TEST REPORT

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RENDERED TO

Fire Retardant Coatings of Texas
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PRODUCT EVALUATED: FX Lumber Guard Fire Retardant Coating on I-Joists in a Floor Ceiling Assembly
EVALUATION PROPERTY: Fire Resistance

Report of Testing FX Lumber Guard Fire Retardant Coating applied to I-joists in a floor ceiling assembly for compliance with the applicable requirements of the following criteria: *Modified ASTM E119-12a Standard Test methods for fire Test of Building Construction and materials, January 2012 Edition.*

1 Table of Contents

2 Introduction

Intertek Testing Services NA, Inc. (Intertek) has conducted testing for Fire Retardant Coatings of Texas on their FX Lumber Guard Fire Retardant applied to I-joists to evaluate the fire resistance of an overall assembly. Testing was conducted on June 23, 2014 as a **Modified ASTM E119-12a, Standard Test Methods for Fire Tests of Building Construction and Materials, 2012 Edition,** and **Modified CAN/ULC-S101-07, Standard Methods for Fire Endurance Tests of Building Construction and Materials.** The methods described in ASTM E119-12a and CAN/ULC-S101-07 are technically equivalent. CAN/ULC-S101-07 requires a roving thermocouple to assess potential hotspots which is not required in ASTM E119-12a.

3 Test Samples

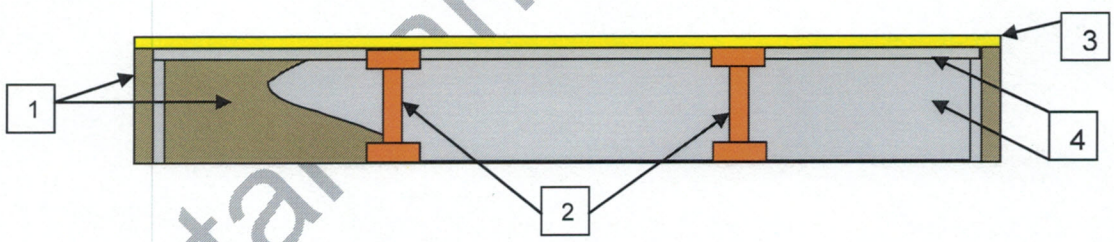
The test sample consisted of a 13- × 8-ft floor section with exposed I-joists and protected plywood decking.

3.1 SAMPLE SELECTION

Samples were submitted to Intertek directly from the Client. Samples were not independently selected for testing. Client supplied materials were received at the Evaluation Center on May 28, 2014 and assigned Intertek I.D. No. SAT1405281747-001 and SAT1405281747-002.

3.2 SAMPLE AND ASSEMBLY DESCRIPTION

A load bearing floor/ceiling assembly was constructed of FX Lumber Guard treated I-joists, 2 x 12-in. rim board, plywood decking, and gypsum wallboard (see Appendix A).



1. Wood Framing - The 13' x 8' exterior frame and rim board was constructed using 2'x12' lumber secured at each corner using three 3-1/2" Deckmate screws.

2. Joist – Two (2) Anthony Eacom, Inc., I-joists, Series PJI-60, 11-7/8-in. deep, nominal 1-1/2"x 2-1/2" top and bottom flanges with 9" OSB web. Per the Client, the I-joists were covered with one coat of FX Lumber Guard Fire Retardant Coating at an application of 325 sq. ft. per gallon. Intertek did not witness the application, or verify the thickness of the coating. Joists were installed nominal 24" o.c. and secured to the frame using two 3-1/2" Deckmate screws into each top and bottom flange (see Appendix A).

3. Plywood Decking – Four sections of 23/32" (.703") plywood were laid with the long edge perpendicular to the joists and secured to the frame and joist using Grip Rite 8d 2-1/2" (6.35 cm) Bright Common nails. An 1/8" groove was then cut into the plywood the length

of the joist across all 4 plywood sheets deep enough to separate the sheets but not deep enough to the infringe on integrity of the joist.(see Appendix A).

4. Interior Cladding – The inside surface of rim board and the underside of the decking were lined with a layer of 5/8" GridMarx Gold Bond® Brand Fire-Shield Wallboard (National Gypsum®) secured with 1-1/4" coarse drywall screws spaced evenly at 8" o.c. on the underside of the decking and inside surface of rim board. The joints across the deck were taped and covered with joint compound; all fasteners were covered with joint compound (see Appendix A).

4 Testing and Evaluation Methods

4.1 INSTRUMENTATION

The unexposed surface of the assembly was instrumented with a total of nine (9) 24 GA, Type K, fiberglass jacketed thermocouples installed on the floor. TC#s 1-3, 5-7 and 9 were centered on various sections of the decking, and TC#s 4 and 8 were installed over the groove on each of the I-joists (see Appendix A). The output of the thermocouples and the furnace probes was monitored by a 100-channel Yokogawa, Inc., Darwin Data Acquisition Unit. The computer was programmed to scan every 6 s and save data every 30 s. Following the test, the files were imported into MS Excel for tabular and graphical display (presented in Appendix B).

Two linear voltage displacement transducer string pots were located at mid-span over each I-joist. Additionally, a tape measure was placed at the center of the sample so the deflection of the unexposed surface could be measured during the course of the test. A graph of the deflection is presented in Appendix B

4.2 TEST STANDARD

Testing was conducted in accordance with the applicable requirements and following the methods of a **Modified ASTM E119-12a, Standard Test Methods for Fire Tests of Building Construction and Materials, 2012 Edition.**

4.3 DEVIATION FROM STANDARD METHOD

Sample did not meet the standard of 180 sq. ft. requirement for floor/ceiling assemblies as specified in Section 8.6.2.1 of ASTM E119-12a and Section 12.2.1 of CAN/ULC-S101-07.

Per Section 7.4, of ASTM E119, and Section 10.4, of CAN/ULC-S101-07, the maximum-load condition allowed under nationally recognized structural design criteria was not applied. However, a reduced load of 14% allowable stress design was requested by the Client and would be a limited design criterion for this assembly in a test in accordance with ASTM E119, or a restricted load is condition in a test in accordance with CAN/ULC-S101-07.

The load was applied over the beams and was not evenly distributed.

5 Testing and Evaluation Results

The test was conducted on June 23, 2014. The ambient temperature at the time of the test was 86 °F and the relative humidity was 67%. The Client-requested load of 234 lbs. per joist was

applied evenly along each I-joist (See Appendix A) by placing concrete blocks evenly along the line of each I-joist creating an applied force equal 18.35 lbf/ft. Note, the load was only applied directly over the joists and not evenly distributed over the entire floor. In addition to a dead load for the assembly of approximately 16 lbf/ft, this resulted in approximately 14% of the full allowable stress design (ASD) bending design load of the I-joists. The live load limited design criterion and restricted load condition is 9 lbf/ft^2.

Observations made during the test are listed below:

Time (min:sec)	Observation
0:00	The test was initiated at 11:03AM
2:04	There was smoking on the unexposed surface
4:11	There was charring on the exposed joists
5:00	There was a 1-1/2" deflection at the center of the assembly
6:00	The deflection at the center had increased to 2"
10:00	The deflection measured 2-3/4" and there were cracking sounds from the sample
10:30	There was flaming the top of the joist and on the underside of the OSB. The deflection had increased to 3"
15:30	The deflection measured 3-1/2"
17:00	The burners were extinguished and the test was terminated

The test assembly withstood the effects of the fire resistance test without passage of flame, of gases hot enough to ignite cotton waste. Transmission of heat across the test assembly did not raise the average temperature on the unexposed surface more than 250°F above the average initial temperature, or the temperature at any single thermocouple more than 325°F above the initial temperature.

Two linear voltage displacement transducer string pots were located at mid-span over each I-joist. One of the string pots malfunctioned 9 min 12 s into the test. Based on a decrease in the slope of the load deflection curve from the deflection data, the I-joists ceased load carrying capability at 8 min 48 s, and the load was transferred to the protected plywood decking. A summary of the deflections from the tape measure are presented in the table below:

Time (min)	Position 1 (in)
Load Applied 234 lb per joist (18.35 lb per linear ft per joist)	0
0:00	0
5:00	1-1/2"
6:00	2"
10:00	2-3/4"
15:30	3-1/2"

6 Conclusion

Intertek Testing Services NA, Inc. (Intertek) has conducted testing for Fire Retardant Coatings of Texas on their FX Lumber Guard Fire Retardant Coating to evaluate the fire resistance of a floor ceiling assembly. Testing was conducted in accordance with the applicable requirements and following the standard methods of **Modified ASTM E119-12a, Standard Test Methods for Fire Tests of Building Construction and Materials, 2012 Edition**, which is equivalent to **Modified CAN/ULC-S101-07, Standard Methods for Fire Endurance Tests of Building Construction and Materials.** The test was conducted on June 23, 2014.

Based on the data from this test, the floor-ceiling assembly described herein met the following conditions for the test duration of 17 minutes:

- The test assembly sustained the superimposed load (14% of full Allowable Stress Design (ASD) bending design load),
- The test assembly withstood the effects of the fire resistance test without passage of flame, of gases hot enough to ignite cotton waste, and
- The test assembly limited transmission of heat and did not raise the average temperature on the unexposed surface more than 250°F above the average initial temperature, nor the temperature at any single thermocouple more than 325°F above the initial temperature.
- No hotspots were visible on the assembly necessitating the use of the roving thermocouple. This is requirement of CAN/ULC-S101-07 only.

These test results do not constitute a fire resistance rating based on testing in full compliance with ASTM E119 or CAN/ULC-S101.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK TESTING SERVICES NA, INC.

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