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March 20, 2019

Mr. Jason Hoerter
Product Manager, Specialty Products
NCFI Polyurethanes
P.O. Box 1528
1515 Carter St.
Mt. Airy, NC 27030

RE: NFPA 285 Complying Exterior Wall Constructions
Project No.: 1JJB00035.000

Dear Mr. Hoerter:

This analysis provides a summary of various exterior wall constructions that will comply with NFPA 285 and that incorporate NCFI's closed cell, nominal 2.0 lb/ft^3 density, spray polyurethane foam plastic insulation (CC-SPF) and/or NCFI's open cell, nominal 0.5 lb/ft^3 density, spray polyurethane foam plastic insulation (OC-SPF). These are identified as:

- Closed cell – either InsulBloc® spray polyurethane foam plastic insulation (ID No. 11-017), InsulStar® spray polyurethane foam plastic insulation (ID No. 11-016), or InsulStar®1.7 (ID No. 11-033); and
- Open cell – InsulStar®Light (ID No. 12-008) spray polyurethane foam plastic insulation

Section 2603.5.5 of the International Building Code (all editions) requires that exterior wall systems on buildings of any height in Types I, II, III, and IV construction that incorporate foam plastic insulation shall meet the requirements of NFPA 285 "Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components."

NCFI has performed several NFPA 285 fire tests on exterior wall systems that have incorporated the above spray polyurethane foam plastic insulations, or spray polyurethane foam plastic insulations that have been evaluated to be equivalent or comparable to those mentioned above. These tests are reported in:

- Southwest Research Institute Final Report No. 01.14431.01.108[1], dated October 12, 2009;
- Intertek Testing Services NA, Inc. Final Report No. 100570865SAT-001 dated January 30, 2012; and,
- Intertek Testing Services NA, Inc. Final Report No. 101432261SAT-004_Rev. 1 dated March 6, 2014.
- Southwest Research Institute Final Report No. 01.17787.01.624, dated November 8, 2013.

Based on the results of these tests, additional small-scale fire tests and our experience with the NFPA 285 fire test, it is our judgment that the various configurations of exterior walls described in the attached tables will meet the performance requirements of NFPA 285.

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This analysis is based on the specific construction materials installed in the manner described in the referenced test report(s). Changes or modifications to the construction and/or materials used in the tested assembly may result in a different fire performance and may change this analysis.

This analysis does not address performance characteristics such as weatherability, durability, or structural issues.

I hope that this information is of assistance and if you have any questions, please feel free to contact me.

Sincerely,

JENSEN HUGHES

David Hintz
Lead Engineer

Jesse J. Beitel
Senior Scientist/Principal

Table I. NFPA 285 Complying Walls with NCFI CC-SPF on Exterior

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 - Concrete wall – minimum 2-inch thick 2 - Concrete Masonry wall 3 - One layer – ⅝-inch thick Type X Gypsum wallboard on interior, installed over steel studs: minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch OC with lateral bracing every 4 ft. vertically.
Floorline Firestopping	4 lb/cu ft. mineral wool (e.g., Thermafiber) in each stud cavity and at each floorline – attached with Z-clips or equivalent. Mineral wool not required in stud cavities at floorlines when infill studwall construction[1] is employed for exterior wall construction.
Cavity Insulation – Use either 1, 2, 3, or 4	1 - None 2 - Full cavity depth or less of InsulBloc®, InsulStar® closed cell (2.0 lb/ft^3), or InsulStar®1.7 (ID No. 11-033) spray polyurethane foam applied using sheathing as substrate and covering the width of the cavity and inside the stud flange 3 - Full cavity depth or less of InsulStar®Light (ID No. 12-008) open cell (0.5 lb/ft^3) spray polyurethane foam applied using exterior sheathing as substrate and covering the width of the cavity and inside the stud flange 4 - Any noncombustible insulation (if batts, can be either faced or unfaced)
Exterior sheathing – Use either 1 or 2	1 - ½-inch thick, exterior type gypsum sheathing 2 - ⅝-inch thick, exterior type gypsum sheathing
Exterior insulation – Use either 1 or 2	1 - None 2 - InsulBloc®, InsulStar® - Total thickness to be a maximum of nominal 5 inches or InsulStar®1.7 (ID No. 11-033) spray polyurethane foam - Total thickness to be a maximum of nominal 4 inches.
Exterior Veneer – Use either 1, 2, 3, 4 or 5	1 - Brick – Standard nominal 4-inch thick, clay brick. Installed with brick veneer anchors – standard types – installed maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 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 Limestone, natural stone or minimum 1½-inch thick cast artificial stone. Any standard non-open-jointed installation technique such as ship-lap, etc. can be used. 4 - Terracotta cladding – Use any terracotta cladding system in which the terracotta is minimum 1¼-inch. Any standard non-open-jointed installation technique such as ship-lap, etc. can be used. 5 – Minimum 1-inch thick, Clark Pacific glass-fiber-reinforced-concrete (GFRC) panels. Standard installation technique shall be used. Spray polyurethane foams from the ‘exterior insulation’ category are sprayed onto the interior face of the GFRC panels to a maximum thickness as listed above.

[1] Infill studwall construction refers to the condition where the stud framing of an exterior wall is interior to the floorline slab edges, effectively terminating the stud cavity at each floorline and creating sectioned stud bays in between sequential floors.

Table I. NFPA 285 Complying Walls with NCFI CC-SPF on Exterior (continued)

Wall Component	Materials
Exterior Veneer – Use either 1, 2, 3, 4 or 5	6 – Minimum 1-inch thick, Gates Precast Gate Lite precast concrete panels. Standard installation technique shall be used. Spray polyurethane foams from the 'exterior insulation' category are sprayed onto the interior face of the precast concrete panels to a maximum thickness as listed above.

Table II. NFPA 285 Complying Walls – CC-SPF or OC-SPF in Wall Cavity Only

Wall Component	Materials
Base wall system – Use either: 1 with interior, steel studs, minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch on center with lateral bracing every 4 ft. vertically, or 2 or 3	1 - 1 layer of ⅝-inch thick Type X exterior gypsum sheathing installed on the exterior side of the steel studs 2 - Concrete wall – minimum 2-inch thick 3 - Concrete Masonry wall
Floorline Firestopping	4 lb/ft^3 mineral wool (e.g., Thermafiber) friction fit in each wall stud cavity at each floorline. Mineral wool not required in stud cavities at floorlines when infill studwall[1] construction is employed for exterior wall construction.
Cavity Insulation – Use either 1, 2, or 3 or any combination of 2 and 4 or any combination of 3 and 4	1 - None 2 - Full cavity depth or less of InsulBloc®, InsulStar® closed cell (2.0 lb/ft^3), or InsulStar®1.7 (ID No. 11-033) spray polyurethane foam applied using sheathing or concrete or masonry as substrate and covering the width of the cavity and inside the stud flange 3 - Full cavity depth or less of InsulStar®Light (ID No. 12-008) open cell (0.5 lb/ft^3) spray polyurethane foam applied using sheathing or concrete or masonry as substrate and covering the width of the cavity and inside the stud flange 4 - Any noncombustible insulation (if batts, can be either faced or unfaced)
Interior gypsum wallboard	Minimum ⅝-inch thick Type X gypsum wallboard
Exterior Wall Covering – Use either 1, 2 or 3	1 - Any non-combustible exterior wall covering material 2 - Any combustible exterior wall covering system that has successfully been tested in accordance with NFPA 285 3 - Any combustible exterior wall covering system up to a maximum wall height of 40 ft. above grade plane. If the combustible material is fire retardant treated wood, the maximum wall height may be 60 ft above grade plane. 4 - For base wall 2 or 3, a covering is optional but not required. Use an Exterior wall covering may be as described in 1, 2 or 3 above.

[1] Infill studwall construction refers to the condition where the stud framing of an exterior wall is interior to the floorline slab edges, effectively terminating the stud cavity at each floorline and creating sectioned stud bays in between sequential floors.