Code Compliance Research Report
CCRR-0516

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DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION
Section: 07 21 00 – Thermal Insulation
Section: 07 21 19 – Foamed-In-Place Insulation

REPORT HOLDER:
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REPORT SUBJECT:
XLS 500-NM and XLS 1800 Spray-applied Polyurethane Foam Insulation

1.0 SCOPE OF EVALUATION

This Research Report addresses compliance with the following Codes:

- 2021, 2018, 2015 *International Building Code*® (IBC)
- 2021, 2018, 2015 *International Residential Code*® (IRC)
- 2021, 2018, 2015 *International Energy Conservation Code*® (IECC)
- 2023 and 2020 *Florida Building Code* – see Section 8.1
- 2022 *California Building Code* – see Section 8.2

NOTE: This report references the most recent edition of the codes cited. Section numbers in earlier editions of the Codes may differ.

XLS 500-NM and XLS 1800 Spray Polyurethane Foam Insulations have been evaluated for the following properties:

- Physical properties
- Surface-burning characteristics
- Thermal resistance
- Air permeability
- Alternatives to thermal barriers
- Alternatives to ignition barriers
- Use in Types I, II, III and IV construction
- Use in Type V construction
- Use in fire-resistance-rated construction

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

2.0 USES

XLS 500-NM and XLS 1800 insulations are intended for use as nonstructural thermal insulating materials on or in interior and exterior walls, floors, and the underside of roofs, in all types of construction under the IBC and dwellings under the IRC. When used in exterior walls of Types I, II, III, or IV construction, the construction must be as described in Section 4.5. Under the IRC, the insulation may be used as air-impermeable insulation as described in Section 3.2.3. The insulations may be used in attics and crawl spaces without the use of a prescriptive ignition barrier when installed as described in Section 4.4.2. The insulations may be applied without the use of a prescriptive thermal barrier when installed as described in Section 4.3.2.

3.0 DESCRIPTION

3.1 Insulation:

3.1.1 XLS 500-NM: XLS 500-NM is a two-component, open-cell, water-blown polyurethane foam plastic insulation. The insulation complies with the mandatory requirements for low-density insulation applications described in Section 3.1.1 and Table 1 of ICC-ES AC377. The insulation is produced in the field by professional contractors combining an isocyanate component "A" with a resin component "B". The insulation uses an A component designated as XCELUS Isocyanate and a proprietary blend for the B component. The B component has a shelf life of six months and the A component has a shelf life of twelve months, when stored in factory-sealed containers at temperatures between 50˚F and 80˚F.

3.1.2 XLS 1800: XLS 1800 is a two-component, closed-cell, rigid foam plastic insulation classified as medium density foam plastic. The insulation is produced in the field by professional insulation contractors combining an isocyanate component "A" with a resin component "B".

XLS 1800 insulation uses an A component designated as XCELUS Isocyanate. The B component has a shelf life of six months and the A component has a shelf life of twelve months, when stored in factory-sealed containers at temperatures between 50˚F and 80˚F.

3.2 Intumescent Coatings:

3.2.1 No-Burn® Plus ThB: No-Burn® Plus ThB is a one-part water-based intumescent coating manufactured by No-Burn, Inc. The coating is supplied in 5-gallon pails and 55-gallon drums and has a shelf life of 12 months when stored in unopened containers between 40ºF and 90ºF. No-Burn® Plus ThB complies with ICC-ES AC456 as recognized in IAPMO Uniform Evaluation Service Report ER-0305.

3.2.2 DC315 Intumescent Coating: DC315 intumescent coating, manufactured by International Fireproof Technology Inc., is a single-component, water-based, liquid-applied intumescent coating. The coating is supplied in 5-gallon pails and 55-gallon drums and has a shelf life of twenty-four months when stored in factory-sealed containers at temperatures between 41˚F and 95˚F. DC315 complies with ICC-ES AC456 as recognized in IAPMO UES Report ER-0499.

3.2.3 FIRESHELL® (IB-4) Coating: FIRESHELL® (IB-4) intumescent coating is a proprietary, water-based, one-part, nonflammable coating manufactured by ICP Construction. The coating is supplied in 5-gallon pails and 55-gallon drums, and has a shelf life of twelve months when stored in factory-sealed containers at temperatures between 45˚F and 75˚F.

3.2.4 FIRESHELL® (F10E) Coating: FIRESHELL® (F10E) intumescent coating is a proprietary, water-based, one-part, coating manufactured by ICP Construction. The coating is supplied in 5-gallon pails and 55-gallon drums and has a shelf life of twelve months when stored in factory-sealed containers at temperatures between 45˚F and 75˚F. Fireshell® F10E complies with ICC-ES AC456 as recognized in ICC Evaluation Service Report ESR-3997.

3.2.5 Flame Seal® TB Intumescent Coating: Flame Seal TB intumescent coating, manufactured by Flame Seal Products, Inc., is a two-component, four-to-one by-volume, liquid-applied, water-based polymeric intumescent coating. The coating is supplied in 5-gallon pails and 55-gallon drums and has a shelf life of six months when stored in factory-sealed containers at temperatures between 40°F and 90°F. When applied at a minimum thickness of 25 mils wet film over XLS 1800 insulation, the assembly 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.

3.2.6 Flame Seal® IB (FS-IB) Intumescent Coating: Flame Seal IB intumescent coating, manufactured by Flame Seal Products, Inc., is a single component, water-based, liquid-applied intumescent coating. The coating is supplied in 5-gallon pails and 55-gallon drums and has a shelf life of six months when stored in factory-sealed containers at temperatures between 60°F and 80°F.

3.3 Performance Characteristics:

3.3.1 Surface Burning Characteristics: XLS 500-NM and XLS 1800 have a flame-spread index of 25 or less and a smoke-developed index of 450 or less, when tested in accordance with ASTM E84 at a maximum thickness of 4 inches. Based on diversified large-scale tests, the insulations may be installed at greater thicknesses as described in Sections 4.3 and 4.4. When the insulation is separated from the interior living space of the building with minimum 1/2-inch-thick gypsum board, or an equivalent thermal barrier, the maximum insulation thickness is not limited. Under the IRC, a thermal barrier of minimum 23/32-inch-thick wood structural panel is also permitted and the maximum insulation thickness is not limited.

3.3.2 Thermal Resistance: The insulations have thermal resistance (*R*-values) at a mean temperature of 75˚F as shown in Table 2.

3.3.3 Air Permeability: XLS 500-NM insulation (at a minimum thickness of 3-1/2 inches) is considered air-impermeable insulation in accordance with IBC Section 202 and IRC Section R202, based on testing in accordance with ASTM E283 and ASTM E2178.

XLS 1800 insulation, at a minimum thickness of 1 inch, is considered air-impermeable insulation in accordance with IBC Section 202 and IRC Section R202, based on testing in accordance with ASTM E2178 and/or ASTM E283.

3.3.4 Air Barrier: XLS 500-NM insulation (at a minimum thickness of 3-1/2 inches) is considered an air barrier material in accordance with IECC Section C402.5.1.3.

4.0 INSTALLATION

4.1 General:

The insulation 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.

4.2 Application:

The insulations are spray-applied on the jobsite using plural-component metering and processing equipment as recommended in the manufacturer's published installation instructions. The insulation must not be used in areas that have a maximum continuous service temperature greater than 180°F or in contact with heat-producing appliances. The foam plastic insulation must not be used in electrical outlet or junction boxes. The substrate must be free of moisture, frost or ice, loose scales, rust, oil, and grease or other surface contaminants. The insulation must be protected from the weather during and after application. XLS 500-NM may be installed in multiple passes, up to 6 inches per pass, to the maximum specified thickness. Where multiple passes are required, each insulation pass must be allowed to fully expand, cure, and cool for a minimum of 5 minutes prior to application of a subsequent pass. XLS 1800 may be applied at thicknesses up to 4 inches maximum per pass or by utilizing up to a 3.5 inch and 3.5-inch back-to-back pass installation, which requires no cooling time between passes.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier: The insulations must be separated from the interior of the building by an approved thermal barrier, such as minimum 1/2-inch gypsum wallboard, installed using mechanical fasteners in accordance with applicable Code, or an equivalent 15-minute thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4, as applicable, with exceptions as described in Sections 4.3.2 and 4.4, or when applied to a sill plate or header of Type V construction at a maximum insulation thickness of 3-1/4 inches as permitted by IRC Section R316.5.11.

When the insulation is separated from the interior living space of the building with minimum 1/2-inch-thick gypsum board, the maximum insulation thickness is not limited. Under the IRC, a thermal barrier of minimum 23/32-inch-thick wood structural panel is also permitted and the maximum insulation thickness is not limited.

4.3.2 Application without a Prescriptive Thermal Barrier: The insulations may be installed without the 15-minute thermal barrier prescribed in the IBC Section 2603.4 and IRC Section R316.4 in assemblies conforming to one of the assemblies described in Table 3. The insulation and coating may be left exposed as an interior finish as indicated in Table 3.

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier: When the insulations are 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 that the foam plastic insulation is not exposed.

4.4.2 Application without a Prescriptive Ignition Barrier: The insulations may be installed in an attic or crawl space without the prescriptive ignition barrier described in IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4, when all of the following conditions apply:

a. Entry to the attic or crawl space is only for the service of 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. Attic ventilation is provided when required by IBC Section 1202.2 or IRC Section R806, except air-impermeable insulation is permitted in unvented attics in accordance with IBC Section 1202.3 or IRC Section R806.5.

e. Under-floor (crawl space) ventilation is provided when required by IBC Section 1202.4 or IRC Section R408.1, as applicable.
f. Combustion air is provided in accordance with IMC (*International Mechanical Code®*) Section 701.

4.4.2.1 Attics and Crawl Spaces: In attics, the insulation may be spray-applied to the underside of roof sheathing or roof rafters, and/or vertical surfaces provided the assembly conforms to one of the assemblies described in Table 4. In crawl spaces, the insulation may be spray-applied to the underside of floors and/or vertical surfaces provided the assembly conforms to one of the assemblies described in Table 4. When an intumescent coating is used, surfaces to be coated must be dry, clean, and free of dirt, loose debris, and any other substances that could interfere with adhesion of the coating. The intumescent coating must be applied to all surfaces in accordance with the respective coating manufacturer's installation instructions. The coating must be applied when ambient and substrate temperatures are above 50°F unless otherwise permitted by the intumescent coating manufacturer's installation instructions. The insulation may be installed in unvented attics as described in this section and in accordance with IBC Section 1202.3 or IRC Section R806.5 at a minimum thickness of 3-1/2 inches.

4.4.2.2 Unvented Attics: End use configuration testing (per IBC Section 2603.9 and IRC Section R316.6) and analysis was performed to qualify the use of XLS 500-NM insulation without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with IBC Section 1202.3 or IRC Section R806.5. The testing and analysis are described in Priest & Associates EEV 10419 Revision 1, dated December 20, 2016. The conclusions of that evaluation are as follows: When XLS 500-NM is applied in unvented attics conforming to IBC Section 1202.3 or IRC Section R806.5, the insulation may be applied to the underside of roof sheathing and/or rafters and to vertical surfaces to a minimum thickness of 3-1/2 inches. Rafters may be left without foam coverage or may be covered with foam up to the maximum thickness allowed. Maximum thickness on the underside of roof sheathing or on vertical wall surfaces is 16 inches. The XLS 500-NM insulation may be left exposed to the attic without a prescriptive ignition barrier or an intumescent coating. The attic must have attic access complying with IRC Section R807, horizontally placed in the attic floor and opening outward toward the living space. For items penetrating the roof deck or walls, such as skylight wells or vents, the penetrating item exposed in the attic must be covered with a minimum of 3-1/2 inches of XLS 500-NM.

4.4.2.3 Use on Attic Floors: XLS 500-NM insulation may be installed exposed (without a protective covering) in attic floors, between and over joists, at a maximum thickness of 6 inches.

XLS 500-NM and XLS 1800 may also be installed in attic floors, between and over joists, with intumescent coatings and maximum thickness as indicated in Table 4. The ignition barrier required in IBC Section 2603.4.1.6 or IRC Section R316.5.3 may be omitted. The insulation must be separated from the interior of the building by an approved thermal barrier.

4.5 Exterior Walls in Types I, II, III, and IV Construction:

XLS 500-NM and XLS 1800 insulations may be installed in or on the interior side of exterior walls of buildings of Types I, II, III, and IV construction complying with IBC Section 2603.5 and as described in this section. The maximum thickness of XLS-500 NM is 6 inches when installed in stud cavities. The maximum thickness of XLS 1800 is 3-1/2 inches when installed on the exterior of the sheathing and 3-5/8 inches when installed in stud cavities. The maximum potential heat of XLS 500-NM is 656 Btu/ft^2 per inch of thickness, the potential heat of XLS 1800 is 2112 Btu/ft^2 per inch of thickness. The tested wall assembly was extended through a third-party engineering analysis to include additional wall constructions described in Tables 5, 6 and 7.

4.6 Fire-Resistance-Rated Construction:

4.6.1 Two-hour Fire-resistance-rated Wall Assembly (load bearing): XLS 1800 may be installed on interior load bearing 2-hour fire-resistance-rated walls, when installed in accordance with the following:

4.6.1.1 Wood Framing: Two rows on separate plates, 3 inches apart, of minimum 2 × 4 wood studs (no. 2 Douglas fir) spaced a maximum of 16 inches on center.

4.6.1.2 Wall Finish: Base layer of 5/8-inch-thick Type X gypsum wallboard applied horizontally and fastened to each outer side of a double row of studs with 6d by 1-7/8-

inch-long coated nails, spaced 24 inches on center. Face layer of 5/8-inch-thick Type X gypsum board is applied horizontally and fastened to each outer side of studs over the base layer with 8d by 2-3/8-inch-long coated nails, spaced 8 inches on center. Gypsum wallboard joints must be staggered 24 inches between layers and on opposite sides of the wall.

4.6.1.3 Insulation: XLS 1800 is applied in the stud cavities of both rows at a thickness of 3 inches.

5.0 CONDITIONS OF USE

The XLS 500-NM and XLS 1800 spray-applied polyurethane foam insulations described in this Research Report comply with, or are suitable alternatives to, what is specified in those Codes listed in Section 1.0 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 The insulation must be separated from the interior of the building by an approved 15-minute thermal barrier as described in Section 4.3.1, except as described in Sections 4.3.2 and 4.4.

5.3 The installed thickness must not exceed that noted in Sections 3.3, 4.3, 4.4, and 4.5.

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

5.5 The insulation must be applied by professional spray polyurethane foam installers approved by Xcelus Building Systems or by the Spray Polyurethane Foam Alliance (SPFA) for the installation of spray polyurethane foam insulation.

5.6 When XLS 500-NM insulation is installed under the conditions of Section 4.4.2.2 of this report, the following conditions apply:

5.6.1 Since the performance of XLS 500-NM, when installed in unvented attics without a Code-prescribed ignition barrier or an intumescent coating, are based on fire performance of an unvented attic, the installation must be approved by the Code official. The installation must conform with the provisions of Section 4.4.2.2 and Conditions a. through c., and Condition f. of Section 4.4.2. A copy of the Priest & Associates Engineering Evaluation (referenced in Section 6.7) must be provided to the Code official upon request.

5.6.2 Signage shall be permanently affixed in the attic and shall be visible from all points within the attic. The sign shall state *"Caution, this is an unvented attic by design. No modification may be made to this unvented condition. The attic shall not be vented. Holes into the unvented attic shall be immediately repaired and sealed. Penetrations of the ceiling or wall membrane between the unvented attic and living space, other than the horizontal access hatch, must be protected in an approved manner. This unvented attic shall not be used for storage. See Intertek Code Compliance Research Report CCRR-0516 on the Intertek Website."*

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

5.8 Jobsite certification and labeling of the insulation must comply with IRC Section N1101.10, N1101.14 and IECC Sections C303.1 or R303.1 and R401.3, as applicable.

5.9 A vapor retarder must be installed in accordance with the applicable Code.

5.10 The insulation components are manufactured under a quality control program with inspection by Intertek Testing Services NA, Inc.

6.0 SUPPORTING EVIDENCE

6.1 Reports of tests in accordance with ASTM C518, ASTM E84, ASTM E283, ASTM E970, ASTM E2178, NFPA 259, NFPA 285, and NFPA 286.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated February 2020, including reports of tests in accordance with Appendix X.

6.3 Data in accordance with ICC 1100 (2019).

6.4 Research Reports for evaluation of data in accordance with ICC-ES Acceptance Criteria for Fire-protective Coatings Applied to Spray-applied Foam Plastic Insulation Installed without a Code-prescribed Thermal Barrier (AC456), dated October 2015 and editorially revised July 2024.

6.5 Intertek Listing Report "Xcelus Building Systems XLS 500-NM and XLS 1800".

6.6 Hughes Associates, Inc. letters, dated April 14, 2014, and October 07, 2014, Re: HAI Project 1JJB00019.001.

6.7 Priest & Associates Engineering Evaluation 10419 Revision 1, dated December 20, 2016.

6.8 Priest & Associates Engineering Letter 40103G, dated July 18, 2017.

7.0 IDENTIFICATION

Each container of components A and B of the insulation bears a label with the Xcelus Building Systems name and address; the product name; the flame-spread and smoke-developed indices; the expiration date, the Intertek Mark; and the Research Report number (CCRR-0516). Intumescent coatings are identified with the manufacturer's name and address, the product trade name and use instructions.

8.0 OTHER CODES

8.1 Florida Building Code:

8.1.1 Scope of Evaluation: XLS 500-NM has been evaluated under the 2023 and 2020 *Florida Building Codes: Building*, *Residential* and *Energy Conservation*.

8.1.2 Conclusions: XLS 500-NM, as described in Sections 2.0 through 7.0, complies with the *Florida Building Codes: Building*, *Residential*, and *Energy Conservation*, including High-Velocity Hurricane Zones, subject to the following conditions:

8.1.2.1 Installation is as described in Sections 2.0 through 7.0 of this Research Report.

8.1.2.2 The product is under a quality assurance program audited by Intertek.

Intertek is an approved evaluation entity and quality assurance entity pursuant to Florida Statute 553.842 – *Product Evaluation and Approval*

8.2 California Building Code:

8.2.1 Scope of Evaluation: XLS 500-NM has been evaluated under the 2022 *California Building Code* (CBC), 2022 *California Residential Code* (CRC) and 2022 *California Energy Code* (CEC).

8.2.2 Conclusions: XLS 500-NM, as described in Sections 2.0 through 7.0, complies with the 2022 *California Building Code* (CBC), 2022 *California Residential Code* (CRC) and 2022 *California Energy Code* (CEC), subject to the following conditions:

8.2.2.1 In accordance with Section 110.8 of the 2022 *California Energy Code*, verification of certification by the Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, must be provided to the Code official, demonstrating that the insulation thermal performance is approved pursuant to the California Code of Regulations, Title 24, Part 12, Chapters 12-13, Article 3, "Standards for Insulating Material".

8.2.2.2 The insulation has not been evaluated under CBC Chapter 7A or CRC Section R327, for use in the exterior design and construction of new buildings located in a Fire Hazard Zone within a State Responsibility Area or any Wildland–Urban Interface Fire Area.

8.2.2.3 The insulation has not been evaluated for compliance with the *International Wildland-Urban Interface Code®*.

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	2021 IBC SECTION[1]	2021 IRC SECTION[1]	2021 IECC SECTION[1]
Physical properties	2603.1.1	Not required	Not required
Surface-burning characteristics	2603.3	R316.3	Not applicable
Alternative to thermal barrier/ignition barrier	2603.4	R316.4	Not applicable
Air permeability	1202.3	R806.5	C402.5 R402.4
Fire-resistance-rated construction	703	R302	Not applicable
Exterior walls in Types I-IV construction	2603.5	Not applicable	Not applicable
Thermal resistance	1301	N1101.10 N1102	C303.1 R303.1

[1] Section numbers may be different for earlier versions of the International Codes.

TABLE 1B – PROPERTIES EVALUATED – FLORIDA BUILDING CODES

PROPERTY	2023 FBC – BUILDING SECTION	2023 FBC - RESIDENTIAL SECTION	2023 FBC – ENERGY SECTION
Physical properties	2603.1.1	Not required	Not required
Surface-burning characteristics	2603.3	R316.3	Not applicable
Alternative to thermal barrier/ignition barrier	2603.4	R316.4	Not applicable
Air permeability	1203.3	R806.5	C402.5 R402.4
Fire-resistance-rated construction	703	R302	Not applicable
Exterior walls in Types I-IV construction	2603.5	Not applicable	Not applicable
Thermal resistance	1301	See FBC - Energy	C303.1 R303.1

TABLE 1C – PROPERTIES EVALUATED – CALIFORNIA BUILDING CODES

PROPERTY	2022 CBC SECTION	2022 CRC SECTION	2022 CEC SECTION
Physical properties	2603.1.1	Not required	Not required
Surface-burning characteristics	2603.3	R316.3	Not applicable
Alternative to thermal barrier/ignition barrier	2603.4	R316.4	Not applicable
Air permeability	1202.3	R806.5	140.3
Fire-resistance-rated construction	703	R302	Not applicable
Exterior walls in Types I-IV construction	2603.5	Not applicable	Not applicable
Thermal resistance	Referred to California Energy Code	Referred to California Energy Code	110.8

TABLE 2 – THERMAL RESISTANCE[1,2,3]

THICKNESS (inches)	R-VALUE (°F·ft²·h/Btu)	
	XLS 500-NM	XLS 1800
1	3.9	7.4
2	7.6	15
3	11	22
3.5	13	25
4	15	28
5	19	35
5.5	20	39
6	22	43
7	26	50
7.5	28	53
8	30	57
9	33	64
9.5	35	67
10	37	71
11.5	43	82
12	44	85
16	59	NA

[1] R-values are calculated based on the test *K* vales at 1-and 4-inch thicknesses.

[2] R-values greater than 10 are rounded to the nearest whole number.

[3] To determine R values for thickness not listed:

a. Between 1 inch and 4 inches can be determined through linear interpolation; or,
b. XLS 500-NM: Greater than 4 inches can be calculated based on R= 3.7 / inch
c. XLS 1800: Greater than 3.5 inches can be calculated based on R = 7.1 / inch

TABLE 3 – USE OF INSULATION WITHOUT A PRESCRIPTIVE THERMAL BARRIER

INSULATION TYPE	MAXIMUM THICKNESS (in) (Wall Cavities)	MAXIMUM THICKNESS (in) (Ceilings, Underside of Roof Sheathing / Rafters & Floors)	INTUMESCENT COATING MINIMUM THICKNESS & TYPE (Applied to all Foam Surfaces)	MINIMUM APPLICATION RATE OF THE INTUMESCENT COATING	May be left exposed as an Interior Finish	TESTS SUBMITTED
XLS 500-NM	8	14	No-Burn Plus ThB 14 wet mils	0.87 gal / 100 ft^2	Yes	UL 1715
	9-1/2	11	DC315 18 wet mils	1.12 gal / 100 ft^2	Yes	NFPA 286
	7-1/2	14-1/2	Fireshell F10E 18 wet mils	1.18 gal / 100 ft^2	Yes	NFPA 286
XLS 1800	6	8	No-Burn Plus ThB 14 wet mils	0.87 gal / 100 ft^2	Yes	UL 1715
	5-1/2	9-1/2	DC315 14 wet mils	0.88 gal / 100 ft^2	Yes	NFPA 286
	5-1/2	9-1/2	Fireshell F10E 21 wet mils	1.16 gal / 100 ft^2	Yes	NFPA 286

TABLE 4 – USE OF INSULATION IN ATTICS AND CRAWL SPACES WITHOUT A PRESCRIPTIVE IGNITION BARRIER

INSULATION TYPE	MAXIMUM THICKNESS (inches) (Wall Cavities and Attic Floor)	MAXIMUM THICKNESS (inches) (Underside of Roof Sheathing/ Rafters and Floors)	INTUMESCENT COATING, MINIMUM THICKNESS & TYPE (Applied to all Exposed Foam Surfaces)	MINIMUM APPLICATION RATE OF INTUMESCENT COATING	TEST SUBMITTED (AC377)
XLS 500-NM	9-1/2	11-1/2	FIRESHELL® (IB-4) 5 wet mils (3.5 dry mils)	0.31 gal / 100 ft²	Appendix X
	11-1/2	15-1/2	DC315 4 wet mils (3 dry mils)	0.25 gal / 100 ft²	Appendix X
XLS 1800	7-1/4	11-1/4	No coating required	NA	Appendix X
	5-1/2	9-1/2	Fireshell F10E 21 wet mils	1.16 gal / 100ft²	NFPA 286
	11-1/4	11-1/4	Flame Seal TB 24 wet mils	1.60 gal / 100ft²	UL 1715
	11-1/2	11-1/2	Flame Seal FS-IB 8 wet mils	0.50 gal / 100ft²	Appendix X
	5-1/2	9-1/2	DC315 14 wet mils	0.88 gal / 100ft²	NFPA 286
	5-1/2	11-1/2	DC315 4 wet mils	0.25 gal / 100 ft²	Appendix X

TABLE 5 – NFPA 285 COMPLYING WALLS – XLS 500-NM IN INTERIOR WALL CAVITY

WALL COMPONENT	MATERIALS
Base wall system – Use either 1, 2 or 3	1 - Concrete wall 2 - Concrete Masonry wall 3 - One layer of 5/8-inch thick Type X gypsum wallboard installed on the interior side of minimum 3-5/8-inch-deep minimum 20-gauge-thick steel studs spaced a maximum of 24-inch on center. Lateral bracing installed minimum every 4 ft. vertically or as required. Wall stud cavities shall be filled at each floor line with minimum 4 lb/ft^3 mineral wool (e.g., Thermafiber) friction fit between steel wall studs.
Perimeter Fire Barrier System	Perimeter fire barrier system complying with IBC Section 715.4 shall be installed, as applicable, to fill the linear gap between the edge of the concrete floor slab and the interior surface of the exterior wall assembly.
Interior Insulation – Use either 1, 2, 3, 4 or 5 or combinations of 3 with 4 or 3 with 5	1 - None 2 - Maximum 6-inch thickness of XLS 500-NM, applied to interior surface of Base Wall System 1 and 2 (See Note 1) 3 - Full wall stud cavity depth or less of XLS 500-NM, applied using exterior gypsum sheathing of Base Wall System 3 as the substrate and covering the width of the cavity and the inside of the steel wall stud framing flange. 4 - Fiberglass batt insulation (faced or unfaced) 5 - Mineral wool insulation (faced or unfaced)
Exterior sheathing	5/8-inch-thick Type X exterior type gypsum sheathing (for Base Wall System 3 above)
Exterior Wall Covering – Use either 1, 2 or 3 (See Note 2)	1 – Any non-combustible exterior wall covering material using any standard installation technique 2 – Any non-combustible exterior wall covering system with a combustible WRB that has successfully been tested in accordance with NFPA 285 3 – Any combustible exterior wall covering system with or without a combustible WRB that has been successfully tested in accordance with NFPA 285
Flashing of window, door and other exterior wall penetrations.	As an option, flash around window, door and other exterior penetrations with limited amounts of maximum 12-inch-wide flashing tape (acrylic, asphalt or butyl-based) or liquid applied membrane material with or without fiber mesh reinforcement.

Note 1: Fireblocking per IBC Section 718 and thermal barrier material requirements must be met for Base Wall Systems 1 and 2, as required by specific wall construction details when combustible concealed space is created on interior side of exterior wall assembly.

Note 2: Combustible exterior wall coverings shall be installed in accordance with manufacturer's requirements.

TABLE 6 – NFPA 285 COMPLYING WALLS – XLS 1800 ON EXTERIOR

WALL COMPONENT	MATERIALS
Base Wall System – Use either 1, 2, or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1-layer of 5/8-inch-thick Type X gypsum wallboard installed on the interior side of minimum 3-5/8-inch-deep minimum 20-gauge thick steel studs spaced a maximum of 24 inch on center. Lateral bracing installed minimum every 4 ft. vertically or as required. Wall stud cavities shall be filled at each floor line with minimum 4 lbs/ft^3 mineral wool (e.g. Thermafiber) friction fit between steel wall studs
Perimeter Fire Barrier System	Perimeter fire barrier system complying with IBC Section 715.4 shall be installed, as applicable, to fill the void between the edge of the concrete floor slab and the interior surface of the exterior wall assembly.
Interior Insulation – Use either 1, 2, 3, 4, or 5; or combination of 2 and 4 or combination of 2 and 5.	1 – None 2 – Maximum 6-inch thickness of XLS 500-NM applied to interior surface of Base Wall System 1 and 2 (See Note 1) 3 – Full wall stud cavity depth or less XLS 500-NM applied using exterior gypsum sheathing of Base Wall System 3 as the substrate and covering the width of the cavity and the inside of the steel wall stud framing flange. 4 – Fiberglass batt insulation (faced or unfaced) 5 – Mineral wool insulation (faced or unfaced)
Exterior Sheathing – Use either 1, 2, or 3. If wall stud cavity insulation is XLS 500-NM SPF, then use 3 only	1 – None (for Base Wall Systems 1 or 2) 2 – ½-inch-thick exterior type gypsum sheathing (for Base Wall System 3) 3 – 5/8-inch-thick Type X exterior type gypsum sheathing (for Base Wall System 3)
Exterior Insulation	Maximum 3-inch thickness of XLS 1800
(Optional) Exterior Insulation Covering – Use 1 or 2	1 – None 2 – As an option, cover XLS 1800 with minimum 2-inch thickness of minimum 4 pcf mineral wool insulation. Mineral wool insulation installation shall be in accordance with Table 8 requirements.
Exterior Wall Covering – Use either 1, 2, 3, 4, or 5	1 – Brick – Standard type brick veneer anchors, installed a maximum 24 inches on center, vertically on each stud with maximum 2-inch air gap between exterior insulation and brick. Brick to be standard nominal 4-inch-thick clay brick installed in a running bond pattern using Type S mortar. 2 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. A secondary water-resistive barrier can be installed between the exterior insulation and the lath. The secondary water-resistive barrier shall not be full-coverage asphalt or butyl-based self-adhered membranes. 3 – Minimum 2-inch-thick natural stone (granite, limestone, marble, sandstone). Any standard non-open jointed installation technique can be used. 4 – Minimum 1-1/2-inch-thick concrete masonry unit (CMU), pre-cast concrete, or artificial cast stone. Any standard non-open jointed installation technique can be used. 5 – Minimum 1-1/4-inch-thick Terra Cotta non-open jointed. Any standard non-open jointed installation technique can be used.
Flashing of window, door and other exterior wall penetrations.	As an option, flash around window, door, and other exterior penetrations with limited amounts of maximum 12-inch-wide flashing tape (acrylic, asphalt or butyl-based) or liquid-applied membrane material with or without fiber mesh reinforcement.

Note 1: Fireblocking per IBC Section 718 and thermal barrier material requirements must be met for Base Wall Systems 1 and 2, as required by specific wall construction details when combustible concealed space is created on interior side of exterior wall assembly.

Note 2: Building Code section references may change in different editions of the IBC.

TABLE 7 – NFPA 285 WALLS – XLS 1800 ON EXTERIOR WITH EXTERIOR INSULATION COVERING

WALL COMPONENT	MATERIALS
Base Wall System – Use either 1, 2, or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer of 5/8-inch-thick Type X gypsum wallboard installed on the interior side of minimum 3-5/8-inch-deep minimum 20-gauge thick steel studs spaced a maximum of 24 inches on center. Lateral bracing installed minimum every 4 ft. vertically or as required. Wall stud cavities shall be filled at each floor line with minimum 4 lb/ft^3 mineral wool (e.g. Thermafiber) friction fit between steel wall studs
Perimeter Fire Barrier System	Perimeter fire barrier system complying with IBC Section 715.4 shall be installed, as applicable, to fill the void between the edge of the concrete floor slab and the interior surface of the exterior wall assembly.
Interior Insulation – Use either 1, 2, 3, 4, or 5; or combination of 2 and 4 or combination of 2 and 5	1 – None 2 – Maximum 6-inch-thickness of XLS 500-NM applied to interior surface of Base Wall System 1 and 2 (See Note 1) 3 – Full wall stud cavity depth or less of XLS 500 NM applied using exterior gypsum sheathing of Base Wall System 3 as the substrate and covering the width of the cavity and the inside of the steel wall stud framing flange. 4 – Fiberglass batt insulation (faced or unfaced) 5 – Mineral wool insulation (faced or unfaced)
Exterior Sheathing – Use either 1, 2, or 3. If wall stud cavity insulation is XLS 500-NM SPF, then use 3 only	1 – None (for Base wall systems 1 or 2) 2 – 1/2-inch-thick exterior type gypsum sheathing (for Base Wall System 3) 3 – 5/8-inch-thick Type X exterior type gypsum sheathing (for Base Wall System 3)
Exterior Insulation	Maximum 3-1/2-inch-thickness of XLS 1800
Exterior Insulation Covering	Cover XLS 1800 with minimum 2-inch thickness of minimum 4 pcf mineral wool insulation. Mineral wool insulation installation shall be in accordance with Table 8 requirements.
Exterior Wall Covering – Use either 1, 2, or 3 (See Note 3)	1 – Any non-combustible exterior wall covering material using any standard installation technique 2 – Any non-combustible exterior wall covering system with a combustible WRB that has successfully been tested in accordance with NFPA 285. 3 – Any combustible exterior wall covering system with or without a combustible WRB that has successfully been tested in accordance with NFPA 285
Flashing of window, door and other exterior wall penetrations.	As an option, flash around window, door, and other exterior penetrations with limited amounts of maximum 12-inch-wide flashing tape (acrylic, asphalt or butyl-based) or liquid applied membrane material with or without fiber mesh reinforcement.

Note 1: Fireblocking per IBC Section 718 and thermal barrier material requirements must be met for Base Wall Systems 1 and 2, as required by specific wall construction details when combustible concealed space is created on interior side of exterior wall assembly.
Note 2: Building Code section references may change in different editions of the IBC.
Note 3: Combustible exterior wall coverings shall be installed in accordance with manufacturer's installation requirements.

TABLE 8 – MINERAL WOOL INSULATION INSTALLATION REQUIREMENTS FOR TABLES 5 AND 6

WALL COMPONENT	REQUIREMENTS
Mineral Wool Insulation Installation Requirements	1 – Mineral wool insulation shall be mechanically fastened to the wall surface using perforated base insulation pins. 2 – Each insulation pin shall be screwed into exterior sheathing and/or steel wall studs. 3 – The length of the insulation pin shall be sized to accommodate the thickness of the SPF plus the mineral wool insulation thickness plus a minimum of 1 inch. 4 – Insulation pin spacing shall be such that a pin is located in each corner of each mineral wool batt as well as one pin located in the geometric center of each insulation batt. 5 – All pins shall be located nominally 2 inches in from the edge of the insulation batt. 6 – SPF shall be installed onto the exterior wall surface such that the perforated pin bases are fully encapsulated. 7 – Mineral wool insulation shall be impaled onto the insulation pins and secured using nominal 2-1/2-inch square galvanized speed friction washers. 8 – Insulation pin tips protruding beyond the speed friction washer shall be bent over to prevent the washer from falling off. 9 – Mineral wool batts shall be tightly fitted against adjacent batts and joints shall be staggered a minimum of one-half batt insulation width (minimum 12 inches).
Mineral Wool Specifications	1 – Mineral wool insulation shall meet the requirements of ASTM C612. 2 – Mineral wool insulation shall not have any type of facer (foil, etc.) on either side. 3 – Mineral wool insulation shall be noncombustible when tested in accordance with ASTM E136. 4 – The mineral wool insulation density shall be a minimum of 4.0 lbs/ft^3. 5 – The R-value per inch for the mineral wool insulation shall be a minimum of 3.45 6 – Mineral wool insulation shall be installed as described above.