) or contact your local building inspector.

#### 5. INSTALLATION

STYROFOAM™ Brand Square Edge Insulation boards are easy to handle, cut using a utility knife or serrated blade, and install. The square edge boards are designed to ensure energy efficiency and minimize on-site cutting and waste. Use a polystyrene-compatible adhesive to hold the boards in place during backfilling. Apply caulk or mastic to the top of the board to prevent water infiltration behind the insulation. To complete the installation, parge the above-grade portions of STYROFOAM™ Brand Square Edge Insulation to protect from solar radiation.

It is recommended that any masonry irregularities or jagged surfaces on the foundation wall or slab be removed prior to installation. Below-grade walls should be protected from moisture leakage and dampness prior to installation of STYROFOAM™ Brand Square Edge Insulation. Code approved drainage systems should be installed. Ensure foundation drainage meets local codes.

Visit [www.dowbuildingsolutions.com](http://www.dowbuildingsolutions.com) or contact a local Dow representative for more specific instructions.

#### 6. AVAILABILITY

STYROFOAM™ Brand Square Edge Insulation is distributed through an extensive network. For more information, contact your local Dow representative or call 1-800-232-2436.

#### 7. WARRANTY

In the United States, a 50-year thermal limited warranty is available on STYROFOAM™ products 1.5 inches and greater. For thickness less than 1.5 inches, other warranties may apply. Warranties are available as described at <http://building.dow.com/na/en/tools/warranty.htm>

#### 8. MAINTENANCE

Not applicable.

#### 9. TECHNICAL SERVICES

Dow can provide technical information to help address questions when using STYROFOAM™ Brand Square Edge Insulation. Technical personnel are available to assist with any insulation project. For technical assistance, call 1-866-583-BLUE (2583).

#### 10. FILING SYSTEMS

[www.dowbuildingsolutions.com](http://www.dowbuildingsolutions.com)  
[www.sweets.com](http://www.sweets.com)



#### The Dow Chemical Company

Building Solutions  
200 Larkin • Midland, MI 48674

#### US

Technical Information: 1-866-583-BLUE (2583)  
Sales Information: 1-800-232-2436

[dowbuildingsolutions.com](http://dowbuildingsolutions.com)

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**CAUTION:** This product is combustible and shall only be used as specified by the local building code with respect to flame spread classification and to the use of a suitable thermal barrier. For more information, consult MSDS, call Dow at 1-866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 1-989-636-4400.

**WARNING:** Rigid foam insulation does not constitute a working walkable surface or qualify as a fall protection product.

Building and/or construction practices unrelated to building materials could greatly affect moisture and the potential for mold formation. No material supplier including Dow can give assurance that mold will not develop in any specific system.



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### AT THE CORE OF YOUR SUCCESS®



Atlas EPS understands that in a manufacturing environment, your process depends on our products performing the same day after day, year after year. Each manufacturing facility uses state of the art vacuum molding technology to assure the most consistent materials, proprietary cutting technology to deliver precise thickness, and customized packaging to fit your manufacturing needs. Density and recycle content combinations are discussed so we fully understand the critical aspects of your product, and product codes assure the same agreed material type is used each time. This is Integrity®.

### THERMAL RESISTANCE R-3.9 to R-4.4 per inch

R means resistance to heat flow. The higher the R-value, the greater the insulation power.

### PRODUCT DESCRIPTION

Integrity® EPS is rigid insulation available in various combinations of density, ASTM types and recycle content. The ASTM Engineered series of products are manufactured to **meet the requirements** of ASTM C578 Standard Specification for Rigid Insulation.

- Industry-leading consistency and delivery
- Virgin expandable polystyrene resin, no recycled content added
- Smooth surface
- Flame retardant grade, meets ASTM E84 < 25 flame spread
- UL Listed
- Contains no CFCs, HFCs or HCFCs — **only air** in the insulating cells
- ROHs and REACH compliant, contains no HBCD
- Closed-cell construction

Table 1 — Physical Properties

Property & ASTM Test Method	ASTM Engineered Solutions					
Product ID	101-00	121-00	151-00	201-00	251-00	351-00
Compressive Strength (minimum psi) @ 10% deformation <sup>1</sup> D1621	12	15	20	30	45	60
R-value per inch (minimum) at 75°F mean temperature C518	3.9	4.0	4.2	4.2	4.2	4.4
ASTM classification C578	Type I	Type VIII	Type II	Type IX	Type XIV	Type XV
R-value per inch (minimum) at 40°F mean temperature C518	4.2	4.3	4.6	4.6	4.6	4.8
R-value per inch (minimum) at 25°F mean temperature C518	4.4	4.5	4.8	4.8	4.8	5.0
Coefficient of linear expansion C578 (in/in/°F)	.000035	.000035	.000035	.000035	.000035	.000035
Flexural Strength (minimum psi) C203	27	33	42	55	65	90
Water absorption % by volume, maximum after 24 hour immersion C272	2.5	2.0	2.0	1.5	1.5	1.5
Water vapor permeance at 1" thick (perms) — typical E96	4.0	3.5	3.0	2.5	2.5	2.0
Surface burning — flame spread and smoke developed E84	FS < 20, SD < 400					
Maximum use temperature	Short term (10-15 minutes) 180°F Long term 165°F					

<sup>1</sup> Integrity EPS is elastic within 1-2% deformation.

### INSTALLATION & HANDLING

Integrity ASTM Engineered EPS is used in some structural products such as SIPS, and must be separated from the interior occupants of a building by a 15 minute thermal barrier. Exceptions can be found in ICC-ES Report ESR-1962, UL ER16529.1.

### DENSITY

OEM products are commonly ordered via nominal density (1#, 1.5#, 2#) etc. Construction products are commonly specified via ASTM C578 Types. While C578 includes minimum density requirements, most OEM applications require engineered solutions, where strength and surface dictate performance and adhesive application consistency. Other Integrity series of products may work in your application.

## CODE COMPLIANCE

Integrity ASTM Engineered EPS complies with the model building codes when properly installed:

- Surface burning — UL BRYX.R16529
- Cal Std Reg #CA472
- International Energy Conservation Code
- ASTM C578 — see product marking for Type
- International Residential Code (IRC) — ICC-ES Report ESR-1962, UL ER16529.1
- International Building Code (IBC) — ICC-ES Report ESR-1962, UL ER16529.1
- CAN/ULC S102.2, S701 — ULC BOZCC.R16529

## QUALITY ASSURANCE SYSTEM

Atlas EPS utilizes the best practices of ISO-9001, while remaining agile enough to customize solutions for each client. Fitness for use is assured through initial product sampling, process inspection, and ERP backed specifications for every single product you buy. If an issue arises, root cause and corrective action are completed with a goal of not more than 72 hour turnaround.

## SAFETY

SDS for this product available at [www.atlaseps.com](http://www.atlaseps.com). Dust generated from sanding or cutting Integrity EPS should be avoided using a dust mask as with other building materials. Integrity EPS is combustible and the product should be protected from ignition sources such as open flames or welder's torch. Applications not specifically listed in ICC-ES Report ESR-1962 or UL ER16529.1 require permanent separation of Integrity EPS from the interior of the building by a thermal barrier such as drywall or concrete for fire safety.

## MOLD RESISTANCE

Integrity EPS has been tested against 4 week exposure to various mold and fungi via ASTM G21, D3273, and C1338 with no growth of spores on the product. Integrity EPS provides no nutritive value for mold. However, construction practices greatly impact mold growth, and fungi have been known to even grow on glass.

The most current version of this document can be found at [www.IntegrityComponentSolutions.com](http://www.IntegrityComponentSolutions.com)



## ENVIRONMENTAL

Integrity EPS uses air in the insulating cells, emitting no gasses. Integrity EPS is readily accepted for recycle at many drop off locations. Visit [www.epspackaging.org](http://www.epspackaging.org) to locate a drop-off location nearest you.

## CHEMICAL & PHYSICAL PROPERTIES

Table 1 lists the physical properties of Integrity EPS. Chemical resistance is listed in Table 2. Contact Technical Services for compatibility of materials not listed.

**Table 2 — Chemical Compatibility of Integrity EPS**

Inorganic Acids (Muriatic, Sulfuric, Boric Acid)	Excellent
Organic Acids (Carbolic, Citric, Acetic Acid)	Good
Bases (Sodium Hydroxide, Potassium Hydroxide, Ammonia)	Excellent
Alcohols (Methanol, Ethanol, Isopropyl Alcohol)	Good
Beer, Tea, Coffee, Carbonated Soda, Water, Fruit Juice	Excellent
Household Liquid Spray Insecticides (non-aqueous)	Poor
Cement	Excellent
MEK, Methylene Chloride, Acetone	Poor
Antifreeze (Ethylene Glycol — Green, Propylene Glycol — Orange)	Excellent
Hydrocarbons (Hexane, Gasoline, Diesel, Kerosene)	Poor
Mineral Oil	Excellent
Other Oils (Corn, Motor, Palm, Coconut Oil)	Good
Agricultural (Manure, Feed, Urine, Soil, Fertilizer)	Excellent
Formaldehyde, Turpentine, Chloroform, Naphtha)	Poor
Salts (Ammonium, Ferrous, Sodium Chloride, Sulfur)	Excellent
MDI-based Adhesive (Gorilla Glue, Fast-Tac, Dow Great Stuff)	Good
Bleach, Detergents, Borax	Excellent
Cured Mastic, Construction Adhesive, Hardened Asphalt	Good
Wherever XPS insulation is used	Excellent

Excellent = No degradation, no effect from exposure  
Good = some effect from exposure, but not significant for product performance  
Poor = significant degradation affecting performance, up to completely dissolving product  
This table is a guide only — consult Atlas Technical Services for specific chemical design questions

**CLIENT:** **Plascore**  
615 N. Fairview Street.  
Zeeland Michigan, 49464-0170

**Test Report Number :** **TJ6043-2-B**

**Date:** **July 8, 2019**

**SAMPLE ID:** The client identified the following test material as:  
Plascore-30 Panel Assembly (opaque skin)

**SAMPLING DETAIL:** The F10E coating was witnessed by Daniel Barnett of QAI on May 29th, 2019 in accordance with section 3.3 of ICC-ES AC85. The coating was applied at 18 Wet film thickness by a single application. The coating was applied at the QAI facility. The coating was sampled per section 3.1 of AC85.

**DATE OF RECEIPT:** Samples were received at QAI facilities on: February 26, 2019

**TESTING PERIOD:** Tuesday, June 11, 2019

**AUTHORIZATION:** Testing was authorized by Sandy Gump for proposal 19SP031102 signed March 11, 2019.

**TEST REQUESTED:** Perform standard flame spread and smoke density developed classification tests on the sample supplied by the Client in accordance with ASTM E2768 - 11 "Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials ( 30 min Tunnel Test)".

**TEST RESULTS:**

**Flame Spread**  
**0**

**Smoke Developed**  
**50**

**CONCLUSION:** When tested in accordance to ASTM E2768-11 the tested material resulted in a Class 'A during the first 10 minutes of the test with a maximum flame spread of: 8 feet from the burner during the 30-minute flame exposure. The product met the above specification for Ignition Resistant Material.

**Prepared By**



Hunter Hoffman  
Fire Technician

**Signed for and on behalf of  
QAI Laboratories, Inc.**



J. Brian McDonald  
Operations Manager





**SCOPE:** This fire-test-response standard is used for the comparative surface burning behavior of building materials is applicable to exposed surfaces such as walls, ceilings and others. The test is conducted with the specimen in the ceiling position with the surface to be evaluated exposed face down to the ignition source. The material, product, or assembly shall be capable of being mounted in the test position during the test. Thus, the specimen shall either be self-supporting by its own structural quality, held in place by added supports along the test surface, or secured from the back side. The purpose of this test method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke developed index are reported. However, there is not necessarily a relationship between these two measurements.

**USE:** The use of supporting materials on the underside of the test specimen has the ability to lower the flame spread index from those which might be obtained if the specimen could be tested without such support. These test results do not necessarily relate to indices obtained by testing materials without such support.

Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place.

*This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire-hazard or fire-risk assessment of the materials, products, or assemblies under actual fire conditions.*

**PROCEDURE:** A brief overview of the method is as follows: The test specimen, a material between 20 and 24 inches in width by 24 feet +/- 12 inches in length is loaded onto the water cooled ledge of the fire test chamber when tested to ASTM E84 or CAN/ULC-S102. If tested to CAN/ULC-S102.2 the specimen is tested on the chamber floor. The inside dimensions are 17 3/4 inches +/- 1/4" wide by 12 inches +/- 1/2" deep by 25 feet long. The fire test chamber is a rectangular horizontal duct with a removable lid. The sides and base of the chamber are lined with an insulated firebrick with pressure tight observation windows down one side for a technician to observe flame progression during the duration of the 10-minute test period. The chamber lid is lowered into test position with non combustible concrete board placed between the specimen and chamber lid. A draft of 240 feet per minute which is maintained inside the test chamber throughout the test period by the means of an electronic fan afterburner and an electronically controlled damper door system located downstream of the test chamber in the exhaust ducting. The test is started when the test flame is ignited at the front of the test chamber. An electronic photocell system located in the exhaust system downstream from the test chamber is used to plot the smoke developed for use in calculating the smoke developed index while a technician plots the flame spread distance used in determining the flame spread index. The test is run for the 10 minute duration in accordance to the method.

After the 10 minute test has completed, the test flames exposure on the specimen is continued for an additional 20 minute period with Maximum flame spread from the burner recorded. (See Diagrams in the Appendix of this report.)



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**PREPARATION AND CONDITIONING:**

The Sample Board material was delivered to QAI in 24 inches wide X 12 feet long X 4 inches thick Pieces. 18 wet mil thickness of FireShell F10E was applied to the sample by the client.. Two of these Pieces were used for the test. (See Photos in Appendix of this report). The specimen was placed in the conditioning room (maintained at  $70 \pm 5^\circ$  F and a relative humidity of  $50 \pm 5\%$ ) for a minimum of 72 hours prior to testing.

**MOUNTING METHOD:**

The test ready sample consisting of two pieces measuring 24 inches wide X 12 feet long and an overall test thickness of 4 inches were supported with metal rods spaced at 24 inch intervals and 2 inch hexagonal mesh to fulfill the chamber requirements for testing. Prior to testing the samples were covered with 1/4 inch cement board as required in the test method.

**ASTM E2768 TEST RESULTS:**

<b>CLIENT NAME:</b>	<b>Plascore</b>	<b>TEST DATE:</b>	6/11/2019
<b>SAMPLE ID:</b>	Plascore-30 Panel Assembly (opaque skin)		
<b>SAMPLE IGNITION:</b>	<b>00:14</b>	Minutes / Seconds	
<b>MAX FLAME FRONT:</b>	During 10-minute test	<b>0.0</b>	Feet From 4.5' Mark.
<b>MAX FLAME FRONT:</b>	During 30-minute test.	<b>8.0</b>	Feet From center line of Burner.
<b>TIME TO MAXIMUM SPREAD:</b>		<b>29:00</b>	Minutes / Seconds
<b>TEST DURATION:</b>		<b>30:00</b>	Minutes / Seconds
<b>SUMMARY:</b>	<b>FLAME SPREAD:</b>	<b>0</b>	<i>0 Unrounded</i>
	<b>SMOKE DEVELOPED:</b>	<b>50</b>	<i>48 Unrounded</i>

**OBSERVATIONS:**

Dripping was observed at 00:40. Flaming Dripping was observed at 22:15. Charring was observed at 00:14. Afterburn was observed at 30:01. Falling pieces was observed at 00:50. A Maximum Flamefront of 8 feet was observed at 29:00.



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**SUMMARY OF ASTM E84 / UL 723 RESULTS:**

Because of the possible variations in reproducibility, the results are adjusted to the nearest figure divisible by 5.  
Smoke Density values over 200 are rounded to the nearest figure divisible by 50.

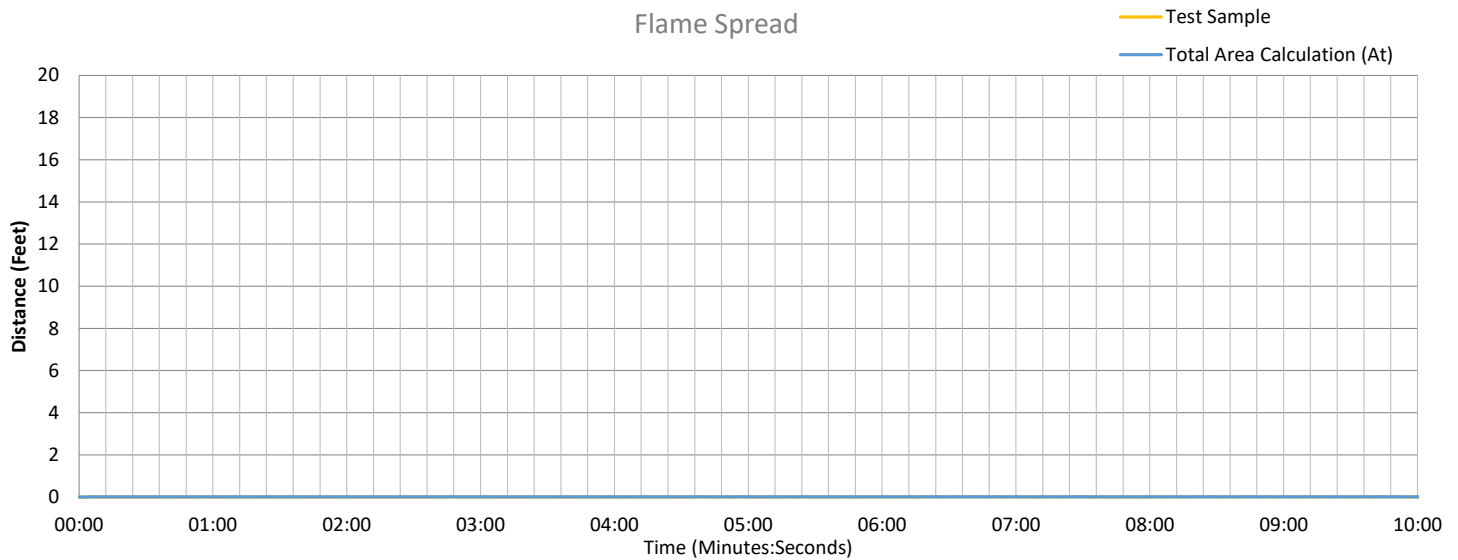
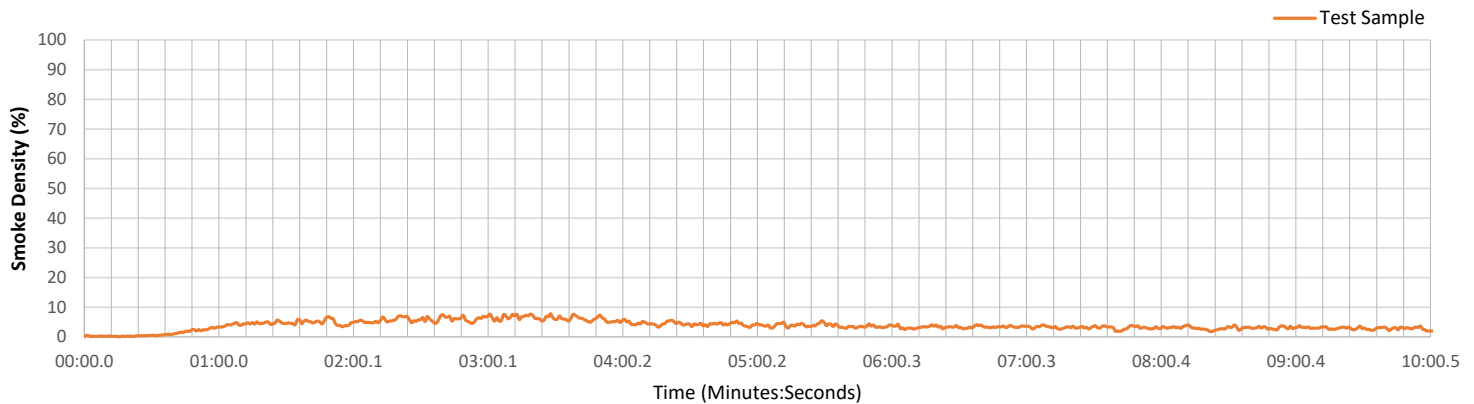
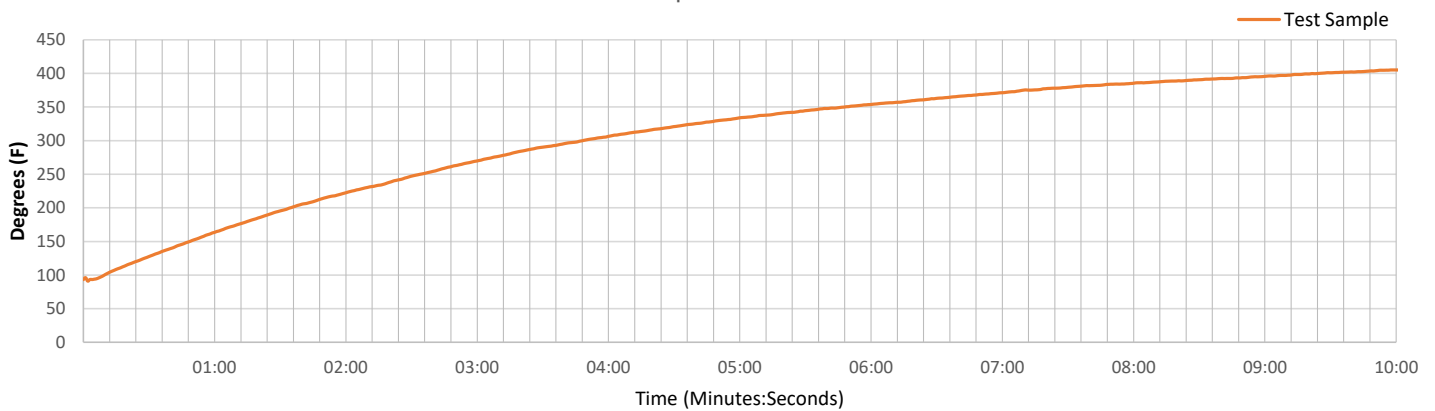
In order to obtain the Flame Spread Classification, the above results should be compared to the following table:

<b><u>NFPA CLASS<sup>1</sup></u></b>	<b><u>IBC CLASS<sup>2</sup></u></b>	<b><u>FLAME SPREAD</u></b>	<b><u>SMOKE DEVELOPED</u></b>
A	A	0 through 25	Less than or equal to 450
B	B	26 through 75	Less than or equal to 450
C	C	76 through 200	Less than or equal to 450

**BUILDING CODES CITED:**

1. National Fire Protection Association, ANSI/NFPA No. 101, "Life Safety Code"
2. International Building Code, Chapter 8, Interior Finishes, Section 803.



**RESULTS CONTINUED:****Flame Spread****Smoke Readings****Temperature**

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## APPENDIX

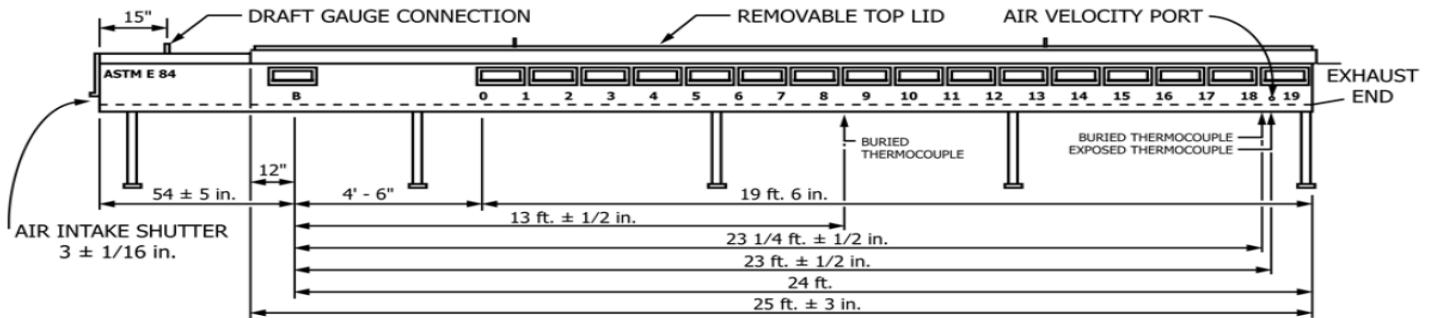


Diagram 1. Test Chamber side view showing critical dimensions.

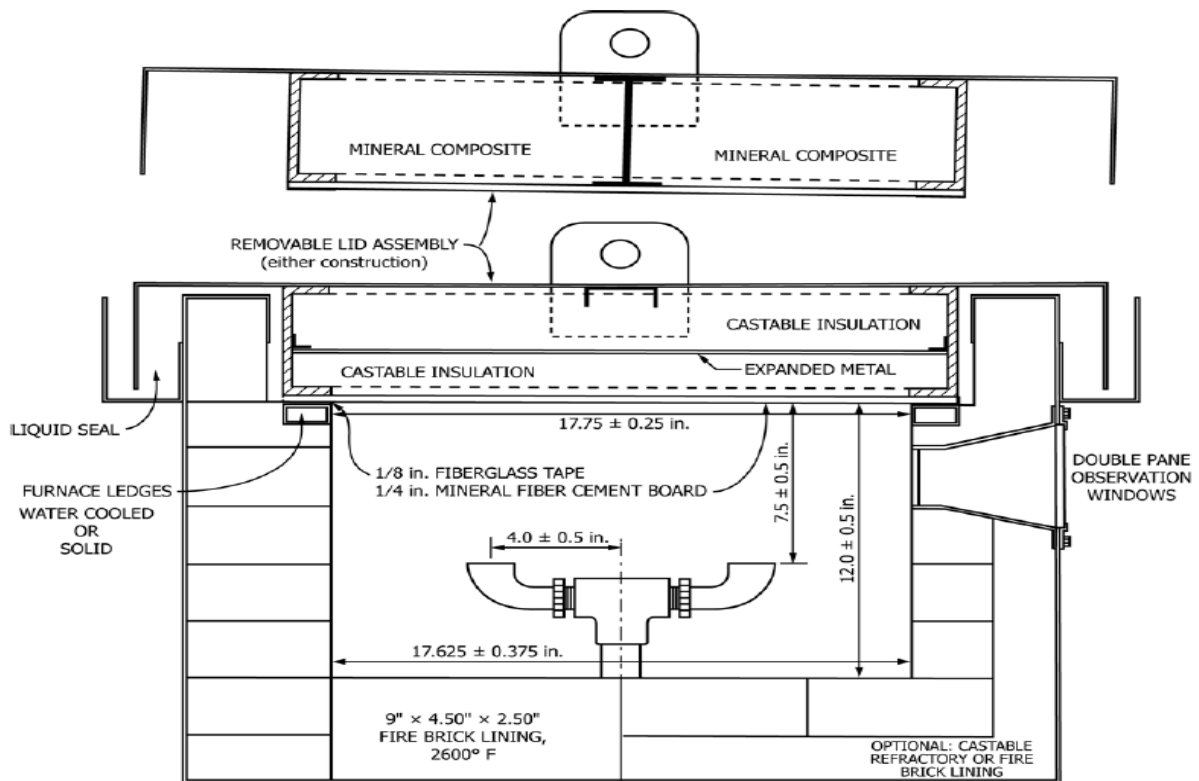


Diagram 2. Test Chamber looking down chamber showing critical dimensions.

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**APPENDIX**

**Photo 1. Surface of Specimen Tested**

\*\*\*<<END OF TEST REPORT>>\*\*\*