Stars Management DMCC

SUBMITTAL

ANDEK FIREGARD

(Fire Resistant Waterproofing Coating)

- Thermal Barrier
- Flame Spread
- Ignition Barrier
- Waterproofing

PRODUCT DATA

ANDEK FIREGARD™

Fire Resistant Waterproofing Coating

Performance Coatings & Sealants Systems

DESCRIPTION

ANDEK FIREGARD is a liquid applied, single component coating that contains highly effective fire retardants to reduce flame spread in the event of fire. It is listed by the Asbestos Information Center and the United States Government as a suitable sealant for encapsulation of low density asbestos lagging and asbestos insulation. ANDEK FIREGARD is also approved by many United States' state Departments of Transportation for fire and waterproofing protection of wood structures. ANDEK FIREGARD has been incorporated into the United States Navy as the specified material for thermal barrier protection of millboard and insulation. Available in white and other standard or custom colors, ANDEK FIREGARD may be used as a waterproof, fire resistant coating, as well as an ignition barrier and thermal barrier over all types of insulation and other combustible substrates. ANDEK FIREGARD has been in constant use for over 30 years, protecting chimneys, ducts, pipes, tanks, wooden structures, building components, boilers, freezers, factories and storage facilities in all types of climates. Manufactured in New Jersey and Pennsylvania, USA, it contains 95% United States sourced raw materials.

HISTORY

ANDEK FIREGARD was originally manufactured in the 1970's under the name POLAROOF FIREGARD, where it was used to protect chimney installations. A progression from roofing applications to many types of construction installations has led to the use of ANDEK FIREGARD in many demanding situations from covered bridges to attics and crawl spaces.

Originally designed for exterior surface protection, ANDEK FIREGARD has increasingly been used for protection of interior surfaces and insulation, including polyurethane foam (PUF). Furthermore ANDEK FIREGARD protects both indoor and outdoor PUF insulated tanks that need to be protected from wet penetration by chemicals and process fluids as well as fire. Walk-in freezers and coolers used for storage of food products in humidity and temperature controlled environments also provided a challenge met by ANDEK FIREGARD, which successfully provides protection to the foam surfaces of the walls and ceilings. Over the many years that ANDEK FIREGARD has been in service, every square foot installed on a building or structure that currently exists is still functioning as originally intended.

CHEMISTRY

ANDEK FIREGARD is designed as a waterproof coating using PVC/PVDC/ethylene terpolymer resins coupled with a hydrophobic mineral to form a fire resistant, water repellant composite. Its fire resistant thermal and ignition barrier properties are achieved using complex interactions between insoluble, inorganic, and organic components that produce endothermic reactions (lowering surface temperature) and inert gas-filled char layers to deny access of oxygen to the substrate. This protects against flame spread by distancing the surface from the auto-ignition temperature. Also, since combustion is the act of a substance combining with oxygen, the prevention of fire spread is also achieved. Smoke suppressants are also incorporated so that, in a fire situation, visibility is maintained for a safe exit. Finally, for long term protection, a strong mixture of biocides and fungicides are incorporated to prevent mold, fungus and bacteria from reducing the lifetime and effectiveness of ANDEK FIREGARD.

OUTSTANDING FEATURES

- √ Can be used over all insulation types including polyurethane foam (PUF), mineral composites, wood, and other surfaces.
- √ Produces a fully adhered, fire resistant thermal and ignition barrier.
- √ Fluid-applied seamless coating that provides waterproof fire protection.
- √ Protects substrate against fire, corrosion, UV damage, and acid rain, and will resist mold and fungus.

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ANDEK FIREGARD™

Fire Resistant Waterproofing Coating

Performance Coatings & Sealants Systems

√ Extremely low smoke emission.

√ Easy to apply directly out of the container by brush, roller or airless sprayer without runs, drips and splash back.

√ Produces no unpleasant odors during or after application.

√ May be used on vertical, pitched and horizontal surfaces.

√ Remains flexible, tough and waterproof at low temperatures and will not flow at high temperatures.

√ Water-based formula means quick and easy cleanup of tools and equipment.

√ Sets quickly and begins to cure immediately after application.

√ Single component formula means no measuring or mixing of separate components or the need for special equipment.

√ Available in 24 standard colors. Custom colors are also available.

√ Attractive, low-sheen finish is easily cleaned.

APPLICATION

All surfaces to be coated must be clean, dry and free of loose particles, oils, grease or any substance that could interfere with proper bond. A careful inspection of the surface should be made to detect any signs of damage or defects, and all repairs should be completed before application begins. Application to all types of polyurethane foam may be accomplished without use of a primer. Most non-porous, non-metallic surfaces will not need to be primed. Metals should be primed with POLAPRIME 21. Porous surfaces should be primed with POLAPRIME 2. Once preparation is completed and the primer is thoroughly dry, ANDEK FIREGARD may be applied.

ANDEK FIREGARD may be applied using brush, roller or airless spray technique. The Graco Ultra Max II 795, Graco GH733, and Graco GH833 airless sprayers are used for high volume, large size applications. Smaller units from other manufacturers may be used provided they can achieve a minimum of 2,000 PSI at the tip. 3/8" diameter hose is ideal. Tip sizes mostly used are 21 to 29.

The coverage rate for an ignition barrier in crawl spaces is 135 sq. ft. per gallon; the coverage rate for a 30 minute flame spread (index 5) and ignition barrier in attics is 100 sq. ft. per gallon; the coverage rate for a 15 minute thermal barrier (UBC 26-2) is 73 sq. ft. per gallon. Tools may be cleaned using water while the product is still wet. If the material has dried, a suitable cleaning solvent may be used.

Do not apply to frozen or saturated surfaces. Protect product from freezing until fully cured. Any exterior application should not commence or proceed when precipitation is forecast within 4 hours. Store container away from direct sunlight and do not allow to freeze. Stored correctly in factory sealed containers, the shelf life is two years from date of manufacture.

PRECAUTIONS

During handling of this product, it is recommended that normal safety equipment, such as rubber gloves and chemical splash goggles, be worn. Do not ingest. In case of ingestion, induce vomiting and seek immediate medical attention. Avoid contact with skin and eyes. In case of contact, flush with clear water for at least 15 minutes. In case of contact with eyes, seek immediate medical attention in addition to flushing.

Keep out of reach of children and pets.

For more information, contact Andek's Technical Services Department.

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	SPECIFICATIONS	*Thicknesses*		
		22 mil wet 14 mil dry	16 mil wet 10 mil dry	8 mil wet 5 mil dry
Cov-erage	Coverage Area sq ft/gal	73	100	200
	Coverage Area sq ft/5 gal	365	500	1000
Fire Resistance	Ignition Barrier—30 min	Yes	Yes	-
	Ignition Barrier—15 min	Yes	Yes	Yes
	Flame Spread—30 min Index 5	Yes	Yes	-
	Flame Spread—15 min	Yes	Yes	Yes
	Thermal Barrier—15 min	Yes	-	-
	Smoke Emission (visibility)	<100	<100	<100
Certificates Received/ Tests Passed	N.V.S.E.S.- Heat and Fire Resistance	Yes	Yes	-
	NFPA 286 - IBC Code	Yes	Yes	-
	AATCC 127 - Water Resistance	Yes	Yes	Yes
	ASTM E 96 - Vapor Performance	Yes	Yes	Yes
	BS 476 - Fire Resistance	Yes	Yes	-
	UBC 26-2 Test-Thermal Barrier-Open Cell Foam	Yes	-	-
	UBC 26-2 Test-Thermal Barrier-Closed Cell Foam	Yes	-	-
	ASTM E-84 30 Minute Flame Spread Test	-	Yes	-
	ASTM E-84 30 Minute Smoke Emission Test	-	Yes	-
Water & Mold Resistance	Water Resistance -% absorption	<5%	<5%	<5%
	Mold Resistance -1.7x10(7) cfus/ml	0%	0%	0%
Other Qualifications	Warranty Duration	10 Years Exterior and Lifetime Interior		
	Duration in the Market	30 Years		
	Waterproof and Vapor Barrier Properties	Yes		
	Resistance to UV Damage, Acid Rain & Fungal Attack	Yes		
	All Manufactured in USA	Yes		
	Applicable over Polyurethane Foam	Yes		
	Compatible with Most Paintable Construction Materials	Yes		
	Single Component	Yes		
	Seamless & Fully Adhered	Yes		
	Rust and Corrosion Resistant	Yes		
	Meets LEED Resquirements	Yes		
	Applicable over Vertical, Pitched & Horizontal Surfaces	Yes		
	Closed Cell Foam and Open Cell Foam Application	Yes		
	Tough at low Temp and does not Flow at High Temp	Yes		
	Resistant to Most Common Chemicals	Yes		
	Recoatable and Repairable	Yes		
	Interior and Exterior Use	Yes		
	VOC Contents	Zero g/l		
	Odor After Application	None		
	No Primer Required for Urethane Foam	Yes		
	Elongation	1000% @ 75°F - ASTM D-412		
	Solid Contents	71% (B.W.); 60% (B.V.)		
	Tensile Strength	520 psi - ASTM D-412		
	Flash Point	Non-flammable		
	Shore 'A' Hardness	52 - ASTM D-2240		
	Impact Resistance 4 mm indent	No cracking or loss of adhesion-BC 3900 Part E3		
	Water Based & Easy to Clean Up	Yes		
	Shipping Weight (5 gal)	70 lb		
	Shelf Life	2 Years		
	Colors Available	24 standard colors		
	Spray Equipment	Graco 795 Airless Pump or Equivalent Equipment		
	Tip Size	21 to 29 Tip Size		

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Performance Coatings & Sealants Systems

TECHNICAL DATA		
Moisture Vapor Transmission	0.38 perms @ 10 mils dft	ASTM E-96
Tensile Strength	520 psi	ASTM D-412
Elongation	1000% @ 75°F	ASTM D-412
Solids	71% (B.W.); 60% (B.V.)	ASTM D-1044
Shore 'A' Hardness	52	ASTM D-2240
Thermal Barrier Properties	15 min.	UBC 26-2; ASTM E-119
External Flame Resistance		
-On Class 4 on PUF	Ext. SAA (Class 1)	BS 476 Part 3
-On Asbestos Sheet	Ext. SAA (Class 1)	BS 476 Part 3
-On Polystyrene Foam	Class 0	BS 476 Part 6
-On Class 4 Polyurethane Foam	Class 1	BS 476 Part 7
-On Asbestos	Class 1	BS 476 Part 7
Interior Flame Spread	Index 5	ASTM E-84
Smoke Developed	Index 30	ASTM E-84
Chemical Resistance	Resists most common chemicals	
Mold Resistance	Zero growth @ 1.7 x 10(7) cfus/ml	AC5168

NOTICE: The information presented herein is based on tests and data that Andek Corporation believes to be reliable. It is intended for use by technically qualified personnel at their own discretion and risk. Since conditions of handling and use are beyond our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. Nothing herein is to be construed as a license to operate or a recommendation to infringe any patent.

Effective Date: 05/2012

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MATERIAL SAFETY DATA SHEET
U.S. Department of Labor
Occupational Safety & Health Administration

ANDEK FIREGARD

SECTION 1 - IDENTIFIERS

MANUFACTURER: Andek Corporation
ADDRESS: 850 Glen Avenue, Moorestown, NJ 08057
TELEPHONE: 1-856-786-6900
In an emergency, contact CHEMTREC 1-800- 424-9300;
outside the United States call +1-703-527-3887
TRADE NAME: Andek Firegard
CHEMICAL FAMILY: Polyvinyl Diene Chloride Emulsion

SECTION 2 – HAZARD IDENTIFICATION & EMERGENCY OVERVIEW

Emergency Overview: Not considered to be hazardous. Some individuals may find the odor to be unpleasant.

Effects of Overexposure:
SKIN: May irritate skin.
EYES: Contact is unpleasant, vapor may irritate.
BREATHING: Not considered harmful; slight ammonia odor may annoy some individuals.
SWALLOWING: Although non-toxic, entry into throat may cause choking.

SECTION 3 - COMPOSITION

COMPONENT	CAS #	APPROX %	TLV
Polyvinyl Diene Chloride/Ethylene Acetate	25085-46-5	27.0	
Barium Sulfate	7727-43-7	25.2	
Titanium Dioxide	13463-67-7	5.8	
Alumina Trihydrate	21645-51-2	8.7	
Antimony Oxide	1309-64-4	3.0	
Zinc Borate	138265-88-0	3.0	
Dispersant (nonionic)/Defoamer (Silicone Emulsion)	744-21-3	0.6	
Fungicides	1897-45-6	0.6	
Methyl Cellulose	9004-62-0	0.2	
Water	7732-18-5	Balance	

SECTION 4 – FIRST AID MEASURES

SKIN: While wet, wash with water. If dry, use proprietary hand cleaner followed by hot water.
EYES: Flush with plenty of water and seek medical attention.
BREATHING: Remove to fresh air.
SWALLOWING: Induce vomiting and call a physician.

SECTION 5 – FIRE & EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): >200°F. (ASTM D50)
FLAMMABLE LIMITS: N/A
EXTINGUISHING MEDIA: N/A
SPECIAL FIRE FIGHTING PROCEDURES: N/A
UNUSUAL FIRE & EXPLOSION HAZARDS: None
DECOMPOSITION PRODUCTS: Oxides of calcium, carbon, silicon, antimony, barium, titanium, and halogens.

SECTION 6 – SPILL OR LEAK PROCEDURES

Cover with a layer of sand or suitable absorbent material, or wash away with water.

SECTION 7 – HANDLING & STORAGE

Avoid prolonged contact with skin. Do not consume food or beverage while handling. Do not allow to freeze; otherwise material will be unusable and require disposal.

SECTION 8 – PERSONAL PROTECTION/EXPOSURE CONTROLS

RESPIRATORY PROTECTION (SPECIFY TYPE): Unnecessary if used outdoors.
EYE PROTECTION: Chemical splash goggles.
SKIN PROTECTION: Neoprene rubber or polyethylene gloves.
OTHER PROTECTIVE EQUIPMENT: Coveralls and/or rubber apron, rubber shoes or boots.

PERSONAL HYGIENE: Wash thoroughly after use.

SECTION 9 - PHYSICAL DATA

BOILING POINT (F)	212°	SPECIFIC GRAVITY (H^2O=1)	1.37
VAPOR PRESSURE	68	PERCENT, VOLATILE BY VOLUME	40
VAPOR DENSITY (AIR=1)	As Water	EVAPORATION RATE (N.B.A.=1)	As Water
SOLUBILITY IN WATER	Soluble	pH	8.5

APPEARANCE & ODOR - White or colored liquid with slight ammoniacal odor.

SECTION 10 - REACTIVITY DATA

STABILITY: Stable.
INCOMPATABILITY (MATERIALS TO AVOID): Strong oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: None
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Freezing will coagulate material.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE ORAL TOXICITY	Slight
ACUTE INHALATION TOXICITY	None
ACUTE DERMAL TOXICITY	Minimal
SENSITIZATION	Unlikely
MUTAGENICTIY	Negative
CARCINOGENICITY	Not Classifiable

SECTION 12 ECOLOGICAL INFORMATION

BIODEGRADATION	Not Readily
TOXICITY TO FISH	Minimal
TOXICITY TO AQUATIC INVERTEBRATES	Minimal
TOXICITY TO MICRO ORGANISMS	Minimal
ATMOSPHERIC OXIDATION OF VOLATILES	None
BIOACCUMULATION	Unlikely
TOXICITY TO PLANTS	Minimal

SECTION 13 – DISPOSAL CONSIDERATIONS

Dispose of in accordance with local, state and federal regulations.

SECTION 14 – TRANSPORT INFORMATION

PROPER SHIPPING NAME:	Paint
HAZARD CLASS:	None
PACKING GROUP:	N/A
ID #:	N/A
RQ:	N/A

TRANSPORT LABELS REQUIRED: This material is not regulated by the D.O.T.

SECTION 15 – REGULATORY INFORMATION

See reference data for individual components.

SECTION 16 – OTHER INFORMATION (HMIS RATING)

Health	1
Flammability	0
Physical Hazard	0
Personal Protection	B

March 8, 2013

Performance
Coatings & Sealant
Systems

USACE

To Whom it may concern:

I would like to confirm that Andek Firegard is applicable to all types of insulation foam, including half-pound, two-pound, and three-pound density, both closed cell and open cell. Andek Firegard has been applied over all hydrocarbon-based urethane foam, as well as polyurethane foam, modified with soy-based polyols.

The manufacturers of polyurethane foams to which Andek Firegard is applicable include Bayer, BASF, Demilec, NCFI, and all of the major United States producers. Andek Firegard has been tested and approved as a thermal barrier, ignition barrier, and flame-spread inhibitor for interior and exterior applications.

If you have any questions or require any individual technical information, please contact me.

Sincerely yours,

ANDEK CORPORATION

Neil R. Shearer
Chief Chemist

NRS/jcw

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PROJECT REFERENCES

	PROJECT	LOCATION	ANDEK PRODUCT USED
	U.S. Naval Research Lab	Washington DC	Polaroof NW
	Reagan National Control Tower	Reagan National Airport, Washington, DC	Polaroof AC, Wearcoat 66
	Arch Street Presbyterian Church	Philadelphia, PA	Polaprime 21, Polaroof AC
	Trump Building Wall Street (Metal roof)	New York, NY	Polaprime 21, Polaroof AC
	PA DOT-Interstate 476	Pennsylvania	Polagard AG
	McDonnell Douglas (Boeing Aerospace)	New Jersey	Polaroof RAC

JFK NEW YORK JFK	John F Kennedy Airport	New York, NY	Polaroof SP, Flashband
LaGuardia AIRPORT	LaGuardia Airport	New York, NY	Polaroof SP, Flashband
	Throgs Neck Bridge	New York, NY	Roofdx Super, Roofab
LAX Los Angeles World Airports	Los Angeles Int'l Airport	Los Angeles, CA	Polaroof RAC, Roofab, Polaroof SP
	PSE&G Nuclear Power Station	Salem, NJ	Andek 950, Wearcoat 66
	Philadelphia Park Horse Stables	Philadelphia, PA	Polaprime 21, Polaroof AC
	U.S. Air Force Airlift Command	Dover AFB, DE	Polaroof AC
	U.S. Navy (Military Sealift Command)	Norfolk, VA	Polaroof SP

	Walt Disney World	Orlando, FL	Roofdx Super, Polaroof RAC, Roofab, Polaroof AC, Polaroof NW, Clearcoat 44
	The Moshulu	Philadelphia, PA	Polaprime 21, Roofab, Polaroof RAC
	Interstate 78	Pennsylvania	Polagard AG
	Veteran's Administration Hospitals	Delaware & Palo Alto, CA	Polaroof RAC, Polaroof SP
	Jazzland Amusement Park	New Orleans, LA	Polagard AG
	NASA Goddard Space Flight Center	Greenbelt, MD	Polaroof RAC, Roofab
	National Institutes of Health	Bethesda, MD	Cocoon 560, Cocoon Vinyl Bond B

	Harrah's Casino	Atlantic City, NJ	Polaroof AC, Roofdx Copper
	General Electric	Burkeville, AL	Cocoon 560, Cocoon Vinyl Bond B
	Baltimore/Washington Int'l Airport	BWI Airport, MD	Polaroof NW
	U.S. Department of State	Overseas Embassies	Rubberkote 1047
	Princeton University	Princeton, NJ	Polaroof AC, Polaroof NW, Wearcoat 44, Roofab
	U.S. Army Corps of Engineers	Hungry Horse, MT & Johnson Atoll	Polajoint
	Dupont Corp	Richmond, VA	Polafloor PUR,Wearcoat 44, Polafloor Epoxy Topping
	Lucy the Elephant	Margate, NJ	Polaroof AC, Polaprime 21
	Maryland DOT	Chesapeake House Service Center	Polaroof AC, AIM #3

	Philadelphia City Hall	Philadelphia, PA	Roofdx Super
Pfizer	Pfizer Pharmaceutical	Philadelphia, PA	Polafloor PUR
	Philadelphia Naval Shipyard	Philadelphia, PA	Polaroof AC, Polaroof NW, Wearcoat 44, Roofab
	University of Texas	Austin, TX	Clearcoat 44
	Delaware DOT	Harrington, DE	Polaroof NW
THE RITZ-CARLTON	The Ritz Carlton Resort & Golf Club	Bradenton, FL	Andek Firegard
PENNSTATE	Pennsylvania State University Wiley Lab	State Park, PA	Cocoon 560, Cocoon Vinyl Bond B
HERSHEYPARK	Hershey Park	Hershey, PA	Polafloor Colorcoat

	National Italian Foundation HQ	Washington D.C.	Polagard Fibrelastic
	Independence Blue Cross/Blue Shield HQ	Philadelphia, PA	Roofdx Super, Polafloor PUR
	U.S. Navy - Military Sealift Command	Norfolk, VA	Polaroof SP
	U.S. Army	Picatinny Arsenal, NJ	Polajoint Super
	Noramco Pharmaceuticals	Wilmington, DE	Polaprime 21, Polaroof NW,Clearcoat 44
	U.S. Coast Guard	Cape May, NJ	Polaroof SP, Polaroof RAC, Roofab
	Bank of America	Baltimore, MD	Polaprime 21, Roofdx Super, Polaroof RAC, Roofab
	Blue Cross/ Blue Shield	Columbia, SC	Polagard AG

Osiris	Osiris Therapeutics	Columbia, MD	Cocoon 560, Cocoon Vinyl Bond B
	Delaware "Smoke House" Fire Training Facility		Polaprime 21, Wearcoat 44
	Kentucky Horse Park-Central Show Arena Facility	Lexington, KY	Polaprime 21, Polaroof NW
	Triborough Bridge & Tunnel Authority	New York, NY	Roofdx Super, Roofab, Silver Film
	Druid Hill Recreation Center	Baltimore, MD	Wearcoat 44

ICC-ES Evaluation Report

ESR-1172

Reissued February 1, 2013
This report is subject to renewal February 1, 2015.

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

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EVALUATION SUBJECT:

SEALECTION® 500 SPRAY-APPLIED POLYURETHANE FOAM INSULATION

1.0 EVALUATION SCOPE

Compliance with the following codes:

- ® 2009 International Building Code (IBC)
- ® 2009 International Residential Code (IRC)
- 2009 International Energy Conservation Code® (IECC)
- Other Codes (see Section 8.0)

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Air permeability
- Fire-resistance-rated construction
- Exterior walls in Type I through IV construction

2.0 USES

SEALECTION® 500 spray-applied polyurethane foam insulation is used as a nonstructural thermal insulating material in Type I, II, III, IV and Type V construction under the IBC and in dwellings under the IRC. The insulation is for use in wall cavities, floor/ceiling assemblies, or attics and crawl spaces when installed in accordance with Section 4.0. Under the IRC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.4. The insulation may be used in nonload-bearing, fire-resistance-rated walls when construction is in accordance with Section 4.5.

3.0 DESCRIPTION

3.1 Materials:

SEALECTION® 500 spray-applied foam insulation is semirigid, low-density, polyurethane foam plastic that is installed as a component of floor/ceiling and wall assemblies. The insulation is a two-component spray foam plastic with a nominal in-place density of 0.5 pcf (8 kg/m^3). The insulation is produced in the field by combining a polymeric isocyanate (A500 component) with a polymeric resin (B500 component). The insulation liquid components are supplied in 55-gallon (208 L) drums and/or 250-gallon (946 L) totes and must be stored at temperatures between 40ºF (4.5ºC) and 100ºF (38ºC). The liquid components have a shelf life of one year when stored in factory-sealed containers at these temperatures.

3.2 Surface-burning Characteristics:

The insulation, at a maximum thickness of 6 inches (152 mm) and a nominal density of 0.5 pcf (8 kg/m^3), has a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84. Greater thicknesses are recognized as described in Sections 4.3 and 4.4.

3.3 Thermal Resistance, R-values:

The insulation has thermal resistance (R-value) at a mean temperature of 75ºF (24ºC) as shown in Table 1.

3.4 Air Permeability:

SEALECTION® 500 spray-applied polyurethane foam insulation, at a minimum thickness of 3.5 inches (89 mm), is considered air-impermeable insulation in accordance with Section R806.4 of the IRC, based on testing in accordance with ASTM E283 and ASTM E2178.

3.5 Blazelok™ IB4 Intumescent Coating:

Blazelok™ IB4 intumescent coating, manufactured by TPR$_2$ Corporation, is a one-component, water-based liquid coating with specific gravity of 1.3. Blazelok™ IB4 is supplied in 5-gallon (19 L) pails and/or 55-gallon (208 L) drums and has a shelf life of one year when stored in factory-sealed containers at temperatures between 45ºF (7ºC) and 90ºF (32ºC).

3.6 Blazelok™ TB Intumescent Coating:

Blazelok™ TB intumescent coating, manufactured by TPR$_2$ Corporation, is a one-component, water-based liquid coating with specific gravity of 1.3. Blazelok™ TB is supplied in 5-gallon (19 L) pails and/or 55-gallon (208 L) drums and has a shelf life of one year when stored in factory-sealed containers at temperatures between 45ºF (7ºC) and 90ºF (32ºC).

3.7 Andek Firegard Intumescent Coating:

Andek Firegard intumescent coating, manufactured by Andek Corporation, is a one-component, water-based coating with specific gravity of 1.37. Andek Firegard is supplied in 5-gallon (19 L) pails and has a shelf life of one year when stored in factory-sealed containers at temperatures between 45ºF (7ºC) and 90ºF (32ºC).

3.8 No-Burn® Plus XD Intumescent Coating:

No-Burn® Plus XD intumescent coating, manufactured by No-Burn, Inc., is a translucent aqueous liquid in 1- and 5-gallon (3.8 and 18.8 L) pails and 55-gallon (208 L) drums. The coating has a shelf life of three years when stored in a factory-sealed container at temperatures between 40ºF (4.5ºC) and 90ºF (32ºC).

4.0 INSTALLATION

4.1 General:

SEALECTION® 500 spray-applied foam insulation must be installed in accordance with the manufacturer's published installation instructions and this report. A copy of the manufacturer's published installation instructions must be available at all times on the jobsite during installation.

4.2 Application:

The SEALECTION® 500 insulation is spray-applied on the jobsite using a volumetric positive displacement pump as identified in the Demilec application manual. The insulation must be applied when the ambient temperature is greater than 23ºF (-5ºC). The insulation must not be used in areas that have a maximum in-service temperature greater than 180ºF (82ºC). The foam plastic must not be used in electrical outlet or junction boxes or in contact with water, rain or soil. The foam plastic must not be sprayed onto a substrate that is wet, or covered with frost or ice, loose scales, rust, oil, or grease. The insulation must be protected from the weather during and after application. The insulation may be applied to the maximum thickness in a single pass. Where insulation is used as an air-impermeable insulation, such as in unvented attic assemblies under IRC Section R806.4, the insulation must be installed at a minimum thickness of 3.5 inches (89 mm).

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier:

SEALECTION® 500 spray foam insulation must be separated from the interior of the building by an approved thermal barrier of 1/2-inch-thick (12.7 mm) gypsum wallboard or an equivalent 15-minute thermal barrier complying with, and installed in accordance with, IBC Section 2603.4 or IRC Section R316.4, as applicable, except where insulation is in an attic or crawl space as described in Section 4.4. Thicknesses of up to 9 1/4 inches (235 mm) for wall cavities and 14 inches (356 mm) for floor/ceiling cavities are recognized, based on room corner fire testing in accordance with NFPA 286.

4.3.2 Application without a Thermal or Ignition Barrier: The prescriptive 15-minute thermal barrier or ignition barrier may be omitted when installation is in accordance with this section. SEALECTION® 500 spray foam insulation and Blazelok™ TB intumescent coating may be spray-applied to the interior facing of walls, the underside of roof sheathing or roof rafters, and in crawl spaces, and may be left exposed as an interior finish without a prescribed 15-minute thermal barrier or ignition barrier. The foam plastic insulation thickness must not exceed 5 1/2 inches (140 mm) in walls and 10 inches (254 mm) in floors or ceilings. All foam surfaces must be covered with 14 dry mils (0.36 mm) [25 wet mils (0.64 mm)] of Blazelok™ TB intumescent coating, described in Section 3.6. The intumescent coating must be spray-applied over the insulation in accordance with the coating manufacturer's instructions and this report at a rate of 1 gallon (3.38 L) per 82 square feet (7.6 m_2) to obtain the recommended minimum dry film thickness noted in this section.

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier: When SEALECTION® 500 spray foam insulation is installed within attics or crawl spaces where entry is made only for service of utilities, an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 or IRC Section R316.5.3 or R316.5.4, as applicable. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable code, and must be installed in a manner so the foam plastic insulation is not exposed. SEALECTION® 500 spray-applied foam insulation as described in this section may be installed in unvented attics in accordance with IRC Section R806.4.

4.4.2 Application Without a Prescriptive Ignition Barrier:

4.4.2.1 General: SEALECTION® 500 spray-applied foam insulation may be installed in attics and crawl spaces, without a prescriptive ignition barrier as described in IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4, in accordance with Section 4.4.2.2, 4.4.2.3, 4.4.2.4, or 4.4.2.5, when all of the following conditions apply:

a. Entry to the attic or crawl space is only to service utilities, and no storage is permitted.

b. There are no interconnected attic or crawl space areas.

c. Air in the attic or crawl space is not circulated to other parts of the building.

d. Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.

e. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with Section R806.4 of the IRC.

f. Combustion air is provided in accordance with IMC (International Mechanical Code®) Section 701.

4.4.2.2 Application with Blazelok™ IB4 Intumescent Coating: In attics, SEALECTION® 500 foam insulation may be spray-applied to the underside of the roof sheathing and/or rafters; and in crawl spaces, the insulation may be spray-applied to the underside of wood floors as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 11 1/2 inches (292 mm) and the vertical surfaces must not exceed 9 1/2 inches (241 mm). The foam plastic surface must be covered with a minimum nominal thickness of 5 dry mils (0.13 mm) [9 wet mils (0.23 mm)] of the Blazelok™ IB4 intumescent coating described in Section 3.5. The intumescent coating must be spray-applied over the insulation in accordance with the coating manufacturer's instructions and this report at a rate of 1 gallon (3.38 L) per 175 square feet (16.3 m) to obtain the recommended minimum dry film thickness noted in this section.

4.4.2.3 Application with Andek Firegard Intumescent Coating: In attics, SEALECTION® 500 foam insulation may be spray-applied to the underside of the roof

sheathing and/or rafters and in crawl spaces. The insulation may be spray-applied to the underside of wood floors as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 11 1/2 inches (292 mm) and the vertical surfaces must not exceed 9 1/2 inches (241 mm). The foam plastic surface must be covered with a minimum nominal thickness of 10 dry mils (0.25 mm) [20 wet mils (0.51 mm)] of the Andek Firegard intumescent coating described in Section 3.7. The intumescent coating must be spray-applied over the insulation in accordance with the coating manufacturer's instructions and this report at a rate of 1 gallon (3.38 L) per 100 square feet (9.3 m^2) to obtain the recommended minimum dry film thickness noted in this section.

4.4.2.4 Application with No-Burn® PlusXD Intumescent Coating: In attics, SEALECTION® 500 foam insulation may be spray-applied to the underside of the roof sheathing and/or rafters and in crawl spaces. The insulation may be spray-applied to the underside of wood floors as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 11 1/2 inches (292 mm), and the application to vertical surfaces must not exceed 9 1/2 inches (241 mm). The foam plastic surfaces must be covered with a minimum nominal thickness of 6 dry mils (0.15 mm) [10 wet mils (0.25 mm)] of the No-Burn® Plus XD intumescent coating described in Section 3.8. The intumescent coating must be spray-applied over the insulation in accordance with the coating manufacturer's instructions and this report, at a rate of 1 gallon (3.38 L) per 160 square feet (14.9 m^2) to obtain the recommended minimum dry film thickness noted in this section.

4.4.2.5 Use on Attic Floors: SEALECTION® 500 spray-applied foam insulation may be installed at a maximum thickness of 9 1/2 inches (241 mm) between and over the joists in attic floors. All exposed foam plastic surfaces must be covered with a minimum nominal thickness of 9 wet mils (0.23 mm)] of the Blazelok™ IB4 intumescent coating; 20 wet mils (0.51 mm) of the Andek Firegard intumescent® coating; or 10 wet mils (0.25 mm) of No-Burn Plus XD intumescent coatings as described in this report. The intumescent coatings must be applied over the insulation in accordance with the coating manufacturer's instructions and this report.

4.5 One-hour Fire-resistance-rated Wall Assemblies (Nonload-bearing):

SEALECTION® 500 foam insulation may be used as a component of a one-hour fire-resistance-rated, nonload-bearing wall assembly as described in this section (Section 4.5).

4.5.1 Interior and Exterior Face: One layer of 5/8-inch-thick (16 mm), Type X gypsum wallboard complying with ASTM C36 or ASTM C1396 is installed on the interior and exterior side of nominally 2-by-6, No. 1, Southern yellow pine wood studs spaced 16 inches (406 mm) on center. The wallboard is attached with 1 5/8-inch-long (41 mm), coarse-thread drywall screws located 8 inches (203 mm) on center along the perimeter and 12 inches on center (305 mm) in the field of the wallboard. Wallboard joints must be taped and treated with joint compound in accordance with ASTM C840 or GA-216. Fastener heads must also be treated with joint compound in accordance with ASTM C840 or GA-216.

4.5.2 Stud Cavity: A nominally 5 1/2-inch (140 mm) thickness of SEALECTION® 500 foam insulation is spray-applied in all stud cavities.

4.6 Exterior Walls of Type I, II, III and IV Construction: When used on exterior walls of Type I, II, III and IV construction, the SEALECTION® 500 foam insulation must comply with Section 2603.5 of the IBC at a maximum thickness of 3 5/8 inches (92 mm), when installed per the manufacturer's published installation instructions and this section. The potential heat of Demilec SEALECTION® 500 spray polyurethane foam insulation is 496 Btu/ft^2 (5.6 MJ/m^2) per inch of thickness when tested in accordance with NFPA 259.

4.6.1 Nonload-bearingNFPA285-testedWall Assembly:

4.6.1.1 Interior Face: One layer of 5/8-inch-thick (16 mm), Type X gypsum wallboard complying with ASTM C36 or ASTM C1396 is installed with the long dimension perpendicular to 3 5/8-inch-deep (92 mm), 20 gage steel studs spaced a maximum of 24 inches (609 mm) on center. The wallboard is attached with 1 1/4-inch-long (31.8 mm), bugle head screws located 8 inches (203 mm) on center along the perimeter and 12 inches on center (305 mm) in the field of the wallboard. Wallboard joints must be taped and treated with joint compound in accordance with ASTM C840 or GA-216. Fastener heads must also be treated with joint compound in accordance with ASTM C840 or GA-216.

4.6.1.2 Stud Cavity: SEALECTION® 500 foam insulation, in a maximum thickness of 3 5/8 inches (92 mm), is spray-applied in all stud cavities.

4.6.1.3 Exterior Face: One layer of 5/8-inch-thick (16 mm) GP DensGlass® sheathing attached to steel studs using 1 1/4-inch-long (31.8 mm), self-tapping screws spaced 8 inches (203 mm) on center along the perimeter and 12 inches on center (305 mm) in the field of the sheathing. Details of the exterior wall covering must be provided by the report holder, designer or specifier to the code official, with a fire engineering analysis demonstrating that the addition of the wall covering will not negatively affect conformance of the assembly with the requirements of IBC Section 2603.5.

5.0 CONDITIONS OF USE

SEALECTION® 500 spray foam insulation described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The products must be installed in accordance with the manufacturer's published installations instructions, this evaluation report and the applicable code. If there are any conflicts between the manufacturer's published installation instructions and this report, this report governs.

5.2 The insulation must be separated from the interior of the building by an approved 15-minute thermal barrier, except when installation is as described in Sections 4.3.2 or 4.4.1 through 4.4.2.5.

5.3 The insulation must not exceed the thicknesses noted in Sections 3.2, 4.2, 4.3, 4.4, 4.5, and 4.6.

5.4 The insulation must be protected from exposure to weather during and after application.

5.5 The insulation must be applied by contractors certified by Demilec USA LLC.

5.6 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IRC Section R318.4 or IBC Section 2603.8, as applicable.

5.7 When use is on exterior walls of buildings of Type I, II, III, and IV, construction must be as described in Section 4.6.

5.8 See Section 4.5 for the fire-resistance-rated wall assemblies.

5.9 Jobsite certification and labeling of the insulation must comply with IRC Sections N1101.4 and N1101.4.1 and IECC Sections 102.1.1 and 102.2.11, as applicable.

5.10 The insulation is produced in Arlington, Texas, under a quality control program with inspections by Intertek Testing Services NA, Inc. (AA-647).

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated June 2012, including reports of tests in accordance with Appendix X.

6.2 Reports of fire propagation characteristics tests in accordance with NFPA 285.

6.3 Reports of air leakage testing in accordance with ASTM E283.

6.4 Reports of air permeance tests in accordance with ASTM E2178.

6.5 Reports of room corner tests in accordance with NFPA 286.

6.6 Reports of tests in accordance with ASTM E119.

6.7 Reports of potential heat tests in accordance with NFPA 259.

7.0 IDENTIFICATION

Components of the spray foam insulation are identified with the manufacturer's name (Demilec USA LLC), address and telephone number; the product name (SEALECTION® A500 or SEALECTION® B500); use instructions; the density; the flame-spread and smoke-developed indices; the date of manufacture; thermal resistance values; the evaluation report number (ESR-1172); and the name of the inspection agency (Intertek Testing Services NA).

Each pail of the Blazelok™ IB4 and the Blazelok™ TB intumescent coating is labeled with the manufacturer's name (TPR Corporation), the product name, and use instructions. Each pail of Andek Corporations Firegard intumescent coating is labeled with the manufacturers name (Andek Corporation) and address, the product trade name, and use instructions.

No-Burn® Plus XD intumescent coating is identified with the manufacturer's name (No-Burn, Inc) and address, the product trade name, and use instructions.

8.0 OTHER CODES

8.1 Evaluation Scope:

In addition to the codes referenced in Section 1.0, the products recognized in this report have also been evaluated in accordance with the following codes:

- 2006 International Building Code® (2006 IBC)
- 2006 International Residential Code® (2006 IRC)
- 2006 International Energy Conservation Code® (2006 IECC)
- 2003 International Building Code® (2003 IBC)
- 2003 International Residential Code® (2003 IRC)
- 2003 International Energy Conservation Code® (2003 IECC)

8.2 Uses:

The products comply with the above-mentioned codes as described in Sections 2.0 through 7.0 of this report except as noted below:

- **Application with a Prescriptive Thermal Barrier:** See Section 4.3.1, except the approved thermal barrier must be installed in accordance with Section R314.4 of the 2006 IRC or Section R314.1.12 of the 2003 IRC.

- **Application with a Prescriptive Ignition Barrier**: See Section 4.4.1, except attics must be vented in accordance with Section 1203.2 of the 2006 and 2003 IBC or Section R806 of the 2003 IRC, and crawl space ventilation must be in accordance with IBC Section 1203.3 of the 2006 and 2003 IBC or IRC Section R408, as applicable. Additionally, an ignition barrier must be installed in accordance with Sections R314.5.3 or R314.5.3 of the 2006 IRC or Section R314.2.3 of the 2003 IRC, as applicable.

- **Application without a Prescriptive Ignition Barrier:** See Section 4.4.2, except attics must be vented in accordance with Section 1203.2 of the 2006 and 2003 IBC or Section R806 of the IRC, and crawl space ventilation must be in accordance with Section 1203.3 of the 2006 and 2003 IBC or IRC Section R408, as applicable.

- **Protection Against Termites:** See Section 5.6, except use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with Section R320.5 of the 2006 IRC or Section R320.4 of the 2003 IRC.

- **Jobsite Certification and Labeling:** See Section 5.9, except jobsite certification and labeling must comply with Sections 102.1.1 and 102.1.11, as applicable, of the 2006 IECC.

TABLE 1—THERMAL RESISTANCE (R-VALUES)

THICKNESS (inches)	R-VALUE (°F.ft^2.h/Btu)
1	3.8
3.5	13
4	15
5.5	21
7	27
9.5	36
10	38
11.5	44
14	52

For SI: 1 inch = 25.4 mm; 1 °F.ft^2.h/Btu = 0.176 110 °K.m^2 /W.

[1] R-values are calculated based on tested K-values at 1- and 4-inch thicknesses.

VTEC Laboratories Inc.

May 9, 2008

Client: ANDEK Corp.
850 Glen Ave.
Morrestown, NJ 08057

Attn: Mr. Neil Shearer

SUBJECT: Uniform Building Code Standard 26-2, "Test Method for the Evaluation of Thermal Barriers" on the Sealection 500 panel provided by ANDEK Corp.

SAMPLE DESCRIPTION:

The 36"x36"x7.5" Sealection 500 panel was provided by ANDEK Corp. for UBC 26-2 fire endurance testing. The sample consited of a 36"x36" wood frame made up of five 2x4 wood, four pieces forming a 36"x36" square and the fifth piece placed 18" from one side of the frame. A 36"x36"x1/2" piece of plywood was fastened to one side of the frame. The inside of the frame was filled with the Sealection 500 material, which overflowed above the frame at a thickness of 3.5". ANDEK firequard was applied on top of the Sealection 500 at a thickness of 20 dry mils. The side with the Sealection 500 material was exposed to the flame. The unexposed side of the sample was instrumented with nine thermocouples spaced 9" O.C. Another panel made up of Calcium Silicate board and 2x4 wood studs was placed on top of the Sealection 500 panel so the nine thermocouples were in between the two panels. The other panel consisted of a 36"x36" frame made of five 2x4 wood studs, four pieces forming a 36"x36" square and the fifth piece placed 18" from one side of the frame. One layer of 36"x36"x½" Calcium Silicate board was fastened to each side of the frame with gypsum screws spaced 12" O.C.

PROCEDURE:

The furnace measures nominally 5 ft x 5 ft x 7 ft. The outside construction is steel and the furnace is lined with a ceramic refractory insulation. Four burners, one centered on each wall, provide uniform heat. Each burner is rated for 1.5 million Btu/hr and is of the flat flame or non-impinging flame design. Furnace conditions are monitored by four 1/4" grounded Inconel-sheathed chromel-alumel thermocouples.

A transition piece was placed on top of the furnace that had an opening of 28" x 28" where the sample was to be placed. The temperature between the unexposed side of the sample and the calcium silicate was monitored by nine, 20-gauge type K, fiberglass sheathed thermocouples.

The fire test was run following the UBC 26-2 time-temperature curve.

The endpoint for the UBC 26-2 Test occurs when either all the thermocouples on the unexposed side of the sample between the test material and the calcium silicate board reach an average of 250°F + ambient starting temperature, any individual thermocouple on the sample exceeds 325°F + ambient starting temperature, or when the sample experiences burn-through. The specimen must meet the above criteria for 15 minutes to be considered as passing the test.

RESULTS:

At 3 minutes, the underside of the sample was on fire.

At 15 minutes, the test was stopped and the furnace was shut off.

The panel met the passing requirements for 15 minutes.

The time-temperature data are contained on the following pages.

Neil Schultz
Executive Director

A. Rahim

Amirudin Rahim
Technical Director

Time (min)	TC 1 Sample Deg. F	TC 2 Sample Deg. F	TC 3 Sample Deg. F	TC 4 Sample Deg. F	TC 5 Sample Deg. F	TC 6 Sample Deg. F	TC 7 Sample Deg. F	TC 8 Sample Deg. F	TC 9 Sample Deg. F	TC 10 Furnace Deg. F	TC 11 Furnace Deg. F	TC 12 Furnace Deg. F	TC 13 Furnace Deg. F	TC 14 Sample Average Deg. F	TC 15 Furnace Average Deg. F
0	65	65	65	65	65	65	65	65	66	72	73	71	71	65	72
1	66	65	65	65	65	65	65	65	66	329	370	319	333	65	338
2	65	65	65	65	65	65	65	65	66	611	530	479	441	65	515
3	65	65	65	65	65	65	65	65	66	702	666	662	665	65	673
4	65	65	65	65	65	65	66	65	66	935	867	884	866	65	888
5	67	66	66	65	65	65	67	67	68	978	963	958	971	66	967
6	77	76	74	67	66	67	78	76	81	1,029	990	984	989	73	998
7	92	94	91	70	71	72	94	92	101	1,168	1,097	1,086	1,088	86	1,110
8	109	114	113	76	82	84	111	117	123	1,237	1,177	1,180	1,171	103	1,191
9	126	145	138	86	103	100	128	138	145	1,297	1,262	1,264	1,241	123	1,266
10	145	165	166	107	126	119	148	152	166	1,342	1,311	1,328	1,297	144	1,319
11	162	176	183	130	161	144	165	162	181	1,364	1,323	1,352	1,311	163	1,337
12	187	187	202	158	202	180	180	172	192	1,381	1,398	1,377	1,369	184	1,381
13	197	200	213	183	206	198	191	183	204	1,382	1,405	1,377	1,372	197	1,384
14	204	210	217	195	208	203	200	197	214	1,394	1,408	1,380	1,380	205	1,390
15	210	218	222	201	212	208	214	224	226	1,400	1,422	1,401	1,386	215	1,402

TEST REPORT

TEST FOR ASTM E-84

REPORT NUMBER: 100582856SAT-001A
ORIGINAL ISSUE DATE: December 29, 2011
REVISED DATE:

EVALUATION CENTER
Intertek Testing Services NA Inc.
16015 Shady Falls Road
Elmendorf, TX 78112

Report of Testing " Firegard" for compliance with the
applicable requirements of the following criteria: ASTM E84-11b (30 Minute Test)
TEST FOR SURFACE BURNING CHARACTERISTICS
OF BUILDING MATERIALS (UL 723, UBC 8-1, NFPA 255)

ABSTRACT

Specimen I. D.	"Firegard"
Test Standard:	ASTM E84-11b (30 Minute Test) TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS (UL 723, UBC 8-1, NFPA 255)
Test Date:	December 22, 2011
Test Results:	FLAME SPREAD INDEX SMOKE DEVELOPED INDEX MAXIMUM FLAME FRONT
	5 95 6 ft. Beyond Burners Centerline

Darrell Gonzales
Technician 3

December 29, 2011

Reviewed and approved:

Servando Romo
Project Manager

December 29, 2011

Intertek

I. INTRODUCTION

This report describes the results of the ASTM E84-11b (30 Minutes) TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS a method for determining the comparative surface burning behavior of building materials, extended to a total of 30 minutes. This test is applicable to exposed surfaces, such as ceilings or walls, provided that the material or assembly of materials, by its own structural quality or the manner in which it is tested and intended for use, is capable of supporting itself in position or being supported during the test period.

The purpose of the method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke density developed are reported, however, there is not necessarily a relationship between these two measurements.

“The use of supporting materials on the underside of the test specimen may lower the flame spread index from that which might be obtained if the specimen could be tested without such support... This method may not be appropriate for obtaining comparative surface burning behavior of some cellular plastic materials... Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place.”

This test method is also published under the following designations:

NFPA 255
UL 723
UBC 8-1

This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.

II. PURPOSE

The ASTM E84 (30 Minutes) (25 foot tunnel) test method is intended to compare the surface flame spread and smoke developed measurements to those obtained from tests of mineral fiber cement board and select grade red oak flooring. The test specimen surface (18 inches wide and 24 feet long) is exposed to a flaming fire exposure during the 10 minute test duration, while flame spread over its surface and density of the resulting smoke are measured and recorded. Test results are presented as the computed comparisons to the standard calibration materials.

The furnace is considered under calibration when a 10 minute test of red oak decking will pass flame out the end of the tunnel in five minutes, 30 seconds, plus or minus 15 seconds. Mineral fiber cement board forms the zero point for both flame spread and smoke developed indexes, while the red oak flooring smoke developed index is set as 100.

III. TEST PROCEDURE

The tests were conducted in accordance with the procedures outlined in the American Society for Testing and Materials ASTM E84 (30 Minutes) except the test was continued for a total of 30 minutes. The self-supporting specimens were placed directly on the tunnel ledges. As required by the standard, one or more layers of 0.25 inch thick reinforced concrete board was placed on top of the test sample between the sample and the tunnel lid. After the tests, the samples were removed from the tunnel, examined and disposed of.

IV. REVISION SUMMARY

DATE	SUMMARY
December 29, 2011	Original

V. DESCRIPTION OF TEST SPECIMENS

Date Received:	12/14/11
Date placed in the conditioning room:	12/14/11
Date Prepared:	12/19/11
Conditioning (73°F & 50% R.H.):	3 days
Specimen Width (in):	24
Specimen Length (ft):	24
Specimen Thickness (in):	0.25 (coating and cement board)
Total Specimen Weight (lbs):	83 (cement board/coating)
Adhesive or coating application rate:	1 coat at 120 sq. ft. per gallon

Mounting Method:
The specimen was self-supporting. If the sample has two different sides, indicate which side is facing down towards the flame. The coating was exposed to the flames.

Specimen Description:
The specimen was described by the client as “Fire Retardant Coating”.

The 24-ft. long test specimen consisted of a fire retardant coating applied to three 8-ft. long x 24-in. wide x 0.25-in. thick cement board at 120 sq. ft. per gallon.

The product was received by our personnel in good condition.

VI. TEST RESULTS & OBSERVATIONS

The test results, computed on the basis of observed flame front advance and electronic smoke density measurements are presented in the following table.

Test Specimen	Flame Spread Index	Smoke Developed Index
"Firegard"	5	95

The data sheets are included in Appendix A. These sheets are actual print-outs of the computerized data system which monitors the tunnel furnace, and contain all calibration and specimen data needed to calculate the test results.

VII. OBSERVATIONS

During the test, the specimen was observed to behave in the following manner.

Time (min:sec)	Observations
4:08	A steady ignition was applied.

After the test, the specimen was observed to be damaged as follows:

Distance (FEET)	Damage Descriptions
0-6	The coating was heavily charred and bleached.
6 - 24	The coating was heavily discolored.

APPENDIX A

ASTM E84 (30 Minutes)
DATA SHEETS

TEST RESULTS

FLAMESPREAD INDEX: 5

SMOKE DEVELOPED INDEX: 95

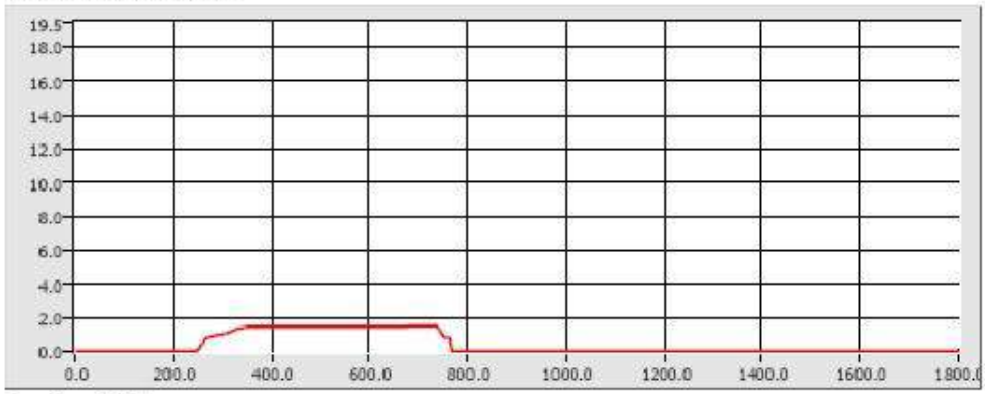
SPECIMEN DATA . . .

Time to Ignition (sec):	248
Time to Max FS (sec):	353
Maximum FS (feet):	1.5
Time to 980 F (sec):	Never Reached
Time to End of Tunnel (sec):	Never Reached
Max Temperature (F):	643
Time to Max Temperature (sec):	1792
Total Fuel Burned (cubic feet):	147.82
FS*Time Area (ft*min):	7.8
Smoke Area (%A*min):	272.0
Unrounded FSI:	4.0

CALIBRATION DATA . . .

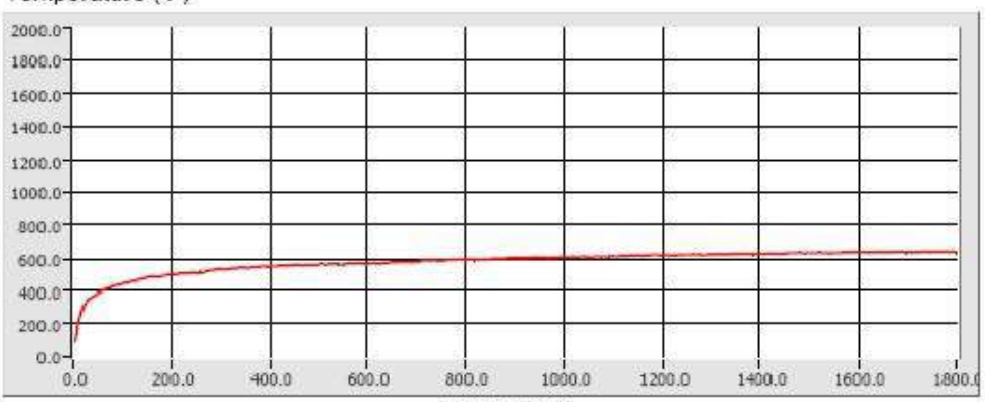
Time to Ignition of Last Red Oak (Sec):	46.0
Red Oak Smoke Area (%A*min):	119.1

FLAME SPREAD (ft)



Smoke (%A)

Temperature (°F)



Time (sec)

600

TEST REPORT

TEST FOR NFPA 255

REPORT NUMBER: 100582856SAT-001A
ORIGINAL ISSUE DATE: December 29, 2011
REVISED DATE:

EVALUATION CENTER
Intertek Testing Services NA Inc.
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Test Date:	December 22, 2011	
Test Results:	**FLAME SPREAD INDEX**	5
	SMOKE DEVELOPED INDEX	95
	MAXIMUM FLAME FRONT	6 ft. Beyond Burners Centerline

December 29, 2011

Darrell Gonzales
Technician 3

Reviewed and approved:

December 29, 2011

Servando Romo
Project Manager

I. INTRODUCTION

This report describes the results of the ASTM E84-11b (30 Minutes) TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS a method for determining the comparative surface burning behavior of building materials, extended to a total of 30 minutes. This test is applicable to exposed surfaces, such as ceilings or walls, provided that the material or assembly of materials, by its own structural quality or the manner in which it is tested and intended for use, is capable of supporting itself in position or being supported during the test period.

The purpose of the method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke density developed are reported, however, there is not necessarily a relationship between these two measurements.

“The use of supporting materials on the underside of the test specimen may lower the flame spread index from that which might be obtained if the specimen could be tested without such support... This method may not be appropriate for obtaining comparative surface burning behavior of some cellular plastic materials... Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place.”

This test method is also published under the following designations:

NFPA 255
UL 723
UBC 8-1

This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.

II. PURPOSE

The ASTM E84 (30 Minutes) (25 foot tunnel) test method is intended to compare the surface flame spread and smoke developed measurements to those obtained from tests of mineral fiber cement board and select grade red oak flooring. The test specimen surface (18 inches wide and 24 feet long) is exposed to a flaming fire exposure during the 10 minute test duration, while flame spread over its surface and density of the resulting smoke are measured and recorded. Test results are presented as the computed comparisons to the standard calibration materials.

The furnace is considered under calibration when a 10 minute test of red oak decking will pass flame out the end of the tunnel in five minutes, 30 seconds, plus or minus 15 seconds. Mineral fiber cement board forms the zero point for both flame spread and smoke developed indexes, while the red oak flooring smoke developed index is set as 100.

III. TEST PROCEDURE

The tests were conducted in accordance with the procedures outlined in the American Society for Testing and Materials ASTM E84 (30 Minutes) except the test was continued for a total of 30 minutes. The self-supporting specimens were placed directly on the tunnel ledges. As required by the standard, one or more layers of 0.25 inch thick reinforced concrete board was placed on top of the test sample between the sample and the tunnel lid. After the tests, the samples were removed from the tunnel, examined and disposed of.

IV. REVISION SUMMARY

DATE	SUMMARY
December 29, 2011	Original

V. DESCRIPTION OF TEST SPECIMENS

Date Received:	12/14/11
Date placed in the conditioning room:	12/14/11
Date Prepared:	12/19/11
Conditioning (73°F & 50% R.H.):	3 days
Specimen Width (in):	24
Specimen Length (ft):	24
Specimen Thickness (in):	0.25 (coating and cement board)
Total Specimen Weight (lbs):	83 (cement board/coating)
Adhesive or coating application rate:	1 coat at 120 sq. ft. per gallon

Mounting Method:
The specimen was self-supporting. If the sample has two different sides, indicate which side is facing down towards the flame. The coating was exposed to the flames.

Specimen Description:
The specimen was described by the client as “Fire Retardant Coating”.

The 24-ft. long test specimen consisted of a fire retardant coating applied to three 8-ft. long x 24-in. wide x 0.25-in. thick cement board at 120 sq. ft. per gallon.

The product was received by our personnel in good condition.

VI. TEST RESULTS & OBSERVATIONS

The test results, computed on the basis of observed flame front advance and electronic smoke density measurements are presented in the following table.

Test Specimen	Flame Spread Index	Smoke Developed Index
" Firegard"	5	95

The data sheets are included in Appendix A. These sheets are actual print-outs of the computerized data system which monitors the tunnel furnace, and contain all calibration and specimen data needed to calculate the test results.

VII. OBSERVATIONS

During the test, the specimen was observed to behave in the following manner.

Time (min:sec)	Observations
4:08	A steady ignition was applied.

After the test, the specimen was observed to be damaged as follows:

Distance (FEET)	Damage Descriptions
0-6	The coating was heavily charred and bleached.
6 - 24	The coating was heavily discolored.

APPENDIX A

ASTM E84 (30 Minutes)
DATA SHEETS

TEST RESULTS

FLAMESPREAD INDEX: 5

SMOKE DEVELOPED INDEX: 95

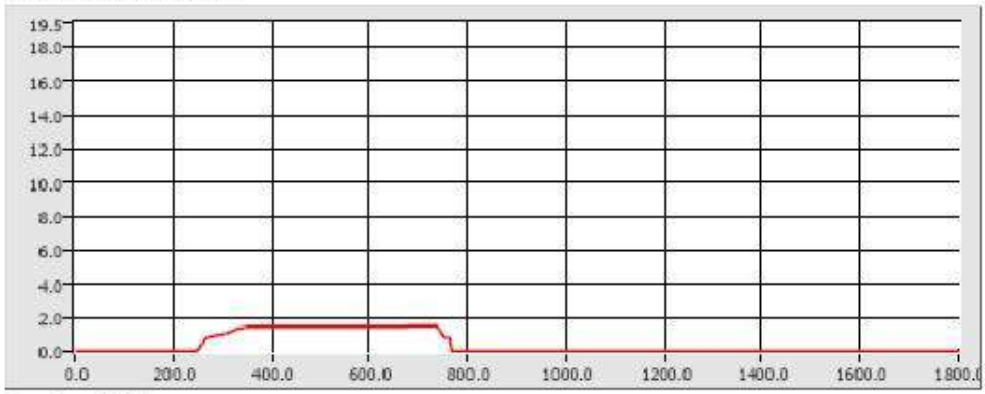
SPECIMEN DATA . . .

Time to Ignition (sec):	248
Time to Max FS (sec):	353
Maximum FS (feet):	1.5
Time to 980 F (sec):	Never Reached
Time to End of Tunnel (sec):	Never Reached
Max Temperature (F):	643
Time to Max Temperature (sec):	1792
Total Fuel Burned (cubic feet):	147.82
FS*Time Area (ft*min):	7.8
Smoke Area (%A*min):	272.0
Unrounded FSI:	4.0

CALIBRATION DATA . . .

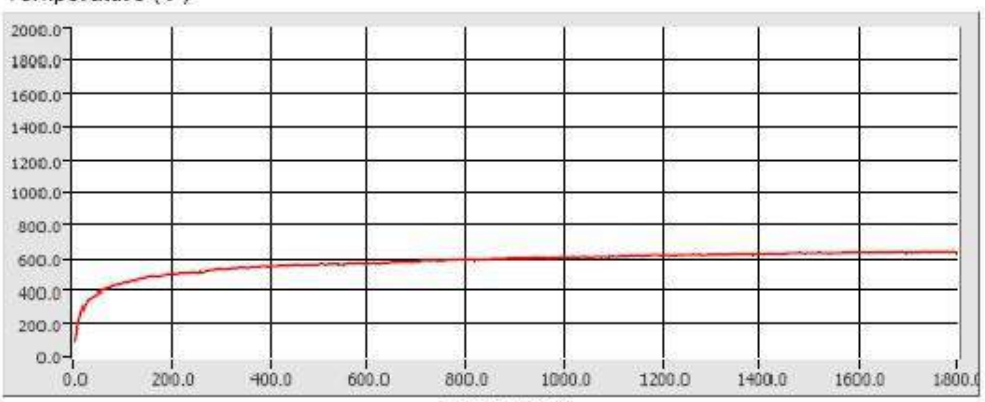
Time to Ignition of Last Red Oak (Sec):	46.0
Red Oak Smoke Area (%A*min):	119.1

FLAME SPREAD (ft)



Smoke (%A)

Temperature (°F)



Time (sec)

600

OMEGA POINT LABORATORIES

TEST REPORT

OMEGA POINT
LABORATORIES, INC
[illegible] Stick Falls Road
Elmendorf, TX 78112
(V) 210-635-8100
(F) 210-635-8101
800-[illegible]-3233
www.opl.com

ASTM E84-04

SURFACE BURNING CHARACTERISTICS

Report No. 16231 - 123306

Andek Firegard

January 12, 2005

Prepared for:
Andek Corporation
850 Glen Avenue
PO Box 392
Moorestown, NJ 08057-0392

ACCREDITED
No. 0689.01

ABSTRACT

Test Specimen: **Andek Firegard**

Test Standard: **ASTM E84-04**

Test Date: **January 07, 2005**

Test Sponsor: **Andek Corporation**

Test Results:

FLAME SPREAD INDEX = 5
SMOKE DEVELOPED INDEX = 30

123306

E. D. Hutchinson

January 12, 2005

Eric G. Hutchinson
E84 Operator

Reviewed and approved:

William E Fitch PE No. 55296

January 12, 2005

1 INTRODUCTION

This report describes the results of the ASTM E84-04 Standard Test Method for SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS , a method for determining the comparative surface burning behavior of building materials. This test is applicable to exposed surfaces, such as ceilings or walls, provided that the material or assembly of materials, by its own structural quality or the manner in which it is tested and intended for use, is capable of supporting itself in position or being supported during the test period.

The purpose of the method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke density developed are reported, however, there is not necessarily a relationship between these two measurements.

"The use of supporting materials on the underside of the test specimen may lower the flame spread index from that which might be obtained if the specimen could be tested without such support... This method may not be appropriate for obtaining comparative surface burning behavior of some cellular plastic materials... Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place."

This test method is also published under the following designations:

ANSI 2.5
NFPA 255
UBC 8-1 (42-1)
UL 723

This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.

II PURPOSE

The ASTM E84-04 (25 foot tunnel) test method is intended to compare the surface flame spread and smoke developed measurements to those obtained from tests of mineral fiber cement board and select grade red oak flooring. The test specimen sur-face (18 inches wide and 24 feet long) is exposed to a flaming fire exposure during the 10 minute test duration, while flame spread over its surface and den-sity of the resulting smoke are measured and recorded. Test results are presented as the computed comparisons to the standard calibration materials.

The furnace is considered under calibration when a 10 minute test of red oak decking will pass flame out the end of the tunnel in five minutes, 30 seconds, plus or minus 15 seconds. Mineral fiber cement board forms the zero point for both flame spread and smoke developed indexes, while the red oak flooring smoke developed index is set as 100.

III DESCRIPTION OF TEST SPECIMEN

Specimen Identification: Andek Firegard

Date Received:	12/30/2004
Date Prepared:	12/30/2004
Conditioning (73°F & 50% R.H.):	8 days
Specimen Width (in):	24
Specimen Length (ft):	24
Specimen Thickness:	0.2790-in.
Material Weight:	N/A oz./sq. yd
Total Specimen Weight:	84.50-lbs.
Adhesive or coating application rate:	(2) coats at 120 sq. ft. per

Mounting Method:

The specimen was self-supporting and was placed directly on the inner ledges of the tunnel.

Specimen Description:

The Test specimen was described by the client as the "Andek Firegard Is An Air Drying, Halogenated, Aquaborne Co-Polymer Based, Fluid-Applied Coating ." The specimen consisted of (3) 8-ft. long x 24-in. wide x 0.2790-in. thick, Andek Firegard Coating, applied in two coats at 120 sq. ft. per gallon to tunnel board by Omega Point Laboratories personnel. The first coat of the specimen was allowed to dry, before the second coat was applied, as specified by the client's application guide, which was supplied with the Sample Submittal Form. The coating was white in color. The specimen was identified by the client as "Andek Firegard".

IV TEST RESULTS

The test results, computed on the basis of observed flame front advance and electronic smoke density measurements are presented in the following table. In recognition of possible variations and limitations of the test method, the results are computed to the nearest number divisible by five, as outlined in the test method.

While no longer a part of this standard test method, the Fuel Contributed Value has been computed, and may be found on the computer printout sheet in the Appendix.

Test Specimen	Flame Spread Index	Smoke Developed Index
Mineral Fiber Cement Board	0	0
Red Oak Flooring	100	100
Andek Firegard	5	30

The data sheets are included in the Appendix. These sheets are actual print-outs of the computerized data system which monitors the ASTM E84 apparatus, and contain all calibration and specimen data needed to calculate the test results.

V OBSERVATIONS

During the test, the specimen was observed to behave in the following manner: The fire retardant coating ignited at 4:40 (min:sec.). The test continued for the 10:00 duration.

After the test the specimen was observed to be damaged as follows:
The specimen was consumed from 0-ft. - 4-ft. The fire retardant coating was charred from 5-ft. - 12-ft. Light discoloration was observed to the coating from 13-ft. - 24-ft.

APPENDIX

E84 Data Sheets

ASTM E84 DATASHEETS

Client: ANDEK CORPORATION
Date: 1/7/05
Time: 03:16 PM
Test Number: 4
Project Number: 16231-123306
Operator: EH/TA
Specimen ID: "ANDEK FIREGARD, ANDEK FIREGARD IS AN AIR DRYING, HALOGENATED, AQUABORNE CO-POLYMER BASED, FLUID- APPLIED COATING". THE SPECIMEN WAS SELF-SUPPORTING. THE SPECIMEN WAS APPLIED AT A CALCULATED RATE OF 2 COATS AT 120 SQUARE FEET PER GALLON.

TEST RESULTS

FLAMESPREAD INDEX: 5

SMOKE DEVELOPED INDEX: 30

SPECIMEN DATA . . .

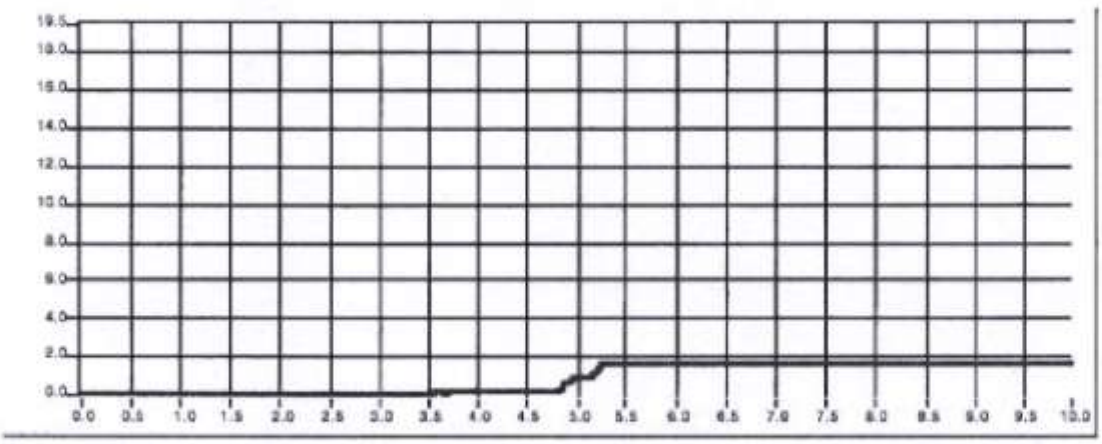
Time to Ignition (sec):	380
Time to Max FS (sec):	319
Maximum FS (feet):	1.6
Time to 980 °F (sec):	Never Reached
Max Temperature (°F):	539
Time to Max Temperature (sec):	600
Total Fuel Burned (cubic feet):	51.38
FS*Time Area (ft*min):	8.3
Smoke Area (%A*min):	29.6
Fuel Area (°F*min):	4703.3
Fuel Contributed Value:	0
Unrounded FSI:	4.3

CALIBRATION DATA . . .

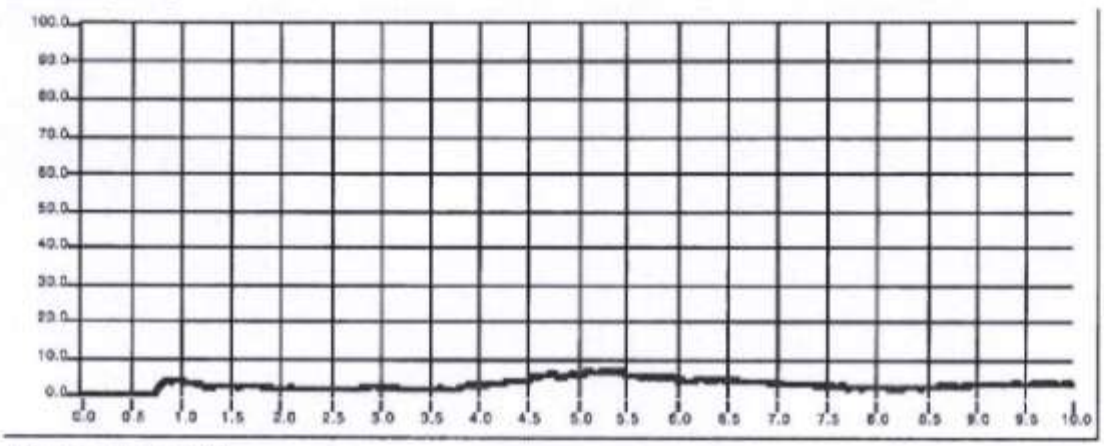
Time to Ignition of Last Red Oak (sec):	38
Red Oak Smoke Area (%A*min):	96.00
Red Oak Fuel Area (°F*min):	6587
Glass Fiber Board Fuel Area (°F*min):	5390

Project No: 16231-123306

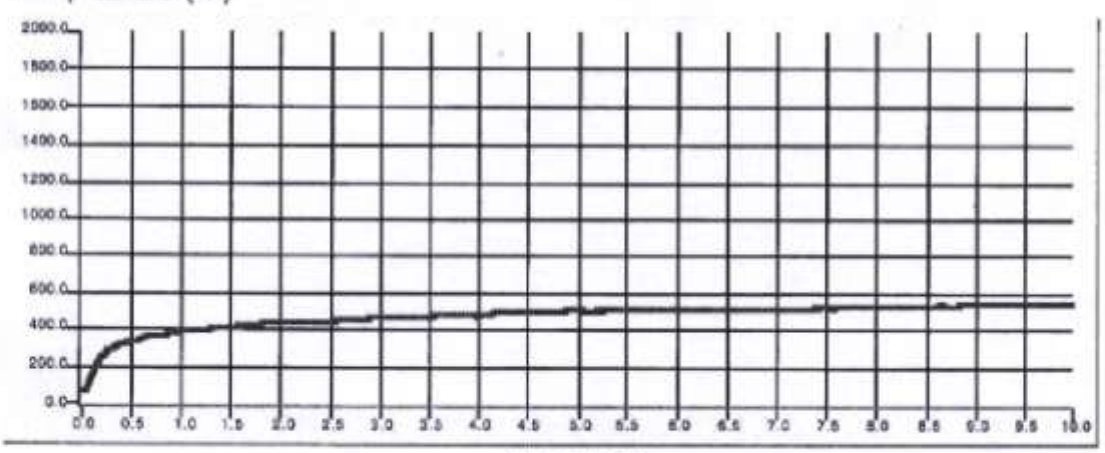
FLAME SPREAD (ft)



Smoke (%A)



Temperature (°F)



Time (min)

STANDARD COLORS

These Standard Colors will vary depending upon your monitor settings. An original Standard Color Card can be sent upon request.


Haddonfield Red


Colonial Gray


Aquarius


Tempest


Red Pepper


Light Gray


Medium Gray


Dark Gray


Montego Tan


Desert Storm


Calcite


Chestnut


Silver Dove


Tradewinds


Fernwood


Mahogany


Snowball


Badger


Sage


Burlington Green


White


Patina Green


Lilypad


Black

9221
053C/Ser 3134
X7740
9 MAR 1989

MEMORANDUM

From: 053C (C. Arazy)
To: 022B

Subj: INSTALLED ASBESTOS MILLBOARD ENCAPSULATION

Ref: (a) Service request from 022B (R. Gardiner) of 27 Oct 88.
(b) NAVSSES memo 9221, 053C/Ser 0937, X7740 of 19 Dec 88.

Encl: (1) Thermogravimetric Analysis (TGA) profile of Firegard

1. The Navy currently utilizes asbestos millboard material on the inside of the outer casings on FF-1052 class Combustion Engineering (CE) boilers. NAVSSES has previously received reports from some ships where this material has deteriorated and, as a result, spread hazardous asbestos particles into the air. In an attempt to control or alleviate this problem, NAVSSES has considered the possiblity of encapsulating the asbestos millboard with a non-hazardous, fireproof coating compound.

2. By reference (a), SSES 022B forwarded information concerning an encapsulation material, FIREGARD to SSES 053C They requested that we study this product literature and advise them if the material would be suitable for shipboard use as an encapsulant over the asbestos millboard discussed above.

3. SSES 053C reviewed the literature and discussed the feasibility of using this product with cognizant personnel in NAVSEA codes 05M3 and 07AE. As a result of these discussions, it was recommended that SSES 053C conduct in-house laboratory testing of this encapsulant material prior to commencing any shipboard tests. This information was communicated to SSES 022B by reference (b), along with a copy of the Material Safety Data Sheet (MSDS) for the FIREGARD material.

022B/4/4/9
R. Gardiner
(215) 897-7177

MILESTONES

TITLE: Asbestos Millboard Encapsulation (E-6580)

OBJECTIVE: To eliminate the need to remove asbestos millboard from boiler casings by encapsulating the installed millboard with an approved coating.

	MILESTONE	PLANNED DATE	REVISED DATE	ACTUAL DATE
.	Obtain material	1/9		1/9
.	Start in house test	2/9		2/9
.	Contact TYCOM to identify candidate ship	4/9		2/9
.	Complete in house test	4/9		2/9
.	Shipboard installation	6/9	5/3/87	5/3/87
.	Shipboard Test/Evaluation	7/9	5/29/87	
.	Inspect installation after first at sea period	8/9	5/31/87	
.	Inspect installation at SAI	12/9	7/31/87	
.	Evaluate Shipboard test results	12/9	9/8/87	
0.	Prepare final report/advisory	12/9		
1.	Complete project/Issue advisory	12/9		

Subj: INSTALLED ASBESTOS MILLBOARD ENCAPSULATION

4. Funding for this test program was received by SSES 053C, sample encapsulant material was received from the manufacturer, and in-house tests were initiated to determine the suitability of the FIREGARD for shipboard use. The results of these tests are as follows:

a. Flame resistance

To ensure that the encapsulant material was non-flammable, four flame resistance test specimens were prepared and then tested in accordance with the requirements of ASTM D 635. This test involves holding one end of the six-inch long specimen over a flame for 30 seconds, removing the flame source, and measuring how long the sample continues to burn without the flame source present. In each of the four tests, the sample was observed to self-extinguish in less than one second. By the criteria specified in ASTM D 635, the FIREGARD material could be rated as both "non-flammable" and "self-extinguishing".

b. Thermogravimetric Analysis (TGA)

To determine the thermal stability of the cured encapsulant material as a function of temperature, samples were submitted for TGA testing. The result of this testing is shown in the graph of enclosure (1). Two factors can be observed from examination of this graph. At a temperature of approximately 100°C, the encapsulant material loses weight due to the evaporation of the ammoniated water, which is one of its ingredients. In addition, the sample was still basically intact after exposure to a temperature as high as 248°C (480°F). SSES 022B has indicated that this temperature is considerably higher than what the encapsulant material would be exposed to in service.

c. Viscosity

The viscosity of the encapsulant was determined by using a Krebs-Stormer viscometer at 200 rpm in accordance with ASTM D 562. The measured viscosity of 108 Krebs units is higher than that of most paints. This material would be relatively easy to apply by brush, but may be difficult to spray onto the desired surface.

d. Density

The density of the encapsulant was determined to be 11.6 lbs/gal. Since the manufacturer supplies this product in five gallon pails, it should be noted that a full pail may be somewhat difficult to lift and transport during a shipboard application. Since the material is a one part system, separating the five gallons into smaller cans prior to use is recommended.

Subj: INSTALLED ASBESTOS MILLBOARD ENCAPSULATION

e. Sag

A Leneta sag test was conducted on the encapsulant to determine if the material had any tendency to run when applied on a flat plate in a vertical position. These tests indicated that coating thicknesses up to 16 mils showed no tendency to sag or run. This is a desired characteristic, considering the orientation of the boiler casing this material would be covering in a shipboard application.

f. Condition in Container

The condition of the encapsulant in its container was considered very good in that no settling was apparent and no skin had formed on the surface. The material appeared homogeneous even before stirring, and was relatively easy to stir. The manufacturer, however, cautioned against exposure of the material to sub-freezing temperatures, which could cause coagulation.

g. Percent Volatiles by Weight

Testing of five samples indicated that an average of 33.1 weight percent of the encapsulant is volatile. This is consistant with the manufacturer's claim that 32 percent of the material is ammoniated water.

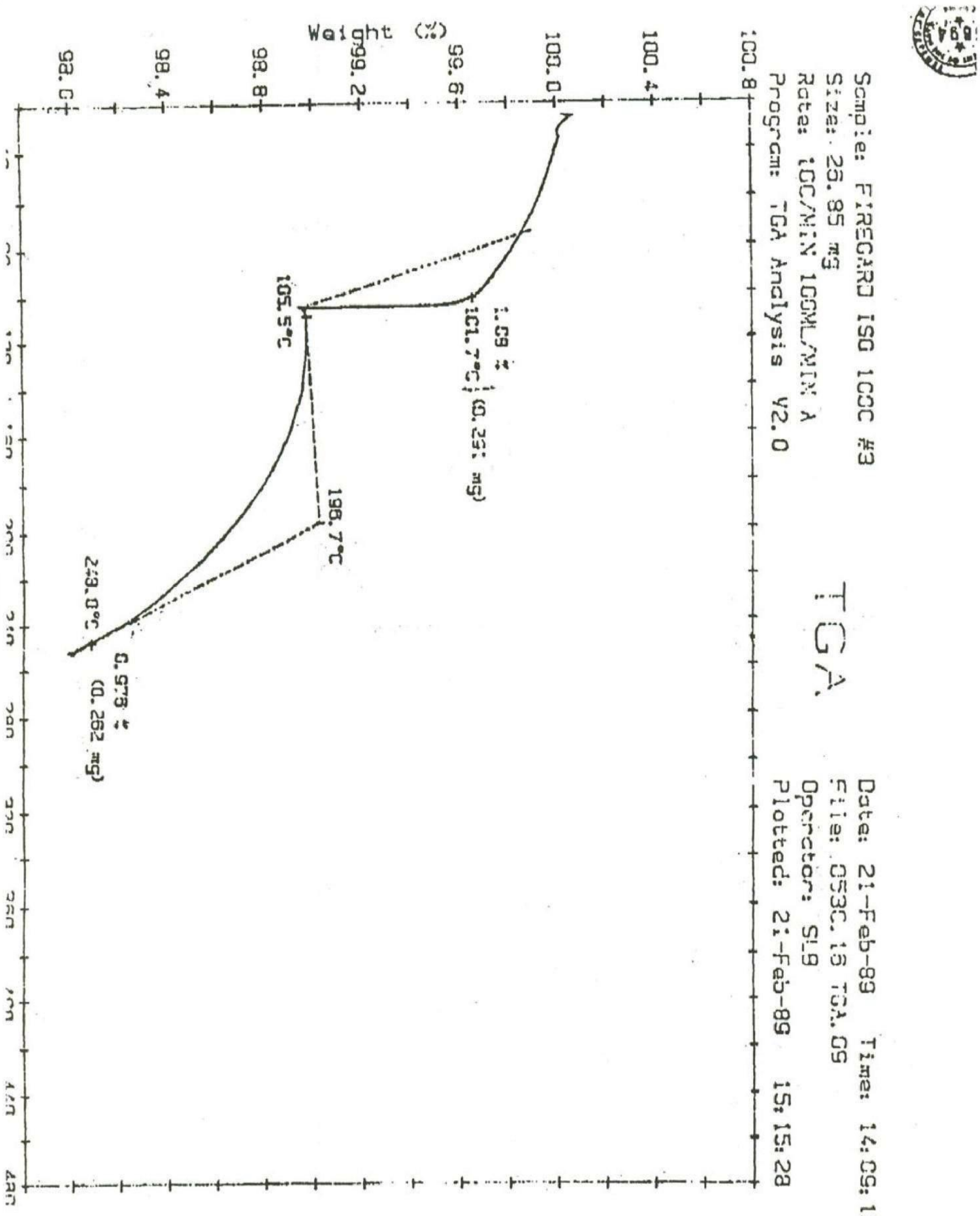
h. Adhesion on Thermal Insulation

Although the material would be used aboard ship on asbestos millboard, safety considerations dictated that our in-house tests be conducted on a similar but non-hazardous substrate (calcium silicate board). Tests were conducted using an elcometer adhesion tester and small metallic pins. The results of these tests indicated that the encapsulant's internal strength and adhesion were greater than the insulation itself, and that the coating forms a rubbery layer over the insulation which is difficult to cut or rip apart. Tests were performed both with and without a surface primer with no difference noted by use of the primer.

5. In summary, as a result of these in-house tests, SSES 053C believes that the FIREGARD encapsulant material could be used successfully, without a primer, over asbestos millboard on FF-1052 class ships. The material is non-flammable, thermally stable, and possesses good viscosity, sag, and adhesion characteristics. SSES 053C can support 022B with any future shipboard evaluations of this product, including initial applications and follow-up inspections. If requested, evaluations of other encapsulant products by different manufacturers can also be performed by SSES 053C.

C. J. Arazy

Copy to:
053, 053C(2)


Sample: FIREGARD ISO 100C #3
Size: 25.85 mg
Rate: 10C/MIN 100ML/MIN A
Program: TGA Analysis V2.0
TGA
Date: 21-Feb-89 Time: 14:09:12
File: 053C.15 TGA.09
Plotted: 21-Feb-89 15:15:28
Weight (%)
100.8
100.4
100.0
99.6
99.2
98.8
98.4
98.0
1.09 %
101.7°C
105.5°C
198.7°C
243.0°C
0.978 %
(0.262 mg)