Code Compliance Research Report
CCRR-1072

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DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION
Section: 07 21 00 – Thermal Insulation

REPORT HOLDER:
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REPORT SUBJECT:
Plasti-Fab Expanded Polystyrene (EPS) Insulation Products:

PlastiSpan® EPS Insulation, GeoSpec® EPS Geofoam, Faced EPS Insulation

1.0 SCOPE OF EVALUATION

This Research Report addresses compliance with the following Codes:

- 2015, 2012, and 2009 *International Building Code* (IBC)
- 2015, 2012, and 2009 *International Residential Code* (IRC)
- 2015, 2012, and *2009 International Energy Conservation Code* (IECC)
- 2015 and 2010 *National Building Code of Canada* (NBC) – See Section 8.1
- 2012 *International Green Construction Code*® (IgCC) – See Section 8.2

PlastiSpan® Expanded Polystyrene (EPS) Insulation and Faced EPS Insulation have been evaluated for the following properties:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Exterior walls in Types I – IV construction
- Use in Type V construction

GeoSpec® Expanded Polystyrene (EPS) Geofoam has been evaluated for the following properties:

- Surface-burning characteristics
- Physical properties

See Table 1 for applicable Code sections related to these properties.

NOTE: This report references 2015 I-Code sections with [2012] I-Code sections shown in brackets where they differ. This report references 2015 NBC sections with [2010] NBC code sections in brackets where they differ.

2.0 USES

PlastiSpan® and Faced EPS Insulation are used for non-structural thermal insulation in wall assemblies, ceiling or floor assemblies, and door cavities. The insulation may also be used in attic and crawl spaces without an ignition barrier when installed per Section 4.2.

The insulation boards may be used as a sandwich panel core where EPS insulation complying with ASTM C578 or CAN/ULC-S701 is specified in the Code Evaluation Report for the sandwich panel.

The insulation boards may be used as insulation on concrete slab edges, foundation walls, and/or under flat concrete slab on grade construction as described in Section 4.3.

GeoSpec® Geofoam is used as lightweight structural fill in floor cavities in the interior of buildings.

3.0 DESCRIPTION

3.1 General:

PlastiSpan® Insulation and Faced EPS Insulation comply with ASTM C578, Types I, VIII, II, IX, XIV, and XV with minimum densities of 0.90 pcf, 1.15 pcf, 1.35 pcf, 1.80 pcf, 2.40 pcf, and 3.00 pcf respectively; and comply with CAN/ULC-S701, Types 1, 2, and 3. The Faced EPS Insulation is a PlastiSpan® product covered with one layer of laminating film on each side of the board. PlastiSpan® products are also sold with tradenames included in Table 7 of this Research Report.

GeoSpec® Geofoam complies with ASTM D6817 designations EPS15, EPS19, EPS22, EPS29, EPS39, and EPS46, having minimum densities of 0.90 pcf, 1.15 pcf, 1.35 pcf, 1.80 pcf, 2.40 pcf, 2.85 pcf, respectively.

3.2 Performance Characteristics:

3.2.1 Surface Burning Characteristics: PlastiSpan® Insulation and Faced EPS Insulation have a flame spread index not exceeding 25 and a smoke developed index not exceeding 450 for thicknesses up to 6 inches when tested in accordance with UL723 (ASTM E84), as required by Section 2603.3 of the IBC or Section R316.3 of the IRC, as applicable. The insulation has a flame spread classification of 290 and a smoke developed classification of over 500 when tested in accordance with CAN/ULC-S102.2.

GeoSpec® Geofoam has a flame spread index not exceeding 25 and a smoke developed index not exceeding 450 for thicknesses up to 6 inches when tested in accordance with UL723 (ASTM E84), as required by Section 2603.3 of the IBC or Section R316.3 of the IRC, as applicable. The insulation has a flame spread classification of 290 and a smoke developed classification of over 500 when tested in accordance with CAN/ULC-S102.2.

3.2.2 Thermal Resistance: PlastiSpan® Insulation has thermal resistance values as listed in Table 3.

3.2.3 Compressive Resistance: Compressive resistance of the GeoSpec® Geofoam at 1 percent strain for EPS15, EPS19, EPS22, EPS29, EPS39, and EPS46 are 3.6, 5.8, 7.3, 10.9, 15.0, and 18.6 psi respectively as determined in accordance with ASTM D6817.

4.0 INSTALLATION

4.1 General:

PlastiSpan® Insulation, Faced EPS Insulation, and GeoSpec® Geofoam must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. The manufacturer's published installation instructions and this Research Report must be strictly adhered to, and a copy of the instructions must be available on the jobsite during installation.

PlastiSpan® Insulation and Faced EPS Insulation must be separated from the interior of the building by a thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4, as applicable.

The GeoSpec® Geofoam must be separated from the building interior with a minimum 1 inch thick layer of concrete or masonry on all faces as required by IBC Section 2603.4.1.1, except in buildings of Type V construction where separation may be by a minimum nominal 1/2 inch thick wood structural panel when installation is in accordance with IBC Section 2603.4.1.14. Where the thermal barrier consists of a minimum 1 inch thick layer of concrete or masonry, the thickness of the GeoSpec® Geofoam in the floor assembly may exceed 4 inches. The design of the concrete or masonry covering is outside the scope of this report.

4.2 Attic and Crawl Spaces:

PlastiSpan® Insulation and Faced EPS Insulation may be used for walls and ceilings of attic or crawl spaces without an ignition barrier required by IBC Section 2603.4.1.6, or IRC Sections R316.5.3 or R316.5.4 when all of the following conditions are met:

- Entry to the attic or crawl space is only to service utilities, and no storage is permitted. Utilities include, but are not limited to, mechanical equipment, electrical wiring, fans, and gas or electric hot water heaters and furnaces.
- There are no interconnected attic or basement areas.
- Air in the attic or crawl space is not circulated to other parts of the building.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, as applicable.
- Under-floor (crawl space) ventilation is provided that complies with IBC Sections 1203.4 [1203.3] or IRC Section R408.1, as applicable.
- Combustion air is provided in accordance with IMC (*International Mechanical Code*) Section 701.
- The insulation is limited to the Type and thickness specified in Table 2.

4.3 Exterior Walls in Buildings Required to be of Types I, II, III, and IV Construction:

PlastiSpan® Insulation and Faced EPS Insulation boards may be used in exterior walls of one-story buildings complying with IBC Section 2603.4.1.4. The insulation may also be used on or in exterior walls in Types I, II, III, or IV construction when it is part of an exterior wall assembly qualified in accordance with the requirements of IBC Section 2603.5.

4.4 Protection Against Termites:

The insulation boards may be used on the interior face or under interior or exterior foundation walls or slab foundations except where the probability of termite infestation is "very heavy" as described in IBC Section 2603.8 [2603.9]. The clearance between foam plastics installed above grade and exposed earth shall be not less than 6 inches.

5.0 CONDITIONS OF USE

The PlastiSpan® Insulation, Faced EPS Insulation, and GeoSpec® Geofoam insulation products described in this Research Report comply with, or are suitable alternatives to, what is specified in those Codes listed in Sections 1.0 and 2.0 of this report, subject to the following conditions:

5.1 Installation must comply with this Research Report, the manufacturer's published installation instructions, and the applicable Code. In the event of a conflict between the manufacturer's instructions and this report, this report governs.

5.2 Exterior walls must be protected by a water-resistive barrier complying with IBC Section 1404.2 or IRC Section R703.2, and by wall coverings that provide the necessary structural wind and seismic resistance between the wall framing members.

5.3 The insulation boards must not be used as a nailing base for siding materials. All fasteners must penetrate through the insulation into the existing wall framing or structural sheathing as required by the wall covering manufacturer's instructions or the applicable Code.

5.4 The following conditions of use apply for the use of GeoSpec® Geofoam Insulation:

5.4.1 The RCPS geofoam must be separated from the building interior as described in Section 4.1.

5.4.2 Use of the geofoam is limited to floor applications where the uniform and localized loading, as determined in accordance with the IBC, does not exceed the compressive resistance reported in Section 3.2.3.

5.4.3 Design calculations and details for specific applications must be furnished to the Code official, verifying compliance with this report and applicable Codes. The documents must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.4.4 Use of the RCPS geofoam is limited to applications where the geofoam will not be subjected to direct exposure to hydrocarbons.

5.4.5 Penetrations through the thermal barrier described in Section 4.1 shall be subject to approval by the Code official.

5.4.6 Use of the geofoam in a fire-resistance-rated floor assembly is outside the scope of this report.

5.5 PlastiSpan EPS Insulation, GeoSpec EPS Geofoam and Faced EPS Insulation are manufactured by Plasti-Fab, at locations listed in Tables 4, 5, and 6 of this report. Each manufacturing location is under a quality control program with inspections by Intertek Testing Services NA, Inc. (AA-647).

6.0 SUPPORTING EVIDENCE

6.1 Reports of tests in accordance with ASTM C578, CAN/ULC-S701, ASTM D6817, UL 723 (ASTM E84), and CAN/ULC-S102.2.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2015 (editorially revised May 2016).

6.3 Data in accordance with the ICC-ES Acceptance Criteria for Rigid Cellular Polystyrene (RCPS) Geofoam Used in Interior Floor Applications (AC452), dated October, 2013.

6.4 Intertek Listing Report Plasti-Fab Ltd. - EPS Insulation Products.

7.0 IDENTIFICATION

PlastiSpan® Insulation, Faced EPS Insulation, and GeoSpec® Geofoam are identified on the packaging by a marking bearing the report holder's name (Plasti-Fab Ltd.), the product name, the manufacturing location, the Intertek Mark, the Code Compliance Research Report number (CCRR-1072), the EPS type, and thermal resistance value (where applicable).

8.0 OTHER CODES

8.1 National Building Code of Canada:

PlastiSpan® Insulation and Faced EPS Insulation, with properties described in Sections 3.0, 6.0, and 7.0 of this Research Report, comply with CAN/ULC-S701 as Types 1, 2, 3 EPS and therefore comply with the requirements of the following NBC references: 3.1.4.2, 3.1.5.12., [3.1.5.14.]., [3.1.5.15.], 5.10.1.1, 9.10.3.2., 9.10.17.10., 9.23.17.2., and 9.25.2.2.

8.2 International Green Construction Code:

PlastiSpan and Faced EPS Insulations have been evaluated under the UL GREENGUARD GOLD certification program. The properties referenced therein are intended to address requirements in IgCC Section 806.6 for material emissions and Section A108.5, total VOC limit project elective. The listing may be found at the following address: http://productguide.ulenvironment.com.

9.0 CODE COMPLIANCE RESEARCH REPORT USE

9.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

9.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

9.3 Reference to the https://bpdirectory.intertek.com is recommended to ascertain the current version and status of this report.

TABLE 1A – PROPERTIES EVALUATED – INTERNATIONAL CODES

PROPERTY	IBC SECTION[1]	IRC SECTION[1]	IECC SECTION[1]
Physical properties	N/A	R404.1.3.3.6.1	Not required
Surface burning characteristics	2603.3	R316.3	N/A
Type I – IV construction	2603.5	N/A	N/A
Thermal resistance	1301	N1101.12, N1102 [N1101.1]	C303.1.1, C303.1.4, R303.1.1, R303.1.4
Attic and crawl space	2603.4.1.6 2603.9	R316.5.3 R316.5.4	N/A
Thermal barrier/ignition barrier	2603.4	R316.4 [R316.1]	N/A

[1] Section numbers in parentheses refer to the 2009 Code if different

TABLE 1B – PROPERTIES EVALUATED – NATIONAL BUILDING CODE OF CANADA

PROPERTY	NBC SECTION
Physical properties	5.10.1.1. and 9.25.2.2.
Combustible insulation and its protection	3.1.4.2., 9.10.17.10.
Combustible insulation	3.1.5.12. [3.1.5.14.]
Foamed plastic insulation	3.1.5.15.
Surface burning characteristics	3.1.12.1., 9.10.3.2.
Thermal resistance	9.25.2.1 and 9.36.2
Thermal barrier	3.1.4.2. and 9.10.17.10.

TABLE 2 – MINIMUM INSULATION BOARD PROPERTIES AND REQUIRED THERMAL BARRIER

EPS TYPE	THERMAL BARRIER	ALLOWABLE EPS THICKNESS
ASTM C578 - TYPE I, VIII, II, IX, XIV, XV	Thermal barrier material as permitted in IBC Section 2603.4 or IRC Section R316.4	Max. 6 inches (152 mm)
CAN/ULC-S701 - TYPE 1, 2, 3	Thermal barrier material as permitted in NBC Article 3.1.4.2., 9.10.17.10.	Min. 12.7 mm (0.5 inches)

TABLE 3 – MAXIMUM INSULATION THICKNESS FOR USE IN ATTICS OR CRAWL SPACES

ASTM C578 EPS TYPE	MAXIMUM THICKNESS (in.)
Type I	4.0
Type VIII	3.6
Type II	3.2
Type IX	2.3
Type XIV	1.1
Type XV	Not permitted

TABLE 4A – THERMAL RESISTANCE – ASTM C578

EPS TYPE ASTM C578	**MINIMUM DENSITY (pcf)**	**R-VALUE (RSI)[1] @ 75°F (24°C) Mean Temperature $ft^2 \cdot h \cdot °F/BTU$ per inch ($m^2 \cdot °C/W$ per 25.4 mm)**	**R-VALUE (RSI)[1] @ 40°F (4.4°C) Mean Temperature $ft^2 \cdot h \cdot °F/BTU$ per inch ($m^2 \cdot °C/W$ per 25.4 mm)**
Type I	0.90	3.6 (0.63)	4.0 (0.70)
Type VIII	1.15	3.8 (0.67)	4.2 (0.74)
Type II	1.35	4.0 (0.70)	4.4 (0.77)
Type IX	1.80	4.2 (0.74)	4.6 (0.81)
Type XIV	2.40	4.2 (0.74)	4.6 (0.81)
Type XV	3.00	4.3 (0.76)	4.7 (0.83)

[1]**RSI is the R-Value defined in SI units.**

TABLE 4B – THERMAL RESISTANCE – CAN/ULC-S701

EPS TYPE CAN/ULC-S701	**Thermal Resistance $m^2 \cdot °C/W$ (for 25 mm thickness)**
Type 1	0.65
Type 2	0.70
Type 3	0.74

TABLE 5 – PLASTISPAN® PROPERTIES AND MANUFACTURING LOCATIONS

MANUFACTURING LOCATION	**ASTM C578 TYPE**
Ajax, Ontario, Canada Crossfield, Alberta, Canada Delta, British Columbia, Canada Kitchener, Ontario, Canada Saskatoon, Saskatchewan, Canada Winnipeg, Manitoba, Canada Lebanon, Ohio, USA	I
	VIII
	II
	IX
	XIV
Crossfield, Alberta, Canada Kitchener, Ontario, Canada Lebanon, Ohio, USA	XV

TABLE 6 – FACED INSULATION PROPERTIES AND MANUFACTURING LOCATIONS

MANUFACTURING LOCATION	ASTM C578 TYPE
Ajax, Ontario, Canada Crossfield, Alberta, Canada Lebanon, Ohio, USA	I
	VIII
	II
	IX
	XIV
Crossfield, Alberta, Canada Lebanon, Ohio, USA	XV

TABLE 7 – GEOSPEC® PROPERTIES AND MANUFACTURING LOCATIONS

MANUFACTURING LOCATION	ASTM D6817 EPS
Ajax, Ontario, Canada Crossfield, Alberta, Canada Delta, British Columbia, Canada Kitchener, Ontario, Canada Saskatoon, Saskatchewan, Canada Winnipeg, Manitoba, Canada Lebanon, Ohio, USA	15
	19
	22
	29
	39
Crossfield, Alberta, Canada Kitchener, Ontario, Canada Lebanon, Ohio, USA	46

TABLE 8 – PLASTISPAN® INSULATION TRADE NAMES

ASTM C578 TYPES	
Type I	PlastiSpan®, PlastiSpan® EFS, DuroSpan, ENERGREEN
Type VIII	PlastiSpan® 13, ENERGREEN 13
Type II	PlastiSpan® HD, ENERGREEN HD
Type IX	PlastiSpan® 25, ENERGREEN 25
Type XIV	PlastiSpan® 40, ENERGREEN 40
Type XV	PlastiSpan® 60, ENERGREEN 60
CAN/ULC-S701 TYPES	
Type 1	PlastiSpan®, PlastiSpan® Type 1, PlastiSpan® EFS, DuroFoam®
Type 2	PlastiSpan® HD, PlastiSpan® HD Type 2, DuroFoam® HD, PlastiSpan® M24, PlastiSpan® 20
Type 3	PlastiSpan® 25, PlastiSpan® 25 Type 3, DuroFoam® 25, PlastiSpan® M-30, PlastiSpan® M-40, PlastiSpan® 40