CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 07 21 00 SUBMITTAL NO. 162 CIANBRO CORPORATION: By: AJP Date: 02/12/2013	☒ 1 - Reviewed, No Exception Taken ☐ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other, Held for Record, Not Reviewed WBRC ARCHITECTS • ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication; processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: michael johanning DATE: 02-25-13

HEATLOK SOY® 200

Technical Data Sheet

Rigid, Spray-applied Polyurethane Foam Insulation
Zero Ozone Depletion Substance, Class I ASTM

HEATLOK SOY® 200 is two component spray applied rigid polyurethane foam, green in color, having a nominal density 2lbs/ft³. This spray foam has been specially formulated to meet the intent of the International Code Council (ICC) building codes and is used primarily as a moisture/vapor barrier, air barrier and thermal insulation on above and below grade interior and exterior applications. Complies with FEMA floodplain insulation requirements. Approved by the USDA for Incidental Food Contact.

HEATLOK SOY® 200 is environmentally-friendly foam developed from recycled plastic materials and rapidly renewable soy oils, while the blowing agent is the HFC 245fa. Certified Insulation Material approved by California Department of Consumer Affairs. *GREENGUARD* and *GREENGUARD Children and Schools* certified. Meets LEED requirements in various categories.

Physical Properties			
Method	**Description**	**Imperial units**	**Metric units**
ASTM D 1622-08	Density (core)	**2.1 lb/ft³**	**34 Kg/m³**
ASTM C 518-04	Aged Thermal Resistance, 180 days @ 23ºC (R-Value)	**R-7.4 @ 1 Inch, R-26.6 @ 4 inches**	**1.32 K·m²/W 4.55 K·m²/W**
ASTM D 1621-04a	Compressive Strength (10%)	**20.6 psi**	**142 kPa**
ASTM D 1623-09	Tensile Strength	**45.4 psi**	**313 kPa**
ASTM D 2126-09	Dimensional Stability @ 158ºF (70ºC), 97% R.H. (168 hrs, sample without any substrate) L/W/T	**% Change +4.9/+5.6/+7.7**	
ASTM D 2842-06	Water Absorption (Serves as moisture barrier and drain plane)	**0.3% Volume**	
ASTM E 96-05	Water Vapor Permeance @ 1.5" (Note: Is a vapor barrier per IBC Section 202, Definitions at 1.2".)	**0.79 perms**	**45.6 ng/Pa.sm²**
ASTM E 283-04	Air Permeance @ 75Pa @ 1" (Note: Air Barrier Association of America (ABAA) approved air barrier)	**0.004 L/sm²**	
ASTM E2178-03	Air Permeance @ 75Pa @ 1-1/2"	**0.001 L/sm²**	
ASTM E 84-09	Surface Burning Characteristics @ 4"thick • Flame spread index • Smoke development	**Class I 20 400**	
ASTM D 1929-01	Ignition Properties Spontaneous Ignition Temperature	**1004°F**	**540°C**
VOC Content	VOC Emissions from Polyurethane Foam Complies with GREENGUARD Children and Schools and LEED requirements	**Pass**	
ASTM C 1338-08	Fungi Resistance	**No fungal growth**	
ASTM D 2856	Closed Cell Content	**> 92%**	
ASTM D 6866-08	Bio-based Content (Rapidly Renewable Natural Content)	**3%**	
ASTM D 2863-08	Oxygen Index	**23%**	
ASTM E 2357-05	Air Leakage of Air Barrier Assembly (static loading to 600 Pa and gust loading to 1,200 Pa) Complies with ABAA requirements	**< 0.0022 L/sm² Pass**	

DEMILEC (USA) LLC® • 2925 Galleria Drive • Arlington, TX 76011
(817) 640-4900 phone • 1.877.DEMILEC (336-4532) toll-free • (817) 633-2100 fax
www.DemilecUSA.com • Info@DemilecUSA.com

HEATLOK SOY® 200 Technical Data Sheet

Fire Test Results		
NFPA 286	Compliant with 2006 IBC Chapter 2603.9, the 2006 IRC 314.6 (2009 IRC 316.6) and the ICC-ES AC 377, Appendix X, for use in attics and crawl spaces without a prescriptive ignition, thermal barrier or intumescent coating.	**Pass**
NFPA 285	Complies with the 2006 IBC Chapter 2603.5, Exterior Walls of Type I, II, III and IV buildings of any height.	**Pass**
NFPA 286	Complies with the 2006 IBC Chapter 803.1.2, Interior finish without a 15 min. thermal barrier with 4 DFT Blazelok TB 200 Primer and 8 DFT Blazelok TB 200 coating.	**Pass**

Recycled Content of Finished Foam	
Pre-Consumer Content = **9. 9%**	Post-Consumer Content = **4.7%**
Total Recycled Content = **14.6%**	

Liquid Components Properties		
Property	Isocyanate A 100	Resin B 200
Color	Brown	Blue
Specific gravity	1.24@ 77°F (25°C)	1.2-1.25@ 77°F (25°C)
Shelf life	1 Year	1 Year
Mixing ratio (volume)	100	100
Viscosity	180-220 cps @ 77°F (25°C)	350-500 cps @ 77°F (25°C)

See MSDS for more information.

Note: Store the resin at temperatures between 59 - 77°F (15 – 25°C). Keep away from direct sunlight.

Processing Parameters			**Recommended Processing Conditions**		
	Imperial units	**Metric units**		**Imperial units**	**Metric units**
Type of machine	Graco® Reactor E-30 with Fusion gun and 02 Mixing Chamber		**Mixing ratio A:B**	1:1	
Components A & B temperature	105°F	41°C	**Mixing temperature**	100 – 120°F	38 – 49°C
Components A & B pressure	850 – 1000 psi	5860 – 6900 kPa	**Mixing pressure**	800 psi	5516 kPa
Ambient temperature	73°F	23°C	**Substrate & Ambient temperature**	>23°F	>(-5)°C
Maximum Thickness per pass	2 in.	500 mm	**Curing temperature**	>23°F	>(-5)°C

Reactivity Profile			
Cream time	Gel time	Tack free time	End of rise
0-1 Seconds	3-4 Seconds	4-5 Seconds	5-6 Seconds

General Information: It is recommended that the foam is covered with an approved thermal barrier in accordance to the local and national building codes when used in buildings and a protective coating when used outside. This product should not be used when the continuous service temperature of the substrate is outside the range of -76ºF (-60ºC) to 176ºF (80ºC). Spraying too thick sections too fast may result in charring of the foam, or in extreme conditions a fire may result.

Disclaimer: The information herein is to assist customers in determining whether our products are suitable for their applications. We request that customers inspect and test our products before use and satisfy themselves as to contents and suitability. Nothing herein shall constitute a warranty, express or implied, including any warranty of merchantability or fitness, nor is protection from any law or patent infringement. All patent rights are reserved. The foam product is combustible and must be covered by an approved thermal barrier. Protect from direct flame and sparks contact. The exclusive remedy for all proven claims is replacement of our materials.

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HEATLOK™ SPRAY POLYURETHANE FOAM SOY-200

DEMILEC (USA) LLC.®

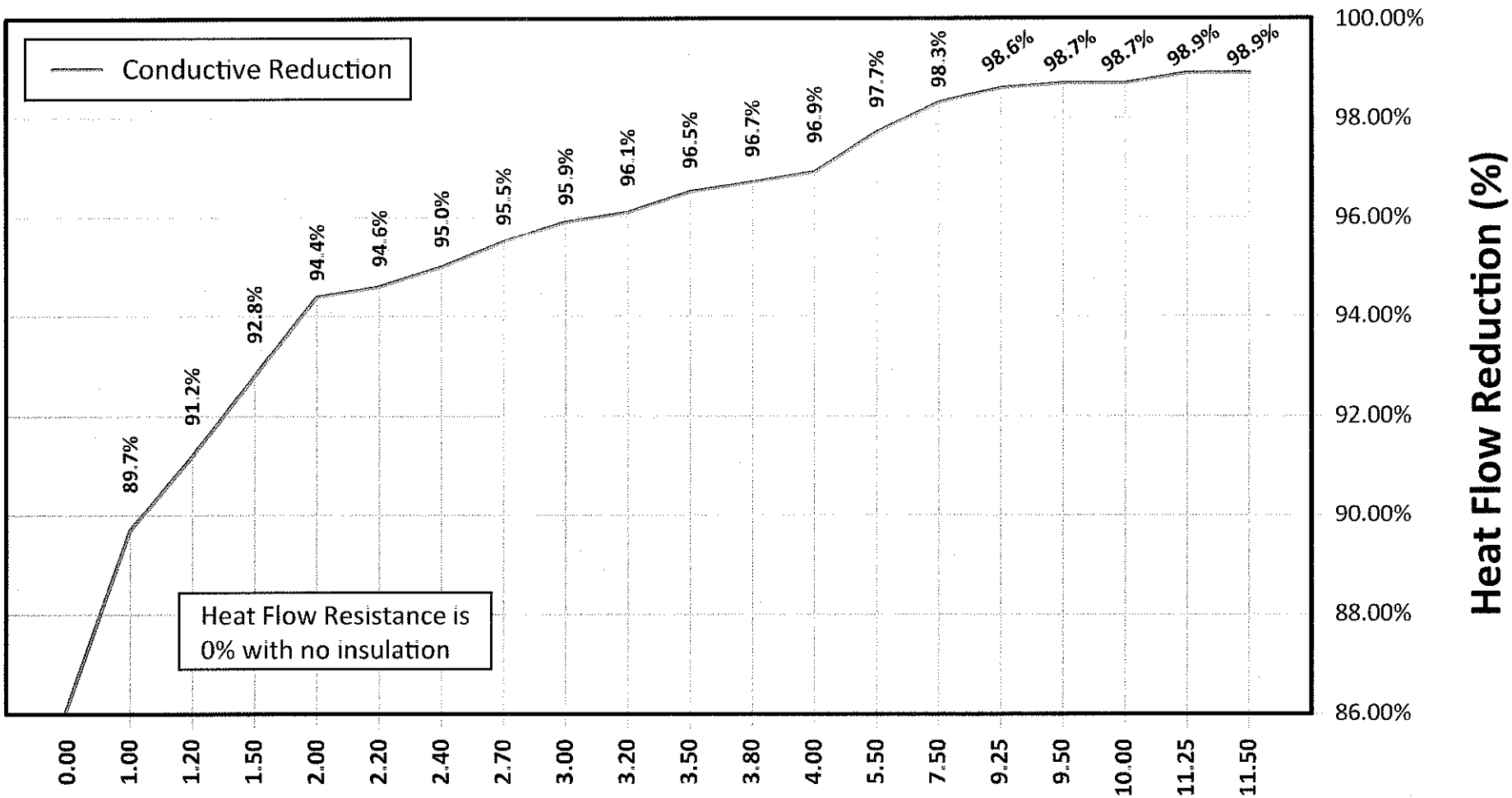
Heat Flow Resistance Data

Thickness (inches)	Outside Air Film	Inside Air Film	R-value	Heat Flow (kBtu)	Heat Flow Reduction
0	0.17	0.68	0	47,058.82	0.0%
1	0.17	0.68	7.4	4,848.48	89.7%
1.2	0.17	0.68	8.8	4,145.08	91.2%
1.5	0.17	0.68	10.9	3,404.26	92.8%
2	0.17	0.68	14.3	2,640.26	94.4%
2.2	0.17	0.68	15	2,523.66	94.6%
2.4	0.17	0.68	16	2,373.89	95.0%
2.7	0.17	0.68	18	2,122.02	95.5%
3	0.17	0.68	20	1,918.47	95.9%
3.2	0.17	0.68	21	1,830.66	96.1%
3.5	0.17	0.68	23.6	1,635.99	96.5%
3.8	0.17	0.68	25	1,547.39	96.7%
4	0.17	0.68	26.6	1,457.19	96.9%
5.5	0.17	0.68	36.5	1,070.95	97.7%
7.5	0.17	0.68	49.8	789.73	98.3%
9.25	0.17	0.68	61.5	641.54	98.6%
9.5	0.17	0.68	63	626.47	98.7%
10	0.17	0.68	66.4	594.80	98.7%
11.25	0.17	0.68	74.8	528.75	98.9%
11.5	0.17	0.68	76.4	517.80	98.9%

Based on a temperature delta of 40ºF and an insulated area of 1,000 ft^2

HEATLOK SPRAY POLYURETHANE FOAM SOY-200

Conductive Heat Flow Resistance



Insulation Thickness (inches)

Note: DEMILEC HEATLOK SOY™ 200 is an air-impermeable insulation and an air barrier when tested in accordance with ASTM E283, ASTM E2178 and ASTM E2357. It is a water resistive barrier when tested in accordance with ASTM E331. HEATLOK SOY™ 200 may be installed in attics and crawlspaces without a prescribed ignition barrier in accordance with NFPA 286 and the AC 377 Appendix X. See ICC-ES ESR 3210 for additional qualifications and compliances with the International Building and Residential Codes.

HEATLOK® SOY
SPRAY POLYURETHANE FOAM

DEMILEC (USA) LLC ®

Heat Flow Resistance Data

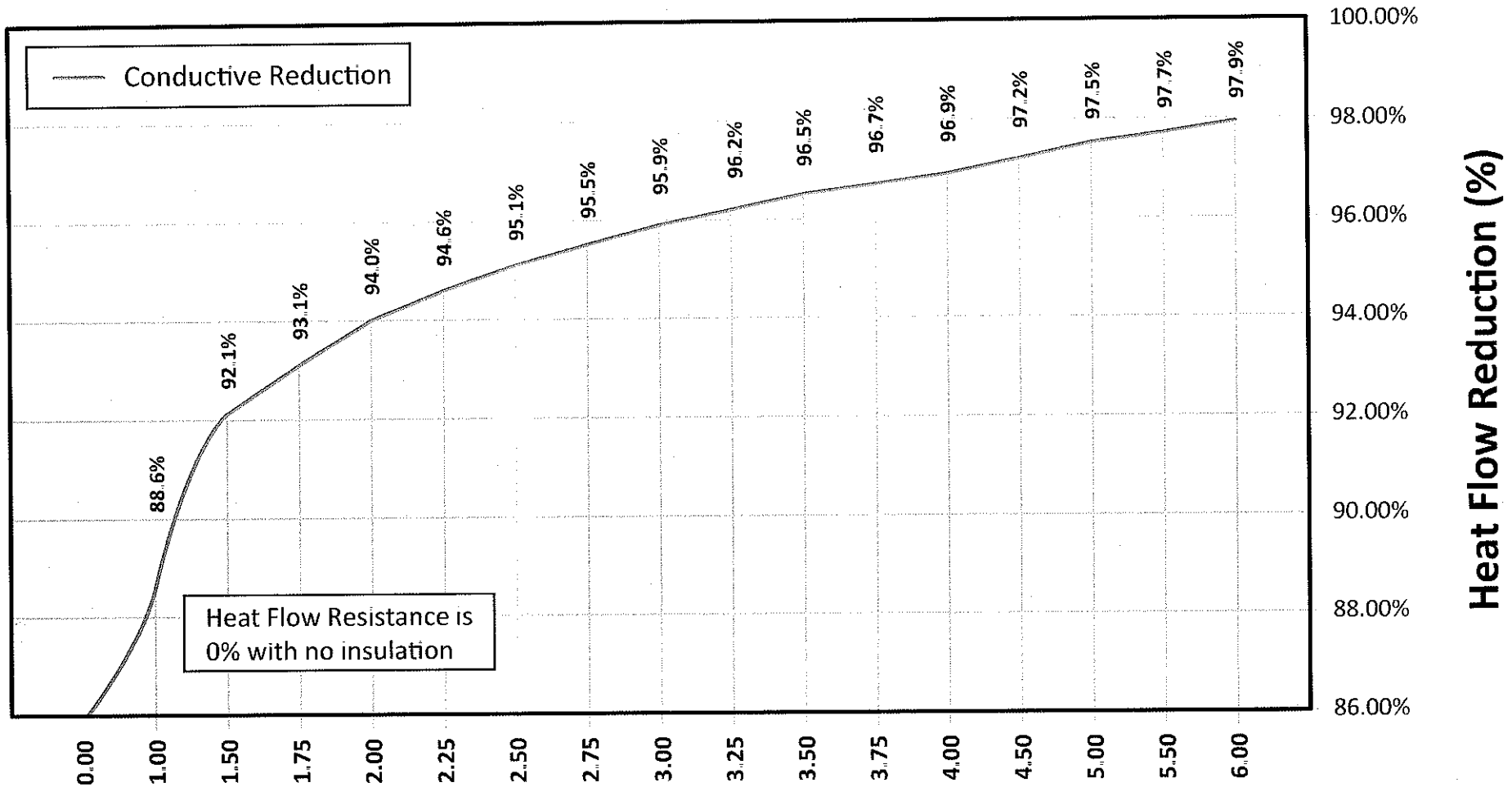
Thickness (inches)	Outside Air Film	Inside Air Film	R-value	Heat Flow (kBtu)	Heat Flow Reduction
0	0.17	0.68	0	47,058.82	0.0%
1	0.17	0.68	6.6	5,369.13	88.6%
1.5	0.17	0.68	9.9	3,720.93	92.1%
1.75	0.17	0.68	11.55	3,225.81	93.1%
2	0.17	0.68	13.2	2,846.98	94.0%
2.25	0.17	0.68	14.85	2,547.77	94.6%
2.5	0.17	0.68	16.5	2,305.48	95.1%
2.75	0.17	0.68	18.15	2,105.26	95.5%
3	0.17	0.68	19.8	1,937.05	95.9%
3.25	0.17	0.68	21.45	1,793.72	96.2%
3.5	0.17	0.68	23.1	1,670.15	96.5%
3.75	0.17	0.68	24.75	1,562.50	96.7%
4	0.17	0.68	26.4	1,467.89	96.9%
4.5	0.17	0.68	29.7	1,309.33	97.2%
5	0.17	0.68	33	1,181.68	97.5%
5.5	0.17	0.68	36.3	1,076.72	97.7%
6	0.17	0.68	39.6	988.88	97.9%

Based on a temperature delta of 40ºF and an insulated area of 1,000 ft²

HEATLOK SOY

SPRAY POLYURETHANE FOAM

Conductive Heat Flow Resistance



Note: DEMILEC HEATLOK SOY™ is an air-impermeable insulation in accordance with the 2007 Supplement to the 2006 IRC, Chapter 2, Definitions, which defines an air-impermeable insulation as having an air permeance equal to or less then 0.02 L/s-m^2 at 75 PA pressure differential according to ASTM E 283.

DEMILEC (USA) LLC.®

BLAZELOK™ TB 200

Intumescent Coating

Technical Data Sheet

Product Description

BLAZELOK™ TB 200 is part of a water based, fire protection intumescent coating system. Eight mils of **BLAZELOK™ TB 200** and 4 mils of **Blazelok TB 200 Primer** applied over **HEATLOK SOY® 200** meets the 2006 and 2009 IBC®, 2009 and 2006 IRC® and the NFPA 101, Life Safety Code for use without a prescribed thermal barrier when tested in accordance with NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

ASTM E 84 **Flame Spread** **Smoke Developed**	 5 20
Protective Properties over Heatlok Soy® 200 (Per NFPA 286)	Complies with the 2009 IBC® 2603.9 and 803.2; 2009 IRC® 302.9.4 and 316.6; 2006 IRC® 314.6 and 315.4 and the NFPA 101 paragraph 10.2.3.7.2 for use without a prescriptive thermal barrier.
Flash Point	None
Volatility/VOC	<50g/l Meets all LEED, AQMD and EPA VOC requirements
Solvents	Water Based
Toxicity	Non-Toxic
Weight per Gallon	11 – 11.4 lbs.
Solids by Volume	63-66%
Color	Dull flat white. Caution: Do not add tint to the Blazelok TB 200.
Top Coating	Wait a minimum of 24 hrs prior to painting with a quality latex topcoat. Must be dry prior to top coating. Moisture meter recommended. Topcoat may be tinted per its manufacturer's instructions
Wet film / coat to dry film thickness (DFT) – spray	15 mils dry to 8 mils, nominal.
Recommended final DFT	8 mil to comply with the 2006 & 2009 IBC Section 803.2
Dry Times	Dry to touch – 1 hour, 2 hrs. between coats depending on humidity/temperature. Humidity above 50% RH has a significant impact on drying time.
Recommended Equipment	Graco® 695/ASM2100 3300 psi with spray gun tip model number RAC 521 or LTX 521 or larger. Hose size: use ¼" dia. last 50' to gun, additional lengths of hose use minimum 3/8" dia. to minimize pressure loss. Remove pump and gun filters prior to spraying.
Sag Resistance	Will not sag at required thicknesses.
Coverage	Up to 120 ft²/gallon at 8 mils DFT on a relatively smooth surface based on NFPA 286 test results. Coverage rates will be reduced on foam surfaces with large undulations or rough surfaces.
Minimum temperatures	Product pail temperature, 70°F Substrate temperature, 50°F Use infrared gun to confirm temperatures.
Priming for Thermal Barrier on Heatlok Soy® 200:	A 4 mil coat of Blazelok TB 200 Primer is required. Noncompliance with the code will result from use on any other primer.
Controlled High Humidity Environments	Contact Demilec's Engineering Department for technical assistance in applications involving controlled high humidity environments.
USDA Approvals	Acceptable for use as an "incidental food contact" material.

This product was developed and tested for use with Blazelok TB 200 Primer only. Note: Blazelok TB and Blazelok TB 200 are different formulations and are not interchangeable. Please contact your DEMILEC (USA) Technical Services Representative for assistance regarding the installation of this product.

TPR® It's In There. Fire Technology To A Higher Power

DEMILEC (USA) LLC.®

BLAZELOK™ TB 200 PRIMER

Thermal Barrier Primer for Blazelok TB 200 Coating

Technical Data Sheet

Product Description

BLAZELOK™ TB 200 Primer is part of a water-based, fire protection, intumescent coating system. Four mils of **BLAZELOK™ TB 200 Primer** along with an eight mil finish coat of **Blazelok™ TB 200** applied over **HEATLOK SOY® 200** meets the 2006 and 2009 IBC®, 2009 and 2006 IRC® and the NFPA 101, Life Safety Code for use without a prescribed thermal barrier when tested in accordance with NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

ASTM E84 *Flame Spread* *Smoke Developed*	 0 20
Protective Properties over Heatlok Soy 200 (as per *NFPA 286)*	Complies with the 2009 IBC® 2603.9 and 803.2; 2009 IRC® 302.9.4 and 316.6; 2006 IRC® 314.6 and 315.4 and the NFPA 101 paragraph 10.2.3.7.2 for use without a prescriptive thermal barrier.
Flash Point	None
Volatility/VOC	Zero
Solvents	Water Based
Toxicity	Non-Toxic & No Formaldehyde
Environmental Impact *(as per greenguide.com)*	EPA & SCAQMD & LEED compliant
Weight per Gallon	10.5 – 11.2 lb.
Solids by Volume	54-55%
Color	Gray.
Wet film / coat to DFT	7 mils dries to 4 mils, nominal.
Recommended final DFT	4mils
Dry Times	1-1/2 hrs. depending on humidity/temperature. Humidity above 50% RH has a significant impact on drying time. This primer may be over coated with Blazelok TB 200 immediately upon verification the primer is dry.
Changeover from Blazelok TB 200 Primer to Blazelok TB 200 Coating	*No flushing of equipment or hoses is required when changing from the primer to the finish coat. Use warm water to flush and clean equipment upon completion of spraying operation.*
Recommended Equipment	*Graco® 695/ASM2100 3300 psi with spray gun tip model number RAC 521* or LTX 521 *or larger. Hose size: use ¼" dia. last 50' to gun, additional lengths of hose use minimum 3/8" dia. to minimize pressure loss. Remove pump and gun filters prior to spraying.*
Sag Resistance	No sagging when sprayed at required wet thickness.
Coverage	Up to 170 ft²/gallon at 4 mils dry on a relatively smooth surface. Coverage rates will be reduced on foam surfaces with large undulations or rough surfaces.
Minimum temperatures	Product pail temperature, 70°F Substrate temperature, 50°F Use infrared gun to confirm temperatures.
Fungus/Mold Resistance	No mold growth per ASTM D 3273 test

This product was developed and tested for use with Blazelok TB 200 intumescent coating only. Please contact your Demilec USA Technical Services Representative for assistance regarding the installation of this product.

STYROFOAM™ Brand Spray Polyurethane Foam Insulation (RS Series)

Product Name

STYROFOAM™ Brand Spray Polyurethane Foam Insulation (RS Series)

Manufacturer

The Dow Chemical Company
Dow Building Solutions
200 Larkin
Midland, MI 48674
866-583-BLUE (2583)
Fax 989-832-1465

www.dowbuildingsolutions.com

Product Description

STYROFOAM™ Brand Spray Polyurethane Foam (RS Series) is a two-component, spray-applied polyurethane foam that creates a seamless, monolithic barrier against water vapor and air on the interior of stud walls. This closed-cell, 2-pcf spray foam is chlorofluorocarbon (CFC) free and successfully incorporates a zero ozone-depleting blowing agent.

STYROFOAM™ Brand SPF (RS Series) is available in three formulas:

RS 2030
30°F – 70°F Ambient Processing
30°F – 60°F Substrate Processing

RS 2045
45°F – 95°F Ambient Processing
45°F – 100°F Substrate Processing

RS 2060
60°F – 100°F Ambient Processing
60°F – 120°F Substrate Processing

Properties

STYROFOAM™ Brand SPF Insulation is created from a unique polyol technology, which offers improved foam yield and wide processing latitude. STYROFOAM™ Brand SPF Insulation expands during installation to fill cavities, cracks and crevices, helping prevent uncontrolled air leakage and helping maintain consistent, comfortable indoor temperatures. The foam serves as both an insulation and air sealant for a wide range of new and retrofit applications throughout the building envelope. In addition, STYROFOAM™ Brand SPF Insulation resists moisture and provides structural reinforcement for improved racking strength. STYROFOAM™ Brand SPF Insulation provides structural enhancement only. Use in conjunction with approved structural components and framing members consistent with local building code requirements.

STYROFOAM™ Brand SPF Insulation exhibits typical physical properties indicated in Table 1 when tested as represented.

Sizes

STYROFOAM™ Brand Spray Polyurethane Foam (RS Series) is sold in sets of 55 gallon drums (one A isocyanate and one B polyol blend). Contact your Dow sales representative with questions.

Technical Data

APPLICABLE STANDARDS

Applicable test methods include:

- ASTM C1029 – Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
- ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics
- ASTM D1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics
- ASTM D6226 – Standard Test Method for Open Cell Content of Rigid Cellular Plastics

Code Compliances

STYROFOAM™ Brand SPF Insulation complies with the following codes:

- Conforms to IBC/IRC requirements for foam plastic insulation
- Underwriters Laboratories, Inc. see UL 723
- Southwest Research Institute (SWRI), Classified Class A (ASTM E84)
- ICC ES AC377 Appendix X modified NFPA 286: Being exposed in attics and ceilings

Fire Protection

STYROFOAM™ Brand Spray Polyurethane Foam is combustible and may constitute a fire hazard. Do not expose foam to flame or temperatures above 240°F.

Safety and Conditions of Use

- Read the instructions and Material Safety Data Sheets carefully before use. The MSDSs are available at www.dowbuildingsolutions.com/na. Visit www.spraypolyurethane.com for information covering a wide range of topics, including an overview of SPF health and safety guidelines, suggested personal protective equipment (PPE), typical first-aid treatment, and regulations and information about “green” marketing.
- STYROFOAM™ Brand Spray Polyurethane Foam Insulation contains isocyanate, hydrofluorocarbon blowing agent and polyol. Do not breathe vapor or spray. Use only with a NIOSH-approved supplied air respirator (SAR) in accordance with your company’s respiratory protection program. Supplied air respirator or an approved air-purifying respirator equipped with an organic vapor sorbent and a P100 particulate filter is required to maintain exposure levels below ACGIH, OSHA, WEEL or other applicable limits. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure, air-supplying respirator (air line or self-contained breathing apparatus).
- Isocyanate is irritating to the eyes, skin and respiratory system, and may cause sensitization by inhalation or skin contact. Sensitization, or the development of asthma, can lead to permanent respiratory problems.
- STYROFOAM™ Brand SPF will adhere to most surfaces and skin. Do not get foam on skin. When spraying polyurethane foam, wear MDI-resistant chemical gloves (e.g., nitrile) or fabric gloves coated in nitrile, neoprene, butyl or PVC. Spray applicators should wear chemically resistant coveralls or full body suits with hoods and MDI-resistant fitted boots or booties. Professional judgment is necessary to determine the appropriate PPE necessary for secondary activities such as cleaning and trimming of the cured foam. Cured foam must be mechanically removed or allowed to wear off in time.
- The contents are under pressure.
- STYROFOAM™ Brand SPF should be installed by a trained SPF applicator.

Installation

Spray equipment must be capable of delivering the proper ratio (1:1 by volume) of polymeric isocyanate and polyol blend at adequate temperatures and spray pressures. Substrate must be at least 5 degrees above dew point, with best processing results when ambient humidity is below 80 percent. Substrate must also be free of moisture (dew or frost), grease, oil, solvents and other materials that would adversely affect adhesion of the polyurethane foam. Substrate temperatures should not exceed 60°F for STYROFOAM™ Brand SPF RS 2030.

Due to the exothermic reaction of the isocynate and polyol blend, mixed components should be applied in layers (maximum 2½" thickness per layer). Allow foam to cool completely before applying successive layers.

Contact a local Dow representative or visit www.dowbuildingsolutions.com for more specific instructions.

Table 1: Typical Physical Properties(1) of STYROFOAM™ Brand SPF Insulation (RS Series)

Property and Test Method	Value		
	RS 2030	RS 2045	RS 2060
Ambient (Substrate) Temperature Range, °F	30-70 (30-60)	45-95 (45-100)	60-100 (60-120)
Core Density, ASTM D1622, lb/ft^3	2.5	2.5	2.2
Compressive Strength, ASTM D1621, lb/in^2, parallel	25	25	20
Tensile Strength, ASTM D1623, lb/in^2, parallel	60	60	60
Closed-cell Content, ASTM D6226, %	>95	>95	>95
Thermal Resistance, ASTM C518, 75°F mean temp., R-value(2) per inch, ft^2•h•°F/Btu•in			
Aged value (90 days @ 140°F)	6.2	6.4	6.1
Water Vapor Permeability, ASTM E96, perm-inch	2.2	2.2	2.2
Water Absorption, ASTM D2842, % by volume	1.2	2.5	1.5
Dimensional Stability, ASTM D2126, max. % linear change			
At -20°F, ambient R.H., 7 days	-0.1	0.4	0.1
At 158°F, ambient R.H., 7 days	-2.0	2.2	3.0
At 158°F, 97% R.H., 7 days	Pass(3)	Pass(3)	Pass(3)
Surface Burning Characteristics(4), ASTM E84	Class A	Class A	Class A
Flammability, NFPA 286(4)			
Maximum foam thickness with code-approved thermal barrier			
Wall	12"	12"	12"
Ceiling	12"	12"	12"
Flammability, AC377 Appendix X (modified NFPA 286)(5)			
Maximum foam thickness uncovered			
Attics	10"	10"	10"
Crawl spaces	10"	10"	10"

(1) Not to be considered sales specifications. Properties determined by processing foam with Gusmer H2O/35 primary heater at 120°F (A,B), hose temperature of 120°F with GX7 gun; .028 drilled module with 70 PCD; dynamic pressures at 600 psi-1,000 psi.
(2) R means resistance to heat flow. The higher the R-value, the greater the insulating power.
(3) Pass AC377
(4) Flammability values for this or any other material are not intended to represent hazards that may be present under actual fire conditions.
(5) Attic and crawl space use limitations apply. Contact Dow at 866-583-BLUE (2583) for more information.

Storage and Shelf Life

STYROFOAM™ Brand SPF Insulation has a shelf life of six months when stored dry between 60°F and 90°F.* Avoid direct sunlight during shipping and storage on the job site. Artificial warming of drums is not recommended.

Exercise caution when opening the containers as pressure may be present when material has been exposed to elevated temperatures.

Ensure drums are capped after use. Empty drums are nonreturnable and should be disposed of by using current industrial practices in accordance with federal, state or local regulations.

Availability

STYROFOAM™ Brand Spray Polyurethane Foam (RS Series) is distributed through an extensive network. For more information, call 800-232-2436.

Technical Services

Dow can provide technical information to help address questions when using STYROFOAM™ Brand Spray Polyurethane Foam (RS Series). Technical personnel are available to assist with any insulation project. Call 866-583-BLUE (2583).

*SPF 2030 has a preliminary shelf life of three months. Extended shelf life testing results are pending.

COMBUSTIBLE: STYROFOAM™ Brand Spray Polyurethane Foam is combustible and may constitute a fire hazard. Do not expose foam to flame or temperature above 240°F. For more information, consult MSDS, call Dow at 866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 989-636-4400.

STYROFOAM™ Brand SPF Insulation contains isocyanate, hydrofluorocarbon blowing agent and polyol. Read the instructions and Material Safety Data Sheets carefully before use. Wear protective clothing, gloves, goggles or safety glasses, and proper respiratory protection. Supplied air or an approved air-purifying respirator equipped with an organic vapor sorbent and a P100 particulate filter is required to maintain exposure levels below ACGIH, OSHA, WEEL or other applicable limits. Provide adequate ventilation. Contents under pressure. STYROFOAM™ Brand SPF should be installed by a trained SPF applicator.

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.

a proud partner of

Habitat for Humanity®

www.dowbuildingsolutions.com

FOR TECHNICAL INFORMATION: 866-583-BLUE (2583)
FOR SALES INFORMATION: 800-232-2436

THE DOW CHEMICAL COMPANY

Dow Building Solutions • 200 Larkin • Midland, MI 48674

Printed in U.S.A.

Form No. 179-07751X-0510P&M

DEMILEC (USA) LLC.
POLYURETHANE SYSTEMS MANUFACTURER

August 2012

RE: ASTM C1029

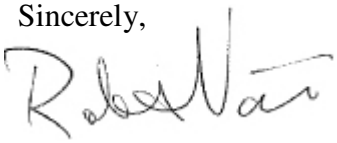
ASTM C1029 is a compilation of multiple physical properties tests that have been conducted individually on HEATLOK SOY® 200. This letter confirms that HEATLOK SOY® 200 meets the ASTM C1029 requirements as a Type I thermal insulation. The physical properties are shown below:

Property	Test Standard	HEATLOK SOY® 200
Density	ASTM D1622	2.1 lb/ft^3 (nom.)
Thermal Resistance	ASTM C518	7.4°F·ft2·hr/BTU
Water Vapor Permeability	ASTM E96	1.2 perm-in
Water Absorption	ASTM D2842	0.3%
Compressive Strength	ASTM D1621	20.6 psi
Tensile Strength	ASTM D1623	45.4 psi
Dimensional Stability	ASTM D2126	< 8%
Closed Cell Content	ASTM D2856	> 92%
Surface Burning Characteristics	ASTM E84	<25 FSI, <450 SDI

This data can be verified via the HEATLOK SOY® 200 Technical Data Sheet.

HEATLOK SOY® 200 is classified as Type I thermal insulation due to the compressive strength value of 20.6 psi, whereas Type II thermal insulation would have a compressive strength value of 25 psi or greater. Compressive strength is an important factor in applications where the foam is going to be subjected to a dynamic load environment such as an exterior roofing application. However, when installed in a wall, on the exterior of a building or under a roof the foam is in a very benign environment and compressive strength is not a significant design factor.

Sincerely,



Robert Naini
Director of Engineering
DEMILEC (USA) LLC®

Engineering Department
(817) 640-4900 Office • Fax (817) 633-2100 • Engineering@DemilecUSA.com
2925 Galleria Dr, Arlington, Texas 76011

Taking Technology to a Higher Power™

July 23, 2012

State of Maine
Department of Public Safety
Office of the State Fire Marshall
52 State House station
Augusta, Maine 04333-0052

RE: Demilec (USA) LLC's Blaze-Lok Products

Dear Sir/Madam:

Please be advised that TPR^2 Corporation manufactures for Demilec (USA) LLC, all of the products that Demilec (USA) LLC sells under their private label name of Blaze-Lok. The Blaze-Lok TB200 is a derivative of TPR^2 Corporation's Fireshell® F10E formula and the Blaze-Lok TB200 Primer is the same as TPR^2 Corporation's F1E formula. These products have passed NFPA 286 over Demilec (USA) LLC's Heat-Lok Soy closed cell foam as a thermal barrier system. The test report is attached hereto and made a part hereof.

If you have any questions please do not hesitate to contact us.

Very truly yours,

Peter S. Gummo

36 Plains Road, Essex, CT 06426 (Tel) 860-767-8772 (Fax)860-767-8779 www.tpr2.com

STATE OF MAINE
Department of Public Safety
Office of State Fire Marshal
52 State House Station
Augusta, ME 04333-0052

JOHN ELIAS BALDACCI
GOVERNOR

ANNE H. JORDAN
COMMISSIONER

JOHN C.DEAN
STATE FIRE MARSHAL

November 23, 2010

Memo

To: All Public Safety Inspectors

From: John Dean

Re: Thermal barriers over spray foam

This memo is to clarify the position of this office regarding the 15 minute thermal barrier required to be installed over spray foam insulation to separate the foam from habitable and occupiable spaces. Title 25 section 2447-B allows for ½" gypsum wallboard or equivalent to be installed to obtain this thermal barrier. At this time this office will recognize the following products as having achieved equivalency.

1. Cafco TB –415
2. Cafco TB-15
3. Flame Seal TB
4. TPR 2 Fireshell F10E
5. TPR 2 Fireshell F 1 E
6. International Fireproof Technology Inc. DC 315

These products can be used if installed as per the manufactures instructions, this also includes following the foam manufactures requirements for coating their product. This list can be amended as more products are tested and evaluated . Installers shall provide property owners a certification of correct installation of these products . A copy of the cut sheet and the certification shall be kept by the owner for verification of compliance

The following products may be used within an attic or crawl space where entry is only made for servicing of utilities without an ignition barrier as provided for by the above named statute

1. Gaco Western Wallfoam 183

John C. Dean
State Fire Marshal

Fire Technology To A Higher Power

2/25/11

To Whom It May Concern:

Demilec (USA) LLC and TPR Corporation entered into a Private Label Distribution Agreement dated as of December 30,2008 and the name Blaze-Lok™ is simply the private label name selected by Demilec for use as their private label name.

Sincerely,

Richard Barone
VP - TPR
36 Plains Rd
Essex, Ct 06426

CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 07 21 00 SUBMITTAL NO. 056 CIANBRO CORPORATION: By: BAC Date: 11/12/2012	☐ 1 - Reviewed, No Exception Taken ☒ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other, Held for Record, Not Reviewed WBRC ARCHITECTS • ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication; processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: MGC DATE: 11/20/12 Spray foam product is acceptable. Expansion joint product included in submittal is not relevant and is not reviewed.

ENERGY STAR PARTNER

PERMAX® SPRAY SYSTEM
RT 2045 SERIES

TECHNICAL INFORMATION

DESCRIPTION

RT 2045 is a technologically advanced HFC-245fa, sprayable polyurethane foam for walls, ceilings, and pipe.

TYPICAL PHYSICAL PROPERTIES

	ASTM Method	RT 2045-1.8	RT 2045-2.0
Nominal Density	D 1622	1.8 pcf	2.0 pcf
Compressive Strength	D 1621	22 psi	25 psi
Tensile Strength	D 1623	40 psi	50 psi
Shear Strength	C 273	35 psi	45 psi
Closed Cell Content (min.)	D 1940	90%	90%
K Factor (Aged 140°f @ 90 days) – 1"	C 518	0.1546	0.1548
R-Value (Aged 140°f @ 90 days) – 1"	C 518	R-6.466	R-6.459
K Factor (Aged 140°f @ 90 days) – 4"	C 518	0.1552	0.1603
R-Value (Aged 140°f @ 90 days) – 4"	C 518	R-6.441	R-6.242
Water Absorption (gm/cc)	D 2842	0.025	0.020
Water Vapor Transmission	E-96	1½"	1.269 Perms
		2"	0.859 Perms
Dimensional Stability			
158°F/100% RH	D2126		
ΔV 1 Day		5%	
ΔV 7 Days		7%	
ΔV 28 Days		10%	
-10°F/AmbientRH		±1%	

1. This information is intended only as a guide for design purposes. The values shown are the average values obtained from sprayed laboratory samples. The test methods were performed per the ASTM Book of Standards.

2. K Factor varies depending on age and use conditions.

NOTE: These products are intended for commercial, industrial, and residential projects, and should be applied by a licensed insulation contractor who has been specifically trained in the application of polyurethane foam products.

LIQUID COMPONENT PROPERTIES

Viscosity/Specific Gravity at 70°F	RT-2045-1.8	RT-2045-2.0
Component A (CPS)	200/124	200/124
Component B (CPS)	750 ± 50 CPS/1.22	850 ± 50 CPS/1.22
Mixing Ratio by Volume		
Component A (CPS)	50	50
Component B (CPS)	50	50

PROCESSING CHARACTERISTICS AND RECOMMENDATIONS

RECOMMENDED PROCESSING TEMPERATURES	**Preheater**
Component A	110-120°F
Component B	110-120°F
Hose	110-120°F

These temperatures are typical of those required to produce acceptable product using conventional Gusmer or Graco equipment. Environmental conditions may dictate the use of other temperature ranges. However, under no circumstances should a temperature of 140°F be exceeded. It is the responsibility of the applicator to determine the specific temperature settings to match the environmental conditions and his own equipment.

PROCESSING CHARACTERISTICS

Machine Mix at recommended temperatures*	**Winter**	**Regular**
Cream Time	1 sec.	2 sec.
Tack Free Time	On Rise	On Rise
Cure Time	4 Hours	4 Hours

The nominal physical properties reported were achieved using a Gusmer H-2000 Proportioner and GAP-Pro gun with #01 module with a static proportioner pressure setting of 1400 psi. New generation spray foams incorporating 245fa materials will require additional heat capacity to efficiently spray. Older equipment may be upgraded with "Arctic Booster Pack" heaters or minimum H-2000 proportioners are required to adequately pre-heat the components. Spray guns such as; D-gun, GAP-gun, GX-7, Fusion gun, or Probler guns fitted with smaller output tips (15-18 lbs/min.) for better spray control for stud wall applications at recommended processing temperatures are recommended.

RECOMMENDED SUBSTRATE TEMPERATURES

At time of application	**RT2045 Winter**	**RT2045 Regular**
Minimum	30°F	60°F
Maximum	80°F	120°F

For applications below 40°F, Resin Technology Company technical personnel should be consulted. At the lower end of the indicated temperature ranges, flash passes should be avoided.

SHELF LIFE

When stored in the original unopened container at 50°F-75°F, the shelf life of the components is six months. Temperature above 75°F decreases the shelf life.

FLAMMABILITY CHARACTERISTICS*

SURFACE BURNING CHARACTERISTICS

ASTM E-84*	4"-inches	6"-inches
Flame Spread*	20	20
Smoke	450	450

Sample Spray applied at 1/4" Cement Board.

UBC 26-1, (Standard Test Method to Determine Potential Heat of Building Materials).

	Density (lb/ft^3)	BTU per Board Foot
RT-2045	1.8	1,706
	2.0	1,895

*Note: This numerical flame spread and all other data presented is not intended to reflect the hazards presented by this or any other material under actual fire conditions.

CAUTION: Polyurethane foam produced from these materials may present a fire hazard if exposed to fire or excessive heat (i.e. cutting torches). The use of polyurethane foam in interior applications on walls or ceiling presents an unreasonable fire risk unless protected by an approved fire resistant thermal barrier with a finish rating of not less than 15 minutes. A code definition of an approved "thermal barrier" is a material equal in fire resistance to 1/2" gypsum board. Each firm, person, or corporation engaged in the use, manufacture, production or application of the polyurethane foams produced from these resins should carefully examine his end use to determine any potential fire hazard associated with such product in a specific use and to utilize appropriate precautionary and safety measures. Consultation with building code officials and insurance agency personnel before application is recommended.

FREIGHT CLASSIFICATION

B Component - Resin Compounds Item 46030, Class 55, NOIBN Non-Hazardous
A Component - Resin Compounds Item 46030, Class 55, NOIBN Non-Hazardous

Revised 02/2008

PROCESSING AND APPLICATION GUIDE

DESCRIPTION

This system is a sprayable closed cell rigid polyurethane foam system designed to insulate residential stud walls, ceilings, and sub-floor areas. Controlled Atmosphere (CA) produce storage buildings, metal buildings, commercial cold store, and freezer warehouses. The sprayed product results in a seamless, monolithic, and durable insulation system. Air leakage throughout the structure is sealed eliminating costly air flow where conventional insulation materials fail. Adhesion to most clean and dry building components provides an air tight seal, and in some installations will function as a vapor barrier.

Resin Technology spray systems are technologically advanced, sophisticated materials and should only be applied by qualified, experienced spray applicators.

SUBSTRATE PREPARATION

For Optimum results, surfaces to receive foam insulation should be clean and dry, free of dirt, oil, solvent, grease, loose particulates, and other foreign matter.

Plywood, OSB, and Structural Lumber (studs and joists); substrates shall be dry and free from contaminants, moisture, frost, and shall not have a moisture content above 15%. Generally a primer for these surfaces are not required. Heating of these surfaces during Winter conditions may increase adhesion.

Concrete Block and Poured in Place Concrete; Concrete must have a minimum 28 day cure and a moisture content below 15% to apply foam insulation. Residential footings, stemwalls, and basements generally do not require priming. Commercial CA structures, cold storage, and freezer buildings do require an appropriate primer to insure adequate adhesion where curing agents may have been used. Generally a two-component epoxy primer designed to seal and provide adhesion to concrete surfaces such as RTC Urebond V is recommended.

Painted Steel, Galvanized Steel, and Aluminum Panels: Check metal panels for surface oil used in the manufacturing process. This oil must be washed off and the surface clean and dry before priming or foaming. All aluminum and galvanized panels must be primed using a wash primer such as Cardinal 4860-420 (323-283-9335) or Sherwin Williams DTM Wash Primer. Washed and dry painted steel panel may not require priming. If a primer is required RTC-Acryprime – Substrate may be used. Metal panels are susceptible to condensate moisture forming on the ceilings, thus these surfaces must be checked prior to priming or foam insulation application.

SUBSTRATE TEMPERATURE

RT-2045-Series is formulated in two different reactivity profiles to meet varying substrate temperatures jobsite. It may be a requirement to provide supplemental heating when temperatures reach 40°f and below. Depending on relative humidity these products may be applied down to 20°f when adding heat.

Caution; in freezing conditions when adding heat to the spray area it may be a requirement to maintain an elevated temperature during the foam insulations cure cycle so extreme temperature drops to the "green" foam are not experienced which could cause shrinking or cracking. **When using fuel fired heating units the exhaust must be vented directly outdoors to prevent unsafe carbon monoxide conditions in the work area.** Electric heating units are recommended. All heaters must be turned off before the application of foam begins. RTC Technical Personnel should be consulted in all cases where application conditions are marginal.

On substrates where the moisture content cannot be determined, a suitable primer is recommended. Adhesion spray tests may be performed with insulating foam and the interface line checked upon cure for good cell structure and adhesion.

Climatic Conditions

Moisture in the form of rain, dew, frost can seriously affect the quality and adhesion of the insulating foam to the substrate or itself on new construction projects. RTC does not recommend the spraying of this system when the relative humidity (RH) exceeds 85%. When heating the interior of a building the RH can change dramatically and should constantly be measured.

Equipment

The proportioning equipment shall be manufactured specifically for heating, mixing, and spray application of polyurethane foam and be able to maintain 1:1 metering with a ±2% variance. All proportioners shall have adequate main heating capacity to deliver heated and pressurized materials up to 130°f. Heated hose shall be able to maintain pre-set temperatures for the full length of the application hose. Minimum 2:1 ratio feeder pumps are required to supply stored materials through minimum 1/2-inch supply hoses. Pressurized and heated tanks systems may be used if sized appropriately to provide adequate flow at maximum operating capacity and temperatures. **Caution; do not re-circulate the 'B' component for increased storage temperature as frothing or boil-over may occur at material temperatures above 60°f.**

Guns such as GX-7, D-gun, Gap-gun, Fusion-gun, Probler with tip size approximately 16 lbs. per minute are suitable for most residential applications. Commercial cold storage, freezer applications, and large metal buildings may be insulated with higher gun outputs.

Processing Temperatures

Recommended processing temperatures; 'A' Main 100-(110)-115°f, 'B' Main 130-(130)-135°f, Hose 110-(115)-120°f are critical settings to reduce viscosity to allow balanced pressure during spraying. Balanced chemical output pressures are important to producing good mix. Foam output pressures greater than 200 psi differential indicates either improper chemical temperatures, or worn gun/packing parts. Unequal pressures will cause poor chemical mixing through the module and uneven backpressure. A critical requirement for good spray mixing requires appropriate tip/module sizing for the proportioner and adequate heating capacity. Unequal pressure (>200 psi) can cause excessive pump wear.

Spraying

RTC does not recommend "flash passes" to very cold surfaces. Thin passes (1/4" or less) should be avoided. They may result in reduced yield and loss of adhesion. It is recommended that the design thickness be completed each day rather than partial application thickness.

This spray system should be applied in nominal uniform pass thickness of 1-inch, maximum pass thickness 3-inches. Application temperatures below 40°f may require reduction in application thickness. Additional thickness may be applied after a brief waiting period. Yield and in-place-density is dependent upon the temperature of the substrate, ambient air temperature, gun speed application, gun tip size, and the output of the proportioning unit. RT-2045-Series is designed to provide maximum yield when sprayed with full thickness (2") passes. Excessive pass thickness can reduce density and physical properties. No charring or inter-foam discoloration is observed when insulation material is applied with proper mixing at 3-inch lifts.

RT-2045-Series foam insulation shall not be applied over CPVC sprinkler pipe when pressurized for leak testing.

Vapor Barriers

The installation of minimal thickness of polyurethane foam insulation will provide an effective Air Barrier seal to reduce air migration traveling through the building walls when framing plates and windows are properly sealed. Economically driven projects may be specified with fiberglass insulation installed over the polyurethane foam to meet R-Value requirements. Combo System: If foam insulation is installed less than 2 1/2" to provide Air Barrier protection and fiberglass or another insulation material is installed to meet the R-Value requirements a vapor barrier **is required** on the interior side (warm side) of the structure to keep moisture accumulation out of the wall system. Without this protection mold may grow within the wall. An air barrier is required on the outside of the structure if less than 2 1/2" of foam is installed.

Air Barrier

The installation of a minimum of 2" of RT-2045-2.0 polyurethane insulation foam can provide an Air Barrier for many residential projects. 2" will not meet the insulation R-value requirements for most projects and added insulation is required. Depending upon geographic location, a vapor barrier will be required. Generally the vapor barrier is installed on the predominant warm side of the wall.

WARNING: POLYURETHANE FOAMS WILL BURN WHEN EXPOSED TO FIRE. Caution during application must be observed with signs posted for other trades, **"Caution Combustible Insulation, No Welding or Hot Work Allowed".** On a daily basis remove all debris and shavings from the job site leaving a clean work area.

Fire and Thermal Barrier

Polyurethane foam insulation may present a fire hazard if exposed to fire or excessive heat (i.e. cutting torches, arc welders). The use of exposed polyurethane foam in interior applications on walls or ceilings presents an unreasonable fire risk unless protected by an approved fire resistant thermal barrier with a finished rating of not less than 15 minutes. A code definition of an approved "thermal barrier" is a material equal in fire resistance to 1/2" gypsum board.

Some areas of construction may require a code approved "ignition barrier" such as attics and crawl spaces rather than a 15 minute Thermal Barrier. Consult with RTC Technical Personnel if you have questions regarding a specific application.

Storage of Raw Materials

All materials should be stored in their original containers and away from heat and moisture, especially after the seals have been broken and some materials have been used. Both components should be stored indoors, in drums, or in tanks jobsite at a temperature between 50°f and 75°f. Excessive low or high temperatures may decrease shelf life. Containers should be opened carefully to allow any pressure buildup to be vented safely. Extensive venting of the 'B' component may result in higher density foam and reduced yield. Materials stored at temperatures below 50°f will increase viscosity and application equipment may not be designed to reach spray temperature set points. Supply pumps and hose sizing must be of adequate size to provide adequate supply when materials are cold and have a higher viscosity.

SAFETY, HEALTH and TOXICITY INFORMATION

A material safety data sheet on this product is available from Resin Technology Company upon request. Users of this product should read and understand the MSDS before use.

Protective Equipment
Spraying of polyurethane foam results in the atomizing of the components to fine mist. Inhalation and exposure to the atomized particles should be minimized. The following protective equipment is recommended:

a. Fresh air full face mask or hood with fresh air source.
b. Fabric coveralls
c. Fabric gloves

Physical Examination of Personnel
All personnel to be employed in the spraying of these materials should have a complete physical examination prior to starting spray operations. Periodic checkups are recommended if the personnel continue to spray these materials. Personnel with the following conditions should avoid the spraying of these components:

a. Asthma or chronic bronchitis.
b. Chronic respiratory disorders.
c. Sensitization to chemical substances including polymeric isocyanates.

Outdoor Application Precautions
The area surrounding the spray operation should be protected from overspray and exposure of individuals not involved in the spray operations as follows:

a. Post warning signs a minimum of 100 feet from all work areas.
b. Close all air intake vents on air handling equipment on the building.
c. Limit spectators to a minimum.
d. No welding, smoking or open flame.

Indoor Application Precautions
Indoor applications are generally more hazardous than outdoor applications. All personnel in the spray area must be equipped with a fresh air supply mask or hood. Additional precautions include:

a. Seal off the work area from adjacent rooms and ventilation ducts.
b. Restrict the access of non-application personnel.
c. No welding, smoking or open flame.

Dermal Exposure
If a major splash or spill of the isocyanate component comes in contact with the skin, the affected area should immediately be washed with copious amounts of water from a safety shower or other water source. Contaminated clothing should be removed and the skin wiped with a clean dry cloth to remove residual isocyanate. The affected area should then be wiped with a 70% solution of rubbing alcohol (isopropanol) followed by repeated washing with soap and water. If a rash develops, a physician should be consulted immediately.

Eye Exposure
Splashes of either component into the eyes should be flushed immediately with copious amounts of water for at least 15 minutes. CONSULT TRAINED MEDICAL PERSONNEL IMMEDIATELY.

Inhalation
Symptoms of vapor inhalation are characterized by coughing, tightness in the chest, and shortness of breath. Excessive exposure can produce serious, possibly irreversible lung damage. Smoking in the area of application increases the risk of pulmonary injury and must be prohibited. High concentrations of isocyanate may cause symptoms and problems to appear immediately. However, chronic exposure may also lead to the same symptoms and problems. IF BREATHING HAS STOPPED, ARTIFICIAL RESPIRATION MUST BE PROMPTLY APPLIED. If breathing is short, oxygen (if available) should be administered by trained medical personnel. OBTAIN MEDICAL ATTENTION IMMEDIATELY.

Clean Up
Non flammable solvents should be used for clean up. Consult your solvent manufacturer for handling precautions.

Incompatible Materials
The isocyanate component (A component) is incompatible with strong bases, tertiary amines or water. These materials may cause rapid spontaneous polymerization with subsequent generation of heat and gas.

Decontamination of Spills
In the event of a major isocyanate spill, the area should be immediately evacuated. Only personnel equipped with appropriate respiratory and eye equipment should remain. If the spill occurs indoors, the area should be ventilated and leaking containers should be taken outdoors and the remaining isocyanate transferred to other containers.

The spill should be covered with sawdust, Ekoperl, vermiculite, fullers earth or any other oil-absorbed material. The area should then be treated with a dilute solution of ammonium hydroxide/detergent. The neutralized material should be swept up and placed in a suitable container. The material should then be disposed of by a standard method consistent with good industrial practice and accordance with environmental protection regulations in your area. Where permissible, sanitary landfill disposal is recommended.

Paint to Protect ™

International Fireproof Technology, Inc.

17528 Von Karman Ave. Irvine, CA 92614

Product Name:	DC 315 Fireproof Paint for Foam
Name of Company:	International Fireproof Technology, Inc.
Brand:	Paint to Protect ™
Address:	17528 Von Karman Ave. Irvine, Ca. 92614
Phone:	949.975.8588
Chemtrec Emergency No:	800-424-9300
Web Site:	www.painttoprotect.com
Email:	ptp@painttoprotect.com

Characteristics

Finish:	Flat
Color:	Off-White, Special orders DC 315 is available in gray
V.O.C.:	(47 g/l)
Volume Solids:	67%
Drying Time:	@ 77°F & 50% RH to touch 1-2 hours to recoat 2 to 4 hours
Type of Cure:	Coalescence
Flash Point:	None
Reducer/Cleaner:	Water
Shelf Life:	1 years (unopened)
Packaging:	5 & 55 gallon containers
Shipping weight:	5 gallon pail - 58 lbs. 55 gallon drum - 640 lbs.
Application:	Brush, roller, conventional and airless spray

Surface Preparation:

All surfaces to be painted must be clean, cured, firm, dry and free of dust, dirt, oil, wax, grease, mildew, and efflorescence. The quality of any paint job is only as good as the surface preparation that precedes the paint application. Our coating has excellent bonding characteristics and will adhere to most sound, clean, foam surfaces. Make sure the surface of the foam is free of gouges, holes, exposed cells, and that the surface is stable and not crumbling or deteriorated. If any such defects are found, repair them prior to proceeding.

Mildew: should be removed by scrubbing with a 25% solution of household bleach water. Tri-sodium phosphate (TSP) or common laundry powder such as Tide may be added to solution to assist removal.

Efflorescence: is a white powdery alkaline crystal growth sometimes found on plaster or masonry walls. It is a condition caused by excessive moisture in the walls forcing alkaline salts to the surface of the wall. Efflorescence must be removed and neutralized with an acidic solution (white vinegar works well).

Caution: The presence of efflorescence indicates that a moisture problem has occurred behind the wall at some point in time. If the source of excessive moisture is not corrected, the efflorescence will return and push any coating, including ours, off the wall.

Temperature: **DC 315** is water based coating which will freeze and become unusable at temperatures below 32° F. PROTECT FROM FREEZING DURING SHIPMENT AND STORAGE. Do not store material at temperatures below 50° F. Do not apply **DC 315** when ambient air and substrate temperatures fall below 50° F. Store at 50° F to 80° F.

Important: Humidity 65% and higher must use fans to move air for curing. High humidity may require longer cure times.

Material Preparation:

DC315 Fireproof Paint must be thoroughly mixed before application. Failure to do so will seriously compromise our coating's ability to perform. We recommend mechanical stirring with a high speed drill and a paddle appropriate for the size container you are working from. Contents should be stirred from the bottom up, making sure to scrape the bottom and sides with a paint stick as you go. Contents should be stirred to a creamy consistency with no lumps. Thinning is usually not needed. If paint has been exposed to high heat, water may evaporate from the plastic 5 gallon container. If the paint level is below 3 inches from the top of the container, add enough water to bring the level back up to within 3 inches from the top in order to ensure proper consistency.

DC315 is a water based product and slight thinning will not hurt the product, however, thinning increases the likelihood of not applying the proper thickness of paint, thus diminishing our product's fire proofing ability. Ultimately, it is your responsibility to make sure that the proper thickness of material has been applied so our product can do its job. Except for tinting with universal paint tint, never mix our product with other materials.

Cold Storage: Before applying DC 315 in cold storage please review pre-application check list. It is important that all wall and ceiling surfaces must clean and dry. Application and curing temperatures must be above 50º F and rising. Curing time is 7-11 days high humidity may require longer cure time.
Please be aware that condensation will occur in cold storage rooms when the temperature is warmer outside and the door is left open. When this happens moisture will form on the wall and ceiling surfaces. This will affect proper adhesion and performance of DC 315 if substrate is not dried before applying. **DC 315 is not washable.**

Freezer: Before applying DC 315 in freezers please review pre-application check list. It is important that wall and ceiling surfaces be completely clean and dry. The temperature of substrate needs to be above 50º F degrees. Application and curing temperatures must be minimum 50º F and rising. Curing time takes 7-11 days. To reduce cure time too approximately 5 days add fans for air movement and heaters. DC 315 is a water-base product and if the coating is not completely cured it will freeze and affect proper adhesion. **DC 315 is not washable.**

Humidity: Humidity 65% and high must place fans to circulate air so moisture will not develop on walls and ceiling, if walls are not dry before applying DC 315, this will affect proper adhesion and performance. High humidity may require longer cure times.

Testing:

- UL 1715 - Thermal Barrier
- NFPA-286 - Contribution to Room Combustibility
- ASTM E 84
- CAL 1350
- NSF/ANS1 51 Incidental Food Contact, USDA approved for ceiling, **DC 315 is not washable.**

Application Equipment:

DC 315 can be applied by brush, roller or airless sprayer.
Brushing: Use top quality polyester/nylon blend brushes such as those supplied by Purdy, Wooster, or equivalent.
Rolling: 3/8" polyester blend nap roller covers generally work well when applying DC 315 by roller.

Spraying:

Airless Spray Minimum:

PSI:	3000 PSI or higher or equivalent
Filter:	30 mesh, removal of filter is recommend from gun and machine
Hose:	1/4” diameter airless spray line for the first 50’ from pump and ¼” x 6’ whip
Tip:	517 – 531
GPM:	.95

For best results use, Hose: 3/8” diameter airless spray line for the first 50’ from pump and ¼” x 6’ whip and no filters gun and machine

For Smaller Jobs Residential and Small Warehouses

IMPACT SERIES
740

Pump:	(Titan) 740 Impact or equivalent
PSI:	3300 / 227
GPM:	.80
Tip:	517 – 531 or equivalent.
Filter:	30 mesh, removal of filter is recommend from gun and machine
Hose:	1/4” diameter airless spray line for the first 50’ from pump and ¼” x 6’ whip

Pump:	(Graco) Ultra Max II 795 Hi-Boy or equivalent
PSI:	3300 / 227
GPM:	.95
Tip:	517 – 531 or equivalent.
Filter:	30 mesh, removal of filter is recommend from gun and machine
Hose:	1/4” diameter airless spray line for the first 50’ from pump and ¼” x 6’ whip

Pump:	(SprayTex) GPX 130 or equivalent
PSI:	3300 / 227
GPM:	1.30
Tip:	517 - 531 or equivalent.
Filter:	30 mesh, removal of filter is recommend from gun and machine
Hose:	1/4” diameter airless spray line for the first 50’ from pump and ¼” x 6’ whip

For Best results: For all Jobs big or small

Pump:	(Graco) Mark 4 or 5 or equivalent
PSI:	3300 / 227
GPM:	1.35
Tip:	517 - 533 or equivalent.
Filter:	30 mesh, removal of filter is recommend from gun and machine
Hose:	3/8” diameter airless spray line for the first 50’ from pump and ¼” x 6’ whip

For 55 gallon Drums

Pump:	(Graco) GH 300 or equivalent
PSI:	3300/ 227
GPM:	3.0 / 11.4
Tip:	517 - 537 or equivalent.
Filter:	30 mesh, removal of filter is recommend from gun and machine
Hose:	3/8” diameter airless spray line for the first 50’ from pump and ¼” x 6’ whip

Pump:	(Graco) GH 833 or equivalent
PSI:	4000/ 276
GPM:	3.0 / 11.4
Tip:	517 - 537 or equivalent.
Filter:	30 mesh, removal of filter is recommend from gun and machine
Hose:	3/8” diameter airless spray line for the first 50’ from pump and ¼” x 6’ whip

See test data for recommendations of mil thickness, or call the manufacturer for technical assistance.

Application Temperatures:

Temperature of substrate and application must be 50º F and rising. 68º to 90º F are recommended temperatures for applying. Do not apply if temperature will fall below 50º within two hours of application. It is the sole responsibility of the applicator to ensure that DC 315 has been applied in accordance with the application directions. Application should not proceed if surface or air temperatures exceed 90º F.

Workmanship:

General: Apply DC 315 fireproof paint according to manufacturer's written instructions. Use applicators and techniques best suited to the type of foam being applied. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable paint film. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces.

Coverage: Check Test report for square feet per gallon and mil thickness. Example at a rate of approximately 20 wet mils @ 80 square feet per gallon application. Dry film thickness (DFT) will be approximately 13 mils. The final (DFT) will vary and depends on the substrate of the specific assembles.

Curing time: 7-11 Days

Cleanup:

- ✓ At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- ✓ After completing painting, clean glass and paint-spattered surfaces.
- ✓ Remove spattered paint by proper methods. Be careful not to scratch or otherwise damage adjacent finished surfaces.
- ✓ Provide "Wet Paint" signs to protect newly painted finishes.
- ✓ After completing painting, remove temporary protective wrappings provided by others to protect their work.

Health & Safety

- ✓ All work carried out under this specification shall be in tradesman-like manner, with due regard to prevention of contamination of the site and associated work.
- ✓ Appropriate steps are to be taken to protect the health and safety of any person who has reason to be on the site.
- ✓ Refer to the governing Health and Safety regulations and minimize the hazards on site by using the proper trade approved equipment and techniques. Ensure supply and appropriate use of protective clothing and equipment.
- ✓ **Lead**: Existing coatings may contain lead. Test surfaces accordingly. All necessary precautions must be taken with existing painted surfaces that contain lead.
- ✓ **Asbestos**: Contractors need to comply with local regulations and guidelines before commencing any work on surfaces and substrates that may contain asbestos.
- ✓ Avoid contact with skin and eyes and avoid breathing of vapors and spray mist. Wear eye protection, dust mask and protective clothing when using. Open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, seek fresh air immediately. Wash thoroughly after handling. Close container after each use.

FIRST AID

- ✓ If swallowed, drink large amounts of water and get medical attention immediately.
- ✓ In case of eye contact flush with plenty of water and consult a physician immediately.

Check List Before You Start

- ✓ **Temperature** Is temperature within limits (60º to 90º F)?
- ✓ **Humidity** Is the relative humidity less than 85%?
- ✓ **Consistency** Are the contents thoroughly mixed?
- ✓ **Surface** Are all substrates clean, dry and sound?
- ✓ **Measurement** Wet film gauge on site?
- ✓ **Safety** Are Health and Safety checks complete?
- ✓ **Need help** Call 949.975.8588
- ✓ Correct spray tips –525 thru 529
- ✓ Airless sprayer with minimum 1.25 GPM

- ✓ Electrical power and at minimum 12 gauge extension cord
- ✓ 30 mesh machine & gun (if applicable) filters
- ✓ Power drill & mixer of appropriate size
- ✓ Drop cloths or poly sheeting
- ✓ Disposable gloves, mask, protective eyewear
- ✓ Clean metal flashing or equivalent for spray (or clean metal flashing)
- ✓ Portable fans to speed drying
- ✓ Space heaters as required to create conditioned space (=>68°f)
- ✓ Disposable paint brushes
- ✓ Work lights for tight areas
- ✓ Scaffolding (as required)
- ✓ Clean-up rags
- ✓ 2 five gallon pails for clean-up
- ✓ Dish detergent for clean-up 1-2 oz.

Measuring Wet Film Thickness

Figure 1

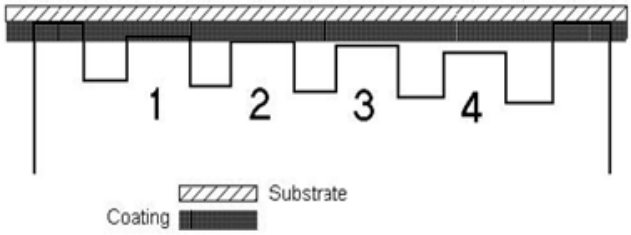


Figure 2

How do I use a wet film thickness (WFT) gauge?

A wet film thickness gauge is designed to give the spray operator immediate feedbacks as to the film build just sprayed. In most cases, measuring the dry film thickness (DFT) provides little information as it is usually measured a considerable amount of time after the actual spraying. Many things could have influenced the DFT: operator fatigue, ambient air temperature, coating temperature, etc.
There are several types of WFT gauges available. The most common being the notch gauge (see figure 1). Others types including the eccentric disk, the rolling notch gauge and the 6 sided gauges are available from specialty vendors.
There are several issues that must be addressed when using a WFT gauge.

- Technique
- Timing
- Reading with clear coats
- Creating surface defects

<u>Technique</u>

- When placing the gauge on a freshly painted part, the gauge must be placed 90 degrees to the part. The operator also needs to be aware of variation of the surface that may influence the reading. For example, if the surface is not perfectly flat, one direction may give a more accurate reading than another.
- To use the WFT gauge, place the gauge directly on the wet finished part (see figure 2) and as described above. The notches will indicate the measured film thickness. For example, if the 1 and 2 mil notches are wet and the 3 and 4 notches are dry, then the measured thickness is between 2 and 3 mils (.002 to .003 inches)

<u>Reading with Clear Coats</u>

- A clear coating on a WFT gauge would be very difficult to read. The most common method of reading clear coats is to use the gauge as a stamp on a piece of absorbent (non-gloss) paper. Many companies use the stamp method as a way of documenting the WFT.

Creating Surface Defects

- After using a WFT gauge to check the film thickness, the material may not flow to hide the area where the gauge was used. If this creates an undesirable defect, place a small sample of the material in line with the operators normal spray path. This sample should be sprayed along with the part. The sample then may be checked for WFT or DFT (after curing)

Wet Mil and Dry Mil:

During Application, the wet film thickness should be checked using a wet film thickness gauge. To use the gauge insert the teeth into the wet DC 315 wet base coat, the last tooth to be coated indicates the thickness achieved. This is very important so you can achieve the required dry film thickness (DFT) of the specific assembly. During the drying process, DC 315 will shrink due to evaporation.

Below Wet Mil Film (WFT) and a Dry Mil Film (DFT) Chart when using DC 315

Wet Mil Film Thickness (WFT) Build Chart

- ✓ 5 Gal @ 4 Mils covers 2000 square feet @ 400 square feet per gallon
- ✓ 5 Gal @ 18 Mils covers 450 square feet @ 90 square feet per gallon
- ✓ 5 Gal @ 20 Mils covers 400 square feet @ 80 square feet per gallon
- ✓ 5 Gal @ 22 Mils covers 365 square feet @ 73 square feet per gallon

Dry Mil Film Thickness (DFT) Build Chart

- ✓ 5 Gal @ 3 Mils covers 2000 square feet @ 400 square feet per gallon
- ✓ 5 Gal @ 12 Mils covers 450 square feet @ 90 square feet per gallon
- ✓ 5 Gal @ 13 Mils covers 400 square feet @ 80 square feet per gallon
- ✓ 5 Gal @ 15 Mils covers 365 square feet @ 73 square feet per gallon

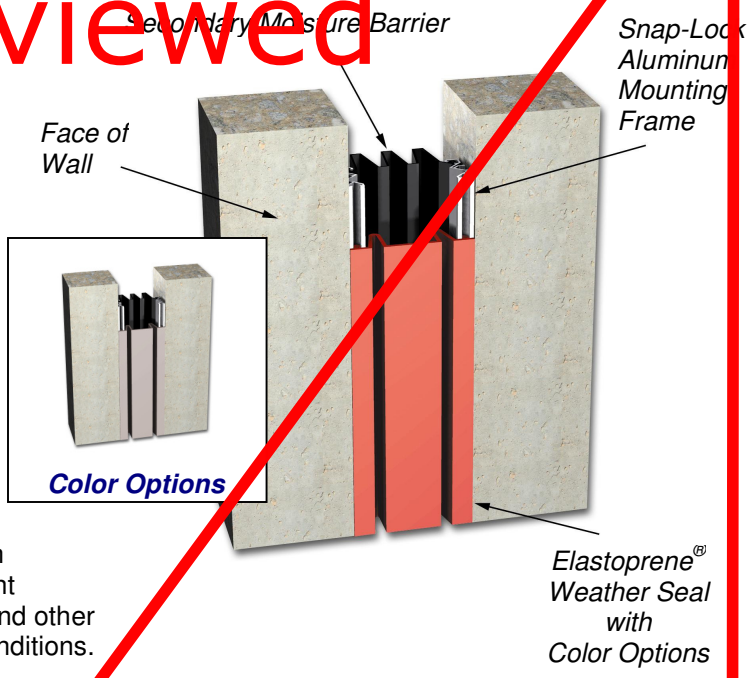
MM® Vertical Sealing System

SPEC DATA

MM Systems Corp. • 50 MM Way, Pendergrass, GA 30567 • 866.506.6929 • www.mmsystemscorp.com

DESCRIPTION

The Vertical Sealing System is a high performance expansion joint sealing system for vertical applications. A continuous elastoprene seal is snap locked into two aluminum frames securing it directly to the vertical opening. A secondary moisture barrier provides additional protection against water penetration.



BASIC USE

VSS is a watertight seismic sealing system designed for sealing vertical expansion joint openings in parking structures, buildings and other structures exposed to extreme weather conditions.

FEATURES

- Continuous locking Elastoprene® seal snaps into two aluminum frames.
- No visible aluminum or hardware.
- Engineered for multi-directional seismic movement.
- Resistant to UV, ozone, acid rain, most chemicals and extreme temperatures.
- Seal profile splices can be heat welded or bonded with specialty adhesive.
- Factory fabricated tee's, crosses and directional changes are available.

SPECIAL FEATURES

- Compatible with most seismic expansion joints.
- Multiple seal seismic system available with pantograph centering device.
- Fire Barriers - MM expansion joint systems are available with appropriate 2 - 5 hour fire ratings.

LIMITATIONS

- Expansion joint openings must be parallel and straight to achieve watertight seal.

PACKAGING

Aluminum extrusion supplied in 10-foot lengths shipped on wooden pallets or cardboard cartons.

Hardware and other accessories packaged in cardboard cartons.

VSS Seals are supplied in longest possible lengths shipped on pallets, spools or cartons.

STORAGE

All materials should be stored in a cool, dry location 60-80°F (15-27°C) prior to use.

COLOR OPTIONS

Available in black, gray, beige and custom color match options.

Not Reviewed

Warranty #:
Issued:
Expiration:

HENRY COMPANY (“HENRY”)
25 YEAR WARRANTY
PERMAX 1.8 OR 2.0 (FOR WALLS)(“PRODUCT”)

Building Name:
Building Location:
Building OWNER: (“OWNER”)
Date Product Installation Completed:

What This Limited Warranty Covers:

Commencing with the date of completion of installation of the Product and continuing for the term set forth above, if manufacturing defects in the Product cause the Product to not perform in conformance with the Product label or liquid resin properties of the technical data sheet, as published on www.henry.com at time of warranty issuance, or for its intended application, then HENRY at its sole option will, subject to the following section (What This Warranty Does Not Cover), refund OWNER’s original purchase price for the Product prorated by the unused portion of the warranty term. Under option (1), during the first year after installation of the Product, HENRY will refund OWNER’s full purchase price for the Product, exclusive of installation cost and minus any cost previously incurred by HENRY for the replacement of Product under this Warranty. After the first year, the purchase price to be refunded will be prorated by the remaining number of years of the Warranty term, minus any cost previously incurred by HENRY for the replacement of Product under this Warranty.

Decisions as to the extent of repair or replacement required will be made solely by HENRY. The remedy under this Warranty is available only for that portion of the Product exhibiting defects at the time of the warranty claim. The replacement Product as well as any remaining original Product will be warranted only for the original warranty period. This limited warranty applies only to Product used for an application specified by HENRY for the Product and applied in strict accordance with HENRY published specifications, as published on www.henry.com in effect at the time of application. IF PRODUCT IS USED FOR OTHER THAN A HENRY SPECIFIED APPLICATION, IT IS SOLD AS IS AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

What This Warranty Does Not Cover:

This Warranty warrants that the Product will be free from manufacturing defects which affect the ability of the Product to perform in conformance with the Product label or liquid resin properties of the technical data sheet for its intended application during the Warranty Period; it is not a warranty that the Product will never deteriorate or age or to undertake responsibilities, liabilities or obligations other than those specifically identified in the preceding section.
The Contractor who installs the Product is not a representative, agent or employee of HENRY. HENRY therefore does not warrant or guarantee the workmanship of the Contractor.

HENRY is not responsible or liable for: (a) personal injury or property damage of any kind, even if arising from a breach of this Warranty, (b) damage to the building, or to other components of the building or its contents, including mold, mildew or interruption or complete disruption in the use of the building, (c) expenses associated with removal, excavation, or replacement of other materials or building assemblies in connection with testing, repair, removal, or replacement of the Product, (d) change in color or other aesthetic diminution, and (e) damage to the Product attributable to one or more of the following conditions:

1. Acts of God (including, but without limitation, lightning, Beaufort Scale 10 or higher winds, hurricane, tornado, hail, or other violent storm or casualty), impact or damage of objects or damage to the Product due to settlement, distortion, failure or cracking of walls or foundation of the building or for any splitting, cracking, blistering, delamination or separation of the Product due to defect and/or failure of underlying materials not supplied by HENRY.
2. Civil insurrection, war, riot, terrorism, intentional destruction or vandalism.
3. Exposure to ionized radiation, contamination by radioactivity from any nuclear source, or bird droppings, chemical, or vermin attack on the Product.

Obtaining Warranty Service:

If the Product fails to perform in conformance with the Product label or liquid resin properties of the technical data sheet for its intended application, notify HENRY at (866) 787-6947 or by email at warranty@henry.com, within 48 hours or within the next business day after discovery of any defect in the Product. The OWNER must give written notice to HENRY no later than thirty (30) days after a defect is discovered or should by reasonable diligence have been discovered. Claims under this Warranty will require proof of purchase by the OWNER. HENRY is not responsible for any claims without such proof of purchase. Should the alleged failure or the remedy sought by the OWNER lie outside the scope of this Warranty, OWNER agrees to promptly reimburse HENRY for the cost of any investigation requested by OWNER, including remedy costs, plus a HENRY administrative fee of $250.00.

Time for Remedy:

HENRY shall have forty-five (45) days after receipt of written notification of a Product defect to initiate either of the remedies contained in this Warranty unless prevented by acts of God or events beyond HENRY’s reasonable control.

Limitations and Exclusions:

TO THE EXTENT PERMITTED BY APPLICABLE LAW, HENRY DISCLAIMS ANY OTHER WARRANTY EXPRESS OR IMPLIED, THAN THAT PROVIDED FOR HEREIN. THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, GUARANTEES, CONDITIONS AND REPRESENTATIONS, EXPRESS OR IMPLIED, ORAL OR WRITTEN, STATUTORY OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED CONDITIONS OR WARRANTIES AS TO THE MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE HENRY PRODUCT. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. HENRY DOES NOT AUTHORIZE ANY PERSON INCLUDING ITS REPRESENTATIVES, TO MAKE ANY REPRESENTATION OR TO OFFER ANY WARRANTY, CONDITION OR GUARANTY IN RESPECT OF THE SYSTEM OTHER THAN THIS WARRANTY. THIS LIMITED WARRANTY SHALL BE THE OWNER’S SOLE AND EXCLUSIVE REMEDY AGAINST HENRY AND HENRY SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL,

EXEMPLARY, SPECIAL, INCIDENTAL OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, LOSS OF USE, OR DAMAGE TO THE BUILDING OR ITS CONTENTS OR THE ROOF DECK. INCIDENTAL, CONSEQUENTIAL AND EXEMPLARY DAMAGES SHALL NOT BE RECOVERABLE EVEN IF THE REMEDIES OR THE ACTIONS PROVIDED FOR IN THIS WARRANTY FAIL OF THEIR ESSENTIAL PURPOSE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. HENRY SHALL NOT BE LIABLE FOR ANY DAMAGES WHICH ARE BASED UPON NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY OR ANY OTHER LEGAL THEORY OF LIABILITY OTHER THAN THE EXCLUSIVE LIABILITY SET FORTH IN THIS WARRANTY.

Conditions of Warranty:

HENRY's continuing liability under this Warranty is conditioned upon the following:

a) The Product was stored, handled, applied and maintained in accordance with HENRY's instructions, recommendations and specifications in effect at the time of application;
b) HENRY and the Contractor have been paid in full for the Product;
c) The Product has not been altered, modified or repaired without prior written approval of HENRY;
d) The OWNER has notified HENRY in writing of any failure of the Product covered by this Warranty within thirty (30) days following such failure;
e) There has been no misuse, abuse or negligence with respect to the Product on the part of the OWNER, facility or mechanical tradesmen.

Transfer:

This Warranty is assignable upon prior written approval by HENRY. Such approval is subject to the terms, conditions and fees contained in HENRY's application for transfer of warranty.

Waiver:

HENRY's failure at any time to enforce or rely upon any of the terms or conditions stated herein shall not be construed to be a waiver of its rights hereunder.

OWNER's Agreement:

HENRY would not agree to assume the obligations contained in this Warranty in the absence of any of the limitations and exclusions contained herein. Therefore, (1) OWNER's agreement to each and every term of this Warranty is an essential condition precedent to HENRY's obligations hereunder; (2) in the absence of such agreement by the OWNER the Product is sold AS IS AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE; (3) failure of any condition precedent herein shall discharge HENRY from all further obligation under this Warranty, and the disclaimer herein of any other warranties, conditions and representations shall survive; and (4) by accepting or asserting any rights hereunder, OWNER irrevocably agrees to indemnify and hold harmless HENRY, its affiliates, successors, assigns, directors, officers, employees and agents (each an "Indemnified Party") from and against all claims, expenses (including attorney's fees and expenses), losses, liabilities and damages in any way related to or arising from matters described in the section of this Warranty entitled "What This Warranty Does Not Cover," and all amounts paid in defense of the foregoing which may be imposed upon, incurred by or asserted against an Indemnified Party by any person, firm or entity.

Except as otherwise expressly provided above, this Warranty shall be governed by and construed in accordance with the laws of the State of Texas without regard to conflict of law rules.

HENRY COMPANY

By:_____ Date:_____

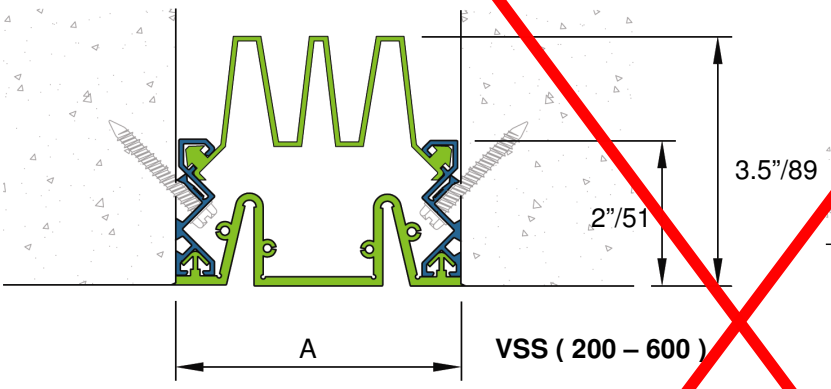
Name: Kevin G. Acosta, Warranty Manager

MM® Vertical Sealing System

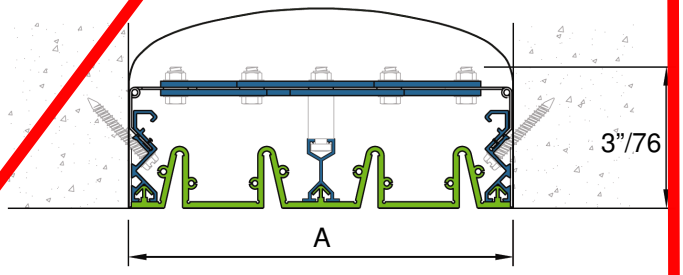
SELECTION GUIDE

Model Number	Total Movement		Joint Opening "A" Min.		Max.		Seismic		Installation Midpoint "A"	
VSS-200	**1.75**	44	**1.25**	32	**3.00**	76	**10.0**	250	**2.00**	51
VSS-300	**3.25**	83	**1.25**	32	**4.50**	114	**10.0**	250	**3.00**	76
VSS-400	**4.25**	108	**1.75**	44	**6.00**	152	**10.0**	250	**4.00**	102
VSS-500	**5.75**	146	**1.75**	44	**7.50**	191	**17.0**	432	**5.00**	127
VSS-600	**7.25**	184	**1.75**	44	**9.00**	229	**17.0**	432	**6.00**	152
VSS-700	**8.00**	203	**4.00**	102	**12.0**	305	**18.0**	457	**7.00**	178
VSS-800	**8.00**	203	**4.00**	102	**12.0**	305	**18.0**	457	**8.00**	203
VSS-900	**11.00**	279	**4.00**	102	**15.0**	381	**24.0**	610	**9.00**	229
VSS-1000	**11.00**	279	**4.00**	102	**15.0**	381	**24.0**	610	**10.00**	254

*Dimensions are in **inches** (bold) and millimeters.*
Larger sizes available. Call for details.



VSS (200 – 600)



VSS (700 – 1000)

LIMITED WARRANTY

MM Systems warrants the MM Vertical Sealing System to be free of defects in material and conform to technical data listed. We make no warranty as to color or appearance. Since methods of application can affect performance and on-site conditions are beyond our control, MM Systems makes no other warranty, expressed or implied, including warranties of MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. MM Systems sole obligation shall be, at its option, to replace, or to refund the purchase price of the quantity of system proved to be defective. In no event shall MM Systems be liable for any special, incidental, consequential, loss of profits or punitive damages. Other warranties may be available when installed by a MM Certified Contractor.

PHYSICAL PROPERTIES

Physical Property	Test Method	Value
Elastoprene-100		
Tensile Strength	ASTM D412	1000 psi
Ultimate Elongation	ASTM D412	445%
Hardness, Shore D	ASTM D2240	65 +/-3
Tear Strength @ 73°F (23°C)	ASTM D624	140 pli / 24.5 kN/m
Tear Strength @ 212°F (100°C)	ASTM D624	58 pli / 10.2 kN/m
Compression Set @ 168 hours	ASTM D395	25% @ 23°C/ 73°F
Compression Set @ 168 hours	ASTM D395	38% @ 100°C/ 212°F
Ozone Resistance	ASTM D1149	No Cracks
UV Resistance	ASTM D695	Very Good
Brittle Point	ASTM D746	-76°F (-60°C)

NOTE: The foregoing information is published as general information only. The listed properties and performance characteristics are approximate values while actual field results may vary.

INSTALLATION

1) Remove and repair all unsound concrete in and around the joint opening. All spalls must be repaired with compatible patching material.
2) Uncoil seal and allow it to relax in the sun for as long as possible before installation.
3) Attach aluminum frame to inside walls of joint with anchors supplied.
4) Directional Changes – insert galvanized splice pins (finishing nails) to align and reinforce splice connections before applying adhesive.
5) Insert the secondary moisture seal into aluminum frame first, then insert the weather seal and snap-lock into cavity.
6) Install in accordance with detailed installation guide.

Current Issue 10-14-08

MM
MM SYSTEMS
50 MM Way, Pendergrass, GA 30567 • 866.506.6929 • www.mmsystemscorp.com

CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 07 81 00 SUBMITTAL NO. 084 CIANBRO CORPORATION: By: AJP Date: 12/3/2012	☒ 1 - Reviewed, No Exception Taken ☐ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other, Held for Record, Not Reviewed WBRC ARCHITECTS • ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication; processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: michael johanning DATE: 12-12-12

ISLAND INTERNATIONAL INDUSTRIES NEW ENGLAND LLC

835 SCHOOL STREET TEL: 401-723-2040
PAWTUCKET, RI 02860 FAX: 401-723-1990

SUBMITTAL
FOR SPRAYED ON FIRE RESISTIVE MATERIALS

GC: CIANBRO CORP DATE: 11/29/2012

PROJECT: CUMBERLAND COUNTY CIVIC CENTER RENOVATION

ARCHITECT: SINK COMBS DETHLES

BUILDING CODE OR TESTING AUTHORITY

X UNDERWRITERS LABORATORY ____ICBO ____BOCA ____SBCC

PROPOSED MANUFACTURER: ISOLATEK INTERNATIONAL

MATERIAL: CAFCO 300

PROJECT SPECIFICATIONS

NEW FLOOR ASSEMBLY
- **TESTED BEAM = W8X28**
- **W12X16**
- **W8X18, W14X22, W16X26**
- **W12X26, W16X36**
- **W16X45**
- **W12X53**
- **W18X76**

2 HOUR UNRESTRAINED UL N759
- **3/4" WITH 3/8" ON BOTTOM FLANGE TIPS**
- **1 1/16" WITH 9/16" ON BOTTOM FLANGE TIPS**
- **15/16" WITH 1/2" ON BOTTOM FLANGE TIPS**
- **7/8" WITH 7/16" ON BOTTOM FLANGE TIPS**
- **3/4" WITH 3/8" ON BOTTOM FLANGE TIPS**
- **11/16" WITH 3/8" ON BOTTOM FLANGE TIPS**
- **5/8" WITH 5/16" ON BOTTOM FLANGE TIPS**

NEW CONCRETE ROOF ASSEMBLY
- **DECK**
- **BEAMS TESTED BEAM (UL S721) W6X16**
- **W12X16, W14X22**
- **W16X26, W18X35**
- **W16X36, W24X55**
- **W24X76, W18X50**

1 HOUR UL P723
- **7/8"**
- **1/2" WITH 1/4" ON BOTTOM FLANGE TIPS**
- **5/8" WITH 5/16" ON BOTTOM FLANGE TIPS**
- **9/16" WITH 5/16" ON BOTTOM FLANGE TIPS**
- **1/2" WITH 1/4" ON BOTTOM FLANGE TIPS**
- **7/16" WITH 1/4" ON BOTTOM FLANGE TIPS**

COLUMNS
- **W12X53**
- **TS8X8X3/8"**

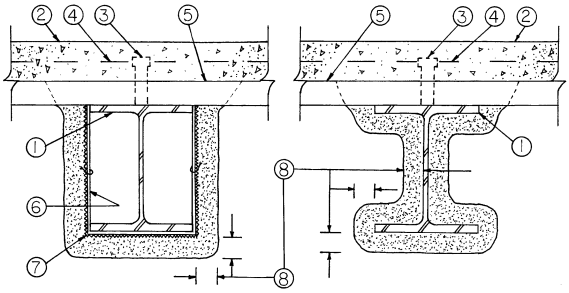
2 HOUR UL X790
- **1 3/16" WITH 9/16" ON FLANGE TIPS**
- **1 "**

REMARKS:

FOOTNOTE: This Submittal Form is to be used in conjunction with the AWCI "Recommended Sprayed Fireproofing Standards." This submittal is based on contractor interpretation of the plans and specifications only. The application of this document to laws, statutes, building codes and other regulatory authorities is not the responsibility of this contractor.

Design No. N759

Restrained Beam Rating — 1, 1-1/2, 2, 3 and 4 Hr. (See Item 8)
Unrestrained Beam Rating — 1, 1-1/2, 2, 3 and 4 Hr. (See Item 8)
Load Restricted for Canadian Applications — See Guide BXUV7



1. **Steel Beam —** W8x28 min size.
2. **Normal Weight or Lightweight Concrete —** Normal weight or lightweight concrete, 2-1/2 in. min thickness over the steel floor and form unit crests or min 3 in. thick slab with a compressive strength of 3500 psi and min dry unit weight of 110 pcf.
3. **Shear Connector —** (Optional) — Studs, 3/4 in. diam headed type or equivalent per AISC specification. Welded to the top flange of beam through the steel floor units.
4. **Welded Wire Fabric —** 6x6, W1.4 x W1.4.
5. **Steel Floor and Form Units —** 1-1/2 to 3 in. deep fluted, cellular or corrugated units in any combination, welded to beam (refer to Item 8).
6. **Lath Hangers —** (To be used with Item 7) — No. 6 SWG steel wire, spaced 27 in. OC max.
7. **Metal Lath —** (Optional) — 3.4 lb/sq yd expanded steel, tied to lath hangers with No. 18 SWG steel wire spaced 6 in. OC max.
8. **Spray-Applied Fire Resistive Materials* —** See tables below for appropriate thicknesses. Applied by mixing with water in accordance with instructions on each bag of materials and spraying in one or more coats to beam or lath surfaces which must be free of dirt, loose scale or oil. Surface of applied material may be lightly finished with a trowel. Crest areas above the beam shall be filled with Spray-Applied Fire Resistive Materials. Min average and min individual density of 15and 14 pcf, respectively.For method of density determination, see Design Information Section, Sprayed Material.

Fluted, Cellular and Corrugated Floor Units

	Min Thkns In.	
Rating Hr	**Restrained Beam Rating Hr**	**Unrestrained Beam Rating Hr**
1	5/16	5/16
1-1/2	7/16	9/16
2	9/16	13/16
2-1/2*	13/16	1-1/16
3	1	1-5/16
3-1/2*	1-1/4	1-9/16
4	1-7/16	1-13/16

Fluted Floor Units Only or Min 3 in. Thick Slab

	Min Thkns In.	
Rating Hr	**Restrained Beam Rating Hr**	**Unrestrained Beam Rating Hr**
1	5/16	5/16
1-1/2	3/8	1/2
2	9/16	11/16
2-1/2*	13/16	7/8
3	1	1-1/16
3-1/2*	1-3/16	1-1/4
4	1-7/16	1-1/2

* The 2-1/2 and 3-1/2 hour ratings are for use when mineral fiber boards, polystyrene insulation exceeding 5 pcf, or polyisocyanurate insulation areused over the concrete in D900 series designs as stated in the front of the Fire Resistance Directory - III. FLOOR-CEILINGS AND ROOF-CEILINGS, item 21. Roof Insulation.

The thicknesses of Spray-Applied Fire Resistive Materials shown in the following table are applicable when the thickness applied to the beams' lower flange edges is reduced by one-half. The min thickness applied to the lower flange edges is 1/4 in.

Fluted, Cellular and Corrugated Floor Units

	Min Thkns In.	
Rating Hr	**Restrained Beam Rating Hr**	**Unrestrained Beam Rating Hr**
1	3/8	3/8
1-1/2	1/2	5/8
2	5/8	7/8
3	1-1/8	1-7/16
4	1-5/8	2

Fluted Floor Units Only or Min 3 in. Thick Slab

	Min Thkns In.	
Rating Hr	**Restrained Beam Rating Hr**	**Unrestrained Beam Rating Hr**
1	3/8	3/8
1-1/2	7/16	9/16
2	5/8	3/4
3	1-1/8	1-3/16
4	1-5/8	1-11/16

BERLIN CO LTD — Types 300, 300ES, 300N or SB.

ISOLATEK INTERNATIONAL —Type 300, Type 300ES, Type 300N or Type SB.
NEWKEM PRODUCTS CORP —Type 300, Type 300ES, Type 300N or Type SB.
LUCKY CORE INSULATING MATERIALS MANUFACTURING L L C —Types 300, 300ES, 300N, or SB.

8A. **(As an alternate to Item 8 and 8B) Spray-Applied Fire Resistive Materials* —** See tables below for appropriate thicknesses. Applied by mixing with water in accordance with instructions on each bag of materials and spraying in one or more coats to beam or lath surfaces which must be free of dirt, loose scale or oil. Surface of applied material may be lightly finished with a trowel. Crest areas above the beam shall be filled with Spray-Applied Fire Resistive Materials. Min average and min individual density of 17.5 and 16 pcf, respectively, for Type 300TW. Min average and min individual density of 22 and 19 pcf, respectively, for Type 400. For method of density determination, see Design Information Section, Sprayed Material.

Fluted, Cellular and Corrugated Floor Units

Rating Hr	Min Thkns In. Restrained Beam Rating Hr	Unrestrained Beam Rating Hr
1	5/16	5/16
1-1/2	7/16	9/16
2	9/16	13/16
2-1/2*	13/16	1-1/16
3	1	1-5/16
3-1/2*	1-1/4	1-9/16
4	1-7/16	1-13/16

Fluted Floor Units Only or Min 3 in. Thick Slab

Rating Hr	Min Thkns In. Restrained Beam Rating Hr	Unrestrained Beam Rating Hr
1	5/16	5/16
1-1/2	3/8	1/2
2	9/16	11/16
2-1/2*	13/16	7/8
3	1	1-1/16
3-1/2*	1-3/16	1-1/4
4	1-7/16	1-1/2

* The 2-1/2 and 3-1/2 hour ratings are for use when mineral fiber boards, polystyrene insulation exceeding 5 pcf, or polyisocyanurate insulation areused over the concrete in D900 series designs as stated in the front of the Fire Resistance Directory - III. FLOOR-CEILINGS AND ROOF-CEILINGS, item 21. Roof Insulation.

The thicknesses of Spray-Applied Fire Resistive Materials shown in the following table are applicable when the thickness applied to the beams' lower flange edges is reduced by one-half. The min thickness applied to the lower flange edges is 1/4 in.

Fluted, Cellular and Corrugated Floor Units

Rating Hr	Min Thkns In. Restrained Beam Rating Hr	Unrestrained Beam Rating Hr
1	3/8	3/8
1-1/2	1/2	5/8
2	5/8	7/8
3	1-1/8	1-7/16
4	1-5/8	2

Fluted Floor Units Only or Min 3 in. Thick Slab

Rating Hr	Min Thkns In. Restrained Beam Rating Hr	Unrestrained Beam Rating Hr
1	3/8	3/8
1-1/2	7/16	9/16
2	5/8	3/4
3	1-1/8	1-3/16
4	1-5/8	1-11/16

ISOLATEK INTERNATIONAL — Type 300TW, Type 400
NEWKEM PRODUCTS CORP —Type 400.
LUCKY CORE INSULATING MATERIALS MANUFACTURING L L C —Type 400.

8B. **(As an alternate to Item 8 and 8A) —** Spray-Applied Fire Resistive Materials* — Prepared by mixing with water according to instructions on each bag of mixture and spray or trowel applied to steel surfaces which are free of dirt, oil or scale. Min average density of 17.5 pcf with min individual value of 17.0 pcf. For method of density determination, see Design Information Section, Sprayed Material.

ISOLATEK INTERNATIONAL —Type 280.

*Bearing the UL Classification Mark

N759 - Half-Flange Tip Option *Unrestrained Beam*
All-Fluted Deck
Lightweight and Normal Weight Concrete
CAFCO 300, 300ES, 300SB, 400

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W21 x 166	2.09	W530 x 248	123.3	63.2	3/8	3/8	7/16	5/8	15/16
147	1.87	219	110.3	70.6	3/8	3/8	7/16	11/16	1
132	1.68	196	99.1	78.6	3/8	3/8	1/2	3/4	1-1/16
122	1.57	182	92.6	84.1	3/8	3/8	1/2	13/16	1-1/8
111	1.43	165	84.4	92.3	3/8	7/16	9/16	7/8	1-3/16
101	1.3	150	76.7	101.5	3/8	7/16	9/16	15/16	1-5/16
93	1.4	138	82.6	94.3	3/8	7/16	9/16	7/8	1-1/4
83	1.26	123	74.3	104.8	3/8	7/16	5/8	15/16	1-5/16
73	1.11	109	65.5	118.9	3/8	1/2	5/8	1	1-7/16
68	1.04	101	61.4	126.9	3/8	1/2	11/16	1-1/16	1-1/2
62	0.95	92	56.1	138.9	3/8	9/16	11/16	1-1/8	1-9/16
57	0.95	85	56.1	138.9	3/8	9/16	11/16	1-1/8	1-9/16
55	0.85	82	50.2	155.3	3/8	9/16	3/4	1-3/16	1-11/16
50	0.83	74	49.0	159.0	3/8	9/16	3/4	1-3/16	1-11/16
48	0.75	72	44.3	176.0	7/16	5/8	13/16	1-1/4	1-13/16
44	0.74	66	43.7	178.4	7/16	5/8	13/16	1-1/4	1-13/16
W18 x 175	2.46	W460 x 260	145.1	53.7	3/8	3/8	3/8	9/16	13/16
158	2.24	235	132.2	58.9	3/8	3/8	3/8	5/8	7/8
143	2.05	213	121.0	64.4	3/8	3/8	7/16	11/16	15/16
130	1.88	193	110.9	70.2	3/8	3/8	7/16	11/16	1
119	1.72	177	101.5	76.7	3/8	3/8	1/2	3/4	1-1/16
106	1.55	158	91.5	85.2	3/8	3/8	1/2	13/16	1-1/8
97	1.42	144	83.8	93.0	3/8	7/16	9/16	7/8	1-3/16
86	1.27	128	74.9	103.9	3/8	7/16	5/8	15/16	1-5/16
76	1.13	113	66.7	116.8	3/8	1/2	5/8	1	1-7/16
71	1.22	106	72.0	108.2	3/8	7/16	5/8	15/16	1-5/16
65	1.13	97	66.7	116.8	3/8	1/2	5/8	1	1-7/16
60	1.04	89	61.4	126.9	3/8	1/2	11/16	1-1/16	1-1/2
55	0.96	82	56.6	137.5	3/8	9/16	11/16	1-1/8	1-9/16
50	0.88	74	51.9	150.0	3/8	9/16	3/4	1-3/16	1-5/8
46	0.87	68	51.3	151.7	3/8	9/16	3/4	1-3/16	1-5/8
40	0.76	60	44.8	173.7	7/16	5/8	13/16	1-1/4	1-3/4
35	0.67	52	39.5	197.0	7/16	5/8	7/8	1-3/8	1-7/8
W16 x 100	1.59	W410 x 149	93.8	83.0	3/8	3/8	1/2	13/16	1-1/8
89	1.43	132	84.4	92.3	3/8	7/16	9/16	7/8	1-3/16
77	1.25	114	73.8	105.6	3/8	7/16	5/8	15/16	1-5/16
67	1.09	100	64.3	121.1	3/8	1/2	11/16	1	1-7/16
57	1.09	85	64.3	121.1	3/8	1/2	11/16	1	1-7/16
50	0.96	74	56.6	137.5	3/8	9/16	11/16	1-1/8	1-9/16
45	0.87	67	51.3	151.7	3/8	9/16	3/4	1-3/16	1-5/8

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

N759 - Half-Flange Tip Option *Unrestrained Beam*
All-Fluted Deck
Lightweight and Normal Weight Concrete
CAFCO 300, 300ES, 300SB, 400

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W16 x 40	0.78	W410 x 60	46.0	169.2	7/16	5/8	13/16	1-1/4	1-3/4
36	0.7	53	41.3	188.6	7/16	5/8	7/8	1-5/16	1-7/8
31	0.66	46	38.9	200.0	7/16	11/16	7/8	1-3/8	1-15/16
26	0.55	39	32.5	240.0	1/2	3/4	15/16	1-1/2	2-1/8
W14 x 808	8.75	W360 x 1202	516.3	15.1	3/8	3/8	3/8	3/8	3/8
730	8.08	1086	476.7	16.3	3/8	3/8	3/8	3/8	3/8
665	7.49	990	441.9	17.6	3/8	3/8	3/8	3/8	3/8
605	6.96	900	410.6	19.0	3/8	3/8	3/8	3/8	3/8
550	6.43	818	379.4	20.5	3/8	3/8	3/8	3/8	3/8
500	5.95	744	351.1	22.2	3/8	3/8	3/8	3/8	3/8
455	5.53	677	326.3	23.9	3/8	3/8	3/8	3/8	7/16
426	5.21	634	307.4	25.3	3/8	3/8	3/8	3/8	7/16
398	4.93	592	290.9	26.8	3/8	3/8	3/8	3/8	7/16
370	4.63	551	273.2	28.5	3/8	3/8	3/8	3/8	1/2
342	4.32	509	254.9	30.6	3/8	3/8	3/8	3/8	1/2
311	3.98	463	234.8	33.2	3/8	3/8	3/8	3/8	9/16
283	3.66	421	215.9	36.1	3/8	3/8	3/8	7/16	9/16
257	3.36	382	198.2	39.3	3/8	3/8	3/8	7/16	5/8
233	3.08	347	181.7	42.9	3/8	3/8	3/8	1/2	11/16
211	2.81	314	165.8	47.0	3/8	3/8	3/8	1/2	3/4
193	2.6	287	153.4	50.8	3/8	3/8	3/8	9/16	3/4
176	2.38	262	140.4	55.5	3/8	3/8	3/8	9/16	13/16
159	2.16	237	127.4	61.1	3/8	3/8	7/16	5/8	7/8
145	1.99	216	117.4	66.3	3/8	3/8	7/16	11/16	15/16
132	1.89	196	111.5	69.8	3/8	3/8	7/16	11/16	1
120	1.71	179	100.9	77.2	3/8	3/8	1/2	3/4	1-1/16
109	1.57	162	92.6	84.1	3/8	3/8	1/2	13/16	1-1/8
99	1.43	147	84.4	92.3	3/8	7/16	9/16	7/8	1-3/16
90	1.31	134	77.3	100.8	3/8	7/16	9/16	15/16	1-1/4
82	1.45	122	85.6	91.0	3/8	7/16	9/16	7/8	1-3/16
74	1.32	110	77.9	100.0	3/8	7/16	9/16	7/8	1-1/4
68	1.22	101	72.0	108.2	3/8	7/16	5/8	15/16	1-5/16
61	1.1	91	64.9	120.0	3/8	1/2	5/8	1	1-7/16
53	1.06	79	62.5	124.5	3/8	1/2	11/16	1-1/16	1-7/16
48	0.97	72	57.2	136.1	3/8	9/16	11/16	1-1/8	1-9/16
43	0.87	64	51.3	151.7	3/8	9/16	3/4	1-3/16	1-5/8
38	0.8	57	47.2	165.0	7/16	5/8	13/16	1-1/4	1-3/4
34	0.72	51	42.5	183.3	7/16	5/8	13/16	1-5/16	1-13/16
30	0.64	45	37.8	206.3	7/16	11/16	7/8	1-3/8	1-15/16
26	0.62	39	36.6	212.9	7/16	11/16	7/8	1-3/8	2
22	0.53	33	31.3	249.1	1/2	3/4	15/16	1-1/2	2-1/8

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

N759 - Half-Flange Tip Option *Unrestrained Beam*
All-Fluted Deck
Lightweight and Normal Weight Concrete
CAFCO 300, 300ES, 300SB, 400

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W12 x 336	4.85	W310 x 500	286.2	27.2	3/8	3/8	3/8	3/8	7/16
305	4.49	454	264.9	29.4	3/8	3/8	3/8	3/8	1/2
279	4.19	415	247.2	31.5	3/8	3/8	3/8	3/8	1/2
252	3.84	375	226.6	34.4	3/8	3/8	3/8	7/16	9/16
230	3.55	342	209.5	37.2	3/8	3/8	3/8	7/16	5/8
210	3.27	313	192.9	40.4	3/8	3/8	3/8	7/16	5/8
190	3	283	177.0	44.0	3/8	3/8	3/8	1/2	11/16
170	2.72	253	160.5	48.5	3/8	3/8	3/8	9/16	3/4
152	2.45	225	144.6	53.9	3/8	3/8	3/8	9/16	13/16
136	2.23	202	131.6	59.2	3/8	3/8	3/8	5/8	7/8
120	1.99	179	117.4	66.3	3/8	3/8	7/16	11/16	15/16
106	1.77	158	104.4	74.6	3/8	3/8	1/2	3/4	1-1/16
96	1.61	143	95.0	82.0	3/8	3/8	1/2	13/16	1-1/8
87	1.47	129	86.7	89.8	3/8	7/16	9/16	13/16	1-3/16
79	1.34	117	79.1	98.5	3/8	7/16	9/16	7/8	1-1/4
72	1.23	107	72.6	107.3	3/8	7/16	5/8	15/16	1-5/16
65	1.11	97	65.5	118.9	3/8	1/2	5/8	1	1-7/16
58	1.1	86	64.9	120.0	3/8	1/2	5/8	1	1-7/16
53	1.02	79	60.2	129.4	3/8	1/2	11/16	1-1/16	1-1/2
50	1.06	74	62.5	124.5	3/8	1/2	11/16	1-1/16	1-7/16
45	0.97	67	57.2	136.1	3/8	9/16	11/16	1-1/8	1-9/16
40	0.86	60	50.7	153.5	3/8	9/16	3/4	1-3/16	1-11/16
35	0.81	52	47.8	163.0	3/8	9/16	3/4	1-3/16	1-11/16
30	0.69	45	40.7	191.3	7/16	5/8	7/8	1-5/16	1-7/8
26	0.61	39	36.0	216.4	7/16	11/16	7/8	1-7/16	2
22	0.62	33	36.6	212.9	7/16	11/16	7/8	1-3/8	2
19	0.54	28	31.9	244.4	1/2	3/4	15/16	1-1/2	2-1/8
16	0.45	24	26.6	293.3	9/16	13/16	1-1/16	1-5/8	2-5/16
14	0.4	21	23.6	330.0	9/16	13/16	1-1/16	1-11/16	2-7/16
W10 x 112	2.17	W250 x 167	128.0	60.8	3/8	3/8	7/16	5/8	7/8
100	1.97	149	116.2	67.0	3/8	3/8	7/16	11/16	15/16
88	1.74	131	102.7	75.9	3/8	3/8	1/2	3/4	1-1/16
77	1.54	115	90.9	85.7	3/8	3/8	1/2	13/16	1-1/8
68	1.38	101	81.4	95.7	3/8	7/16	9/16	7/8	1-1/4
60	1.22	89	72.0	108.2	3/8	7/16	5/8	15/16	1-5/16
54	1.11	80	65.5	118.9	3/8	1/2	5/8	1	1-7/16
49	1.01	73	59.6	130.7	3/8	1/2	11/16	1-1/16	1-1/2
45	1.06	67	62.5	124.5	3/8	1/2	11/16	1-1/16	1-7/16
39	0.92	58	54.3	143.5	3/8	9/16	3/4	1-1/8	1-5/8
33	0.78	49	46.0	169.2	7/16	5/8	13/16	1-1/4	1-3/4
30	0.8	45	47.2	165.0	7/16	5/8	13/16	1-1/4	1-3/4

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

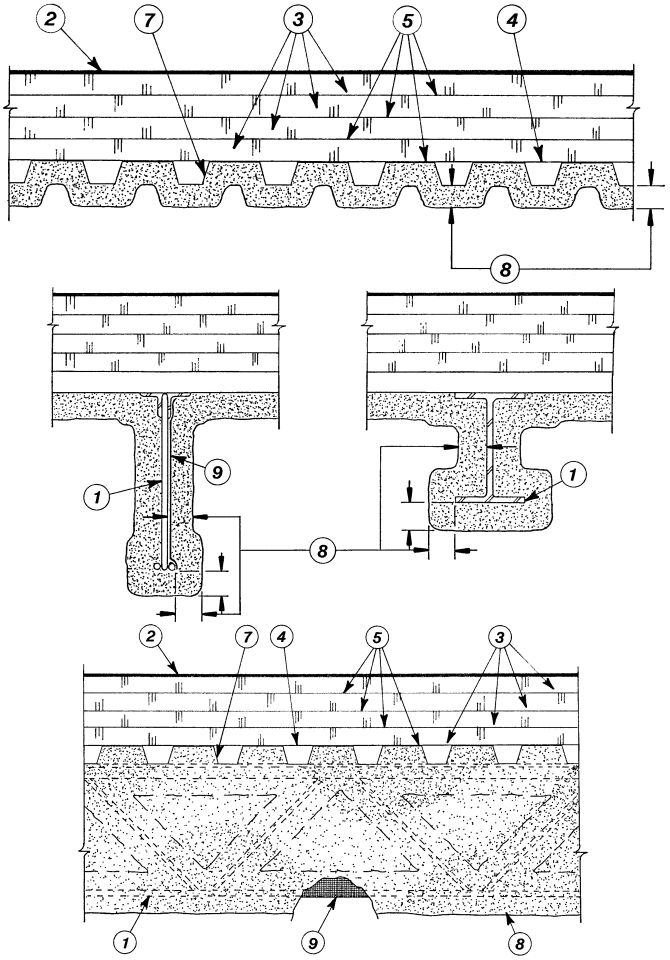
N759 - Half-Flange Tip Option ***Unrestrained Beam***
All-Fluted Deck
Lightweight and Normal Weight Concrete
CAFCO 300, 300ES, 300SB, 400

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W10 x 26	0.7	W10 x 39	41.3	188.6	7/16	5/8	7/8	1-5/16	1-7/8
22	0.6	33	35.4	220.0	1/2	11/16	15/16	1-7/16	2
19	0.6	28	35.4	220.0	1/2	11/16	15/16	1-7/16	2
17	0.54	25	31.9	244.4	1/2	3/4	15/16	1-1/2	2-1/8
15	0.48	22	28.3	275.0	1/2	3/4	1	1-9/16	2-1/4
12	0.39	18	23.0	338.5	9/16	13/16	1-1/8	1-3/4	2-7/16
W8 x 67	1.65	W200 x 100	97.4	80.0	3/8	3/8	1/2	3/4	1-1/16
58	1.44	86	85.0	91.7	3/8	7/16	9/16	7/8	1-3/16
48	1.21	71	71.4	109.1	3/8	1/2	5/8	15/16	1-3/8
40	1.03	59	60.8	128.2	3/8	1/2	11/16	1-1/16	1-1/2
35	0.9	52	53.1	146.7	3/8	9/16	3/4	1-1/8	1-5/8
31	0.8	46	47.2	165.0	7/16	5/8	13/16	1-1/4	1-3/4
28	0.81	42	47.8	163.0	3/8	9/16	3/4	1-3/16	1-11/16
24	0.7	36	41.3	188.6	7/16	5/8	7/8	1-5/16	1-7/8
21	0.67	31	39.5	197.0	7/16	5/8	7/8	1-3/8	1-7/8
18	0.58	27	34.2	227.6	1/2	11/16	15/16	1-7/16	2-1/16
15	0.55	22	32.5	240.0	1/2	3/4	15/16	1-1/2	2-1/8
13	0.48	19	28.3	275.0	1/2	3/4	1	1-9/16	2-1/4
10	0.37	15	21.8	356.8	9/16	7/8	1-1/8	1-3/4	2-1/2
W6 x 25	0.83	W150 x 37	49.0	159.0	3/8	9/16	3/4	1-3/16	1-11/16
20	0.67	30	39.5	197.0	7/16	5/8	7/8	1-3/8	1-7/8
16	0.68	24	40.1	194.1	7/16	5/8	7/8	1-5/16	1-7/8
15	0.52	22	30.7	253.8	1/2	3/4	1	1-1/2	2-1/8
12	0.52	18	30.7	253.8	1/2	3/4	1	1-1/2	2-1/8
9	0.39	14	23.0	338.5	9/16	13/16	1-1/8	1-3/4	2-7/16
8.5	0.37	13	21.8	356.8	9/16	7/8	1-1/8	1-3/4	2-1/2
W5 x 19	0.77	W130 x 28	45.4	171.4	7/16	5/8	13/16	1-1/4	1-3/4
16	0.66	24	38.9	200.0	7/16	11/16	7/8	1-3/8	1-15/16
W4 x 13	0.67	W100 x 19	39.5	197.0	7/16	5/8	7/8	1-3/8	1-7/8

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

Design No. P723

Restrained Assembly Ratings — 1, 1-1/2, 2 and 3 Hr
(See Items 3 and 8)
Unrestrained Assembly Ratings — 1, 1-1/2, 2 and 3 Hr
(See Items 3 and 8)
Unrestrained Beam Ratings — 1, 1-1/2, 2 and 3 Hr.
(See Items 3 and 8)
Restricted Load Condition — See Item 8
Load Restricted for Canadian Applications — See Guide BXUV7



1. **Steel Supports —** W6x16 steel beam, 10K1 or 12K5 steel joists min size (See Item 8).
2. **Roof Covering —** Consisting of hot mopped or cold application bituminous materials compatible with the insulation(s) described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

2A. **In lieu of Item 2, roof covering consisting of single-ply Roofing Membranes* —** that is either ballasted, adhered or mechanically attached as permitted under the respective manufacturer's Classification. See Roofing Membranes (CHCI) category for names of manufacturers.

2B. **Metal Roof Deck Panels —** (Not Shown) — In addition to or in lieu of items 2 or 2A, the Roof Covering may consist of mechanically fastened metal roof deck panel assembly. See Fire Resistance Directory — Metal Roof Deck Panels (CETW).

3. **Roof Insulation — Foamed Plastics* —** 36 by 48 in. (min size) polyisocyanurate foamed plastic insulation boards applied in one or more layers. Min thickness is 2.0 in. (No limit on max overall thickness.) Boards to be installed with end joints staggered a min of 6 in. in adjacent rows. When applied in more than one layer, each layer to be offset in both directions from layer below a min of 6 in. in order to lap all joints. Polyisocyanurate foamed plastic insulation may be installed over a max 1 in. thick layer of Mineral and Fiber Boards* (Item 3B) with each layer offset in both directions as described above.

ATLAS ROOFING CORP —ACFoam II, ACFoam III, ACFoam-II SL, ACFoam IV.
CARLISLE SYNTEC INCORPORATED —Types HP, HP-H, HP-N, HP-W.
FIRESTONE BUILDING PRODUCTS CO L L C —"IS0 95+ GL", "ISO 95+ FK", "ISO 95+ GW", "ISO 300", "ISO 95+ CAN", "ISOGARD HD Composite Board" or "RISISTA".
GAF MATERIALS CORP —Isotherm R.
HUNTER PANELS —H Shield.
GAF MATERIALS CORP —EnergyGuard RH, Tapered EnergyGuard RH
JOHNS MANVILLE — ENRGY 3, ISO-1, PSI 25.
LOADMASTER SYSTEMS INC —Loadmaster Polyisocyanurate Insulation.
RMAX OPERATING L L C —Multi-Max-3, Multi-Max FA-3, Ultra-Max, Ultra-Max Plus, Tapered Ultra-Max Plus, Tapered Thermaroof-3, Tapered Thermaroof FA-3, Tapered Ultra-Max.
SIKA SARNAFIL INC —Sarnatherm r, Sarnatherm r Ultra, Sarnatherm r Tapered, Sarnatherm r Ultra Tapered.
DOW ROOFING SYSTEMS L L C —"Dow Termico Polyisocyanurate Insulation", "Dow Termico ISO 3000 Insulation", "Dow Termico ISO HP-FR" .
GENFLEX ROOFING SYSTEMS L L C — "GenFlex ISO"

3A. **Roof Insulation — Mineral and Fiber Boards* —** (Not Shown) For 1, 1-1/2 and 2 h Ratings— As an alternate to Item 3. To be applied in one or more layers with or without adhesive applied between vapor barrier and roof deck units, vapor barrier and board

and each layer of board. When more than one layer is required, each layer of board to be offset in both directions from layer below a min of 6 in. in order to lap all joints. Min thickness is 2 in. when Item 2A is used. When installed as a base layer for Item 3 (polyisocyanurate roof insulation) max thickness is 1 in.

BMCA INSULATION PRODUCTS INC —Permalite.
GAF MATERIALS CORP —GAFTEMP Perlite.
JOHNS MANVILLE

3B. **Building Units* —** (Not Shown) — As an alternate to Items 3 and 3A. Polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with oriented strand board or plywood. For the building units, min thickness (as measured at core) of the polyisocyanurate foamed plastic insulation is 2.0 in. (No limit on max thickness). Building units to be installed with end joints staggered a min 6 in. in adjacent rows.

ATLAS ROOFING CORP —ACFoam NailBase Insulation, Vented-R, CrossVent.
FIRESTONE BUILDING PRODUCTS CO L L C —Hailgard.
JOHNS MANVILLE —Nailboard.

3C. **Building Units* —** As an alternate to Items 3 through 3B, polyisocyanurate foamed plastic insulation boards faced on the underside with wood fiber board. Min thickness of the polyisocyanurate core is 2.0 in. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.

FIRESTONE BUILDING PRODUCTS CO L L C —"ISO 95+ Wood Fiberboard Composite" .
JOHNS MANVILLE —ENRGY 2 Plus.

3D. **Building Units* —** As an alternate to Items 3 through 3C, polyisocyanurate foamed plastic insulation boards faced on the underside (or both sides) with mineral fiber board. Min thickness of the polyisocyanurate core is 2.0 in. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.

FIRESTONE BUILDING PRODUCTS CO L L C —"ISO 95+ Composite" .
JOHNS MANVILLE —Fesco-Foam.

3E. **Building Units* —** Not Shown — As an alternate to Items 3 and 3D, composite polyisocyanurate foamed plastic insulation board with an adhered nailing surface, nom 48 by 48 or 96 in. may be used with the following limitations. These composite building units have ventilation slots internal to the panels. The thickness of the panel depends upon the thinnest portion of the polyisocyanurate insulation. The following dimensions apply to the polyisocyanurate insulation, min 2 in. thick. May be installed over a max 1 in. thick layer of mineral and fiber boards (Item 3B) with joints offset a min of 6 in., in each direction. There is no limit on the max insulation thickness.

JOHNS MANVILLE —Type ISO-VENT.

3F. **Building units* —** As an alternate to Items 3 through 3E, polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with gypsum board. Min thickness of the polyisocyanurate core is 2.0 in. No limit on overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.

JOHNS MANVILLE —ENRGY 2 Gypsum Composite.

3G. **Foamed Plastic* —** Optional – (Not Shown) - Maximum 1 in. thick polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in. Boards may be applied as the top layer in addition to the specified minimum thickness of any roofing system described herein, as long as the roofing system states that there is no limit on maximum thickness. Joints offset in both directions from layer below.

FIRESTONE BUILDING PRODUCTS CO L L C —"ISOGARD HD"

4. **Vapor Retarder — Sheathing Material* —** (Optional) — Vinyl film or paper scrim vapor barrier, applied to steel roof deck with adhesive (Item 5), asphalt (Item 5A) or laid loosely, overlapped approx 2 in. on adjacent sheets. See Sheathing Materials (CHIZ) category for names of manufacturers.

4A. **Sheathing Material* —** (Optional) — In lieu of Item 4, a self adhered rubberized asphalt roofing underlayment membrane which may be placed on top of the steel roof deck (Item 7).

W R GRACE & CO - CONN — Grace Ice and Water Shield, Grace Ice and Water Shield-HT®, Grace Select, Grace Ultra, and Grace Basik.

5. **Adhesive* —** (Optional) — May be applied between crests of steel roof deck and vapor retarder, between vapor retarder and first layer of insulation, and between layers of insulation. Applied in 1/2 in. wide ribbons 6 in. OC at 0.4 gal/100 sq ft. See Adhesives (BYWR) category for names of manufacturers.

5A. **Asphalt Or Coal Tar Pitch* —** (Optional — Not Shown) — In lieu of Item 5, used to attach the first layer of insulation to vapor retarder and each additional layer of roof insulation. Applied at a max rate of 25 lbs/100 sq ft.

5B. **Adhesive* -(Optional) —** (Bearing the UL Classification Marking for Roof Systems (TGFU)) - When FAST 100 adhesive is used, the Unrestrained Assembly Ratings are limited to 1, 1-1/2 and 2 hr. The vapor retarder, the gypsum wallboard or the first layer of roof insulation may be secured with adhesive to the steel crest surfaces. Also used to attach the vapor retarder to gypsum wallboard, the first layer of insulation to vapor retarder or gypsum wallboard and each additional layer of insulation. Applied at a max rate of 19.8 g/ft^2. When FAST 100 adhesive is used, additional **Spray-Applied Fire Resistance Materials* (CHPX)** is required on the deck for the 1-1/2 and 2 hr Unrestrained Assembly Ratings. The thickness specified for the deck shall be increased by 1/16 in. for 1-1/2 hr Unrestrained Assembly Rating and 1/4 in. for 2 hr Unrestrained Assembly Rating.

CARLISLE SYNTEC INCORPORATED — FAST 100

6. **Mechanical Fasteners —** (Optional — Not Shown) — Mechanical screw-type fastener with metal washer designed for the purpose may be used to attach one or more layers of insulation to steel roof deck.

7. **Steel Roof Deck — (Unclassified) —** Min 1-1/2 in. deep and 30 or 36 in. wide galv or painted fluted steel deck. When unclassified painted steel roof deck is used, Item 8A, Metal Lath, is required. Flutes 6 in. OC with crest width ranging from 3-5/8 to 5-1/16 in. Min gauge is 22 MSG. Ends overlapped at supports min 1-1/2 in. and welded to supports at deck laps and a max of 12 in. OC between sides of units. Side laps of adjacent units welded, button-punched or secured together with No. 12 by 3/4 in. long self-drilling, self-tapping steel screws spaced a max of 36 in. OC.

Classified Steel Floor and Form Units* — Noncomposite, 1-1/2 in. deep, galv units, min gauge is 22 MSG. Ends overlapped at supports min 1-1/2 in. and welded to supports at deck laps and a max of 12 in. OC between sides of units. Side laps of adjacent units welded, button-punched or secured together with No. 12 by 3/4 in. long self-drilling, self-tapping steel screws spaced a max of 36 in. OC.

ASC STEEL DECK, DIV OF ASC PROFILES INC —24 through 36 in. wide, Types DGB Hi-Form, B Hi-Form, DGB, B, DGN Hi-Form, N Hi-Form, DGN, N, DG2W Hi-Form, DG2W, 2W, DG3W Hi-Form, 3W Hi-Form, DG3W, and 3W. All units may be galvanized or Prime Shield™.
CANAM STEEL CORP — Type P-3606 or P-3615.
CANAM STEEL CORP — Types B, NS. Units may be ptd/ptd.
CONSOLIDATED SYSTEMS INC —Types B, BI, F, N and NI. Units may be ptds/ptd.
LOADMASTER SYSTEMS INC —Types PS, SS-200, SS-300.
VERCO DECKING INC - A NUCOR CO —Types PLB, B, PLN, N, PLW2 or W2 Formlok. Units may be phos/ptd. Types PLB, HSB, PLN or N. Units may be ptd/ptd.
VULCRAFT, DIV OF NUCOR CORP —Types 1.5F, 1.5B, 1.5BI, 3N ptd/ptd units may be used for ratings up to 2 hr.
WHEELING-PITTSBURGH STEEL CORP, DIV OF WHEELING CORRUGATING CO —Types BW, High Strength B, High Strength BW, N, TF-200. Type BW may be ptd/ptd.

8. **Spray-Applied Fire Resistive Materials* —** Applied by mixing with water and spraying in more than one coat to the thickness shown below, to steel surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 15 and 14 pcf, respectively. For method of density determination, see Design Information Section, Sprayed Material. Spray-Applied Fire

Resistive Materials on steel deck shall cover screw tips by 1/2 in. min. Use of adhesive (Item 11) is required.

The min thicknesses of Spray-Applied Fire Resistive Materials required for various fire resistance ratings are shown in the table below:

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Protection Mtl Thkns In. on Deck#	on Beam	on Joist
1	1	1	7/8	7/16	1(3/4*)
1	1	1	1-7/16+	7/16	1(3/4*)
1-1/2	1-1/2	1-1/2	1-3/16	9/16	1-3/16
1-1/2	1-1/2	1-1/2	2+	9/16	1-3/16
2	1	1	1-7/16	11/16	1-3/16
2	1-1/2	1-1/2	1-7/16	11/16	1-3/16
2	2	2	1-7/16	13/16	1-3/16
2	2	2	2-5/8+	13/16	1-3/16
3	1-1/2	1-1/2	1-7/16	1-3/16	1-5/8 (1-1/2**)
3	2	2	1-7/8	1-3/16	1-5/8 (1-1/2**)
3	3	3	1-7/8	1-1/4	1-5/8 (1-1/2**)

#The required minimum thickness of Spray-Applied Fire Resistive Materials on the steel deck is increased by 1/16 in. for 1-1/2 hr Unrestrained Assembly Rating and 1/4 in. for 2 hr Unrestrained Assembly Rating when Item 5B is used.

+No minimum insulation thickness required.

*-The 3/4 in. thickness may be applied when numeral and fiber board insulation is used or when the joist is limited to max tensile stress of 26,000 psi.

**-The 1-1/2 in. thickness may be applied when minimum size joist is 12K5.

BERLIN CO LTD — Types 300, 300ES, 300N or SB.

ISOLATEK INTERNATIONAL —Type 300, Type 300ES, Type 300N, or Type SB

NEWKEM PRODUCTS CORP —Type 300, Type 300ES, Type 300N, or Type SB.

LUCKY CORE INSULATING MATERIALS MANUFACTURING L L C —Types 300, 300ES, 300N, or SB.

8A. **(As an alternate to Item 8) Spray-Applied Fire Resistive Materials* —** Applied by mixing with water and spraying in more than one coat to the thickness shown below, to steel surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 17.5 and 16 pcf, respectively, for Types 300TW,. Min average and min individual density of 22 and 19 pcf, respectively, for Type 400. For method of density determination, see Design Information Section, Sprayed Material. Spray-Applied Fire Resistive Materials on steel deck shall cover screw tips by 1/2 in. min. Use of adhesive (Item 11) is required.

ISOLATEK INTERNATIONAL — Type 300TW, Type 400

NEWKEM PRODUCTS CORP —Type 400.

LUCKY CORE INSULATING MATERIALS MANUFACTURING L L C —Type 400.

8B. **Metal Lath —** Not Shown — Required on unclassified painted steel roof deck. Rib lath, galv or painted, min 2.5 lb/sq yd, with ribs facing down, fastened to deck using No. 8 by 1/2 in. wafer head self-drilling, self-tapping coated steel screws spaced max 15 in. OC in both directions with lath edges overlapped approx 3 in.

9. **Glass Fiber Mesh —** (Optional) — May be used to facilitate the spray application of the protection material to the steel bar joists. Min 3/32 in. sq mesh, coated fiberglass scrim fabric, weighing a min of 1.9 oz/sq yd shall be attached to one side of each joist web member. The method of attachment must be sufficient to hold the mesh and fire protection material during application and curing of the material. An acceptable method of attaching the mesh is by embedding the mesh in min 1/4 in. long beads of hot-melted glue. The beads of glue shall be spaced min 12 in. OC along the top chord of the bar joists. Another method of attachment is the use of 1-1/4 in. long 1/2 in. wide hairpin clips formed from 0.064 in. diam steel wire, alternating from top to bottom of the joist web member.

9A. **Metal Lath —** (Optional — Not Shown) — In lieu of Item 9, diamond mesh, 3/8 in. expanded steel, min 2.5 lb/sq yd fastened to one side of joists using No. 18 SWG steel tie wire, located at the midheight of every other web member or 18 in. OC whichever is less. Both sides of lath must be completely coated with Spray-Applied Fire Resistive Materials but with no minimum thickness requirements.

10. **Bridging —** (Not Shown) — Min 1-1/4 by 1-1/4 by 1/8 in. thick steel angles welded to top and bottom chords of each joist. Number and spacing of bridging angles per Steel Joist Institute specification. Bridging coated with the same thickness of Spray-Applied Fire Resistive Materials as the joist to a min distance of 12 in. beyond each side of the joist.

11. **Adhesive* —** Applied to steel roof deck in accordance with manufacturer's instructions.

ISOLATEK INTERNATIONAL — Type EBS or Type X

*Bearing the UL Classification Mark

DESIGN P723

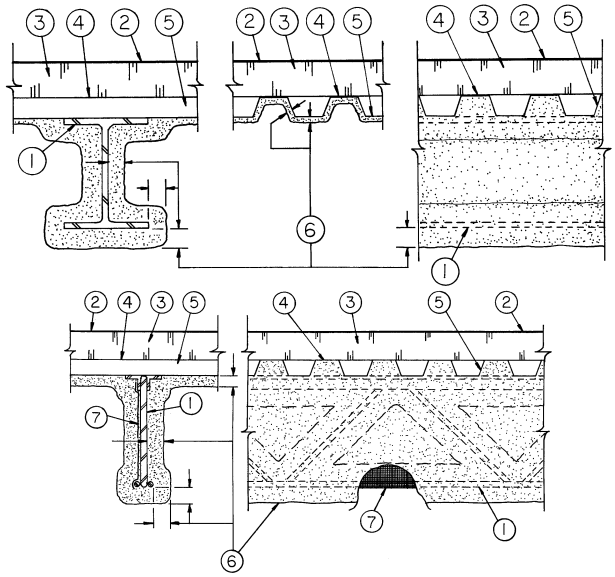
CAFCO® 300, 300ES, 300SB, and 400

Protected Roof Deck
Polyisocyanurate/Mineral & Fiber Board Insulation

Use **Design S721** Table

Design No. S721

Restrained Beam Ratings — 1, 1-1/2, 2, 3 or 4 Hr (See Item 6)
Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 or 4 Hr (See Item 6)
Restricted Load Condition — See Item 1
Load Restricted for Canadian Applications — See Guide BXUV7



1. **Steel Supports —** W6x16 min size steel beam, 10K1, 12K3 or 14K1 min size steel joists. Note: When 10K1 or 12K1 joists are used, they will be limited to a max tensile stress of 26,000 psi.
2. **Roof Covering* —** Consisting of hot mopped, cold application or single-ply materials, compatible with insulation(s) described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).
3. **Roof Insulation* —** Consisting of building units, foamed plastic or mineral and fiber boards, applied in one or more layers. When multiple layers are used, end and side joints shall be offset a min of 12 in. in both directions in order to lap all joints. See category for names of companies providing Classified products — Building Units (BZXX), Foamed Plastic (CCVW) or Mineral and Fiber Boards (CERZ). Roof insulation shall be compatible with roof covering materials Class A, B or C system. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).
4. **Adhesive —** (Optional) — May be applied to steel roof deck units or between insulation layers at a max application rate of 0.4 gal per 100 sq ft. See **Adhesives** (BYWR) category for names of manufacturers.
5. **Steel Roof Deck —** (Unclassified) — Fluted, No. 22 MSG min galv 1-1/2 in. deep with 3-1/2 in. wide flutes spaced 6 in. OC. Ends overlapped a min 1-1/2 in. and welded to supports, 12 in. OC max. Adjacent units button-punched, welded or fastened with No. 12 by 1/2 in. long self-drilling, self-tapping steel screws.
6. **Spray-Applied Fire Resistive Materials* —** Applied by mixing with water and spraying to the beam (or joist) and deck surfaces in one or more coats to the final min thicknesses shown below. Crest areas above the beam (or joist) shall be filled with the Spray-Applied Fire Resistive Materials. Surfaces must be clean and free of dirt, loose scale and oil. Min average and min individual density of 15 and 14 pcf, respectively. For method of density determination see Design Information Section.

Minimum Spray-Applied Fire Resistive Materials Thickness, In.

	Unrestrained Beam Rating Hr			Restrained Beam Rating Hr			
Rating Hr	Beam	Joists		Beam	Joists		Steel Roof
	W6x16	(a)	(b)	W6x16	(a)	(b)	Deck
1	7/16	3/4	3/4	7/16	3/4	3/4	13/16
1-1/2	9/16	15/16	1-3/16	7/16	3/4	1-1/16	15/16
2	13/16	1-3/16	1-7/16	11/16	1-1/8	1-5/16	1-7/16
3	1-1/4	1-13/16	2-5/16	1-3/16	1-13/16	2-1/8	1-7/8
4	1-1/2	—	—	1-1/2	—	—	1-7/16

(a) Metal lath or nonmetallic fabric mesh secured to one side of open web joist. Spray-Applied Fire Resistive Materials thickness applied to each side of lath or mesh shall be equal to thickness required on steel joist.

(b) Spray-Applied Fire Resistive Materials directly applied to joist contours. As an alternate, metal lath or nonmetallic fabric mesh secured to one side of joist to catch overspray when spraying following joist contours. Metal lath to be fully covered with Spray-Applied Fire Resistive Materials but with no min thickness requirements.

As an alternate to the thickness shown above for the steel beam, the thicknesses shown in the following table are applicable when the thickness applied to the beam's lower flange edges is reduced by one-half. The min thickness applied to the lower flange edges is 1/4 in.

Minimum Spray-Applied Fire Resistive Materials Thickness, In.

Rating Hr	Unrestrained Beam Rating Hr	Restrained Beam Rating Hr
1	1/2	1/2
1-1/2	11/16	9/16
2	15/16	13/16
3	1-7/16	1-3/8
4	1-13/16	1-13/16

BERLIN CO LTD — Types 300, 300ES, 300N or SB.
ISOLATEK INTERNATIONAL — Types 300, 300ES, 300N, or SB.
NEWKEM PRODUCTS CORP —Types 300, 300ES, 300N, or SB.
LUCKY CORE INSULATING MATERIALS MANUFACTURING L L C —Types 300, 300ES, 300N, or SB.

6A. **(As an alternate to Item 6) Spray-Applied Fire Resistive Materials* —** Applied by mixing with water and spraying to the beam (or joist) and deck surfaces in one or more coats to the final min thicknesses shown below. Crest areas above the beam (or joist) shall

S721 - Half-Flange Tip Option
Protected Roof Deck
CAFCO 300, 300ES, 300SB, 400

Unrestrained Beam

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W27 x 336	3.36	W690 x 500	198.2	39.3	3/8	3/8	3/8	1/2	5/8
307	3.11	457	183.5	42.4	3/8	3/8	3/8	1/2	11/16
281	2.86	418	168.7	46.2	3/8	3/8	3/8	9/16	11/16
258	2.64	384	155.8	50.0	3/8	3/8	3/8	5/8	3/4
235	2.43	350	143.4	54.3	3/8	3/8	7/16	5/8	13/16
217	2.26	323	133.3	58.4	3/8	3/8	7/16	11/16	13/16
194	2.03	289	119.8	65.0	3/8	3/8	1/2	3/4	15/16
178	1.87	265	110.3	70.6	3/8	3/8	1/2	3/4	1
161	1.7	240	100.3	77.6	3/8	7/16	9/16	13/16	1-1/16
146	1.55	217	91.5	85.2	3/8	7/16	9/16	7/8	1-1/8
129	1.56	192	92.0	84.6	3/8	7/16	9/16	7/8	1-1/8
114	1.39	170	82.0	95.0	3/8	1/2	5/8	15/16	1-3/16
102	1.24	152	73.2	106.5	3/8	1/2	11/16	1	1-5/16
94	1.15	140	67.9	114.8	3/8	9/16	11/16	1-1/16	1-3/8
84	1.03	125	60.8	128.2	7/16	9/16	3/4	1-3/16	1-7/16
W24 x 370	3.98	W610 x 551	234.8	33.2	3/8	3/8	3/8	7/16	9/16
335	3.66	498	215.9	36.1	3/8	3/8	3/8	7/16	9/16
306	3.37	455	198.8	39.2	3/8	3/8	3/8	1/2	5/8
279	3.11	415	183.5	42.4	3/8	3/8	3/8	1/2	11/16
250	2.81	372	165.8	47.0	3/8	3/8	3/8	9/16	11/16
229	2.6	341	153.4	50.8	3/8	3/8	3/8	5/8	3/4
207	2.36	307	139.2	55.9	3/8	3/8	7/16	5/8	13/16
192	2.2	285	129.8	60.0	3/8	3/8	7/16	11/16	7/8
176	2.03	262	119.8	65.0	3/8	3/8	1/2	3/4	15/16
162	1.88	241	110.9	70.2	3/8	3/8	1/2	3/4	15/16
146	1.7	217	100.3	77.6	3/8	7/16	9/16	13/16	1-1/16
131	1.54	195	90.9	85.7	3/8	7/16	9/16	7/8	1-1/8
117	1.38	174	81.4	95.7	3/8	1/2	5/8	15/16	1-3/16
104	1.24	155	73.2	106.5	3/8	1/2	11/16	1	1-5/16
103	1.4	153	82.6	94.3	3/8	1/2	5/8	15/16	1-3/16
94	1.28	140	75.5	103.1	3/8	1/2	11/16	1	1-1/4
84	1.15	125	67.9	114.8	3/8	9/16	11/16	1-1/16	1-3/8
76	1.05	113	62.0	125.7	7/16	9/16	3/4	1-1/8	1-7/16
68	0.94	101	55.5	140.4	7/16	5/8	13/16	1-1/4	1-9/16
62	0.93	92	54.9	141.9	7/16	5/8	13/16	1-1/4	1-9/16
55	0.82	82	48.4	161.0	1/2	5/8	7/8	1-5/16	1-11/16
W21 x 201	2.5	W530 x 300	147.5	52.8	3/8	3/8	7/16	5/8	3/4
182	2.28	272	134.5	57.9	3/8	3/8	7/16	11/16	13/16

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

S721 - Half-Flange Tip Option
Protected Roof Deck
CAFCO 300, 300ES, 300SB, 400

Unrestrained Beam

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W21 x 166	2.09	W530 x 248	123.3	63.2	3/8	3/8	1/2	11/16	7/8
147	1.87	219	110.3	70.6	3/8	3/8	1/2	3/4	1
132	1.68	196	99.1	78.6	3/8	7/16	9/16	13/16	1-1/16
122	1.57	182	92.6	84.1	3/8	7/16	9/16	7/8	1-1/8
111	1.43	165	84.4	92.3	3/8	7/16	5/8	15/16	1-3/16
101	1.3	150	76.7	101.5	3/8	1/2	11/16	1	1-1/4
93	1.4	138	82.6	94.3	3/8	1/2	5/8	15/16	1-3/16
83	1.26	123	74.3	104.8	3/8	1/2	11/16	1	1-1/4
73	1.11	109	65.5	118.9	3/8	9/16	3/4	1-1/8	1-3/8
68	1.04	101	61.4	126.9	7/16	9/16	3/4	1-1/8	1-7/16
62	0.95	92	56.1	138.9	7/16	5/8	13/16	1-3/16	1-1/2
57	0.95	85	56.1	138.9	7/16	5/8	13/16	1-3/16	1-1/2
55	0.85	82	50.2	155.3	1/2	5/8	7/8	1-5/16	1-5/8
50	0.83	74	49.0	159.0	1/2	5/8	7/8	1-5/16	1-5/8
48	0.75	72	44.3	176.0	1/2	11/16	15/16	1-3/8	1-3/4
44	0.74	66	43.7	178.4	1/2	11/16	15/16	1-3/8	1-3/4
W18 x 175	2.46	W460 x 260	145.1	53.7	3/8	3/8	7/16	5/8	13/16
158	2.24	235	132.2	58.9	3/8	3/8	7/16	11/16	7/8
143	2.05	213	121.0	64.4	3/8	3/8	1/2	3/4	15/16
130	1.88	193	110.9	70.2	3/8	3/8	1/2	3/4	15/16
119	1.72	177	101.5	76.7	3/8	7/16	9/16	13/16	1
106	1.55	158	91.5	85.2	3/8	7/16	9/16	7/8	1-1/8
97	1.42	144	83.8	93.0	3/8	7/16	5/8	15/16	1-3/16
86	1.27	128	74.9	103.9	3/8	1/2	11/16	1	1-1/4
76	1.13	113	66.7	116.8	3/8	9/16	3/4	1-1/8	1-3/8
71	1.22	106	72.0	108.2	3/8	1/2	11/16	1-1/16	1-5/16
65	1.13	97	66.7	116.8	3/8	9/16	3/4	1-1/8	1-3/8
60	1.04	89	61.4	126.9	7/16	9/16	3/4	1-1/8	1-7/16
55	0.96	82	56.6	137.5	7/16	5/8	13/16	1-3/16	1-1/2
50	0.88	74	51.9	150.0	7/16	5/8	13/16	1-1/4	1-5/8
46	0.87	68	51.3	151.7	7/16	5/8	7/8	1-5/16	1-5/8
40	0.76	60	44.8	173.7	1/2	11/16	15/16	1-3/8	1-3/4
35	0.67	52	39.5	197.0	9/16	3/4	1	1-1/2	1-7/8
W16 x 100	1.59	W410 x 149	93.8	83.0	3/8	7/16	9/16	7/8	1-1/16
89	1.43	132	84.4	92.3	3/8	7/16	5/8	15/16	1-3/16
77	1.25	114	73.8	105.6	3/8	1/2	11/16	1	1-5/16
67	1.09	100	64.3	121.1	7/16	9/16	3/4	1-1/8	1-3/8
57	1.09	85	64.3	121.1	7/16	9/16	3/4	1-1/8	1-3/8
50	0.96	74	56.6	137.5	7/16	5/8	13/16	1-3/16	1-1/2
45	0.87	67	51.3	151.7	7/16	5/8	7/8	1-5/16	1-5/8

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

S721 - Half-Flange Tip Option
Protected Roof Deck
CAFCO 300, 300ES, 300SB, 400

Unrestrained Beam

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W16 x 40	0.78	W410 x 60	46.0	169.2	1/2	11/16	7/8	1-3/8	1-11/16
36	0.7	53	41.3	188.6	1/2	11/16	15/16	1-7/16	1-13/16
31	0.66	46	38.9	200.0	9/16	3/4	1	1-1/2	1-7/8
26	0.55	39	32.5	240.0	9/16	13/16	1-1/16	1-5/8	2-1/16
W14 x 808	8.75	W360 x 1202	516.3	15.1	3/8	3/8	3/8	3/8	3/8
730	8.08	1086	476.7	16.3	3/8	3/8	3/8	3/8	3/8
665	7.49	990	441.9	17.6	3/8	3/8	3/8	3/8	3/8
605	6.96	900	410.6	19.0	3/8	3/8	3/8	3/8	3/8
550	6.43	818	379.4	20.5	3/8	3/8	3/8	3/8	3/8
500	5.95	744	351.1	22.2	3/8	3/8	3/8	3/8	3/8
455	5.53	677	326.3	23.9	3/8	3/8	3/8	3/8	7/16
426	5.21	634	307.4	25.3	3/8	3/8	3/8	3/8	7/16
398	4.93	592	290.9	26.8	3/8	3/8	3/8	3/8	7/16
370	4.63	551	273.2	28.5	3/8	3/8	3/8	3/8	1/2
342	4.32	509	254.9	30.6	3/8	3/8	3/8	3/8	1/2
311	3.98	463	234.8	33.2	3/8	3/8	3/8	7/16	9/16
283	3.66	421	215.9	36.1	3/8	3/8	3/8	7/16	9/16
257	3.36	382	198.2	39.3	3/8	3/8	3/8	1/2	5/8
233	3.08	347	181.7	42.9	3/8	3/8	3/8	1/2	11/16
211	2.81	314	165.8	47.0	3/8	3/8	3/8	9/16	11/16
193	2.6	287	153.4	50.8	3/8	3/8	3/8	5/8	3/4
176	2.38	262	140.4	55.5	3/8	3/8	7/16	5/8	13/16
159	2.16	237	127.4	61.1	3/8	3/8	7/16	11/16	7/8
145	1.99	216	117.4	66.3	3/8	3/8	1/2	3/4	15/16
132	1.89	196	111.5	69.8	3/8	3/8	1/2	3/4	15/16
120	1.71	179	100.9	77.2	3/8	7/16	9/16	13/16	1-1/16
109	1.57	162	92.6	84.1	3/8	7/16	9/16	7/8	1-1/8
99	1.43	147	84.4	92.3	3/8	7/16	5/8	15/16	1-3/16
90	1.31	134	77.3	100.8	3/8	1/2	11/16	1	1-1/4
82	1.45	122	85.6	91.0	3/8	7/16	5/8	15/16	1-3/16
74	1.32	110	77.9	100.0	3/8	1/2	5/8	1	1-1/4
68	1.22	101	72.0	108.2	3/8	1/2	11/16	1-1/16	1-5/16
61	1.1	91	64.9	120.0	7/16	9/16	3/4	1-1/8	1-3/8
53	1.06	79	62.5	124.5	7/16	9/16	3/4	1-1/8	1-7/16
48	0.97	72	57.2	136.1	7/16	9/16	13/16	1-3/16	1-1/2
43	0.87	64	51.3	151.7	7/16	5/8	7/8	1-5/16	1-5/8
38	0.8	57	47.2	165.0	1/2	11/16	7/8	1-3/8	1-11/16
34	0.72	51	42.5	183.3	1/2	11/16	15/16	1-7/16	1-13/16
30	0.64	45	37.8	206.3	9/16	3/4	1	1-1/2	1-7/8
26	0.62	39	36.6	212.9	9/16	3/4	1	1-9/16	1-15/16
22	0.53	33	31.3	249.1	5/8	13/16	1-1/16	1-11/16	2-1/16

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

S721 - Half-Flange Tip Option *Unrestrained Beam*
Protected Roof Deck
CAFCO 300, 300ES, 300SB, 400

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W12 x 336	4.85	W310 x 500	286.2	27.2	3/8	3/8	3/8	3/8	7/16
305	4.49	454	264.9	29.4	3/8	3/8	3/8	3/8	1/2
279	4.19	415	247.2	31.5	3/8	3/8	3/8	7/16	1/2
252	3.84	375	226.6	34.4	3/8	3/8	3/8	7/16	9/16
230	3.55	342	209.5	37.2	3/8	3/8	3/8	1/2	9/16
210	3.27	313	192.9	40.4	3/8	3/8	3/8	1/2	5/8
190	3	283	177.0	44.0	3/8	3/8	3/8	9/16	11/16
170	2.72	253	160.5	48.5	3/8	3/8	3/8	9/16	3/4
152	2.45	225	144.6	53.9	3/8	3/8	7/16	5/8	13/16
136	2.23	202	131.6	59.2	3/8	3/8	7/16	11/16	7/8
120	1.99	179	117.4	66.3	3/8	3/8	1/2	3/4	15/16
106	1.77	158	104.4	74.6	3/8	3/8	9/16	13/16	1
96	1.61	143	95.0	82.0	3/8	7/16	9/16	7/8	1-1/16
87	1.47	129	86.7	89.8	3/8	7/16	5/8	15/16	1-1/8
79	1.34	117	79.1	98.5	3/8	1/2	5/8	1	1-1/4
72	1.23	107	72.6	107.3	3/8	1/2	11/16	1-1/16	1-5/16
65	1.11	97	65.5	118.9	3/8	9/16	3/4	1-1/8	1-3/8
58	1.1	86	64.9	120.0	7/16	9/16	3/4	1-1/8	1-3/8
53	1.02	79	60.2	129.4	7/16	9/16	3/4	1-3/16	1-7/16
50	1.06	74	62.5	124.5	7/16	9/16	3/4	1-1/8	1-7/16
45	0.97	67	57.2	136.1	7/16	9/16	13/16	1-3/16	1-1/2
40	0.86	60	50.7	153.5	1/2	5/8	7/8	1-5/16	1-5/8
35	0.81	52	47.8	163.0	1/2	5/8	7/8	1-5/16	1-11/16
30	0.69	45	40.7	191.3	1/2	11/16	15/16	1-7/16	1-13/16
26	0.61	39	36.0	216.4	9/16	3/4	1	1-9/16	1-15/16
22	0.62	33	36.6	212.9	9/16	3/4	1	1-9/16	1-15/16
19	0.54	28	31.9	244.4	9/16	13/16	1-1/16	1-5/8	2-1/16
16	0.45	24	26.6	293.3	5/8	7/8	1-3/16	1-13/16	2-1/4
14	0.4	21	23.6	330.0	11/16	15/16	1-1/4	1-7/8	2-3/8
W10 x 112	2.17	W250 x 167	128.0	60.8	3/8	3/8	7/16	11/16	7/8
100	1.97	149	116.2	67.0	3/8	3/8	1/2	3/4	15/16
88	1.74	131	102.7	75.9	3/8	7/16	9/16	13/16	1
77	1.54	115	90.9	85.7	3/8	7/16	9/16	7/8	1-1/8
68	1.38	101	81.4	95.7	3/8	1/2	5/8	15/16	1-3/16
60	1.22	89	72.0	108.2	3/8	1/2	11/16	1-1/16	1-5/16
54	1.11	80	65.5	118.9	3/8	9/16	3/4	1-1/8	1-3/8
49	1.01	73	59.6	130.7	7/16	9/16	3/4	1-3/16	1-1/2
45	1.06	67	62.5	124.5	7/16	9/16	3/4	1-1/8	1-7/16
39	0.92	58	54.3	143.5	7/16	5/8	13/16	1-1/4	1-9/16
33	0.78	49	46.0	169.2	1/2	11/16	7/8	1-3/8	1-11/16
30	0.8	45	47.2	165.0	1/2	11/16	7/8	1-3/8	1-11/16

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

S721 - Half-Flange Tip Option
Protected Roof Deck
CAFCO 300, 300ES, 300SB, 400

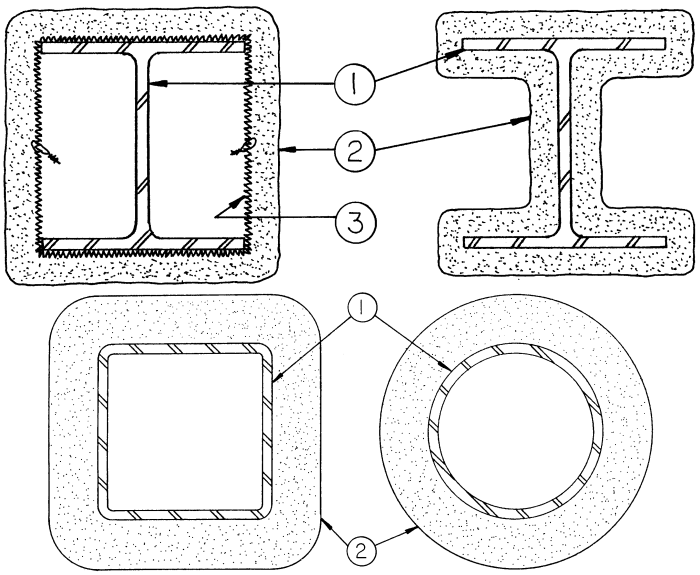
Unrestrained Beam

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W10 x 26	0.7	W10 x 39	41.3	188.6	1/2	11/16	15/16	1-7/16	1-13/16
22	0.6	33	35.4	220.0	9/16	3/4	1	1-9/16	1-15/16
19	0.6	28	35.4	220.0	9/16	3/4	1	1-9/16	1-15/16
17	0.54	25	31.9	244.4	9/16	13/16	1-1/16	1-5/8	2-1/16
15	0.48	22	28.3	275.0	5/8	7/8	1-1/8	1-3/4	2-3/16
12	0.39	18	23.0	338.5	11/16	15/16	1-1/4	1-7/8	2-3/8
W8 x 67	1.65	W200 x 100	97.4	80.0	3/8	7/16	9/16	7/8	1-1/16
58	1.44	86	85.0	91.7	3/8	7/16	5/8	15/16	1-3/16
48	1.21	71	71.4	109.1	3/8	1/2	11/16	1-1/16	1-5/16
40	1.03	59	60.8	128.2	7/16	9/16	3/4	1-3/16	1-7/16
35	0.9	52	53.1	146.7	7/16	5/8	13/16	1-1/4	1-9/16
31	0.8	46	47.2	165.0	1/2	11/16	7/8	1-3/8	1-11/16
28	0.81	42	47.8	163.0	1/2	5/8	7/8	1-5/16	1-11/16
24	0.7	36	41.3	188.6	1/2	11/16	15/16	1-7/16	1-13/16
21	0.67	31	39.5	197.0	9/16	3/4	1	1-1/2	1-7/8
18	0.58	27	34.2	227.6	9/16	3/4	1-1/16	1-9/16	2
15	0.55	22	32.5	240.0	9/16	13/16	1-1/16	1-5/8	2-1/16
13	0.48	19	28.3	275.0	5/8	7/8	1-1/8	1-3/4	2-3/16
10	0.37	15	21.8	356.8	11/16	15/16	1-1/4	1-15/16	2-7/16
W6 x 25	0.83	W150 x 37	49.0	159.0	1/2	5/8	7/8	1-5/16	1-5/8
20	0.67	30	39.5	197.0	9/16	3/4	1	1-1/2	1-7/8
16	0.68	24	40.1	194.1	1/2	11/16	15/16	1-7/16	1-13/16
15	0.52	22	30.7	253.8	5/8	13/16	1-1/8	1-11/16	2-1/8
12	0.52	18	30.7	253.8	5/8	13/16	1-1/8	1-11/16	2-1/8
9	0.39	14	23.0	338.5	11/16	15/16	1-1/4	1-7/8	2-3/8
8.5	0.37	13	21.8	356.8	11/16	15/16	1-1/4	1-15/16	2-7/16
W5 x 19	0.77	W130 x 28	45.4	171.4	1/2	11/16	15/16	1-3/8	1-3/4
16	0.66	24	38.9	200.0	9/16	3/4	1	1-1/2	1-7/8
W4 x 13	0.67	W100 x 19	39.5	197.0	9/16	3/4	1	1-1/2	1-7/8

Note: The thickness applied to the lower flange tips may be reduced to one-half the listed thickness.

Design No. X790

Ratings — 1, 1-1/2, 2, 3 and 4 Hr.



1. **Steel Column, Steel Pipe or Steel Tube —** Wide flange steel column (W) or steel circular pipe (SP) or steel square or rectangular tube (ST), min sizes as shown in the tables below.
2. **Spray-Applied Fire Resistive Materials* —** Applied by mixing with water and spraying in one or more coats to the thicknesses shown below, to steel surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 15 and 14 pcf, respectively. For method of density determination, see Design Information Section, Sprayed Material.
   The min thickness of Spray-Applied Fire Resistive Materials required for various fire resistance ratings of contour sprayed or boxed wide flange columns are shown in the table below:

Column Size	W/D	Min Thkns In. 1 Hr	1-1/2 Hr	2 Hr	3 Hr	4 Hr
W6x9	0.33	15/16	1-1/4	1-9/16	2-1/8	2-11/16
W6x12	0.43	13/16	1-1/8	1-7/16	2	2-9/16
W6x16	0.57	11/16	1	1-5/16	1-7/8	2-3/8
W8x28	0.68	5/8	15/16	1-1/4	1-13/16	2-5/16
W10x49	0.83	9/16	13/16	1-1/8	1-5/8	2-1/8
W12x106	1.46	3/8	9/16	13/16	1-1/4	1-11/16
W14x233	2.52	1/4	3/8	1/2	7/8	1-3/16
W14x730	6.68	1/4	1/4	1/4	3/8	1/2

As an alternate to the above table, the required thickness of Spray-Applied Fire Resistive Materials to be applied to all surfaces of the steel columns for all rating periods may be determined from the following equations:

$$h = \frac{R}{75\ (W/D) + 32}$$

(for column W/D range of 0.33 to 2.51)

$$h = \frac{R}{75\ (W/D) + 15}$$

(for column W/D range of 2.51 to 6.68)

Where:

h = Spray-Applied Fire Resistive Materials thickness in the range of 1/4 to 4-1/2 in. (rounded up to the nearest 1/16 in.)

R = Fire resistance rating period in minutes (60-240 mins.)

D = Heated perimeter of the steel column in inches.

W = Weight of the steel column in lbs per foot.

The thicknesses contained in the table below are applicable when the Spray-Applied Fire Resistive Materials applied to the column's flange tips are reduced to one-half that shown in the table below (for contour application):

Column Size In.	Min Thkns In. 1 Hr	1-1/2 Hr	2 Hr	3 Hr	4 Hr
W6x9	1	1-3/8	1-3/4	2-7/16	3-1/8
W6x12	7/8	1-1/4	1-5/8	2-5/16	3-1/16
W6x16	3/4	1-1/8	1-7/16	2-1/16	2-11/16
W8x28	11/16	1	1-5/16	1-15/16	2-1/2
W10x49	5/8	15/16	1-3/16	1-3/4	2-3/8
W12x106	3/8	5/8	7/8	1-3/8	1-13/16
W14x233	5/16	3/8	9/16	15/16	1-5/16
W14x730	5/16	5/16	5/16	7/16	5/8

The min thickness of Spray-Applied Fire Resistive Materials required for various fire resistance ratings of contour sprayed steel pipes or tubes are shown on the table below:

Min Column Size In.	A/P	1 Hr	1-1/2 Hr	Min Thkns In. 2 Hr	3 Hr	4 Hr
SP 4x0.237	0.22	11/16	1	1-3/8	2-1/16	2-3/4
ST 4x4x0.1875	0.18	3/4	1-1/16	1-7/16	2-1/16	2-11/16
ST 4x4x0.3125	0.29	1/2	13/16	1-1/8	1-3/4	2-5/16

Min Column Size In.	A/P	1 Hr	1-1/2 Hr	Min Thkns In. 2 Hr	3 Hr	4 Hr
ST 4x4x0.375	0.34	7/16	3/4	1	1-9/16	2-1/8
ST 4x4x0.5	0.44	3/8	9/16	7/8	1-3/8	1-7/8
ST 36x24x0.5	0.49	5/16	7/16	11/16	1-1/8	1-9/16

As an alternate to the table above, the required thickness of Spray-Applied Fire Resistive Materials to be applied to all surfaces of the steel pipes or tubes for all rating periods may be determined from the following equation:

$$h = \frac{R}{188\ (A/P) + 45}$$

Where:
h = Spray-Applied Fire Resistive Materials thickness in the range of 5/16 to 4-1/4 in. (rounded up to the nearest 1/16 in.)
R = Fire resistance rating in minutes (60-240 mins.)
A = Cross-sectional area of pipe or tube.
P = Heated perimeter of steel pipe or tube.
A/P = 0.18 to 0.49.
The A/P ratio of a circular pipe is determined by:

$$A/P = \frac{t\ (d - t)}{d}$$

Where:
d = the outer diameter of the pipe (in.)
t = the wall thickness of the pipe (in.)
The A/P ratio of a rectangular tube is determined by:

$$A/P = \frac{t\ (a + b - 2t)}{a + b}$$

Where:
a = the outer width of the tube (in.)
b = the outer length of the tube (in.)
t = the wall thickness of the tube (in.)

BERLIN CO LTD — Types 300, 300ES, 300N or SB.
ISOLATEK INTERNATIONAL —Type 300, Type 300ES, Type 300N or Type SB.
NEWKEM PRODUCTS CORP —Type 300, Type 300ES, Type 300N or Type SB.
LUCKY CORE INSULATING MATERIALS MANUFACTURING L L C —Types 300, 300ES, 300N, or SB.

2A. **(As an alternate to Item 2) Spray-Applied Fire Resistive Materials* —** Applied by mixing with water and spraying in one or more coats to the thicknesses shown below, to steel surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 17.5 and 16 pcf, respectively, for Type 300TW. Min average and min individual density of 22 and 19 pcf, respectively, for Type 400. For method of density determination, see Design Information Section, Sprayed Material.
The min thickness of Spray-Applied Fire Resistive Materials required for various fire resistance ratings is shown in Item 2.

ISOLATEK INTERNATIONAL — Type 300TW or Type 400
NEWKEM PRODUCTS CORP —Type 400.
LUCKY CORE INSULATING MATERIALS MANUFACTURING L L C —Type 400.

2B. **(As an alternate to Item 2 and 2A) — Spray-Applied Fire Resistive Materials* —** Prepared by mixing with water according to instructions on each bag of mixture and spray- or trowel-applied to steel surfaces which are free of dirt, oil or scale. Min average density of 17.5 pcf with min individual value of 17.0 pcf. For method of density determination, see Design Information Section, Sprayed Material.
The min thickness of Spray-Applied Fire Resistive Materials required for various fire resistance ratings is shown in Item 2.

ISOLATEK INTERNATIONAL —Type 280.

3. **Metal Lath —** (Optional for contour application) — 3.4 lb/sq yd galv or painted expanded steel lath. Lath shall be lapped 1 in. and tied together with No. 18 SWG galv steel wire spaced vertically 6 in. OC.

*Bearing the UL Classification Mark

X790
Structural Steel Square Tube Columns
CAFCO 300, 300ES, 300SB, 400

ASTM Desig.	Wall Thk	A/P	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
30 x 30	5/8	0.61	762 x 762 x 15.9	121.2	64.3	5/16	7/16	11/16	1-1/8	1-9/16
28 x 28	5/8	0.61	711 x 711 x 15.9	120.9	64.4	5/16	7/16	11/16	1-1/8	1-9/16
26 x 26	5/8	0.61	660 x 660 x 15.9	120.5	64.6	5/16	7/16	11/16	1-1/8	1-9/16
24 x 24	5/8	0.61	610 x 610 x 15.9	120.1	64.8	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.49	x 12.7	96.9	80.4	5/16	7/16	11/16	1-1/8	1-9/16
	3/8	0.37	x 9.5	73.4	106.1	7/16	3/4	1	1-9/16	2-1/8
22 x 22	5/8	0.61	559 x 559 x 15.9	119.6	65.1	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.49	x 12.7	96.6	80.6	5/16	7/16	11/16	1-1/8	1-9/16
	3/8	0.37	x 9.5	73.2	106.4	7/16	3/4	1	1-9/16	2-1/8
20 x 20	5/8	0.61	508 x 508 x 15.9	119	65.4	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.49	x 12.7	96.3	80.9	5/16	7/16	11/16	1-1/8	1-9/16
	3/8	0.37	x 9.5	73	106.7	7/16	3/4	1	1-9/16	2-1/8
18 x 18	5/8	0.60	457 x 457x 15.9	118.3	65.8	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.49	x 12.7	95.8	81.3	5/16	7/16	11/16	1-1/8	1-9/16
	3/8	0.37	x 9.5	72.7	107.1	7/16	3/4	1	1-9/16	2-1/8
16 x 16	5/8	0.60	406 x 406 x 15.9	117.4	66.3	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.48	x 12.7	95.2	81.8	3/8	9/16	7/8	1-3/8	1-13/16
	3/8	0.37	x 9.5	72.4	107.6	7/16	3/4	1	1-9/16	2-1/8
	5/16	0.31	x 7.9	60.7	128.3	1/2	13/16	1-1/8	1-3/4	2-5/16
14 x 14	5/8	0.60	356 x 356 x 15.9	116.3	67.0	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.48	x 12.7	94.5	82.4	3/8	9/16	7/8	1-3/8	1-13/16
	3/8	0.36	x 9.5	72	108.2	7/16	3/4	1	1-9/16	2-1/8
	5/16	0.31	x 7.9	60.4	128.9	1/2	13/16	1-1/8	1-3/4	2-5/16
12 x 12	5/8	0.59	305 x 305 x 15.9	114.7	67.9	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.48	x 12.7	93	83.7	3/8	9/16	7/8	1-3/8	1-13/16
	3/8	0.36	x 9.5	71.4	109.1	7/16	3/4	1	1-9/16	2-1/8
	5/16	0.30	x 7.9	60.1	129.6	1/2	13/16	1-1/8	1-3/4	2-5/16
	1/4	0.24	x 6.4	48.8	159.6	11/16	1	1-3/8	2	2-11/16
10 x 10	5/8	0.59	254 x 254 x 15.9	112.6	69.2	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.48	x 12.7	92.1	84.6	3/8	9/16	7/8	1-3/8	1-13/16
	3/8	0.36	x 9.5	70	111.3	7/16	3/4	1	1-9/16	2-1/8
	5/16	0.30	x 7.9	59.5	130.9	1/2	13/16	1-1/8	1-3/4	2-5/16
	1/4	0.24	x 6.4	48.1	161.9	11/16	1	1-3/8	2	2-11/16
	3/16	0.18	x 4.8	36.5	213.4	3/4	1-1/16	1-7/16	2-1/16	2-11/16
8 x 8	5/8	0.58	203 x 203 x 15.9	108	72.1	5/16	7/16	11/16	1-1/8	1-9/16
	1/2	0.47	x 12.7	89	87.5	3/8	9/16	7/8	1-3/8	1-13/16
	3/8	0.36	x 9.5	69.5	112.1	7/16	3/4	1	1-9/16	2-1/8
	5/16	0.30	x 7.9	58.7	132.7	1/2	13/16	1-1/8	1-3/4	2-5/16
	1/4	0.24	x 6.4	47	165.7	11/16	1	1-3/8	2	2-11/16
	3/16	0.18	x 4.8	36.2	215.1	3/4	1-1/16	1-7/16	2-1/16	2-11/16
7 x 7	1/2	0.46	178 x 178 x 12.7	88.6	87.9	3/8	9/16	7/8	1-3/8	1-7/8
	3/8	0.35	x 9.5	68.7	113.4	7/16	3/4	1	1-9/16	2-1/8
	5/16	0.30	x 7.9	58.1	134.0	1/2	13/16	1-1/8	1-3/4	2-5/16
	1/4	0.24	x 6.4	47.2	165.0	11/16	1	1-3/8	2	2-11/16
	3/16	0.18	x 4.8	36	216.3	3/4	1-1/16	1-7/16	2-1/16	2-11/16

Note: A/P Ratio based on Design Formula

X790 - Half-Flange Tip Option
Wide Flange Structural Steel Columns
CAFCO 300, 300ES, 300SB, 400

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W14 x 120	1.42	W360 x 179	83.8	93.0	5/8	15/16	1-3/16	1-3/4	2-3/8
109	1.29	162	76.1	102.3	5/8	15/16	1-3/16	1-3/4	2-3/8
99	1.18	147	69.6	111.9	5/8	15/16	1-3/16	1-3/4	2-3/8
90	1.08	134	63.7	122.2	5/8	15/16	1-3/16	1-3/4	2-3/8
82	1.23	122	72.6	107.3	5/8	15/16	1-3/16	1-3/4	2-3/8
74	1.12	110	66.1	117.9	5/8	15/16	1-3/16	1-3/4	2-3/8
68	1.04	101	61.4	126.9	5/8	15/16	1-3/16	1-3/4	2-3/8
61	0.92	91	54.3	143.5	5/8	15/16	1-3/16	1-3/4	2-3/8
53	0.91	79	53.7	145.1	5/8	15/16	1-3/16	1-3/4	2-3/8
48	0.83	72	49.0	159.0	11/16	1	1-5/16	1-15/16	2-1/2
43	0.75	64	44.3	176.0	11/16	1	1-5/16	1-15/16	2-1/2
38	0.7	57	41.3	188.6	11/16	1	1-5/16	1-15/16	2-1/2
34	0.63	51	37.2	209.5	3/4	1-1/8	1-7/16	2-1/16	2-11/16
30	0.56	45	33.0	235.7	7/8	1-1/4	1-5/8	2-5/16	3-1/16
26	0.55	39	32.5	240.0	7/8	1-1/4	1-5/8	2-5/16	3-1/16
22	0.47	33	27.7	280.9	7/8	1-1/4	1-5/8	2-5/16	3-1/16
W12 x 336	4.06	W310 x 500	239.5	32.5	5/16	3/8	9/16	15/16	1-5/16
305	3.76	454	221.8	35.1	5/16	3/8	9/16	15/16	1-5/16
279	3.5	415	206.5	37.7	5/16	3/8	9/16	15/16	1-5/16
252	3.2	375	188.8	41.3	5/16	3/8	9/16	15/16	1-5/16
230	2.96	342	174.6	44.6	5/16	3/8	9/16	15/16	1-5/16
210	2.73	313	161.1	48.4	5/16	3/8	9/16	15/16	1-5/16
190	2.5	283	147.5	52.8	3/8	5/8	7/8	1-3/8	1-13/16
170	2.26	253	133.3	58.4	3/8	5/8	7/8	1-3/8	1-13/16
152	2.04	225	120.4	64.7	3/8	5/8	7/8	1-3/8	1-13/16
136	1.86	202	109.7	71.0	3/8	5/8	7/8	1-3/8	1-13/16
120	1.65	179	97.4	80.0	3/8	5/8	7/8	1-3/8	1-13/16
106	1.47	158	86.7	89.8	3/8	5/8	7/8	1-3/8	1-13/16
96	1.34	143	79.1	98.5	5/8	15/16	1-3/16	1-3/4	2-3/8
87	1.22	129	72.0	108.2	5/8	15/16	1-3/16	1-3/4	2-3/8
79	1.11	117	65.5	118.9	5/8	15/16	1-3/16	1-3/4	2-3/8
72	1.02	107	60.2	129.4	5/8	15/16	1-3/16	1-3/4	2-3/8
65	0.92	97	54.3	143.5	5/8	15/16	1-3/16	1-3/4	2-3/8
58	0.92	86	54.3	143.5	5/8	15/16	1-3/16	1-3/4	2-3/8
53	0.85	79	50.2	155.3	5/8	15/16	1-3/16	1-3/4	2-3/8
50	0.9	74	53.1	146.7	5/8	15/16	1-3/16	1-3/4	2-3/8
45	0.82	67	48.4	161.0	11/16	1	1-5/16	1-15/16	2-1/2
40	0.73	60	43.1	180.8	11/16	1	1-5/16	1-15/16	2-1/2
35	0.7	52	41.3	188.6	11/16	1	1-5/16	1-15/16	2-1/2
30	0.6	45	35.4	220.0	3/4	1-1/8	1-7/16	2-1/16	2-11/16
26	0.53	39	31.3	249.1	7/8	1-1/4	1-5/8	2-5/16	3-1/16
22	0.56	33	33.0	235.7	7/8	1-1/4	1-5/8	2-5/16	3-1/16
19	0.48	28	28.3	275.0	7/8	1-1/4	1-5/8	2-5/16	3-1/16
16	0.41	24	24.2	322.0	1	1-3/8	1-3/4	2-7/16	3-1/8
14	0.36	25	21.2	366.7	1	1-3/8	1-3/4	2-7/16	3-1/8
W10 x 112	1.81	W250 x 167	106.8	72.9	3/8	5/8	7/8	1-3/8	1-13/16
100	1.64	149	96.8	80.5	3/8	5/8	7/8	1-3/8	1-13/16

Note: The thickness applied to the flange tips may be reduced to one-half the listed thickness.

CAFCO® 300

Spray-Applied Fire Resistive Material

CAFCO 300 is a durable, wet mix Spray-Applied Fire Resistive Material (SFRM) designed to provide fire protection to various floor and roof assemblies, steel beams, columns, and joists in commercial construction projects.

CAFCO 300 offers the best fire resistance performance per unit thickness of any commercial SFRM. This means less material is needed to achieve required fire ratings. CAFCO 300 is very cost efficient.

CAFCO 300 is applied exclusively by CAFCO licensed and trained contractors. Our technical staff works closely with building team members to meet all fire protection needs.

CODE COMPLIANCES

CAFCO 300 satisfies the requirements of the following:

- IBC - International Building Code (ICC ESR-1649)
- New York City - MEA
- City of Los Angeles
- NBC - National Building Code of Canada

MAJOR SPECIFICATIONS

CAFCO 300 complies with the requirements of the following specifications:

- General Services Administration (GSA): AIA/SC/GSA:07811
- Department of the Navy NAVFACENGCOM Guide Specification NFGS 07810, Sprayed-On Fireproofing
- Veterans Administration (VA): H-08-1
- U.S. ARMY Corps of Engineers CEGS-07811
- U.S. Environmental Protection Agency (EPA): Regulation 40
- Construction Specification Canada (CSC) TEK-AID
- Factory Mutual Approved

FIRE TEST PERFORMANCE

CAFCO 300 has been extensively tested for fire endurance by Underwriters Laboratories (UL) and Underwriters Laboratories of Canada (ULC) in accordance with ASTM E119 (UL 263, CAN/ULC-S101).

These tests have resulted in ratings of up to 4 hours for:

- Floor Assemblies
- Beams
- Joists
- Columns
- Roof Assemblies

CAFCO 300 has also been tested in accordance with ASTM E84 (UL723,CAN/ULC-S102) and has the following Surface Burning Characteristics

Flame Spread.....0

Smoke Developed.....0

THERMAL PROPERTIES

CAFCO 300 is also a thermal insulator. This benefit is important in reducing heat loss, particularly when the product is applied to the underside of a roof deck. The R-value added by CAFCO 300 may allow a reduction in roof insulation.

Product	*Conductivity (k)**	*Resistance (R/inch)*
CAFCO 300	0.54 BTU in/hr ft²°F @ 75°F (0.078 W/mK @ 24°C)	1.85

*When tested in accordance with ASTM C518

Physical Performance

Characteristic	*ASTM Method*	*Standard Performance**	*Tested Performance***
Density	E605	15 pcf (240 kg/m³)	15 pcf (240 kg/m³)
Combustibility	E136	Noncombustible	Noncombustible
Cone Calorimeter	E1354	No Flaming or Heat Release	No Flaming or Heat Release
Cohesion/Adhesion	E736	150 psf (7.2 kPa)	428 psf (20.5 kPa)
Deflection	E759	No Cracks or Delaminations	No Cracks or Delaminations
Bond Impact	E760	No Cracks or Delaminations	No Cracks or Delaminations
Compressive Strength	E761	750 psf (35.9 kPa)	3,100 psf (148.4 kPa)
Air Erosion Resistance	E859	Less than 0.025 g/ft² (0.27 g/m²)	0.000 g/ft² (0.000 g/m²)
Corrosion Resistance	E937, Mil. Std. 810	Does Not Promote Corrosion of Steel	Does Not Promote Corrosion of Steel
Sound Absorption	C423		0.50 NRC 1" (25mm) on deck and beam
Fungal Resistance	G21	No Growth After 28 Days	Passed

* Standard performance based on General Services Administration AIA/SC/GSA/07811. Refer to UL design for density requirement. For further information refer to the application manual.

** Values represent independent laboratory tests under controlled conditions.

ISOLATEK INTERNATIONAL®

CAFCO 300 Guide Specification

PART 1 – GENERAL

1.1 Work included

1.1.1 Provide all labor, materials, equipment and services necessary for, and incidental to, the complete and proper installation of all sprayed fire protection and related work as shown on the drawings or where specified herein, and in accordance with all applicable requirements of the Contract Documents.

1.1.2 The material and installation shall conform to the applicable building code requirements of all authorities having jurisdiction.

1.2 Quality Assurance

1.2.1 Work shall be performed by a firm with expertise in the installation of fire protection or similar materials. This firm shall be licensed or otherwise approved by the spray-applied fire resistive material manufacturer.

1.2.2 Before proceeding with the fire protection work, approval of the proposed material thicknesses and densities shall be obtained from the architect and other applicable authorities having jurisdiction.

1.3 Related Sections

1.3.1 Section 05100 – Structural Steel.
1.3.2 Section 05300 – Metal Decking.
1.3.3 Section 07200 – Insulation.
1.3.4 Section 07270 – Firestopping.
1.3.5 Section 07812 – Intumescent Coatings.
1.3.6 Section 09200 – Lath and Plaster.
1.3.7 Section 09900 – Painting.

1.4 References

A. ASTM E84 – Surface Burning Characteristics of Building Materials.
B. ASTM E119 – Fire Tests of Building Construction and Materials.
C. ASTM E605 – Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.
D. ASTM E736 – Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
E. ASTM E759 – Effect of Deflection of Sprayed Fire-Resistive Materials Applied to Structural Members.
F. ASTM E760 – Effect of Impact on Bonding of Sprayed Fire-Resistive Materials Applied to Structural Members.
G. ASTM E761 – Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.
H. ASTM E859 – Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members.
I. ASTM E937 – Corrosion of Steel by Sprayed Fire-Resistive Materials Applied to Structural Members.
J. CAN / ULC–S101 – Standard Methods of Fire Tests of Building Construction and Materials.
K. CAN / ULC–S102 – Steiner Tunnel Test.

1.4.1 Underwriters Laboratories of Canada (ULC) List of Equipment and Materials.
1.4.2 Underwriters Laboratories, Inc (UL) Fire Resistance Directory.
1.4.3 Uniform Building Code Standard No. 7-6 (current edition): Thickness and Density Determination for Spray-Applied Fire Protection.
1.4.4 AWCI Publication: Technical Manual 12-A Standard Practice for the Testing and Inspection of Field-Applied Sprayed Fire Resistive Materials; an Annotated Guide.

1.5 Submittals

1.5.1 Manufacturer's Data: Submit Manufacturer's specification, including certification as may be required to show material compliance with Contract Documents.

1.5.2 Test Data: Independent laboratory test results shall be submitted for all specified performance criteria.

1.6 Delivery, Storage and Handling

1.6.1 Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data. Packaging shall bear the UL labels for fire hazard and fire-resistance classifications.

1.6.2 Store materials above ground, in a dry location, protected from the weather. Damaged packages found unsuitable for use should be rejected and removed from the project.

1.7 Project Conditions

1.7.1 When the prevailing outdoor temperature at the building is less than 40° F (4°C), a minimum substrate and ambient temperature of 40° F (4°C) shall be maintained prior to, during, and a minimum of 24 hours after application of spray-applied fire resistive material. If necessary for job progress, General Contractor shall provide enclosures and heat to maintain proper temperatures and humidity levels.

1.7.2 General Contractor shall provide ventilation to allow proper drying of the sprayed fire protection during and subsequent to its application.

1.7.2.1 In enclosed areas, ventilation shall not be less than 4 complete air changes per hour.

1.8 Sequencing/Scheduling

1.8.1 All fire protection work on a floor shall be completed before proceeding to the next floor.

1.8.2 The Contractor shall cooperate in the coordination and scheduling of fire protection work to avoid delays in job progress.

PART 2 – PRODUCTS

2.1 Acceptable Manufacturers. The spray-applied fire resistive material shall be manufactured under the CAFCO® brand name, by authorized producers.

2.2 Materials

2.2.1 Materials shall be CAFCO 300, (UL/ULC designation: Type 300) applied to conform to the drawings, specifications and following test criteria:

2.2.1.1 Deflection: When tested in accordance with ASTM E759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one time vertical centerload resulting in a downward deflection of 1/120th of the span.

2.2.1.2 Bond Impact: When tested in accordance with ASTM E760, the material shall not crack or delaminate from the concrete topped galvanized deck to which it is applied.

2.2.1.3 Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 150 psf (7.2 kPa).

2.2.1.4 Air Erosion: When tested in accordance with ASTM E859, the material shall not be subject to losses from the finished application greater than 0.025 grams per sq. ft. (0.27 grams per square meter).

2.2.1.5 Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 750 psf (35.9 kPa).

2.2.1.6 Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.

2.2.1.7 Surface Burning Characteristics: When tested in accordance with ASTM E84 or CAN/ULC-S102, the material shall exhibit the following surface burning characteristics:
Flame Spread 0
Smoke Developed 0

2.2.1.8 Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL / ULC design or as required by the authority having jurisdiction.

2.2.2 The material shall have been tested and classified by Underwriters Laboratories, Inc. (UL) or Underwriters Laboratories of Canada (ULC) in accordance with the procedures of UL 263 (ASTM E119) or CAN/ULC-S101.

2.2.3 Spray-applied fire resistive materials shall be applied at the appropriate minimum thickness and density to achieve the following ratings:
Floor assemblies ___hr.
Roof assemblies ___hr.
Beams ___hr.
Girders ___hr.
Columns ___hr.
Joists ___hr.

2.2.4 Potable water shall be used for the application of spray-applied fire resistive materials.

2.2.5 Spray-applied fire resistive materials shall be free of all forms of asbestos, including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite. Material manufacturer shall provide certification of such upon request.

PART 3 – EXECUTION

3.1 Preparation

3.1.1 All surfaces to receive spray-applied fire resistive material shall be free of oil, grease, loose mill scale, dirt, paints/primers or other foreign materials which would impair satisfactory bonding to the surface. Manufacturer shall be contacted for procedures on handling primed/painted steel. Any cleaning of surfaces to receive sprayed fire protection shall be the responsibility of the General Contractor or Steel Erector, as outlined in the structural steel or steel deck section.

3.1.2 Clips, hangers, supports, sleeves and other attachments to the substrate are to be placed by others prior to the application of spray-applied fire resistive materials.

3.1.3 The installation of ducts, piping, conduit or other suspended equipment shall not take place until the application of spray-applied fire resistive materials is complete in an area.

3.1.4 The spray-applied fire resistive material shall only be applied to steel deck which has been fabricated and erected in accordance with the criteria set by the Steel Deck Institute.

3.1.5 When roof traffic is anticipated, as in the case of periodic maintenance, roofing pavers shall be installed as a walkway to distribute loads.

3.2 Application

3.2.1 Equipment, mixing and application shall be in accordance with the manufacturer's written application instructions.

3.2.2 The application of spray-applied fire resistive material shall not commence until certification has been received by the General Contractor that surfaces to receive sprayed fire protection have been inspected by the applicator and are acceptable to receive spray-applied fire resistive material.

3.2.3 All unsuitable substrates must be identified and made known to the General Contractor and corrected prior to application of the spray-applied fire resistive material.

3.2.4 Spray-applied fire resistive material shall not be applied to steel floor decks prior to the completion of concrete work on that deck.

3.2.5 The application of spray-applied fire resistive material to the underside of roof deck shall not commence until the roofing is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and after construction roof traffic has ceased.

3.2.6 Proper temperature and ventilation shall be maintained as specified in 1.7.1,1.7.2. and 1.7.2.1

3.2.7 Provide masking, drop cloths or other suitable coverings to prevent overspray from coming in contact with surfaces not intended to be sprayed.

3.2.8 CAFCO BOND-SEAL (Type EBS) adhesive shall be applied as per the appropriate UL/ULC fire resistance design and manufacturer's written recommendations.

3.3 Repairing and Cleaning

3.3.1 All patching of and repair to spray-applied fire resistive material, due to damage by other trades, shall be performed under this section and paid for by the trade responsible for the damage.

3.3.2 After the completion of the work in this section, equipment shall be removed and all surfaces not to be sprayed shall be cleaned to the extent previously agreed to by the applicator and General Contractor.

3.4 Inspection and Testing

3.4.1 The spray-applied fire resistive material shall be tested for thickness and density in accordance with one of the following procedures: ASTM E605 – Standard Test Method of Sprayed Fire-Resistive Materials Applied to Structural Members. AWCI Publication: Technical Manual 12-A Standard Practice for the Testing and Inspection of Field-Applied Sprayed Fire Resistive Materials; an Annotated Guide. UBC Standard No. 7-6 – Thickness and Density Determination for Spray-Applied Fire Protection.

Product Availability

Isolatek International Spray-Applied Fire Resistive Materials are available to trained, licensed contractors around the world from strategically located production and distribution points in the U.S., Canada, Mexico, Europe and the Pacific Basin.

ISOLATEK INTERNATIONAL is registered with the AIA Continuing Education System (AIA/CES)

For Further Information

CAFCO Technical and Sales Representatives are always available to lend assistance. Additional printed materials, including Material Safety Data Sheets, and other product literature, are available upon request.
For more information about our CAFCO line of sprayed fire protection, thermal and acoustical treatments, Intumescent Coatings, thermal barriers and CAFCO-BOARD® or for the name of the Sales Representative in your area, please contact:

In the United States: Isolatek International, Stanhope, New Jersey Tel: 800.631.9600 Fax: 973.347.9170
In Mexico & Central America: Cafco Mexico S.A. de C.V., Mexico D.F. Tel: 525.254.6683 Fax: 525.531.7826
In Andean Countries: Cafco Andina S.A., Santiago, Chile Tel: 562.719.0394
In Canada: Cafco Industries, Toronto (Ontario) Tel: 888.873.0003 Fax: 416.679.2933
In Asia/Pacfic: Tel: 60.3.5121.3886 Fax: 60.3.5121.4886

For more detailed product information, visit our website at
www.cafco.com or contact us at technical@isolatek.com

ISOLATEK INTERNATIONAL®

Cafco® Total Passive Fire Protection

MATERIAL SAFETY DATA SHEET

Section 1 – Chemical Product / Company Information

Product Name: CAFCO® 300, CAFCO® 300 SB, CAFCO® 300 ES

Effective Date: 5/9/11

Product Use/Class: Spray-Applied Fire Resistive Materials (SFRM)

Supersedes: 12/28/09

Manufacturer: United States Mineral Products Company
dba Isolatek International
41 Furnace Street
Stanhope, NJ 07874 USA
973-347-1200

Preparer: R&D Department

CHEMTREC Transportation Emergency Phone #: 800-424-9300 / 703-527-3887 (Int'l)

Section 2 – Composition / Information On Ingredients

Chemical Name	CAS Number	Wt. % (Max.)
Calcium Sulfate, Hemihydrate	26499-65-0	50 - 75
Vermiculite	1318-00-9	15 - 35
Cellulose	065996-61-4	1 - 10
Calcium Carbonate	1317-65-3	1 - 10
Quartz	014808-60-7	0 - 5

Section 3 – Hazards Identification

Emergency Overview: A granular powder that poses little immediate hazard. However, components may contain trace amounts of crystalline silica (quartz). Prolonged exposure to respirable crystalline silica (quartz) may cause cancer.

Effects of Overexposure – Eye Contact: May cause irritation to the eyes.

Effects of Overexposure – Skin Contact: May cause skin irritation. Prolonged exposure may cause alkali burns.

Effects of Overexposure – Inhalation: May cause irritation to upper respiratory system.

Effects of Overexposure – Ingestion: May cause gastro – intestinal irritation.

Effects of Overexposure – Chronic Hazards: Dust may cause inflammation of the cornea. Dermatitis may occur in sensitive individuals. Inhalation over long periods may overload lung clearance mechanisms; make lungs more vulnerable to disease. Prolonged inhalation of respirable crystalline silica may result in lung disease (silicosis, lung cancer).

Primary Route(s) of Entry: Skin Contact, Skin Absorption, Inhalation, Ingestion, Eye Contact

Medical Conditions Prone to Aggravation by Exposure: Sensitive skin; respiratory conditions.

Section 4 – First Aid Measures

First Aid – Skin Contact: Wash with soap and water. If persistent irritation occurs, seek medical attention.

First Aid – Eye Contact: Flush eyes with clean water for at least 15 minutes. Seek medical attention if irritation persists.

First Aid – Inhalation: Breathe fresh air. Seek medical attention if irritation persists.

First Aid – Ingestion: If swallowed do not induce vomiting. Seek immediate medical attention.

Section 5 – Fire Fighting Measures

Flash Point: Not Applicable
Lower Explosive Limit: Not Applicable
Upper Explosive Limit: Not Applicable

NFPA Rating
Health: **1**
Flammability: **0**
Reactivity: **0**

Extinguishing Media: Not Applicable. Product will not burn.
Unusual Fire & Explosion Hazards: None
Special Firefighting Procedures: None

Section 6 – Accidental Release Measures

Steps To Be Taken If Material Is Released Or Spilled: Sweep up material and place in disposal containers. Avoid inhalation of dust. Wet material should be treated with an inert absorbent material and placed in disposal containers. Dispose of material in accordance with all federal, state, and local regulations. Use personal protective equipment as necessary.

Section 7 – Handling And Storage

Handling: Avoid inhalation of dust. Avoid skin & eye contact. Wear skin and eye protection during use. Use normal personal hygiene to remove materials, contaminants; wash clothing separately before re-use.

Storage: Keep dry. Keep containers closed when not in use. Store in a cool, dry place with adequate ventilation.

Section 8 – Exposure Controls / Personal Protection

		Exposure Limits (8-hour TWA) (mg/m^3)			
Chemical Name	**CAS Number**	**OSHA PEL**	**ACGIH TLV**	**NIOSH**	**Mexico**
Calcium Sulfate, Hemihydrate	26499-65-0	15 (T), 5 (R)	10 (R)	10 (T), 5 (R)	10 (R)
Calcium Carbonate	1317-65-3	15 (T), 5 (R)	n/a	10 (T), 5 (R)	10 (R)
Quartz	14808-60-7	30 (T), 10 (R)	0.025 (R)	0.05 (R)	0.10 (R)
		(T) - Total (R) - Respirable			

Engineering Controls: Fans may be necessary to control nuisance dust levels.

Respiratory Protection: Wear a NIOSH approved disposable dust mask (N-95, or equivalent) to prevent exposure above the limits specified.

Skin Protection: Wear gloves and use hand creams to prevent dry skin.

Eye Protection: Wear proper eye protection; at minimum, safety glasses with side shields.

Work / Hygienic Practices: Use bag opening procedures which minimize dust release. Use anti-slip surfaces on working platforms – material is slippery when wet.

Section 9 – Physical And Chemical Properties

Boiling Point (°F): N/A
Appearance & Odor: Light grey or tan, light green or light red, granular powder; no odor.
Vapor Pressure (mm Hg): N/A
Vapor Density (air=1) N/A
Solubility in Water: Negligible
Specific Gravity (H_2O=1): N/A
Melting Point (°F): >1800°F (981° C)
Evaporation Rate: N/A
Physical State: Solid
% Volatiles: 0
PH: 8 - 11

(See section 16 for abbreviation legend)

Section 10 – Stability And Reactivity

Stability: (under normal conditions):	Stable
Conditions to Avoid:	Contact with strong acids
Incompatibility (Materials to Avoid):	Strong Acids
Hazardous Decomposition Products:	CO,CO_2
Hazardous Polymerization:	Will not occur
Conditions to Avoid:	N/A

Section 11 – Toxicological Information

Ingredient **CAS Number** **LD50/LC50**

No Data Available

	IARC			NTP		OSHA
Carcinogenicity	Group 1	Group 2A	Group 2B	Known	Suspect	
Calcium Sulfate, Hemihydrate	NO	NO	NO	NO	NO	NO
Vermiculite	NO	NO	NO	NO	NO	NO
Cellulose	NO	NO	NO	NO	NO	NO
Calcium Carbonate	NO	NO	NO	NO	NO	NO
Quartz	YES	NO	NO	YES	NO	YES

Section 12 – Ecological Information

Ecological Information: No Data Available

Section 13 – Disposal Information

Disposal Information: Non hazardous product (U.S. (EPA, 40 CFR 261). Dispose of waste in accordance with applicable regulations.

Section 14 – Transportation Information

Proper Shipping Name: Not Applicable
Technical Name: Not Applicable
Hazard Class: Non-Hazardous
UN/NA Number: Not Applicable
Additional Notes: None

Section 15 – Regulatory Information

U.S. Federal Regulations SARA 311/312	Immediate Health (Acute)	Delayed Health (Chronic)	FIRE	PRESSURE	REACTIVE
	No	Yes	No	No	No

		State Hazardous Substance List					
U.S. State Regulations	CAS NUMBER	CA	MA	MN	NJ	PA	RI
	26499-65-0	No	No	No	Yes	Yes	No
	1317-65-3	No	No	No	Yes	No	Yes
	14808-60-7	No	No	Yes	Yes	Yes	Yes

California Proposition 65
Warning: This product contains substances know to the State of California to cause cancer, birth defects or other reproductive harm.

INTERNATIONAL REGULATIONS AS FOLLOWS:

Chemical Inventory Status

All chemicals in this product are listed or exempt from listing in the following:

U.S	Canada	Europe	Australia	Korea
TSCA	DSL | NDSL	EINECS | ELINCS	AICS	ECL
Yes	Yes | No	Yes	Yes	Yes

CANADIAN WHMIS

This MSDS has been prepared in compliance with Controlled Product Regulations and contains all information required.

CANADIAN WHMIS CLASS: D2A

HMIS Ratings
Health: 1 **Flammability**: 0 **Reactivity**: 0 **Personal Protection**: e

VOLATILE ORGANIC COMPOUNDS, GR/LTR MIXED (UNTHINNED): 0

Section 16 – Other Information

Prepared By: Research Department, U.S.A.
Telephone: (973) 347-1200

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results to be obtained from the use thereof. VENDOR SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. In no event shall the vendor be liable for special, indirect or consequential damages.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in this data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes all risks in his use of the material.

CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 07 84 13 SUBMITTAL NO. 059 CIANBRO CORPORATION: By: AJP Date: 11/15/2012	☒ 1 - Reviewed, No Exception Taken ☐ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other, Held for Record, Not Reviewed WBRC ARCHITECTS • ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication; processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: michael johanning DATE: 11-26-12

Certificate of Compliance

Certificate Number **20060214-R13240E**
Report Reference **2006 February 14**
Issue Date **2006 February 14**

Underwriters Laboratories Inc.®

Issued to: **Hilti, Inc.**
5400 S 122ND East Ave
Tulsa, OK 74146 USA

This is to certify that representative samples of **Fill, Void or Cavity Materials**
FS-ONE

Have been investigated by Underwriters Laboratories Inc.® in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: ANSI/UL 1479, ANSI/UL 2079, CAN/ULC-S115-05

Additional Information: FS-ONE Sealant for use in Joint Systems and FS-ONE for use in Through-Penetration Firestop Systems as currently described in the UL Fire Resistance Directory.

Only those products bearing the UL Classification Mark should be considered as being covered by UL's Classification and Follow-Up Service.

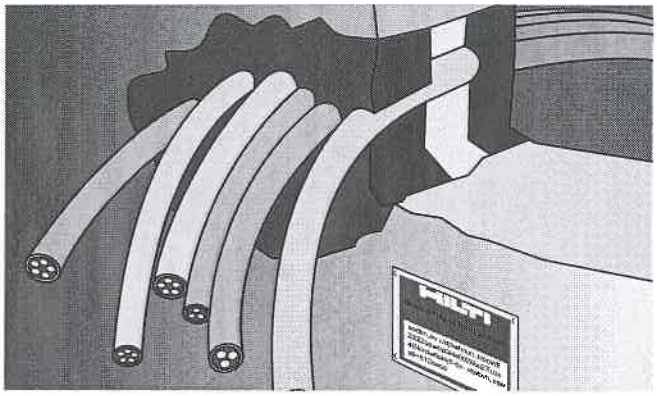
The UL Classification Mark includes: UL in a circle symbol: with the word "CLASSIFIED" (as shown); a control number (may be alphanumeric) assigned by UL; a statement to indicate the extent of UL's evaluation of the product; and, the product category name (product identity) as indicated in the appropriate UL Directory.

Look for the UL Classification Mark on the product

Issued by:
Mona Couloute
Mona Couloute
Underwriters Laboratories Inc.

Reviewed by:
Christopher Johnson
Underwriters Laboratories Inc.

FS-ONE
High Performance Intumescent Firestop Sealant



Product description
- Intumescent (expands when exposed to fire) firestop sealant that helps protect combustible and non-combustible penetrations for up to 4 hours fire rating

Product features
- Smoke, gas and water resistant after material has cured
- Contains no halogen, solvents or asbestos
- High fire rating properties
- Water based, easy to clean
- Protects most typical firestop penetration applications
- Paintable
- Single component systems available
- Meets LEED™ requirements for indoor environmental quality credit 4.1 Low Emitting Materials, Sealants and Adhesives and 4.2 Paints and Coatings

Areas of application
- Steel, copper and EMT pipes
- Insulated steel and copper pipes
- Cable bundles
- Closed or vented plastic pipes
- HVAC penetrations

For use with
- Concrete, masonry, drywall and wood floor assemblies
- Wall and floor assemblies rated up to 4 hours

Examples
- Sealing around combustible pipe penetrations in fire rated construction
- Sealing around non-combustible penetrations in fire rated construction

Technical Data*	FS-ONE
Chemical basis	Water-based intumescent acrylic dispersion
Color	Red
Application temperature	40°F to 104°F (5°C to 40°C)
Skin forming time	Approx. 20-30 min.
Curing time	Approx. 2 mm / 3 days
Movement capability	Approx. 5%
Expansion rate (unrestricted)	Up to 3-5 times original volume
Temperature resistance (cured)	–40°F to 212°F (–40°C to 100°C)
Surface burning characteristics (ASTM E 84-96)	Flame Spread: 0 Smoke Development: 5
Sound transmission classification (ASTM E 90-99)	56 (Relates to specific construction)
Approvals • California State Fire Marshal - No. 4485-1200:108 • City of New York - MEA 326-96-M Vol. IV	
Tested in accordance with • UL 1479 • ASTM E 814 • ASTM E 84	

*At 73°F (23°C) and 50% relative humidity

C UL US CLASSIFIED — FILL, VOID OR CAVITY MATERIAL FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS — SEE UL FIRE RESISTANCE DIRECTORY 66Y7

FM APPROVED

FGG -BM- CZ SYSTEM COMPATIBLE

Installation instructions for FS-ONE

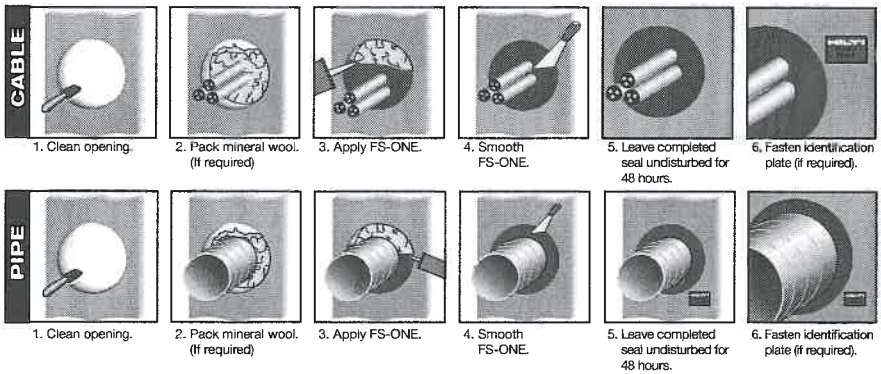
Notice
- Before handling, read Material Safety Data Sheet and product label for safe usage and health information.
- Instructions below are general guidelines — always refer to the applicable drawing in the UL Fire Resistance Directory or Hilti Firestop Systems Guide for complete installation information

Opening
1. Clean the opening. Surfaces to which FS-ONE will be applied should be cleaned of loose debris, dirt, oil, moisture, frost and wax. Structures supporting penetrating items must be installed in compliance with local building and electrical standards.

Application of firestop sealant
2. Install the prescribed backfilling material type and depth to obtain the desired rating (if required). Leave sufficient depth for applying FS-ONE.
3. Application of firestop sealant: Apply FS-ONE to the required depth in order to obtain the desired fire rating. Make sure FS-ONE contacts all surfaces to provide maximum adhesion. For application of FS-ONE use a standard caulking gun, foil pack gun, bulk loader and bulk gun. With FS-ONE buckets, Graco type sealant pumps may be used. (Contact pump manufacturer for proper selection).
4. Smoothing of firestop sealant: To complete the seal, tool immediately to give a smooth appearance. Excess sealant, prior to curing, can be cleaned away from adjacent surfaces and tools with water.
5. Leave completed seal undisturbed for 48 hours.
6. For maintenance reasons, a penetration seal could be permanently marked with an identification plate. In such a case, mark the identification plate and fasten it in a visible position next to the seal.

Not for use
- High movement expansion joints
- Underwater
- On materials where oil, plasticizers or solvents may bleed i.e. impregnated wood, oil based seals, green or partially vulcanized rubber
- In any penetration other than those specifically described in this manual or the test reports

Storage
- Store only in the original packaging in a location protected from moisture at temperatures between 40°F (5°C) and 86°F (30°C)
- Observe expiration date on the packag



Hilti. Outperform. Outlast.

Product name: **FS-ONE High Performance Intumescent Firestop Sealant**
Description: One-part acrylic-based sealant
Supplier: Hilti, Inc. P.O. Box 21148, Tulsa, OK 74121
Emergency # (Chem-Trec.): 1 800 424 9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)

INGREDIENTS AND EXPOSURE LIMITS

Ingredients:	CAS Number:	PEL:	TLV:	STEL:
Polyacrylate dispersion	Mixture	NE	NE	NE
Calcium carbonate	001317-65-3	5 mg/m³ (T)	10 mg/m³ (T)	NE
Zinc borate	138265-88-0	NE	NE	NE
Ammonium polyphosphate	068333-79-9	NE	NE	NE
Talc	014807-96-6	20 mppcf	2 mg/m³	NE
Expandable graphite	012777-87-6	5 mg/m³ (T)	2 mg/m³ (T)	NE
Ethylene glycol	000107-21-1	NE	C:100 mg/m³ (A)	NE
Polybutene	009003-29-6	NE	NE	NE
Iron oxide	001309-37-1	10 mg/m³	5 mg/m³	NE
Glass filament	065997-17-3	NE	5 mg/m³ (T)	NE
Silicon dioxide	014808-60-7	0.05 mg/m³ (T)	0.1 mg/m³ (T)	NE
Water	007732-18-5	NE	NE	NE

Abbreviations: **PEL** = OSHA Permissible Exposure Limit. **TLV** = ACGIH Threshold Limit Value. **C** = Ceiling. **STEL** = Short Term Exposure Limit. **NE** = None Established. **NA** = Not Applicable. **(T)** indicates "as total dust". **(R)** indicates "as respirable fraction". **(A)** indicates "as an aerosol". **mppcf** = million particles per cubic foot.

PHYSICAL DATA

Appearance:	Red paste.	**Odor:**	Odorless.
Vapor Density: (air = 1)	Not determined.	**Vapor Pressure:**	23mbar @ 20C / 68F
Boiling Point:	Not applicable.	**VOC Content:**	75.0 g/L.
Evaporation Rate:	Not applicable.	**Solubility in Water:**	Soluble.
Specific Gravity:	1.5	**pH:**	Not determined.

FIRE AND EXPLOSION HAZARD DATA

Flash Point:	Non-flammable.	**Flammable Limits:**	Not applicable.
Extinguishing Media:	Not applicable. Use extinguishing media as appropriate for surrounding fire.		
Special Fire Fighting Procedures:	None known. Use a self-contained breathing apparatus when fighting fires involving chemicals.		
Unusual Fire and Explosion Hazards:	None known. Thermal decomposition products can be formed such as oxides of carbon, sulfur and phosphorous.		

REACTIVITY DATA

Stability:	Stable.	**Hazardous Polymerization:**	Will not occur.
Incompatibility:	Strong acids, peroxides, and oxidizing agents.		
Decomposition Products:	Thermal decomposition can yield CO and CO_2.		
Conditions to Avoid:	None known.		

HEALTH HAZARD DATA

Known Hazards:	None known.
Signs and Symptoms of Exposure:	Possibly irritating upon contact with the eyes or upon repeated contact with the skin.
Medical Conditions Aggravated by Exposure:	Eye and skin conditions.
Routes of Exposure:	Dermal.

Carcinogenicity:	IARC classifies crystalline silica (quartz sand) as Group I based upon evidence among workers in industries where there has been long-term and chronic exposure (via inhalation) to silica dust; e.g. mining, quarry, stone crushing, refractory brick and pottery workers. This product does not pose a dust hazard; therefore, this classification is not relevant. Based upon the nature and intended use of this product, it does not pose an increased cancer risk to workers.

EMERGENCY AND FIRST AID PROCEDURES

Eyes:	Immediately flush with plenty of water. Call a physician if symptoms occur.
Skin:	Immediately wipe off material and wash with soap and water. Material can adhere to the skin. If material has adhered to the skin, use an abrasive containing hand cleaner. If material does not come off, buff with a pumice stone.
Inhalation:	Move victim to fresh air if discomfort develops. Call a physician if symptoms persist.
Ingestion:	Seek medical attention. Do not induce vomiting unless directed by a physician. If a large quantity was ingested, give 1 to 2 glasses of water to dilute. Never give anything by mouth to an unconscious person.
Other:	Referral to a physician is recommended if there is any question about the seriousness of the injury/exposure.

CONTROL MEASURES AND PERSONAL PROTECTIVE EQUIPMENT

Ventilation:	General (natural or mechanically induced fresh air movements).
Eye Protection:	Not required, however, safety glasses should be worn in most industrial settings.
Skin Protection:	Avoid skin contact. Cloth gloves are suitable for hand protection.
Respiratory Protection:	None normally required. Where ventilation is inadequate to control vapors, use a NIOSH-approved respirator with organic vapor cartridges. Never enter a confined space without an appropriate air-supplied respirator.

PRECAUTIONS FOR SAFE HANDLING AND USE

Handling and Storing Precautions:	Store in a cool, dry area preferably between 40o and 77o F. Keep from freezing. Do not store in direct sunlight. Avoid contact with the eyes or skin. Practice good hygiene; i.e. always wash thoroughly after handling and before eating or smoking. For industrial use only. Keep out of reach of children. Follow label/use instructions.
Spill Procedures:	Immediately wipe away spilled material before it hardens. Place in a container for proper disposal in accordance with all applicable local, state, or federal requirements.

REGULATORY INFORMATION

Hazard Communication:	This MSDS has been prepared in accordance with the federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
HMIS Codes:	Health 1, Flammability 0, Reactivity 0, PPE B
DOT Shipping Name:	Not regulated.
IATA / ICAO Shipping Name:	Not regulated.
TSCA Inventory Status:	Chemical components listed on TSCA inventory. SARA Title III, Section 313: This product contains < 3% ethylene glycol (CAS 107-21-1) and < 15% zinc borate (re: zinc compounds) which are subject to reporting under Section 313 of SARA Title III (40 CFR Part 372).
EPA Waste Code(s):	Not regulated by EPA as a hazardous waste.
Waste Disposal Methods:	Consult with regulatory agencies or your corporate personnel for disposal methods that comply with local, state, and federal safety, health and environmental regulations.

CONTACTS

Customer Service:	1 800 879 8000 **Technical Service:** 1 800 879 8000
Health / Safety:	1 800 879 6000 Jerry Metcalf (x6704)
Emergency # (Chem-Trec):	1 800 424 9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)

The information and recommendations contained herein are based upon data believed to be correct; however, no guarantee or warranty of any kind expressed or implied is made with respect to the information provided.

Certificate of Compliance

Certificate Number **20100512-R13240**
Report Reference **2010 May 12**
Issue Date **2010 May 12**

Underwriters Laboratories Inc.®

Issued to: Hilti, Inc.

54 S 122ND East AVe
Tulsa, OK 74146 USA

This is to certify that representative samples of Fill, Void or Cavity Materials
FS-ONE

Have been investigated by Underwriters Laboratories Inc.® (UL) or any authorized licensee of UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: ANSI/UL 1479, ANSI/UL 2079, CAN/ULC-S115-05
Third Edition, revised March 1, 2010

Additional Information: FS-ONE Sealant for use in Joint Systems and FS-ONE for use in Through-Penetration Firestop Systems as currently described in the UL Fire Resistance Directory.

Only those products bearing the UL Classification Mark should be considered as being covered by UL's Classification and Follow-Up Service.

The UL Classification Mark includes: UL in a circle symbol: with the word "CLASSIFIED" (as shown); a control number (may be alphanumeric) assigned by UL; a statement to indicate the extent of UL's evaluation of the product; and, the product category name (product identity) as indicated in the appropriate UL Directory.

Look for the UL Classification Mark on the product

Issued by:
Mona Couloute
Mona Couloute
Underwriters Laboratories Inc.

Reviewed by:
Chris J. Johnson
Underwriters Laboratories Inc.

UL/cUL SYSTEM NO. HW-D-1069

TOP OF WALL JOINT : CONCRETE WALL OR BLOCK WALL ASSEMBLY

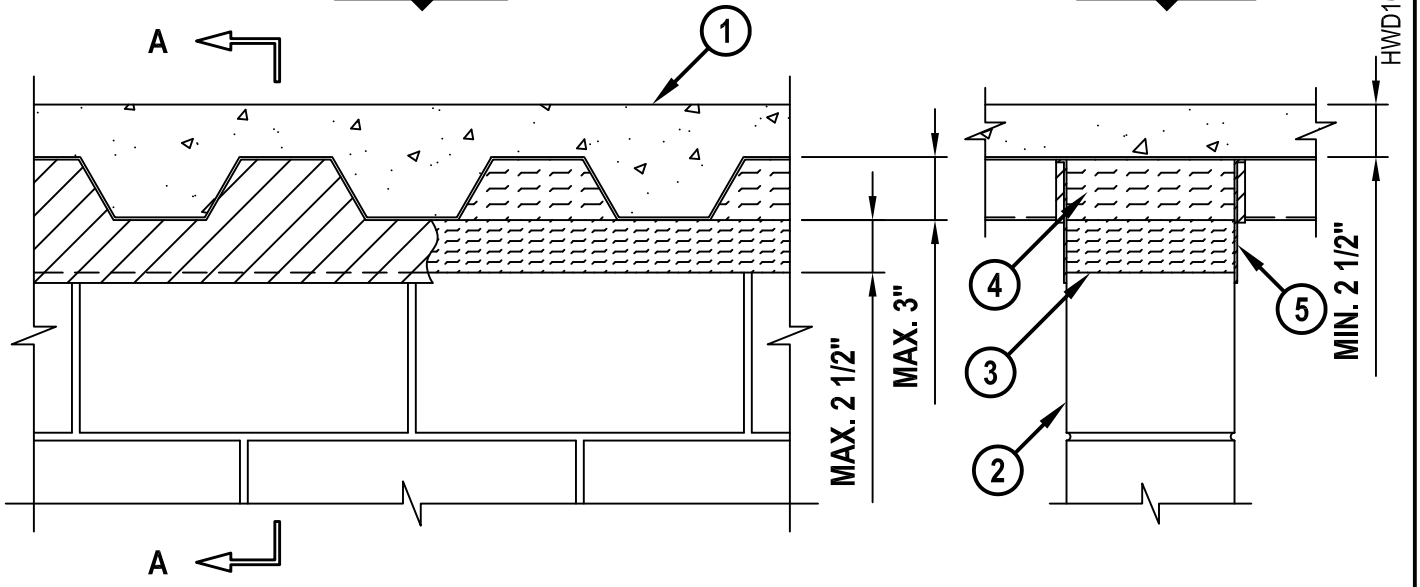
ASSEMBLY RATING = 2-HR.

CLASS II MOVEMENT CAPABILITIES - 40% COMPRESSION OR EXTENSION

HWD1069b.052510

FRONT VIEW

SECTION A-A



1. FLOOR OR ROOF ASSEMBLY (2-HR. FIRE-RATING) :
   A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR (MIN. 2-1/2" THICK) OVER METAL DECKING (UL/cUL CLASSIFIED D900 SERIES).
   B. INSULATING CONCRETE (MIN. 2-1/4" THICK) OVER METAL DECKING (UL/cUL CLASSIFIED P900 SERIES).
2. CONCRETE WALL ASSEMBLY CONSTRUCTED PERPENDICULAR OR PARALLEL TO FLUTES (PERPENDICULAR SHOWN) (2-HR. FIRE-RATING) :
   A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE WALL (MINIMUM 6" THICK).
   B. ANY UL/cUL CLASSIFIED CONCRETE BLOCK WALL.
3. MINERAL WOOL (MINIMUM 4 PCF DENSITY) COMPRESSED 50% AND INSERTED INTO JOINT, FLUSH WITH BOTH SIDES OF WALL ASSEMBLY.
4. HILTI CP 777 SPEED PLUGS FRICTION FITTED TO COMPLETELY FILL FLUTE, FLUSH WITH BOTH SIDES OF WALL (WHEN PERPENDICULAR TO FLUTES) (SEE NOTE BELOW).
5. MINIMUM 1/8" (WET) THICKNESS HILTI CFS-SP WB FIRESTOP JOINT SPRAY OR HILTI CP 672 SPEED SPRAY TO COMPLETELY COVER MINERAL WOOL AND TO OVERLAP MINIMUM 1/2" ONTO CONCRETE WALL OR CONCRETE BLOCK WALL AND METAL DECK ON BOTH SIDES OF WALL ASSEMBLY.

NOTE : AS AN ALTERNATE TO HILTI CP 777 SPEED PLUGS, MINERAL WOOL (MIN. 4 PCF DENSITY) COMPRESSED 50% MAY BE USED.

CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 06 10 53 SUBMITTAL NO. 046 CIANBRO CORPORATION: By: AJP Date: 11/6/2012	☒ 1 - Reviewed, No Exception Taken ☐ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other, Held for Record, Not Reviewed WBRC ARCHITECTS • ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication; processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: michael johanning DATE: 11-9-12

D-Blaze® treated products show no evidence of significant progressive combustion at 30 minutes exposure to flame. In most applications, D-Blaze® treated products offer a lower in-place cost than noncombustible-classified materials.

How to Specify D-Blaze® FRT Lumber and Plywood

To assure structural integrity in roof areas of high temperature and humidity, D-Blaze® span and strength design adjustment factors have been determined by independent third parties in accordance with ASTM D 5516 for plywood and ASTM D 5664 for lumber. Extended specifications can be found in Sweet's Directory and ARCAT.

All D-Blaze® FRT lumber and plywood:

- shall be pressure-treated with D-Blaze® fire retardant to meet Underwriters Laboratories FR-S rating or a flame spread and smoke index rating denoting a surface-burning characteristic rating of 25 or less for flame spread and smoke developed.
- shall bear the Underwriters Laboratories label or stamp attesting to the FR-S rating or flame spread and smoke index rating, or the ESR 2645 Building Code Approval, and to the fact that it also meets the American Wood Protection Association (AWPA) P50, U1, UCFA for interior Type A (HT) use.
- shall be kiln-dried to a maximum moisture content of 19% for lumber and 15% for plywood.
- shall be kept dry at all times during transit, job site storage and construction.

All structural design calculations shall be based on the D-Blaze® Strength Design Factor Tables as published in ESR 2645.

ARCAT BIM INFO Content

see us at Sweets.com

Standardized 3-part specifications are available at www.Treatedwood.com and www.ARCAT.com.

treatedwood.com
Viance Treated Wood Solutions

Safety & Handling

D-Blaze® pressure-treated products do not contain any EPA-listed hazardous chemicals and are easy to work with, requiring no special precautions other than routine wood working safety procedures. When working with or machining D-Blaze® pressure-treated wood, the following safety precautions should be followed:

- Wear gloves to protect against splinters.
- Wear a dust mask when machining any wood to reduce the inhalation of wood dusts.
- Wear appropriate eye protection to reduce the potential for eye injury from wood particles and flying debris during machining.
- Wash thoroughly with mild soap and water after working with treated wood.
- Wood scraps should be disposed of in accordance with local waste management regulations.

Refer to the latest D-Blaze® Material Safety Data Sheet available at **www.TreatedWood.com.**

Scan with smart phone to visit www.TreatedWood.com

Get the free mobile app at http://gettag.mobi

Viance™
PRESERVATION INNOVATION

200 E. Woodlawn Rd., Suite 350
Charlotte, NC 28217
1-800-421-8661 ▪ Fax: 704-527-8232
ProductInfo@viance.net

treatedwood.com
Viance Treated Wood Solutions

D-BLAZE
FIRE RETARDANT TREATED WOOD

treatedwood.com
Viance Treated Wood Solutions

D-BLAZE
FIRE RETARDANT TREATED WOOD

D-Blaze® fire retardant treated wood (FRTW) is available for interior applications where fire retardant construction materials are required by building codes. D-Blaze® treated lumber and plywood is highly effective in controlling the spread of flame and smoke development caused by fire.

Product Features

- **UL® Classified with FR-S Rating**
- **Code Compliant under ESR 2645**
- Very Low Smoke Rating
- Workable with common wood-working tools
- **50-Year Limited Warranty**
- Low-corrosivity
- Low-hygroscopicity
- No VOC's or Formaldehyde
- Non-blooming

D-Blaze® Treated Products are:

- Compliant with 2009 model building codes (IBC & IRC).
- Tested and certified by Underwriters Laboratories® (UL).
- Quality Control assured by third-party inspection agencies such as TP, SPIB and UL.
- UL® classified with an FR-S rating.
- Compliant with 2009 model building codes under ICC ESR-2645.
  - For the species listed in Table 5, D-Blaze FRTW exhibits a flame spread and smoke developed index of 25 or less under ASTM E 84 flame tunnel testing of a 30-minute duration without evidence of significant progression combustion. D-Blaze has one of the lowest smoke ratings in the industry.
- Tested for hygroscopicity in accordance with ASTM D 3201, resulting in classification as an interior Type A (HT) fire-retardant wood as defined in AWPA Standards P50, U1, UCFA.
- Protected by a **50-Year** Limited Warranty. Visit **www.TreatedWood.com** for warranty details.

Common Applications

- Roof and floor trusses
- Roof decks and sheathing
- Interior non-load-bearing partitions
- Exterior load-bearing walls protected by a weather barrier
- Subflooring
- Studs and Joists
- Beams and purlins
- Blocking and furring

AWPA PROTECTING WOOD SINCE 1904 Proud Sponsor

ICC ES ESR 2645

CLASSIFIED C UL US FR-S Rating

D-BLAZE Technical Specifications

FIRE RETARDANT TREATED WOOD

Table 1

Strength Design Adjustment Factors for D-Blaze® Fire Retardant Lumber compared to Untreated Lumber				
Property	Service Temperature < 100° F (38° C)	D-Blaze® Lumber Roof Framing Climate Zone[1,2]		
		1A	1B	2
Compression Parallel, Fc	0.935	0.935	0.935	0.935
Horizontal Shear	0.985	0.838	0.894	0.964
Tension Parallel	0.874	0.625	0.775	0.905
Bending: Modulus of Elasticity, E	1.000	0.977	0.986	0.997
Bending: Extreme Fiber Stress, Fb	0.972	0.740	0.828	0.939
Fasteners/Connectors	0.900	0.900	0.900	0.900

Structural Properties

D-Blaze® FRT wood has been tested by independent laboratories following industry standards ASTM D 5516 & ASTM D 5664 to develop strength reduction factors for various use conditions, including roof temperatures of up to 150° F for lumber and 170° F for plywood. Consult Table 1 (D-Blaze® Lumber Strength Design Adjustment Factors) and Table 2, 3 and 4 (D-Blaze® Plywood Span Rating Adjustments) for specific adjustment factors.

Testing and Approvals

D-Blaze® FRT wood meets or exceeds the guidelines for testing construction materials as set forth and/or established by the following authorities and specifications:

Testing	Approvals
▪ ASTM D 5516	▪ ICC-ES ESR 2645
▪ ASTM D 5664	▪ City of Los Angeles RR 24502
▪ ASTM E 84	▪ CAN/ULC S102
▪ ASTM D 3201	▪ CAN/ULC S102.2
	▪ National Fire Protection Association (255)
	▪ New York City Building Code (MEA Numbers 406-87 and 407-87)
	▪ National Building Code of Canada

Table 2

Span Ratings for D-Blaze® Fire Retardant Southern Pine Plywood for Roof Sheathing Applicable at a Temperature up to 170° F (77°C) Based on Uniform Loading, Two Span Construction and L/180 Deflection Limit			
Plywood Thickness (Inches)	D-Blaze® [1,2,3,4,5,8,9,10,11,12,13] Plywood Roof Sheatings Span Ratings Used at Temperatures > 100° F and < 170° F		
	Climate Zone[6,7]		
	1A	1B	2
3/8" (0.375)	20	20	20
15/32" (0.469)	24	24	24
1/2" (0.500)	24	24	24
19/32" (0.594)	32	32	32
5/8" (0.625)	32	32	32
23/32" (0.719)	40	32	40
3/4" (0.750)	40	32	40
7/8" (0.875)	40	40	48
1 (1.000)	48	48	48
1 - 1/8" (1.125)	48	48	48

Table 3

Span Ratings for D-Blaze® Fire Retardant Douglas Fir and other species Plywood for Roof Sheathing Applicable at a Temperature up to 170° F (77°C) Based on Uniform Loading, Two Span Construction and L/180 Deflection Limit			
Plywood Thickness (Inches)	D-Blaze® [1,2,3,4,5,8,9,10,11,12,13] Plywood Roof Sheatings Span Ratings Used at Temperatures > 100° F and < 170° F		
	Climate Zone[6,7]		
	1A	1B	2
3/8" (0.375)	16	16	20
15/32" (0.469)	20	20	24
1/2" (0.500)	20	20	24
19/32" (0.594)	24	24	32
5/8" (0.625)	24	24	32
23/32" (0.719)	32	32	32
3/4" (0.750)	32	32	32
7/8" (0.875)	40	32	40
1 (1.000)	40	40	48
1 - 1/8" (1.125)	48	40	48

Table 4

D-Blaze® Treated Plywood Subfloor Allowable Spans (Inches) used at Temperatures < 100° F (38° C)		
Plywood Thickness (Inches)	Southern Pine	Douglas Fir
	Allowable Span (Inches)[1,2]	Allowable Span (Inches)[1,2]
3/8" (0.375)	16	16
15/32" (0.469)	20	20
1/2" (0.500)	20	20
19/32" (0.594)	24	24
5/8" (0.625)	24	24
23/32" (0.719)	32	32
3/4" (0.750)	32	32
7/8" (0.875)	40	32
1 (1.000)	40	40
1 - 1/8" (1.125)	48	40

Table 5

The following species are building code compliant when treated according to ESR 2645, and these species also have the UL® FR-S Classification.

D-Blaze® Lumber and Plywood Approved Species			
Softwood Lumber			
Jack Pine	Red Pine	Hem-Fir	Black Spruce
Lodgepole Pine	Alpine Fir	Spruce-Pine-Fir (SPF)	Englemann Spruce
Ponderosa Pine	Balsam Fir	White Fir	Red Spruce
Southern Pine	Douglas Fir	Western Hemlock	White Spruce
Plywood		Hardwood lumber	
Douglas Fir		Basswood	
Lauan		Red Oak	
Southern Pine			
Red Pine			

NOTE: From time to time, additional species will be tested. Check with your supplier if the species desired are not shown.

AWPA PROTECTING WOOD SINCE 1904 — **Proud Sponsor**

ICC ES — **ESR 2645**

CLASSIFIED C UL US — **FR-S Rating**

Notes

Table 1

[1]Climate Zone definition:
- Zone 1 – Minimum design roof live load or maximum ground snow load ≤ 20 psf (960 Pa)
- Zone 1A – SouthWest Arizona, South East Nevada (area bounded by Las Vegas- Yuma-Phoenix- Tucson)
- Zone 1B – All other qualifying areas of the United States
- Zone 2 – Maximum ground snow load ≥ 20 psf (960 Pa)

[2]Duration of load adjustments for snow loads, 7-day (construction) loads, and wind loads as given in the National Design Specifications for Wood Construction apply.

Tables 2 and 3

SI Units Conversion: 1 inch = 25.4 mm, 1 psf = 48 N/m2

[1]All loads are based on two-span condition with panels 24 inches wide or wider, strength axis perpendicular to supports.

[2]Fastener size and spacing must be as required in the applicable building code for untreated plywood of the same thickness.

[3]Roof spans and loads apply to roof systems having the minimum ventilation areas required by the applicable building code. Fifty percent of required vent area must be located on upper portion of sloped roofs to provide natural air flow.

[4]For low-sloped or flat roofs with membrane or built-up roofing having a perm rating less than 0.2, use rigid insulation having a minimum R value of 4.0 between sheathing and roofing, or use next thicker panel than tabulated for the span and load (e.g., 19/32 for 24 inches, 23/32 for 32 inches); and use a continuous ceiling air barrier and vapor retarder with a perm rating less than 0.2 on the bottom of the roof framing above the ceiling finish.

[5]For unblocked roof diaphragms panel edge clips are required for roof sheathing: one midway between supports for 24-inch and 32-inch spans, two at 1/3 points between supports for 48-inch span. Clips must be specifically manufactured for the plywood thickness used.

[6]Tabulated loads for Zone 1A are based on a duration of load adjustment for 7-day (construction) loads of 1.25. Tabulated loads for Zone 1B and Zone 2 are based on a duration of load adjustment for snow of 1.15. All values within the table are based on a dead load (DL) of 8 psf. If the DL is less than or greater than 8 psf, the tabulated live load may be increased or decreased by the difference. Applicable material weights, psf: asphalt shingles - 2.0, 1/2-inch plywood - 1.5, 5/8-inch plywood - 1.8, 3/4-inch plywood - 2.2.

[7]Climate Zone definition:
- ZONE 1 – Minimum design roof live load or maximum ground snow load ≤ 20 psf (960 Pa)
- ZONE 1A – SouthWest Arizona, South East Nevada (area Bounded by Las Vegas- Yuma-Phoenix- Tucson)
- ZONE 1B – All other qualifying areas of the United States
- ZONE 2 – Maximum ground snow load ≥ 20 psf (960 Pa)

[8]Duration of load adjustments for snow loads, 7-day (construction) loads, and wind loads as given in the National Design Specifications for Wood Construction apply.

[9]D-Blaze treated plywood must not be used as roof sheathing if a radiant shield is used beneath the roof sheathing.

[10]The 19/32-inch and 5/8-inch thickness are limited to performance rated 4-ply or 5-ply. 23/32- and 3/4-inch thicknesses are limited to performance rated 5-ply or 7-ply.

[11]Deflection of roof sheathing at tabulated maximum live load is less than 1/240 of the span, and under maximum live load plus dead load is less than 1/180 of the span.

[12]Staples used to attach asphalt shingles must be minimum 15/16-inch crown and minimum 1-inch leg, or otherwise comply with the applicable code, with the quantity of fasteners adjusted in accordance with Table 1 of this report.

[13]Placement of insulation and airflow should be designed to maintain acceptable wood temperatures. Good ventilation is essential in fire retardant wood construction to minimize excessive relative humidity and condensation. At relative humidity conditions when FRW moisture content levels are expected to exceed 15%, appropriate design value adjustments for high moisture content should be made.

Table 4

SI Units Conversion: 1 inch = 25.4 mm, 1 psf = 48 N/m2

[1]Uniform live load = 100 psf and Dead load = 10 psf, LL deflection L/360, LL+ DL deflection L/240

[2]Fastener size and spacing must be as required in the applicable building code for untreated plywood of the same thickness.

Proper roof system ventilation shall be used to provide a uniform flow of air over all interior surfaces of the plywood to prevent heat build-up and sufficient to effectively remove moisture where the roof is warmed by solar radiation.

D-BLAZE FIRE RETARDANT TREATED WOOD

3M™ Fire Barrier Sealant CP 25WB+

Product Data Sheet

FIRE BARRIER — UP TO 4 HOUR Fire Protection

SMOKE SEAL — L RATED Meets Optional L Requirements

SOUND BARRIER — STC 54 in STC 54-rated wall assembly

CLASSIFIED UL

FILL, VOID OR CAVITY MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
90G9

ULC LISTED

FILL, VOID OR CAVITY MATERIALS
90G9

FM APPROVED

SUBJECT TO THE CONDITIONS OF APPROVAL AS A WALL & FLOOR PENETRATION FIRESTOP WHEN INSTALLED AS DESCRIBED IN THE CURRENT EDITION OF THE FMRC APPROVAL GUIDE

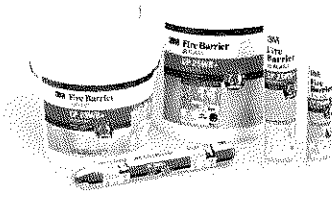
LISTED — OMEGA POINT LABORATORIES US — Intertek
FIRESTOP SYSTEMS
SEE INTERTEK DIRECTORY

LISTED — c US — Intertek
FIRESTOP SYSTEMS
SEE INTERTEK DIRECTORY

1. Product Description

3M™ Fire Barrier Sealant CP 25WB+ is a high-performance, ready-to-use, gun-grade, latex-based, intumescent sealant that dries to form a monolithic firestop seal that also acts as a barrier to airborne sound transmission. 3M™ Fire Barrier Sealant CP 25WB+ helps control the spread of fire, smoke and noxious gasses before, during and after exposure to a fire when installed in accordance with a listed through penetration or fire-resistive joint assembly system.

3M™ Fire Barrier Sealant CP 25WB+ firestops blank openings and penetrations passing through fire-rated floor, floor/ceiling or wall assemblies and other fire-rated interior building construction. The unique intumescent property of this material allows 3M™ Fire Barrier Sealant CP 25WB+ to expand and help maintain a firestop penetration seal for up to 4 hours as penetrants are exposed to fire. 3M™ Fire Barrier Sealant CP 25WB+ exhibits excellent adhesion to a full range of construction substrates and penetrants. No mixing is required.



High-performance firestop sealant that also helps minimize sound transfer

Product Color: ■ Red

Product Features

- Firestop tested up to 4 hours in accordance with ASTM E 814 (UL 1479) & CAN/ULC S115
- Fire Resistance tested for static construction joint systems in accordance with ASTM E 1966 (UL 2079)
- Re-enterable / repairable
- Meets UL 1479 aging requirements
- Helps minimize sound transfer*
- Applied with conventional caulking equipment (excellent caulk rate)
- Extensive listed systems
- Sag-resistant
- Halogen-free
- Excellent adhesion
- Paintable
- Water clean up

Meets the intent of LEED® VOC regulations—helps reduce the quantity of indoor air contaminants that may be odorous, irritating and harmful to the comfort and well-being of the installers and occupants. 250 g/L VOC contents (less H_2O and exempt solvents).

**Minimizes noise transfer—STC-Rating of 54 when tested in STC 54-rated wall assembly.*

2. Applications

High-performance 3M™ Fire Barrier Sealant CP 25WB+ is ideal for sealing single or multiple through penetrations in fire-rated construction. 3M™ Fire Barrier Sealant CP 25WB+ is typically used in mechanical, electrical and plumbing applications to firestop openings created by the following penetrations in fire-rated floors, floor/ceilings or walls: metallic pipe, plastic pipe (excluding CPVC), conduit, power and communication cable, cable trays, busways, combos, insulated pipe and HVAC duct penetrations. 3M™ Fire Barrier Sealant CP 25WB+ is also used to firestop blank openings and static construction joints.

3. Specifications

3M™ Fire Barrier Sealant CP 25WB+ shall be a one component, ready-to-use, gun-grade, latex-based, intumescent firestop sealant capable of expanding a minimum of 3 times its dried volume when exposed to temperatures above 1000°F (538°C). The material shall be thixotropic and shall be applicable to overhead, vertical and horizontal firestops. The sealant shall be listed by independent test agencies such as UL, Intertek or FM. 3M™ Fire Barrier Sealant CP 25WB+ shall be tested to and pass the criteria of ASTM E 814 (UL 1479) Standard Test Method for Fire Tests of Penetration Firestop Systems, ASTM E 1966 (UL 2079) Standard Test Method for Fire Resistive Joint Systems and CAN/ULC S115 Standard Method of Fire Tests of Firestop Systems. 3M™ Fire Barrier Sealant CP 25WB+ meets the requirements of the IBC, IRC, IFC, IPC, IMC, NFPA 5000, NEC (NFPA 70) and NFPA 101.

Typically Specified Division
Division 7

Section 07 84 00 – Firestopping

Related Sections
Section 07 84 16 – Annular Space Protection
Section 07 84 43 – Fire-Resistant Joint Sealants
Section 07 86 00 – Smoke Seals
Section 07 87 00 – Smoke Containment Barriers
Section 07 27 00 – Air Barriers
Section 21 00 00 – Fire Suppression
Section 22 00 00 – Plumbing
Section 26 00 00 – Electrical

3M

4. Physical Properties

Color:	Red
Application Temperature Range: (ASTM C 1299)	40° to 122°F (4° to 50°C)
Service Temperature Range:	-20° to 180°F (-28° to 82°C)
STC (ASTM E 90 and ASTM E 413):	54 when tested in STC 54-rated wall assembly
Surface Burning (ASTM E 84):	Flame Spread 0 Smoke Development 0
Hardness (ASTM D 2240 Shore A):	45
Tensile Strength:	85 psi (0.59 MPa)
Volume Shrinkage (ASTM C 1241):	28%
VOC Less H_2O and Exempt Solvents:	<1 g/L

Dry: Under typical conditions of 75°F (23°C) and 50% R.H., sealant becomes tack-free in about ten minutes and dry-to-touch in 30 to 60 minutes. Full dry depends upon ambient conditions and volume of sealant. Typical dry rate is approximately 1/8 inch (3 mm) per day.

Unit Volume: 10.1 fl. oz tube (298.7 mL, 18.2 in^3), 20 fl. oz. sausage (591.5 mL, 36.1 in^3), 27 fl. oz tube (798.5 mL, 48.7 in^3), 2 gal. pail (7.57 L, 462 in^3), 5 gal. pail (18.9 L, 1155 in^3)

5. Packaging, Storage, Shelf Life

Packaging Product packaged in cartridge or pail is enclosed in HDPE plastic containers, sausage is packaged in aluminum foil wrap

Storage 3M™ Fire Barrier Sealant CP 25WB+ should be stored indoors in dry conditions between 40°F and 90°F (4°C and 32°C) in the original unopened package. Avoid repeated freeze / thaw exposures of the 3M™ Fire Barrier Sealant CP 25WB+ prior to installation.

Shelf Life 3M™ Fire Barrier Sealant CP 25WB+ shelf life is 12 months in original unopened containers from date of packaging when stored above 68°F (2°C).

Lot numbering (e.g. 8183AS): First digit = Last digit of year manufactured, Second to fourth digit = Julian Date, Letters = Random to distinguish between lot numbers

6. Installation Techniques

Consult a 3M Authorized Fire Protection Products Distributor / Dealer or Sales Representative for Applicable UL, Intertek or other third-party drawings and system details.

Preparatory Work The surface of the opening and any penetrating items should be cleaned to allow for the proper adhesion of the 3M™ Fire Barrier Sealant CP 25WB+. Ensure that the surface of the substrates are not wet and are frost free. Sealant can be installed with a standard caulking gun, pneumatic pumping equipment or it can be easily applied with a putty knife or trowel.

Installation Details Install the applicable depth of backing material, if required, as detailed within the applicable UL, Intertek, FM or other third-party listed system. Cut the end of the 3M™ Fire Barrier Sealant CP 25WB+ tube spout to achieve the desired bead width when applying. Install the applicable depth of 3M™ Fire Barrier Sealant CP 25WB+ into the opening flush with the surface of the substrate, or as detailed within the applicable listed system, at the depth for the assembly and rating that is required. Tool within 5 minutes. Clean all tools immediately after use with water.

Limitations Do not apply 3M™ Fire Barrier Sealant CP 25WB+ when surrounding temperature is less than 40°F (4°C) and in conditions where seals may be exposed to rain or water spray within 18 hours of application. Do not apply 3M™ Fire Barrier Sealant CP 25WB+ to building materials that bleed oil, plasticizers or solvent (e.g. impregnated wood, oil-based sealants, or green or partially vulcanized rubber). Do not apply 3M™ Fire Barrier Sealant CP 25WB+ to wet or frost-coated surfaces or to areas that are continuously damp or immersed in water.

NOTICE: This product is not acceptable for use with chlorinated polyvinylchloride (CPVC) pipes.

7. Maintenance

No maintenance should be required when installed in accordance with the applicable UL, Intertek, FM or other third-party listed system. Once installed, if any section of the 3M™ Fire Barrier Sealant CP 25WB+ is damaged, the following procedure will apply: remove and reinstall the damaged section in accordance with the applicable listed system, with a minimum 1/2 in. (12.7 mm) overlap onto the adjacent material.

8. Availability

3M™ Fire Barrier Sealant CP 25WB+ is available from 3M Authorized Fire Protection Products Distributors and Dealers. 3M™ Fire Barrier Sealant CP 25WB+ is available in 10.1 fl. oz. cartridges (12/case), 20.0 fl. oz. sausages (10/case), 27.0 fl. oz. cartridges (6/case), 2 gallon pails (1/case) and 5 gallon pails (1/case). For additional technical and purchasing information regarding this and other 3M Fire Protection Products, please call: 1-800-328-1687 or visit www.3m.com firestop.

9. Safe Handling Information

Consult product's Material Safety Data Sheet (MSDS) prior to handling and disposal.

Important Notice to User:

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use: Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

Warranty and Limited Remedy: 3M warrants that each 3M Fire Protection Product will be free from defects in material and manufacture for 90 days from the date of purchase from 3M's authorized distributor. 3M MAKES NO OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. If a 3M product does not conform to this warranty, the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

Limitation of Liability: Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted.

3M

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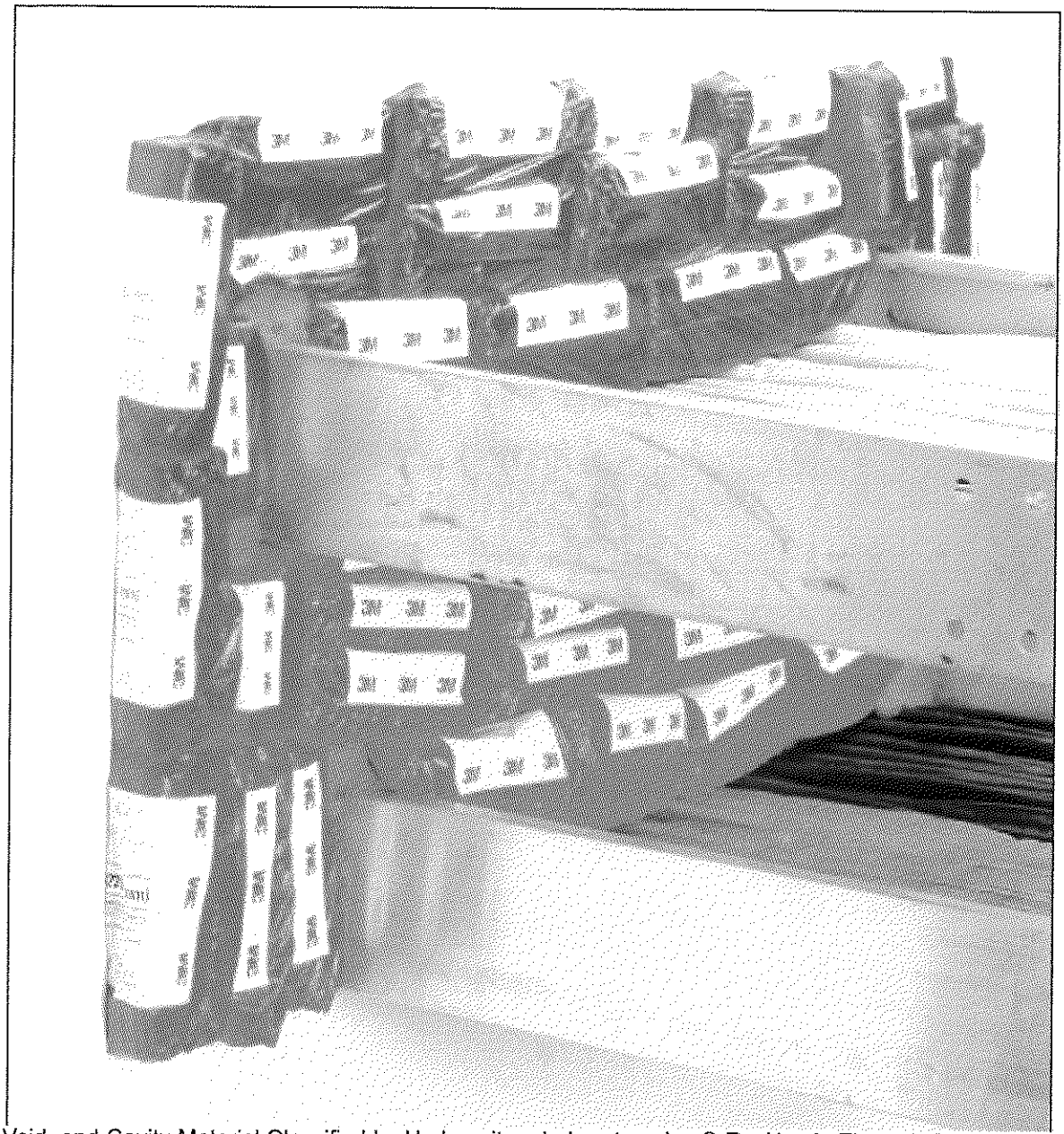
St. Paul, MN 55144-1000 USA
1-800-328-1687
www.3M.com/firestop

3M

Fire Barrier Pillow

Product Data and Installation Instructions



Fill, Void, and Cavity Material Classified by Underwriters Laboratory, Inc.® For Use In Through-Penetration Firestop Systems (XHEZ). See Current UL Fire Resistance Directory.

1. Product Description
3M™ Fire Barrier Pillow is a self contained, highly intumescent firestop product for use in through-penetration firestops.

The 3M Fire Barrier Pillows achieve up to 3 hour fire ratings when tested by Underwriters Laboratory, Inc. in accordance with ASTM E 814 (UL1479).

Features
- Tested to UL 910 flammability test
- Graphite free composition.
- Multiple sizes available.
- Red Color- Easy to inspect
- Easy retrofit - remove and replace pillows, as needed.

2. Applications
- No wire mesh required. Consult UL Fire Resistance Directory for specific systems.
- Gypsum Wall, Block Wall, and Concrete Floors
- Blank openings up to 540 sq. in. (3483 sq. cm).
- 1 or 2 Cable Trays per penetration
- Conduit Bank and steel pipe applications

See the 3M Application and Specifiers guide for complete details.

3. Availability

Product	Unit	Size	Units/ ctn.	Wt./ ctn.
3M Fire Barrier Pillow FB 249	each	2 in.x 4 in. x 9 in. (51 mm x 10,2 cm x 22,8 cm)	24	12.5 lbs. 5,6 kg
3M Fire Barrier Pillow FB 269	each	2 in. x 6 in. x 9 in. (51 mm x 15,2 cm x 22,8 cm)	32	12.5 lbs. 5,6 kg
3M Fire Barrier Pillow FB 369	each	3 in. x 6 in. x 9 in. (76 mm x 15,2 cm x 22,8 cm)	20	15 lbs. 6,8 kg

4. Typical Physical Properties
Blanket Color: 3M Red
Density: 6 PCF (nominal)

5. Performance
3M Fire Barrier Pillow has been tested in accordance with ASTM E 84.
- Heat Expansion Begins: 392°F (200°C)
- Significant Expansion Begins: 536°F (280°C)
- Volume Expansion: 18% (calculated)

L Rating: See UL Listing.

Installation shall be in strict accordance with manufacturer's written instructions. The product shall be classified by Underwriter's Laboratory, Inc. as a Fill, Void and Cavity Material. When installed in accordance with systems outlined in the current UL Fire Resistance Directory and tested in accordance with ASTM E 814 and (UL 1479), up to a 3 hour rating is achieved.

6. Installation Techniques
1. Install 3M Fire Barrier Pillows so the 9 in. (22,8 cm) dimension travels through the wall, or floor.
2. One of the large faces of the 3M Fire Barrier Pillow shall face the framing of the penetration.
3. A mixture of following pillows may be necessary to obtain the correct compression (20% - 25% compression).
   FB 249: 2 in. x 4 in. x 9 in. (50,8 mm x 101,6 mm x 228,6 mm)
   FB 269: 2 in. x 6 in. x 9 in. (50,8 mm x 152,4 mm x 228,6 mm)
   FB 369: 3 in. x 6 in. x 9 in. (76,2 mm x 152,4 mm x 228,6 mm)
4. Begin by installing as many FB 369 pillows, as possible. Then install additional FB 269 and FB 249, as needed, to complete the installation.

Storage
The 3M Fire Barrier Pillows must be stored in a dry warehouse environment. Pallets should not be stacked.

Methods:
1. Choose the appropriate firestop system in the 3M Fire Protection Products Applications and Specifiers Guide, or the UL Fire Resistance Directory.
2. Starting in the bottom corners of the penetration, install 3M Fire Barrier Pillows vertically so that the large faces of the pillows are facing the framing. See picture.
3. Fill in the space between vertical pillows with pillows installed horizontally in rows.
4. Repeat steps 2 and 3 until the penetration is completely full. See Figure 2.
5. If required, apply a minimum 1 in. (25,4 mm) depth of 3M Moldable Putty+ in all four corners between the vertical pillow and framing.
6. Check for any openings between pillows (and penetrating items) greater than 1/16 in. (1,5 mm) Fill any openings between 1/16 in. (1,5 mm) and 1-1/2 in. (38 mm) with a minimum 1 in. (25,4 mm) depth of 3M Moldable Putty+.

Calculating Pillow Requirement:
Measure the opening, in inches, and multiply the length by the width to get the total area. Estimate the area occupied by the penetrating items and subtract it from the area of the opening. This is the amount of area to be firestopped.

For example, an opening through a gypsum wall measures 30 in. x 18 in. (76 cm x 45 cm).
The openings area 30 in. x 18 in. (76 cm x 45 cm) is 540 sq. in. (3483 sq. cm). A 24 in. x 4 in. (60,9 cm x 10 cm) cable tray which is 40% full of cables is running through the opening. The tray occupies an area 0.4 in. x 24 in. x 4 in. (10,1 mm x 60,9 cm x 10 cm) of 38.4 sq. in. (247,7 sq, cm). The amount of

area to be firestopped 540 sq. in. – 38.4 sq. in. (3483 sq. cm - 247 sq. cm) is 501.6 sq. in.

After calculating the amount of area to be firestopped determine the number of each size pillow needed to firestop the penetration. In most penetrations you will need to use some of each of three sizes of pillows. Determine the number of each pillow by dividing the total area by the pillows Estimating Number and round up the nearest whole pillow. See Table1. In this example it should take approximately twenty-five FB 369 pillows, eleven FB 269 pillows, and three FB 249 pillows to properly firestop this penetration.

Pillow Size	Estimating Number	Example (501.6 sq. in.) (3232 sq. cm)
FB 369 3 in. x 6 in. x 9 in. (76,2mm x 152,4mm x 228,6mm)	20.3	501.6/20.3 = (25) pillows
FB 269 (2 in. x 6 in. x 9 in.) (50,8mm x 152,4mm x 228,6mm)	49.4	501.6/49.4 = (11) pillows
FB 249 (2 in x 4 in. x 9 in.) (50,8mm x 101,6mm x 228,6mm)	172.0	501.6/172.0 = (3) pillows

7. Maintenance

Inspection: Installations should be inspected periodically for subsequent damage. Damaged pillows shall be replaced.

Retrofit: Cables may be added or replaced by simply removing and replacing pillows and putty as required.

8. Purchase Information

3M Fire Barrier products are available through a network of nationwide distributors. For information on where to buy, go to www.3m.com/firestop.

9. Safe Handling Information

Consult Material Safety Data Sheet prior to handling and disposing of 3M Fire Barrier Pillow.

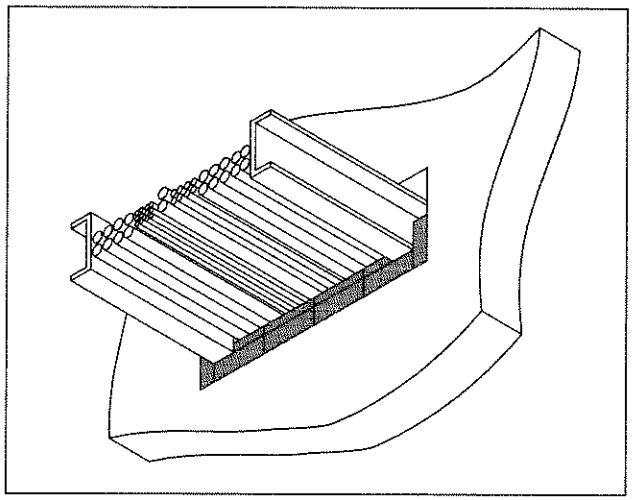


Figure 1

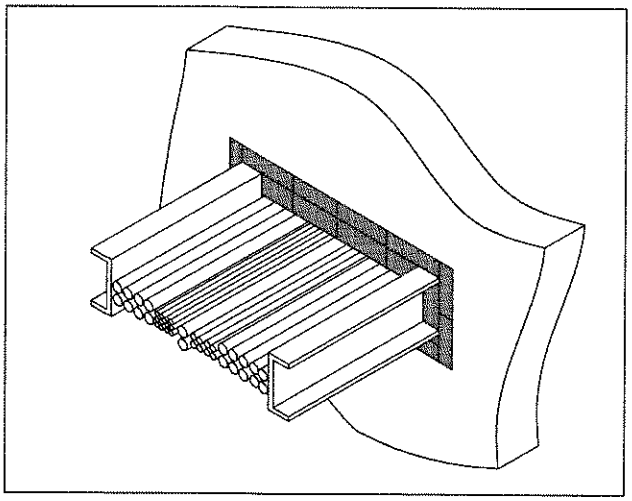


Figure 2

Warranty and Limited Remedy. This product will be free from defects in material and manufacture for a period of ninety (90) days from date of purchase. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTIBILITY OR FITNESS FOR A PARTICULAR PURPOSE.** User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of application. If this 3M product is proved to be defective within the warranty period stated above, your exclusive remedy and 3M's sole obligation shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the product.

Limitation of Liability. Except where prohibited by law, 3M will not be liable for any loss or damages arising from the use of this 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

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