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Thermal Resistance

Product:	The Icynene Insulation System®
Testing Organization:	National Research Council Canada
Test Method:	ASTM C-518-85 Steady-state flux measurements and thermal transmission properties by means of the heat flow apparatus.
Date:	February 1988
Result:	3.6 hr.sq.ft. F/BTU per inch 0.624 RSI
Comments:	Because polyisocyanurate insulation works on the principle of air, as opposed to refrigerant entrapment, there is no gradual deterioration of R-value over time. Icynene® does not exhibit the performance loss as other air- permeable insulations do because it controls air movement.

Air Permeance

Product: The Icynene Insulation System®

Testing Organization: Air-Ins Inc.

Test Method: ASTM E-283
Standard test method for air permeability testing.

Date: June 2000

Result: 0.0049 L/s-m² at 75Pa for 5.25" sample

0.0080 L/s-m² at 75Pa for 3.25" sample

Note: Air barrier materials are required to have an air leakage rate less than 0.02 L/s-m².

The Icynene Insulation System® exceeds this requirement.

Vapor Permeance

Product:	The Icynene Insulation System®	Product:	The Icynene Insulation System®
Testing Organization:	National Research Council Canada	Testing Organization:	NRC
Test Method:	ASTM E96-80 Standard test method for water vapor transmission of materials	Test Method:	Moisture transportation through glass-fiber insulation in the presence of thermal gradient. Journal of Thermal Insulation. Vol. 10, pp 243-255, 1987. NRCC 28451. A test method developed by the NRC to study water vapor transmission of materials in the presence of thermal gradient.
Date:	February 1988	Date:	June 1988
Result:	25 perms based on a nominal 2" thick sample By extrapolation water vapor permeance is calculated to be at: 16 perms (941 ng/[Pa.s.m ²]) at nominal 3 inch (75mm) thickness 10 perms (565 ng/[Pa.s.m ²]) at nominal 5 inch (127mm) thickness	Conclusion:	Polyicynene exhibits very low hygroscopicity.
		Comments:	Polyicynene slows the passage of water vapor, and does not entrap it. The drying potential of the building envelope is thus fully realized. It should be noted that moisture volume issues are related to the volume of air movement. Due to its low air permeance, traditional building envelope moisture concerns are greatly reduced with The Icynene Insulation System®. In most cases an additional vapor retarder is not required.

Burn Characteristics

Product: The Icynene Insulation System®

Flame Spread

Testing Organization: Underwriters' Laboratories of Canada

Test Methods: ASTM E84 (tunnel test)
Can4-S102 (corner wall test)
Standard test methods for surface burning characteristics of building materials.

Date: April 1988

Results:

ASTM E84 Tunnel test	
Flame Spread	20
Smoke Developed	400
Fuel Contribution	0
Can4-S102 Corner Wall Test	
Flame Spread	530
Smoke Developed	150
Fuel Contribution	0

Comments: Icynene® does not melt or drip when exposed to fire. It also self-extinguishes upon removal of fire.

Oxygen Index

Testing Organization: National Research Council Canada

Test Method: ASTM D2863-77
Standard test method for measuring the minimum oxygen concentration to support candle-like combustion of plastics (oxygen index).

Results: Average value 23.1%

Comments: Percent oxygen in atmosphere is 20.95%, and therefore under normal conditions there is inadequate oxygen supply to support flame.

Fire Rated Wall Assemblies

Assembly 1

Product:	The Icynene Insulation System®
Testing Organization:	Inchcape Testing Services
Test Method:	ASTM E119-95 Standard test method that prescribes a standard fire exposure for comparing the test results of building construction assemblies.
Date:	November 1996
Result:	1 hour rating Wall assembly consisted of: - 2x4 wood studs, 16" o/c - 2" Icynene® - 2 layers of 1/2" Type X - Gypsum Wallboard on each side
Comments:	For full details contact the Icynene Engineering Department

Assembly 2

Product:	The Icynene Insulation System®
Testing Organization:	Inchcape Testing Services
Test Method:	ASTM E119-95 Standard test method that prescribes a standard fire exposure for comparing the test results of building construction assemblies.
Date:	November 1996
Result:	1 hour rating Wall assembly consisted of: - 2x4 wood studs, 16" o/c - 2" Icynene® - 1 layer of 1/2" Sound Board on each side - 1 layer of 5/8" Type X Gypsum Wallboard on each side
Comments:	For full details contact the Icynene Engineering Department

Water Absorption

Product:	The Icynene Insulation System®
Testing Organization:	National Research Council of Canada
Test Method:	ASTM D2842-69 Standard test method for water absorption of rigid cellular plastics.
Date:	February 1988
Result:	Average amount of water absorption, 34% by volume.
Comments:	This test is designed for rigid closed cell materials and was conducted because polyicynene appears to be hydrophobic. The facts are that as an open celled material which should absorb 90-100% water by volume, only absorbed 34% after being submerged in water 96 hours. Icynene Insulation System® is clearly not hygroscopic and in fact appears to be hydrophobic.

Emissions

Product:	The Icynene Insulation System®
Testing Organization:	Saskatchewan Research Council
Test Method:	Determination of the volatile organic compound emissions using Procedure B of CGSB Standard CAN/CGSB-51.23-92 (CAN/ULC 5774)
Date:	January 2003
Result:	The emissions were evaluated by a toxicologist at the University of Saskatchewan who recommended a residential occupancy time of 1 day. A safety factor of 100 was used in the analysis.

Electrical Wiring

Product:	The Icynene Insulation System®
Testing Organization:	Center for Building Sciences, University of Toronto
Test Method:	Thermocouple temperature determination on residential wiring encased in polyicynene under 20 Amp. load.
Date:	August 1985
Result:	Average temperature rise after 10 hours, 50°C (122°F)
Conclusion:	<p>The Icynene Insulation System® when encapsulating residential wiring does not cause wire temperature to exceed safety limits.</p> <p>Ontario Hydro's assessment (June 1987), indicated that they knew of no reason for electrical wiring installed in accordance with the electrical code not to operate safely when Icynene® is used as the insulation.</p>

Stability

Product:	The Icynene Insulation System®
Testing Organization:	Buchan, Lawton, Parent Ltd.
Test Methods:	CAN/CGSB-149.10-M86 Method for determining the air tightness of building envelopes by the fan depressurization method.
Date:	May 1994
Result:	The air tightness of the Icynene® insulated house did not change significantly over 7 years. This indicates that Icynene® resists cracking.

Fungus And Bacteria Support

Product: The Icynene Insulation System[®]

Testing Organization: Thomson Research Associates

Test Methods: Burial in microbiologically active soil

Date: May 1985

Result: No fungal growth and no material deterioration caused by microbial action.

Product: The Icynene Insulation System[®]

Testing Organization: Texas Tech University Health Sciences Center

Test Methods: Evaluation of Fungal Growth on Icynene[®] foam insulation

Date: October 2001

Result: Icynene[®] cannot be utilized as a food source by fungi.

Acoustics

Product: The Icynene Insulation System®

Sound Transmission Class (STC)

Testing Organization: Gold Bond Building Products
Research Center

Test Method: ASTM E90-83, E413
Standard test method for the laboratory measurement of airborne sound transmission loss of building partitions.

Date: May 1988

Result: STC-37
Wall assembly consisting of:
- 2x4 wood studs
- 3.5" Icynene®
- 1 layer of 5/8" gypsum wallboard on each side

Noise Reduction Co-efficient (NRC)

Testing Organization: Gold Bond Building Products
Research Center

Test Method: C423-84
Standard method for the measurement of sound absorption.

Date: May 1988

Result: NRC – 0.7

Comments: The Icynene Insulation System® has an added advantage over other similarly rated materials, in that it air seals the structure when it is applied. The above tests do not allow for loss of rating due to air leakage.

Corrosion

Product:	The Icynene Insulation System®
Testing Organization:	Center for Building Science, University of Toronto
Test Method:	Steel corrosion test
Date:	August 1985
Result:	No significant corrosion noted.
Comments:	Polyicynene does not contain chloroflourocarbons. It is inert, and does not contribute to lowering the pH in its environment. Therefore it does not contribute to corrosion.