

ENGINEERING EVALUATION

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RENDERED TO

DURABOND PRODUCTS LTD.
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ON M1R 3B4 CANADA

PRODUCT EVALUATED: Logix Insulated Concrete Forms
With Durabond EIFS Cladding System
EVALUATION PROPERTY: CAN/ULC S101-04

Engineering Evaluation of Logix Insulated Concrete Forms with Durabond EIFS Cladding System for compliance with the applicable requirements of the following criteria: CAN/ULC S101-04, Fire Endurance Tests of Building Construction and Materials

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) is conducting an engineering evaluation for Durabond Products Ltd. (Durabond), on their Durabond EIFS Cladding System, to evaluate fire resistance. The evaluation is being conducted to determine if the Durabond ULC Listed product will maintain compliance with CAN/ULC S101-04, "Fire Endurance Tests of Building Construction and Materials" when installed on an Logix ICF product.

3 Product and Assembly Description

3.1. Product and/or Assembly Description:

The Logix ICFs are used as pour-in-place formwork for structural concrete which consists of expanded polystyrene (EPS) foam plastic panels and plastic webs. The ICF consists of rigid interlocking expanded polystyrene (EPS) foam plastic boards that serve as permanent formwork for reinforced concrete, exterior and interior walls, and foundation and retaining walls. The polypropylene webs are spaced at 8" (203mm) apart and maintain the EPS board facings at a fixed distance of 4" (102mm), 6.25" (159mm), 8" (203mm) or 10" (254mm). The standard forms are 16" (406mm) high by 48" (1219mm) long. The expanded polystyrene foam plastic complies with ASTM C578-05 as Type II product. The foam is 2 $\frac{3}{4}$ " (70mm) in thickness with a density of 1.45 pcf (23.23kg/m³).

Nudura ICFs were tested with Durabond's EIFS system in order to obtain a UL Listing. The Nudura ICF consisted of two 96" (2440mm) by 18" (457mm) by 2.64" (67mm) thick expanded polystyrene (EPS) insulation panels linked by polypropylene webs at 7.87" (200 mm) OC horizontally. The minimum width of the ICF cavity is 6" (152mm) and the maximum density of the EPS is 1.25 pcf (20 kg/m³). The expanded polystyrene foam plastic complies with ASTM C578-05 as Type II product.

The Durabond EIFS system is applied to the following specifications: A first layer of base coat is applied to the bottom 17.7" (450mm) of the wall at a minimum wet application rate of 10.5kg/m². The base coat consists of a mixture of 4 parts by weight of "Durex Uniplast" powder to 1.0 by weight of "Durex Acrybond S" liquid. A 17.7" (450mm) wide layer of fiberglass mesh reinforcement with an area density of 0.50kg/m² is installed horizontally trowel applied into the top surface of the first layer of base coat. A second layer of base coat is then applied to the entire wall surface at a minimum wet application rate of 4.73kg/m². The base coat consists of a mixture of 4 parts weight of "Durex Uniplast" powder to 1.0 part of "Durex Acrybond S" liquid. Following the base coat, a layer of fiberglass mesh reinforcement with an area density of 0.20kg/m² is installed vertically with 100mm overlap between strips. The mesh is to be trowel applied into the top surface of the second layer of base coat. A third layer of base coat is applied over the entire wall surface at a minimum wet application rate of 3.37kg/m². The base coat consists of a mixture of 4 parts by weight of "Durex Uniplast" powder to 1.0 part by weight of "Durex Acrybond S" liquid. Finally, one layer of premixed "Durex Architectural Coating" applied at a minimum wet application rate of 2.05kg/m² over base coat.

3.2. Product and/or Assembly Traceability:

The Logix ICF used as part of the Engineering Evaluation has not been used in prior tests with Durabond's EIFS system and therefore does not require sampling information.

The Nudura ICFs used in the fire tests in conjunction with Durabond's EIFS system was not the subject of the test and therefore required no sampling.

The Durabond EIFS system was being produced under the Follow-Up Service of Underwriters' Laboratories of Canada. The products already had ULC labels and in this way, traceability was established.

3.3. Product and/or Assembly Certification:

Logix ICF has been certified in several EIFS system design listings with Intertek. The listing numbers cannot be included in this evaluation for confidentiality reasons. They have also been certified with ICC with details outlined in ICC-ES ESR report 1642.

Nudura ICF is an Intertek and ULC certified product and is under Intertek and UL ongoing surveillance through Follow-up inspections. The Intertek Listing Report Number for Nudura Insulated Concrete Forms is Spec ID 18773. The ULC listing design numbers are W012 and W013.

The Durabond EIFS system consists of "Durex Uniplast", "Durex Acrybond S", and "Durex Architectural Coating". The production for this system including the various coatings takes place under the Follow-Up Service of ULC and has a design number of EW23.

Authorities Having Jurisdiction (AHJ) should be consulted in all cases as to the particular requirements covering the installation and use of Intertek certified products, equipment, systems, devices and materials. The AHJ should be consulted before construction. Fire resistance assemblies and products are developed by the design submitter and have been investigated by Intertek for compliance with specific requirements. The published information (product and design listings) cannot always address every construction nuance encountered in the field. When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the test standard referenced for each Intertek certified product. The test standard includes specifics concerning alternate materials and alternate methods of construction. Only products which bear Intertek's Mark are considered as certified. The appearance of a company's name or product in Intertek Directory of Listed Building Products does not in itself assure that products so identified have been manufactured under Intertek's Follow-Up Service. Only those products bearing the Intertek Mark should be considered to be Listed and covered under Intertek's Follow-Up Service. Always verify the Mark on the product before using it.

4 Reference Documents

As part of this evaluation, Intertek has directly or indirectly used the following referenced documents:

- CAN/ULC S101-04, "Fire Endurance Tests of Building Construction and Materials" (CAN/ULC S101-04)
 - ULC Design Listing FWFOC.EW23 (Durabond EIFS System)
 - ULC Design Listing O012 and W013 (Nudura ICF)
 - ULC Report Number R199530 (Project 05CAN17882) issued on November 10, 2005
 - Intertek Listing Spec ID 18773 (Nudura ICF)
 - ICC-ES ESR Report Number 1642
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5 Evaluation Method

The purpose of this evaluation is to determine if the Durabond ULC Listed product will maintain compliance with CAN/ULC S101-04 when installed on a Logix ICF product.

This evaluation is being conducted solely for the above referenced project or use or both. Due to the variables that exist from project to project and the fact that each evaluation requires review of the most current existing data and information, this evaluation is not to be used as justification for any other opinion nor used for any other project, without the express written consent of Intertek. This report should serve as Intertek's opinion regarding the use of the certified product in the conditions described herein. The materials used on the project, which are applied in compliance with Intertek Design Listings, must bear the Intertek listing mark. All certified products must be installed in accordance with the details contained in Intertek's Directory of Listed Building Products.

Durabond EIFS system has been tested with Nudura ICF products by ULC in Report Number R199530 (Project 05CAN17882) issued on November 10, 2005. Results showed that the system combination of the Nudura ICF and Durabond EIFS system described in Section 3.1 of this evaluation satisfied the 15 min remain in place requirement when subjected to CAN/ULC S101-04. The results of this test along with the system specifications were then summarized in ULC Design Listing FWFOC.EW23.

Durabond has requested this evaluation in order to determine if replacing the Nudura ICF with a Logix ICF will allow the system to maintain compliance with CAN/ULC S101-04 for a 15 minute stay-in-place fire resistance rating.

When evaluating an EIFS product installed over a foam insulation board, the property of concern is its contribution to fuel loading. Since polystyrene is a highly flammable material, by increasing the amount of polystyrene in the wall system, there is a higher chance the polystyrene will ignite and cause the EIFS system to fall off and fail the 15 minute stay-in-place test.

Nudura is currently listed with ULC for the following specifications with corresponding EPS insulation boards:

- Standard form units comprised of two 96" (2440mm) by 18" (457mm) by 2.64" (67mm) thick EPS panels with a maximum density of 1.25pcf (20 kg/m³)

Logix is currently listed with CCMC for the following specifications with corresponding EPS insulation boards:

- Form comprised of two 48" (1219mm) by 16" (406mm) by 2.75" (70mm) thick EPS panels with a nominal density of 1.45pcf (23.3kg/m³)

By calculation, a 1 foot by 1 foot square of EPS has the following fuel contribution for Nudura ICF:

$$1.25 \frac{lb}{ft^3} \times 2.64in \times \frac{1ft}{12in} \times 1ft^2 = 0.275lb$$

This means that for one panel of EPS board on the Nudura ICF, there is a total fuel load of:

$$0.275lb \times 96in \times 18in \times 2.64in = 1255lb * in^3$$

By calculation, a 1 foot by 1 foot square of EPS has the following fuel contribution for Logix ICF:

$$1.45 \frac{lb}{ft^3} \times 2.75in \times \frac{1ft}{12in} \times 1ft^2 = 0.333lb$$

This means that for one panel of EPS board on the Logix ICF, there is a total fuel load of:

$$0.333lb \times 48in \times 16in \times 2.75in = 703lb \cdot in^3$$

In order for the Logix material to be eligible for the same fire resistance rating as the Nudura ICF combined with the Durabond product, the fuel loading for the Logix ICF must be lower than the insulation board the EIFS is currently listed for on the ULC Design Listing FWFOC.EW23.

The maximum fuel loading for these products have been calculated and reported in the below table:

Table 1: Nudura Maximum Fuel Contribution

Product Name	Max Fuel Contribution per EPS panel (lb*in ³)
Nudura ICF	1255
Logix ICF	703

The Nudura ICF has a maximum fuel contribution of 1255 lbs*in³ per one EPS panel. The Logix ICF with a fuel contribution of 703 lbs*in³ will not increase the fuel loading of the assembly; therefore we can expect to see equivalent or better results.

In addition, a comparison of the plastic ties between the EPS panels for both systems was carried out. **Both ties are of a proprietary design and cover approximately the same area:** 144in²(93000mm²) The thickness of the ties are approximately 1/10" (3mm). This means that the amount of polypropylene material in the fire test is negligible and will not cause a significant difference between the two products.

Therefore, if the Durabond EIFS products are installed onto Logix ICF products as per the installation instructions in the ULC Design Listing FWFOC.EW23, it is Intertek's professional opinion that the assembly will maintain compliance to the 15 minute stay-in-place test of CAN/ULC S101-04. The Logix ICF must be maximum 1.45 pcf (23.3kg/m³) in density and must be compliant as a Type II material in accordance with ASTM C578-08 and CAN/ULC S701-05. Additionally, the EIFS Basecoat/Mesh shall be bonded to the concrete substrate at all openings and at the perimeter of all wall sections and control joints.

6 Conclusion

Intertek is conducting an engineering evaluation for Durabond, on their Durabond EIFS Cladding System, to evaluate fire resistance. The evaluation is being conducted to determine if the Durabond ULC Listed product will maintain compliance with CAN/ULC S101-04, "Fire Endurance Tests of Building Construction and Materials" when installed on an Logix ICF product.

Based on the information contained and referenced herein, it is Intertek's professional judgment based on sound engineering principles that the following is true:

The assembly composed of Logix ICF and the Durabond EIFS system will maintain compliance to the 15 minute stay-in-place test of CAN/ULC S101-04 provided that the Logix ICF has the following specifications:

- Form comprised of two 48" (1219mm) by 16" (406mm) by 2.75" (70mm) thick EPS panels with a nominal density of 1.45pcf (23.3kg/m³)
- The EPS component of the Logix ICF must be compliant as a Type II material in accordance with ASTM C578-08 and CAN/ULC S701-05
- EIFS Basecoat/Mesh shall be bonded to the concrete substrate at all openings and at the perimeter of all wall sections and control joints


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7 LAST PAGE & REVISION SUMMARY

DATE	SUMMARY
May 28, 2010	Original