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INTERNATIONAL BUILDING CODE

2009 EDITION – CHAPTER 26

THE USE OF CORE INSULATION

The attached letter dated May 31, 2011 is a review of the requirements set forth in Chapter 26 of the International Building Code (IBC), 2009 Edition, and its relationship to insulation inserts within the cores of exterior masonry walls.

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DATE: Tuesday, May 31, 2011

TO: David Nickerson
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FROM: Ben Muscente, P.E. (not MD)

RE: KORFIL INSULATION PRODUCT

- Review of Applicability with Chapter 26 of International Building Code
-

Mr. Nickerson,

As requested Howe Engineers has reviewed the material information and fire test data for the Korfil Insulation product manufactured by Concrete Block Insulating Systems in West Brookfield, Massachusetts. The purpose of our review was to determine whether the product meets the requirements of Chapter 26 of the International Building Code (IBC), 2009 Edition and suitable for the installation within exterior concrete masonry walls. This letter presents the results of our review and our professional opinion on compliance with the referenced building code.

The Korfil product is a molded expanded polystyrene insert that is designed to be installed within the core of concrete masonry units. The Korfil product reviewed is approximately 1 inch thick with an average density of 1.2 lb/ft³. Since the Korfil product is considered foam plastic insulation it is required to comply with Section 2603 of the International Building Code, 2009 Edition.

Section 2603 provides the requirements for foam insulation when used within buildings. For ease of reference, the requirements of Section 2603 are provided below with our professional opinion on how they relate to the Korfil Insulation product based on our review.

- Product must be labeled of an approved agency (IBC Section 2603.2)
 - The product packaging was not included as part of our review. It is assumed the proper labels are provided for the Korfil Product.

- Foam plastic cores shall have a flame spread index of not more than 75 and a smoke-developed index of not more than 450 where tested in the maximum thickness in accordance with ASTM E 84 or UL 723, or meet one of the exceptions (IBC Section 2603.3)
 - A UL test was provided to our office for review which provides the flame spread and smoke-developed indexes for the foamed plastic used to form the Korfil Product at varying densities and thicknesses. Our review indicates the Korfil product intended for use (approximately 1 inch thick at a density of 1.2 lb/ft³) is compliant with the flame spread and smoke-developed indexes of this section.
- Foam plastic must be separated from the interior of the building by an approved thermal barrier of ½-inch gypsum wallboard or equivalent thermal barrier material (IBC Section 2603.4)
 - As stated in Section 2603.4.1.1, a thermal barrier is not required for foam plastic installed within a masonry or concrete wall where the insulation is covered by minimum 1 inch thickness of masonry or concrete. Therefore, thermal barrier is not required since the Korfil Insulation will be installed within the core of the grouted concrete masonry units.
 - In addition, since a thermal barrier is not required, the remaining requirements of Section 2603.4 do not apply.
- IBC Sections 2603.5.1 through 2603.5.7 provide additional requirements for foam plastics used on exterior walls. As stated in the building code commentary for Section 2603.5, the intent of this section is to regulate foam plastics on exterior walls when an insulating envelope is created over the exterior structure (see commentary below). This insulating envelope can create a wall cavity and/or exterior façade that may allow the passage of fire to adjacent floors. Therefore, the material used to create the exterior building envelope must be regulated to limit the combustibility and flame spread potential.
 - It is important to note the building code commentary phrasing in this section. The commentary specifically describes the requirements of this section as applying to the materials of the building envelope installed beyond the exterior building structure. The commentary specifically refers to the exterior façade when constructed of foam material (see highlighted section below). Again, the intent being to limit the use of materials that would allow the spread of fire up an exterior wall cavity or exterior façade.

As discussed above, the proposed wall assembly is constructed of grouted concrete masonry units with Korfil Insulation installed within the block cores. The material in question (the Korfil Insulation) is part of the exterior structure, it is not intended to function as an exterior façade or otherwise located beyond the exterior block wall to create a building envelope or curtain wall assembly. Since the foam Korfil cores are encapsulated in grouted masonry block (a non-combustible material) there is very limited, if any, exposure

hazard and potential for the foam insulation to spread fire to adjacent floors or up the exterior wall of the building. Therefore, it is our professional opinion the Korfil insulation cores meet the intent of IBC Section 2603.5. This interpretation is further supported by the NFPA 285 Scope description and Annex, as shown in the figures below. The scope of NFPA 285 specifically states the fire tests of the standard apply to curtain wall assemblies. Several figures are provided throughout the NFPA 285 standard that shows example test assemblies. These test assemblies display curtain wall assemblies installed beyond concrete block exterior walls and clearly indicate the curtain wall is the specimen to be tested. In addition, Annex A of NFPA 285 states the intent of the fire tests is to determine the hazard from interior fires breaking windows and exposing the exterior façade.

2603.5 Exterior walls of buildings of any height. *Exterior walls of buildings of Type I, II, III or IV construction of any height shall comply with Sections 2603.5.1 through 2603.5.7. Exterior walls of cold storage buildings required to be constructed of noncombustible materials, where the building is more than one story in height, shall also comply with the provisions of Sections 2603.5.1 through 2603.5.7. Exterior walls of buildings of Type V construction shall comply with Sections 2603.2, 2603.3 and 2603.4.*

❖ All foam plastics used on exterior walls of all types of buildings, except wood frame, are to be installed in accordance with Sections 2603.5.1 through 2603.5.7. Installations on one-story, noncombustible walls of cold storage buildings are required to also comply with the provisions of Sections 2603.5.1 through 2603.5.7. Foam plastics used on exterior walls of Type V buildings are required to comply with Sections 2603.2, 2603.3 and 2603.4. The intent is to regulate the use of an insulating envelope over the exterior of a structure when the envelope provides no structural support other than the transfer of wind loads. It is recognized that some envelopes will be constructed in place by installing a rigid foam plastic and covering it with an exterior finish while others will be installed as prefabricated panels complete with exterior finish.

Figure 1: International Building Code Commentary

1.1* Scope.

1.1.1* This standard provides a test method for determining the fire propagation characteristics of exterior non-load-bearing wall assemblies and panels used as components of curtain wall assemblies, constructed using combustible materials or that incorporate combustible components, that are intended to be installed on buildings required to have exterior walls of noncombustible construction.

Figure 2: NFPA 285 Scope Description

A.1.1.2 NFPA 285 addresses fire exposures from interior fires that reach flashover, break exterior windows, and expose the building facade. It is not intended to address fire exposures that originate from the building's exterior.

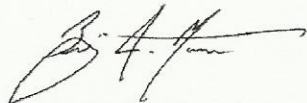
Figure 3: NFPA 285 Annex Description on Purpose of Fire Test

- Section 2306.6 is not applicable since the Korfil Insulation will not be installed within a roof assembly.
- Section 2306.7 is not applicable since the Korfil Insulation will not be installed within a plenum.
- Section 2306.8 provides requirements for termite protection. Howe Engineers did not review compliance with this section. It is assumed the manufacturer and designer will determine compliance with this section.
- Section 2306.9 is provided as a compliance alternative to Sections 2306.4 through 2306.7.

It is also important to note the Korfil insulation product has also been tested in accordance with ASTM E 119. The ASTM E 119 test results were provided and reviewed by our office. The test report indicates a 10 foot by 10 foot wall assembly constructed with grouted 8 x 8 x 16 inch block and Korfil foam inserts was tested with a live structural load throughout the test duration (up to 85 psi live load). The testing results state the tested wall assembly resisted the passage of flame and hot gases for minimum 2 hour duration (a 2-hour fire rating) with no flames occurring to the foam inserts within the block cavity. Although it is our understanding the proposed exterior wall is not required to be fire rated based on discussions with the architect, this ASTM E 119 test shows the concrete block wall assembly with the proposed Korfil foam insulation inserts is capable of resisting the passage of flame and hot gases.

Based on the information noted above, the results of our review indicate the proposed Korfil foam insulation inserts meet the intent of IBC Section 2603. The inserts comply with the flame spread and smoke develop indexes; are compliant with the thermal barrier requirements, and resist the exposure hazard of a fire spreading to adjacent floors through the exterior façade since they are installed within a concrete block wall. It is our professional opinion the proposed Korfil inserts are permitted within required noncombustible wall assemblies in accordance with the International Building Code.

Prepared by,



Ben Muscente, P.E. (not MD)
Project Manager