TRANSMITTAL - NATIONAL PARK SERVICE

Transmittal No.: **27**
Sheet: 1 of: 1

Park: Florissant Fossil Beds N.M.	Project: Water System	Contract No.: C157410C023 TO P12PD11095	Pkg. No.:	Date:

Contractor: Bairco Construction, Inc.

Subcontractor/Supplier:

Item No.	Specification Section No.	Paragraph No.	Description of Item (Size, Type, Name, Manufacturer, Use, Etc.)	No. of Copies Submitted	NPS ACTION: No. of Copies Returned	Approved	Approved with Notations	Disapproved - Resubmit
1	072100	2.1.A	Insulation Products: Extruded-Polystyrene Board	2				
2								
3								
4								
5								
6								
7								

Contractor Signature Mark Algshin

Title, P.M. Date 8/9/12

I hereby certify that this submittal has been reviewed for accuracy, completeness, and compliance with contract requirements (FAR 52.236-21)

Recommended by

Title Date

Review Comments

Action By Date

Contracting Officer's Representative

Approval of this submittal is subject to the provisions of the contract drawings and specifications. This action is for general concurrence only and the Government is not responsible for errors or omission.

SUBMITTAL LOG DATES: From contractor [ ], To reviewer [ ], From reviewer [ ], To Contractor [ ]

Distribution: ( ) Contractor ( ) DSC File ( ) COR ( ) A/E ( ) DSC Interim ( ) COR Interim ( ) Contractor Interim

CM-16Rev. 4/00 (Formerly DSC-1(CS)

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JOB NUMBER: 30160 09-09553
PAGE: 1 of 4
DATE: October 29, 2009

Investigative Chemistry
Non Destructive Testing
Metallurgical Analysis
Geotechnical
Failure Analysis
Materials Testing
Construction Materials
Product Evaluation
Welder Qualification

TESTING OF INSOFAST MATERIAL

Prepared for:
InSoFast, LLC
Attn: Ed Scherrer
7255 Commerce Circle E.
Minneapolis, MN 55432

Client Purchase Order Number: Prepaid & PO0001726

Prepared By:

Briana Hinrichs

Briana Hinrichs
Testing Technician
Product Evaluation Department

Reviewed By:

William Stegeman

William Stegeman
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Phone: 651-659-7230

The test results contained in this report pertain only to the samples submitted for testing and not necessarily to all similar products.

TESTING OF INSOFAST MATERIAL

INTRODUCTION:

This report presents the results of fastener withdrawal, lateral resistance, and adhesion tests conducted on samples of InSoFast material. The testing was authorized by Ed Scherrer of InSoFast, LLC on October 19, 2009. The testing and data analysis were completed on October 29, 2009.

The scope of our work was limited to conducting fastener withdrawal, lateral resistance, and adhesion tests on the samples submitted and reporting the results.

SUMMARY OF RESULTS:

Fastener Withdrawal and Lateral Screw Resistance

Sample Identification	Average Peak Load, lbf	
	Fastener Withdrawal	Lateral Screw Resistance
InSoFast Panel	211	403

Adhesion

Sample Identification	Average		Predominate Type of Failure
	Peak Load, lbf	Peak Stress, psi	
InSoFast Stud Material	48	108	Adhesive failure between PL Premium Adhesive and InSoFast Stud Material

SAMPLE IDENTIFICATION:

The samples for the fastener withdrawal and lateral screw resistance tests were identified as InSoFast Panels. Five (5) panels were supplied for the withdrawal test and five (5) for the lateral resistance test. The fasteners supplied by the customer for testing were #6 - 1 ¼" Drywall Screws (Phillips flat-coarse).

The samples for the adhesion test were identified as a system of InSoFast Stud material adhered to concrete with PL Premium adhesive. Five (5) specimens were supplied by the customer.

TEST METHODS:

The samples were allowed to condition at standard laboratory conditions of 72 ± 4°F and 50 ± 5% relative humidity for at least 40 hours prior to testing. Testing was done based on ASTM D1761 and D4541, with notes of deviations and parameters.

TEST METHODS Continued:

Test Method	Test Method Title	Deviations from and/or Parameters to Method
ASTM D1761-06	Standard Test Method for Mechanical Fasteners in Wood Section 1 – Fastener Withdrawal Strength Section 13 – Lateral Screw Resistance	-InSoFast Panels used instead of wood -The Lateral resistance test used ~1" x 6" steel plates attached ~5" from one of the short ends
ASTM D4541-02	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers	Universal Test Machine used to pull off adhesion dollies.

CALIBRATED TEST EQUIPMENT:

MTS Universal Testing machine, model Qtest/50LP, System No. 1532, Stork TCT asset # MM210-009, calibrated 4/22/09, due 4/22/10
Mitutoyo Calipers, model CD-8C, S# 0006565, ID MM160-068, calibrated 8/21/09, due 8/21/10

UNCALIBRATED TEST EQUIPMENT:

Holding grips, fixtures and clamps

TEST DATA:

Fastener Withdrawal Strength

Sample Identification	Specimen	Peak Load, lbf
InSoFast Panel	1	199
	2	197
	3	193
	4	276
	5	191
Average		**211**
Standard Deviation		**36**

TEST DATA Continued:

Lateral Screw Resistance

Sample Identification	Specimen	Peak Load, lbf
InSoFast Panel	1	387
	2*	444
	3	390
	4*	410
	5	385
Average		**403**
Standard Deviation		**25**

* Fastener failure

Adhesion

Sample Identification	Specimen	Diameter, in	Peak Load, lbf	Peak Stress, psi	Type of Failure
InSoFast Stud Material	1	0.75	38	86	Adhesive failure with concrete
	2	0.75	53	120	Adhesive failure with stud material
	3	0.75	53	119	Adhesive failure with concrete and stud material
	4	0.75	54	121	Adhesive failure with stud material
	5	0.75	42	94	Adhesive failure with stud material
Average			**48**	**108**	
Standard Deviation			**7**	**17**	

REMARKS:

The test materials not consumed in testing will be retained for 14 days from the date of this report and then discarded unless we receive written notification requesting otherwise.

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HBCD Use & Application in EPS Foam Insulation

A flame retardant that promotes increased fire resistance in building & construction applications

Safety First

Flame retardants play a crucial role in making homes, hospitals, schools and other buildings safer from the life-threatening consequences of fire. In 2007, U.S. fire departments responded to 1,557,500 fires involving 531,108 building structures. Total fire related deaths were 3,430, with an additional $15 billion in property damage.[1]

In order to reduce the risk of fires and meet building code requirements when used as components in building assemblies, product manufacturers and professional associations have promoted the use of flame retardants in products and building materials likely to burn. Flame retardants are used in a variety of commercial products to protect people and property from potential fire hazards by accomplishing one or more of the following functions:

- *Raise the ignition temperature of the polymer;*
- *Reduce the rate of burning;*
- *Reduce flame spread; or*
- *Reduce smoke generation.*

HBCD Fire Resistance

The flame retardant used in EPS foam insulation is HBCD. Hexabromocyclododecane (HBCD) is an additive flame retardant that promotes increased fire resistance in building and construction applications allowing EPS to meet stringent fire safety requirements as determined by the building codes dictated by the International Code Council and National Building Code of Canada. It offers unique performance in polystyrene foams because it is effective at low levels (around 0.5% by weight in EPS), enabling fire safety to be ensured without loss of thermal insulation quality.

HBCD Risk Assessment

HBCD has undergone a thorough scientific assessment to identify potential risks for human health and the environment. Research shows that HBCD is degradable and therefore does not meet the criteria as a persistent substance when tested at environmentally relevant concentrations.[2] HBCD distribution in the environment is largely confined to sediments near point sources and is unlikely to be toxic in sediment-dwelling species. Where it was found, the levels were low and not at a level likely to present a toxicological risk to wildlife.[3]

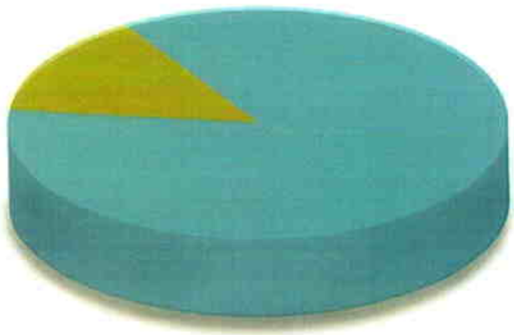
It is also proven that leaching of HBCD from polystyrene foam insulation is insignificant. Under forced laboratory conditions to measure the release of HBCD from polystyrene foam, results indicate that only 0.05% (500 parts per million) or less leached out of the foam within a four week period at which stage the leaching ceased altogether.[4, 5] It is noteworthy that these forced conditions are not representative of what installed insulation products would be subjected to in normal building applications.

The majority of HBCD emissions are related to its use in textiles. A risk assessment completed by the Swedish Chemicals Agency (KEMI) shows that the textile industry is responsible for 86% of the HBCD emissions to the overall environment, and 92% of HBCD emissions in water.

HBCD Emissions

86% of emissions are from Textiles

14% of emissions are from Other Sources



Search for HBCD Alternatives

Currently there is no technically suitable or commercially available alternative to HBCD for use in EPS. Although the industry has been actively engaged in research and development to find an alternative, a viable solution has not been identified. Manufacturers have recognized certain requirements that should be met before HBCD substitutions can be identified and implemented:

- ***Provide equal or better flame retardance;***
- ***Result in equal or better performance and physical properties;***
- ***Pose less risk to the environment and human health;***
- ***Maintain cost effectiveness;***
- ***Offer compatibility with existing manufacturing processes; and***

Industry Actions

Despite the extensive scientific data showing HBCD use in EPS poses minimal risk, government agencies maintain that it merits ongoing review. The flame retardant industry is working closely with the appropriate agencies in North America and Europe to conduct further environmental testing and has introduced voluntary emissions reduction programs to further reduce emissions of HBCD to the environment.

Meeting Future Energy Reduction Goals

Improving energy efficiency in buildings to reduce greenhouse gas emissions and save fossil fuels is a global priority today. EPS foam insulations are essential to achieve energy reduction in building renovations and new construction, offering short payback times and easy installation to quickly improve the thermal envelope of commercial and residential structures. In addition to their insulating properties, EPS can function as a moisture barrier, protect against damage from freeze-thaw cycling and provide structural stability in construction and infrastructure applications. Traditional insulation materials typically have much lower R-values and therefore may not be suitable for applications where high R-value is a critical concern. To meet current market demand for high performance building materials, fast construction and design flexibility, architects and builders need a wide range of insulation solutions that will enable them to meet future energy code requirements.

HBCD Status in Canada

HBCD is not a listed chemical by Environment Canada although it is currently undergoing review.

HBCD Status in U.S.

HBCD is not a listed chemical for the U.S. Toxics Release Inventory (TRI) program.

EPS Molders Association
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[1] U.S. Fire Administration National Fire Statistics, 2007
[2] 'Risk Assessment Report on Hexabromocyclododecane (HBCDD) Environmental Part CAS No.: 25637-99-4, EINECS No.: 247-148-4', Scientific Committee on Health & Environmental Risks (SCHER), Jan 2008
[3] 'Sediment Record and Atmospheric Deposition of Brominated Flame Retardants and Organochlorine Compounds In Lake Thun', C. Bagdad et al, Journal of Environmental Science & Technology, Oct 2008
[4] 'Leaching of Hexabromocyclododecane From Expanded Polystyrene Under Acidic Conditions', Association of Plastics Manufacturers of Europe, Dec 1996
[5] 'Environmental Waste Classification of EPS and XPS Foam Boards Containing Hexabromocyclododecane as Flame Retardant', CEFIC, Feb 2009

References

'An Overview of Alternatives to Tetrabromobisphenol A (TBBPA) and Hexabromocyclododecane (HBCD)', Gregory Morose, Lowell Center For Sustainable Production – University of Massachusetts Lowell, Mar 2006