

Welcome to the

2018 Annual Conference Educational Sessions

Session: New High Performance Fire Resistance Coating Applications

Sponsored by

ORACLE®



*Providing the Most Advanced
Intumescent and Fire Retardant Coating
Solutions for Passive Fire Protection*

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The New Generation of Passive Fire Protection

Company Background:

- Global Fire Proof Solutions (GFS), is a corporation with a portfolio of top tier Intumescent and Fire Retardant Solutions supporting projects throughout the United States and Canada.
- Intertek-Certified Factory Applicators with 3 factory applications facilities across the Southern United States. (Intertek CCRR-1044)
- The management team of GFS has over 30 years of industry and field application experience of high performance chemicals
- This extensive knowledge has greatly assisted in the awareness and education of this new generation of Intumescent Technology to Fire Officials, Building Officials, Architects and Builders



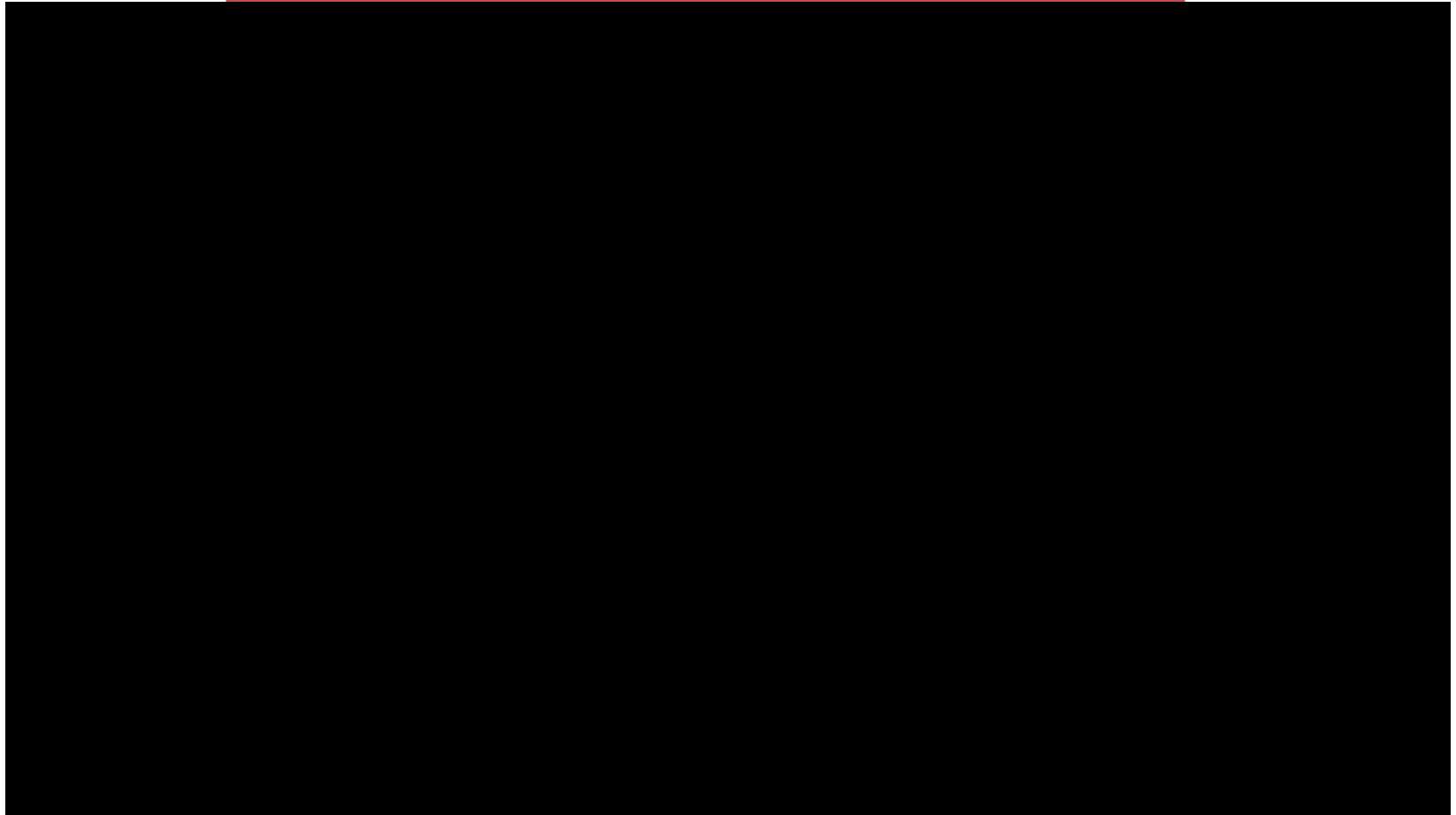
The New Generation of Passive Fire Protection



Educational Presentations and Live Demonstrations



The New Generation of Passive Fire Protection



The New Generation of Intumescent Solutions



Structural Steel

1 and 2 Hour Fire
Ratings



Structural Wood

Upgrade unrated wood
assemblies to 1 and 2
Hour rated assemblies



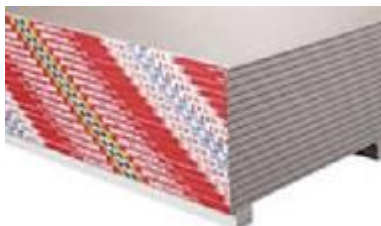
Decorative Wood

Transparent and
Class A Rated



Thatch and Bamboo

Class A Rating



Gypsum

Upgrade FireWalls
from 1 Hour to 2 Hour



Plastics

Class A Fire Rating –
Reduce Toxic Smoke by
over 80%

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Nationally Recognized Accredited Laboratories

<https://www.osha.gov/dts/otpc/nrtl/nrtllist.html>

Most common Fire Testing Laboratories

- Underwriters Laboratory
- InterTek
- Guardian
- Western Fire
- QAI

The screenshot shows the OSHA website header with the United States Department of Labor logo and navigation links. Below the header, the 'Nationally Recognized Testing Laboratory Program' section is visible, featuring a banner image of a hand working on a circuit board. Under the banner, the 'Current List of NRTLs' is displayed, listing four laboratories: CSA Group Testing and Certification Inc., Curtis-Straus LLC (CSL), FM Approvals LLC (FM), and International Association of Plumbing and Mechanical Officials EGS (IAPMO). Each entry includes the laboratory's logo, name, and address.

Logo	Company Name	Address
	CSA Group Testing and Certification Inc.	178 Rexdale Boulevard Etobicoke, Ontario M9W 1R3 Canada
	Curtis-Straus LLC (CSL)	One Distribution Center Circle, Suite#1 Littleton, Massachusetts 01460 United States
	FM Approvals LLC (FM)	1151 Boston-Providence Turnpike Norwood, Massachusetts 02062 United States
	International Association of Plumbing and Mechanical Officials EGS (IAPMO)	5001 East Philadelphia Street Ontario, CA 91761



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FIREPROOFING

- **Fireproofing** is recognized to play a crucial role in establishing building safety and generally refers to the protection of the structural steel and other supporting members in a building.
- **Traditional fireproofing materials** include concrete encasement, gypsum wallboard and coatings categorized as Spray Applied Fire Resistive Materials (SFRM) that typically is composed of ingredients such as mineral wool, cement and gypsum and can vary in density
- **Intumescent fire resistive coatings** are newer fireproofing materials. They are paint-like coatings that are applied to structural steel, structural wood and gypsum firewalls.



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FIREPROOFING

Manufacturers of Fire Resistant/Retardant Coatings

- Carboline (division of RPM)
- International Paint Protective Coatings (Akzo Nobel)
- Albi Manufacturing, a Division of StanChem, Inc.
- Isolatek International (Cafco Products)
- PPG
- Shield Industries
- Fire Retardant Coatings of Texas (FRCT)
- Flamemaster Corp.
- Thermal Product Research (TPR2)
- Flame Control Coatings, LLC
- **All of these fire proofing materials are designed to provide an insulating barrier between a fire and the structural members.**
- **Because the intumescent coatings have paint-like properties, they are now the preferred fireproofing material with architects and designers.**



The New Generation of Fire Retardant Solutions

What are FIRE RETARDANTS?

Fire Retardants are applied to combustible materials, (wood, fabric, paper) and are designed to reduce the rate of flame spread. They look very similar and have a viscosity to a paint or stain, generally are clear or opaque in color.

Fire Retardants are designed to be a penetrant, so the substrate can maintain it's natural aesthetics. Fire retardant treated material can burn, but generally very slowly.

Fire Retardant Treated Wood is required to be tested to meet several recognized standards, the most notable being the ASTM E2768 (30 minute) standard.



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FIRE RETARDANT vs FIRE RESISTANT

There are actually two types of coatings on the market that are designed for use on different substrates and that respond very differently when exposed to fire.

Fire Retardant coatings are applied to combustible materials, (wood, fabric, paper) and are designed to reduce the rate of flame spread. They look very similar and have a viscosity to a paint or stain, generally are clear or opaque in color.

Fire Retardants are designed to be a penetrant, so the substrate can maintain it's natural aesthetics. Fire retardant treated material can burn, but generally very slowly. Fire retardants do not have same high temperature resistance as Fire Resistive Coatings.



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FIRE RETARDANT vs FIRE RESISTANT

Fire Resistant coatings provide insulation to the substrate. Intumescent fire resistant coatings work by chemically reacting to fire and creating an insulation barrier by expanding their volume from **10 to 30 times** and generating an ash-like char layer that erodes as fire exposure continues.

These coatings are given fire ratings (1,2 and 3 hours).

Intumescent coatings are generally referred to as “**thin film**” coatings and are measured by their thickness. Not all intumescent coatings are chemically made the same, therefore each manufactured product will vary in mil thickness requirements to meet a fire rating.



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Intumescent Coating
Flat White in Color



Fire Resistance

Fire Retardant Coating
Clear in Color



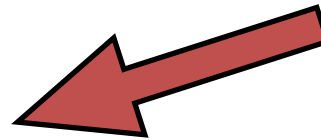
Fire Retardant

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Intumescent Coating Reaction to High Heat



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Intumescent Coating
reaction to high heat fire

- In a fire situation, a chemical reaction will cause the coating to expand many times its original thickness
- This chemical reaction provides an insulating foam-like carbon coating or "char" which protects the substrate from the fire

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Fire Retardant Treated Wood (FRTW) Coating Test Standards

Does a Class A rating require the extended 30-minute test?

- To qualify for Class A, a material must have a Flame Spread index of 0-25 and a Smoke Developed index of 0-450 in the 10-minute tunnel test. It does NOT have to undergo the 30-minute test.
- However, to meet model code requirements for FRT wood, a material must pass Class A and not exhibit progressive combustion in the extended 30-minute test.



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ASTM E-84 – Test Method for Surface Burning Characteristics
of Building Materials



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Fire Retardant Coating Test Standards

The standard ASTM test for flame retardant coatings is ASTM E84, which lasts for 10 minutes. The test evaluates flame spread and smoke development.

This test method incorporates a 25' by 20" chamber with a gas burner that is lit at one end of the tunnel, which is then exposed to a forced draft at the burner end, allowing for the flame to spread along the specimen. In addition, the amount of smoke is measured in the exhaust duct of the tunnel

Coatings that are meant to protect combustible substances are tested over Douglas Fir and are classified as either:

- Class A (Flame Spread under 25, Smoke below 450),
- Class B (Flame Spread between 26 and 75, Smoke below 450)
- Class C (Flame Spread between 76 and 200, Smoke below 450).



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Fire Retardant Treated Wood (FRTW) Coating Test Standards

The standard, ASTM 2768 or formally known as ASTM E84-10, Extended 20 minutes was adopted in 2011.

IBC 2303.2 (2012):

Fire-retardant-treated wood is any wood product which, when impregnated with chemicals by a pressure process *or other means during manufacture*, shall have, when tested in accordance with ASTM E 84 or UL 723, a listed flame spread index of 25 or less and show no evidence of significant progressive combustion when the test is continued for an additional 20-minute period.

In addition, the flame front shall not progress more than 10.5 feet beyond the centerline of the burners at anytime during the test.



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Fire Resistive Coatings Test Standards

- Fire resistive coatings are given fire ratings (1, 2 and 3) depending on the length of time for which they can provide this protection.
- Adhesion, char integrity and char growth are critical. The standard test for these materials for a cellulosic fire is ASTM E119 (UL 263, NFPA 251, UBC 7-1), which involves placement of the coated part in a furnace for as many as 3-4 hours.
- UL 1709 is the test used when it is necessary to simulate a hydrocarbon fire, which can reach very high temperatures very quickly (2000°C within 5 minutes).



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IBC Chapter 1

Section 104 – Duties and Powers of Building Officials

-Alternative Methods

104.11 Alternative materials, design and methods of construction and equipment.

The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. *An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.*

104.11.1 Research reports.

Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.



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Sprinklers

Section 8.15.1.2.11 of NFPA 13 Standard:

Concealed spaces in which the exposed materials are constructed entirely of fire-retardant treated wood as defined by NFPA 703 ... shall not require sprinkler protection. NFPA 13 is referenced in the IBC and satisfies the Life Safety Code, NFPA 101



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*Passive and Active Fire Protection Components
are like Seat Belts and Airbags*



*Working Together for the Same Goal –
Life Safety*



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IFC Chapter 7

SECTION 703 FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance

The required fire-resistance rating of fire-resistance-rated construction (including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems) shall be maintained. Such elements shall be properly repaired, restored or replaced when damaged, altered, breached or penetrated. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with approved methods capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of approved construction meeting the fire protection requirements for the assembly.



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IFC Chapter 8 - Interior Finish, Decorative Materials and Furnishings

SECTION 801 GENERAL

SECTION 802 DEFINITIONS

SECTION 803 INTERIOR WALL AND CEILING FINISH AND TRIM IN EXISTING BUILDINGS

SECTION 804 INTERIOR WALL AND CEILING TRIM IN NEW AND EXISTING BUILDINGS

SECTION 805 UPHOLSTERED FURNITURE AND MATTRESSES IN NEW AND EXISTING
BUILDINGS

SECTION 806 DECORATIVE VEGETATION IN NEW AND EXISTING BUILDINGS

SECTION 807 DECORATIVE MATERIALS OTHER THAN DECORATIVE VEGETATION IN NEW
AND EXISTING BUILDINGS

SECTION 808 FURNISHINGS OTHER THAN UPHOLSTERED FURNITURE AND
MATTRESSES OR DECORATIVE MATERIALS IN NEW AND EXISTING
BUILDINGS



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IFC Chapter 8

803.4 Fire-Retardant Coatings

The required flame spread or smoke-developed index of surfaces in existing buildings shall be allowed to be achieved by application of approved fire-retardant coatings, paints or solutions to surfaces having a flame spread index exceeding that allowed.

Such applications shall comply with **NFPA 703** and the required fire-retardant properties shall be maintained or renewed in accordance with the manufacturer's instructions.



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Building Classes

All construction types must be classified into the following:

- **Fire Resistive** (IBC Type IA)
- **Modified Fire Resistive** (IBC Type IB)
- **Masonry Noncombustible** (IBC Type IIA)
- **Light Noncombustible** (IBC Type IIB)
- **Joisted Masonry** (IBC Type III, IBC Type IV)
- **Frame Construction** (IBC Type V)



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The most common tests for measuring the fire resistance of materials are **ASTM E-84, NFPA 286 and ASTM E-119**



E84
Steiner Tunnel Test



NFPA Corner
Room Test



E119
Wall Test

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NFPA 286 – Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth (a.k.a. the Room Corner Test)

A room is constructed in an indoor laboratory from wood framing, light gage metal framing, or concrete block. The room door opening remains an opening without a door. Interior walls and ceiling of the room are covered with the test material. A gas burner of specific height is placed in one corner of the room, and thermocouples are located at specific locations within the room. Duration of the test is 15 minutes. For the first five minutes the burner is operated at an output of 40 kW. After five minutes the burner output is increased to 160 kW and remains at 160kW for the final ten minutes of the test.



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ASTM E-119 – Test Methods for Fire Tests of Building Construction and Materials

A **fire-resistance rating** typically means the duration for which a passive fire protection system can withstand a standard fire resistance test.



Fire resistance ratings are usually expressed in terms of hours of fire resistance (e.g., ¼ hour, ½ hr, 1, 1½, 2, 3, 4 hour).

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Industrial Applications



Steel Plants – Polypropylene Tanks



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GFS Industrial Fire Armor

Side by Side testing of Schutz MX-EX totes

- Both tanks filled with 250 gallons of water
- Tote on left has no coating
- Tote on right has GFS Fire Armor
- Fire is from 5 gallons of diesel fuel
- Test was stopped at 15 minutes – only as a result of fuel running out.
- Flame temperature = 2,000F (aprox.)

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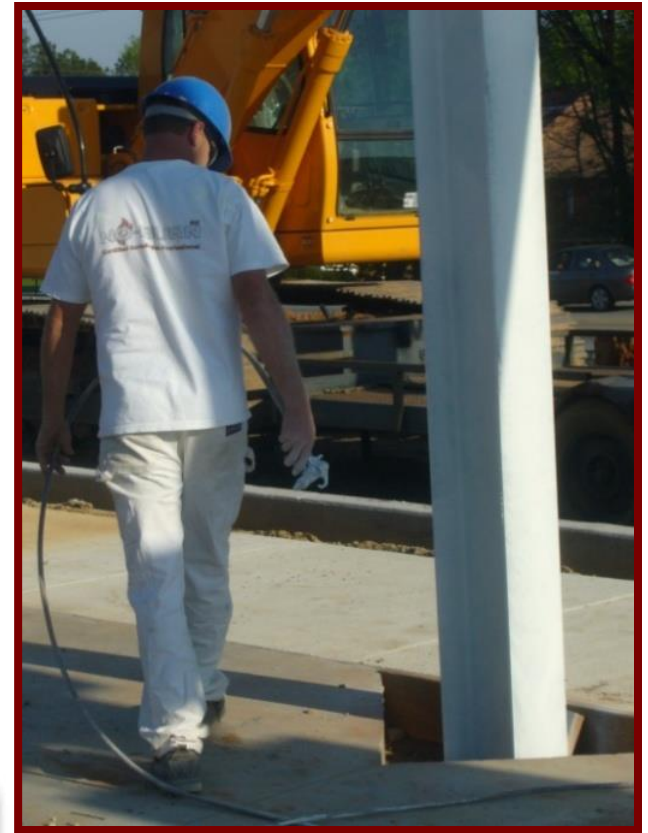
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**Cementitious
Application**



Structural Steel

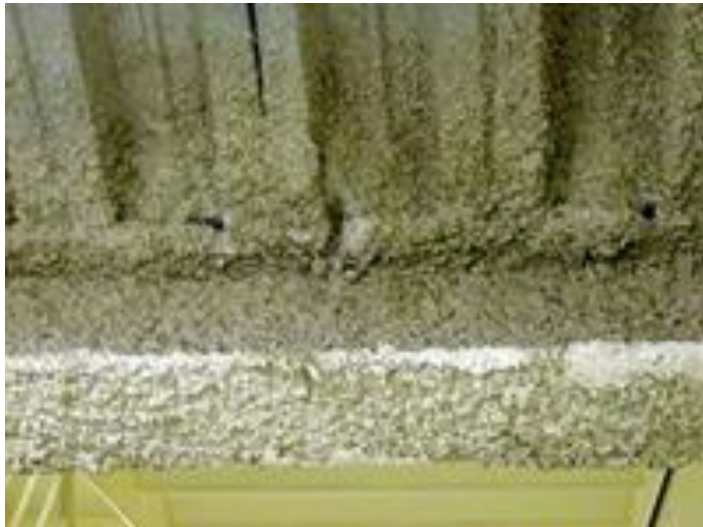
**Intumescent
Application**



GLOBAL
FIREPROOF SOLUTIONS, INC

The New Generation of Intumescent Solutions

Structural Steel



Cementitious

vs



Intumescent

Visual Comparison

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Structural Steel



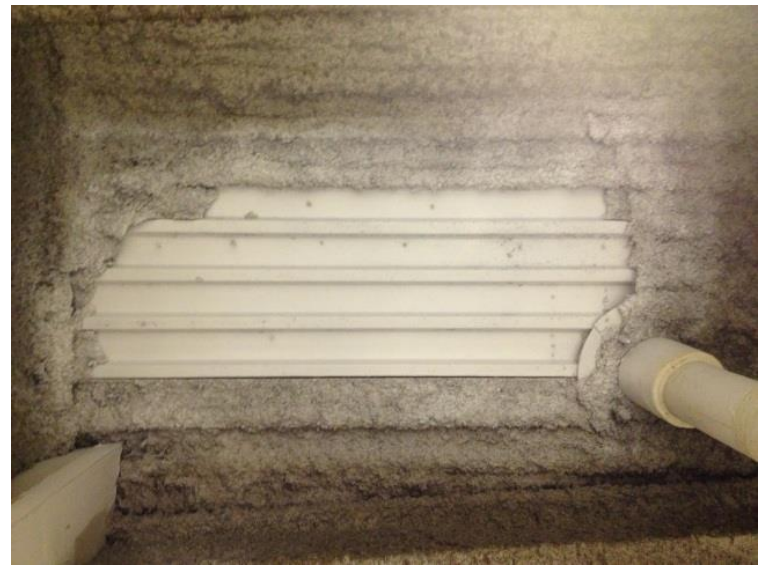
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Structural Steel



Not Code Compliant

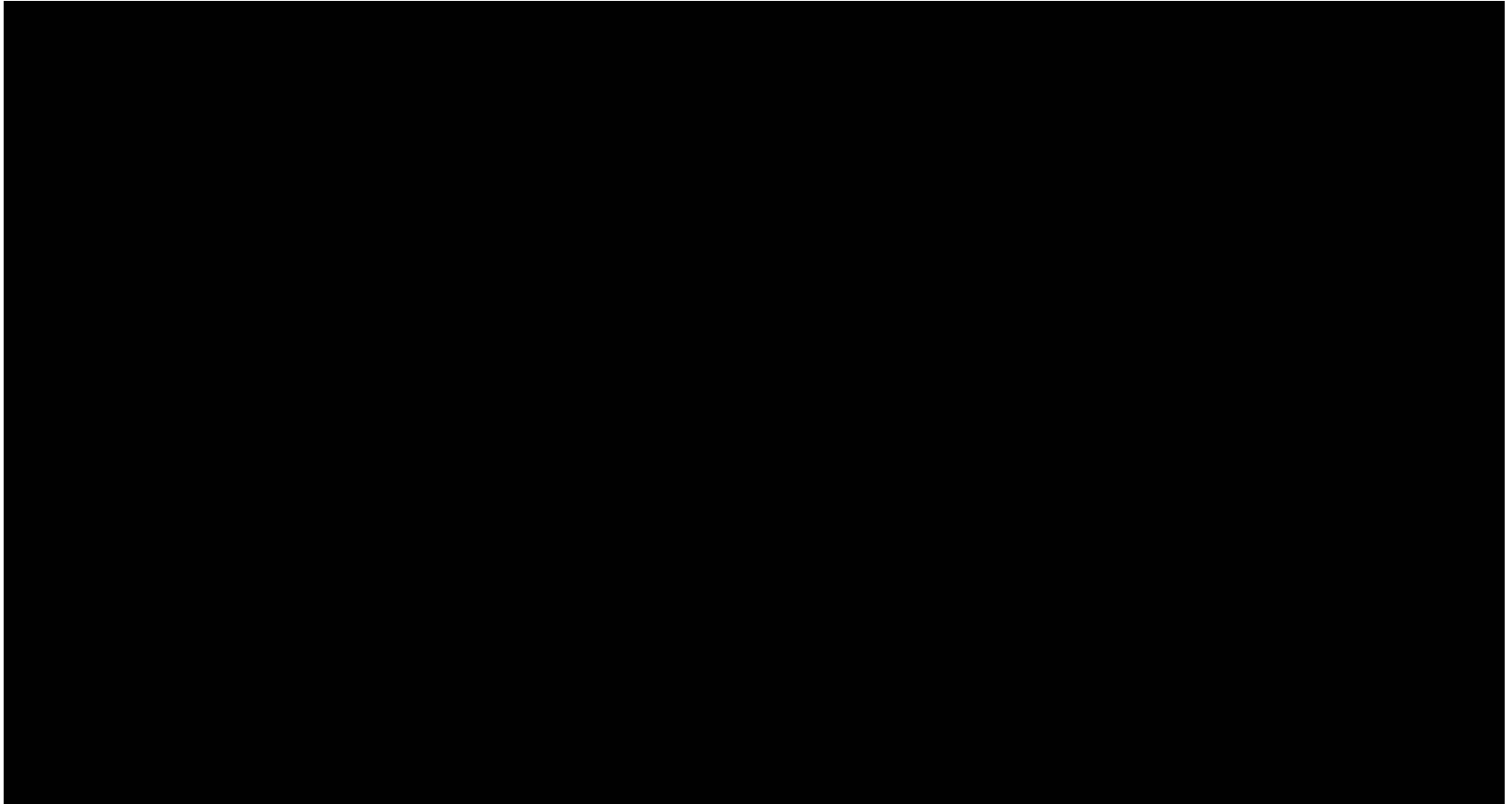
vs



Code Compliant

Intumescent Coatings can be used to “patch” damaged existing fireproofing

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Engineered Wood Products



An engineered wood joist, more commonly known as an **I-joist**, is a product designed to eliminate problems that occur with conventional wood joists.

Invented in 1969, the I-joist is an engineered wood product that has great strength in relation to its size and weight.

An I-joist has two main parts, the web and flange. The web is sandwiched between a top and bottom flange, creating the “I” shape.

The web is typically made from plywood, laminated veneer lumber, or oriented strand board.

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Engineered Wood Products



For exposed Pre Engineered I-joist, Code requires a 15 Minute Thermal Barrier on the underside of the floor framing members which can be provided with:

- 1/2-inch gypsum wallboard membrane
- 5/8-inch wood structural panel membrane
- Or “equivalent”
(i.e. *Tested Intumescent Coating*)

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Engineered Wood

Before
Application

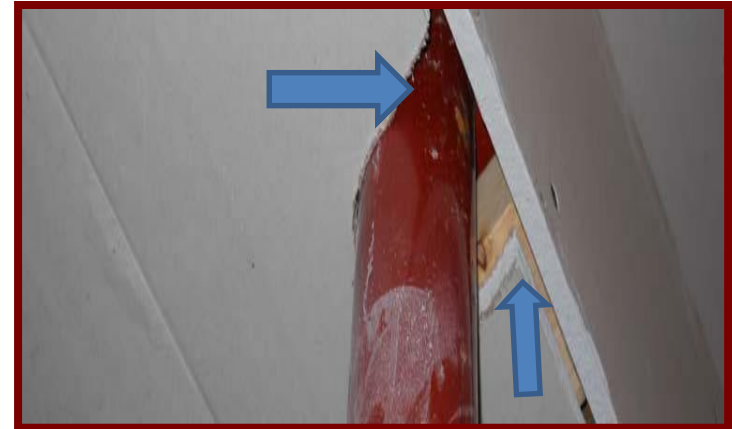
After
Application



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15 Minute Thermal Barrier -

The challenge and/or concern is that the Code does not require the seams or penetrations of the ½" Gypsum or 5/8" Thermal Barrier to be filled?



The New Generation of Fire Retardant Solutions

Fire-retardant-treated 30-Minute Rated OSB:

For the first time in the industry, a Fire Retardant has tested successfully to Class A 30-Minute on OSB.

FX Lumber Guard XT is the FIRST chemical to pass testing for Class A 30-minute Fire-Rated OSB that has equivalent fire performance to FRTW Plywood.

This chemical does NOT reduce the strength of the lumber, and can treat OSB because it does not require pressure impregnation.



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Engineered Wood Products

Fire protection of floors shall not apply to the following:

- Floor assemblies located directly over a space protected by a NFPA13D/P2904, or other equivalent sprinkler system
- Floor systems located directly over a crawl space
 - Must not be intended for storage
 - No fuel-fired appliances
- Floor systems using dimensional lumber of $\geq 2 \times 10$
- Floor systems of structural composite lumber $\geq 2 \times 10$ (e.g. LVL)
- Portions of the floor that:
 - Do not exceed 80 SF per story
 - Fire blocking in accordance with R302.11.1 installed along perimeter of unprotected portion



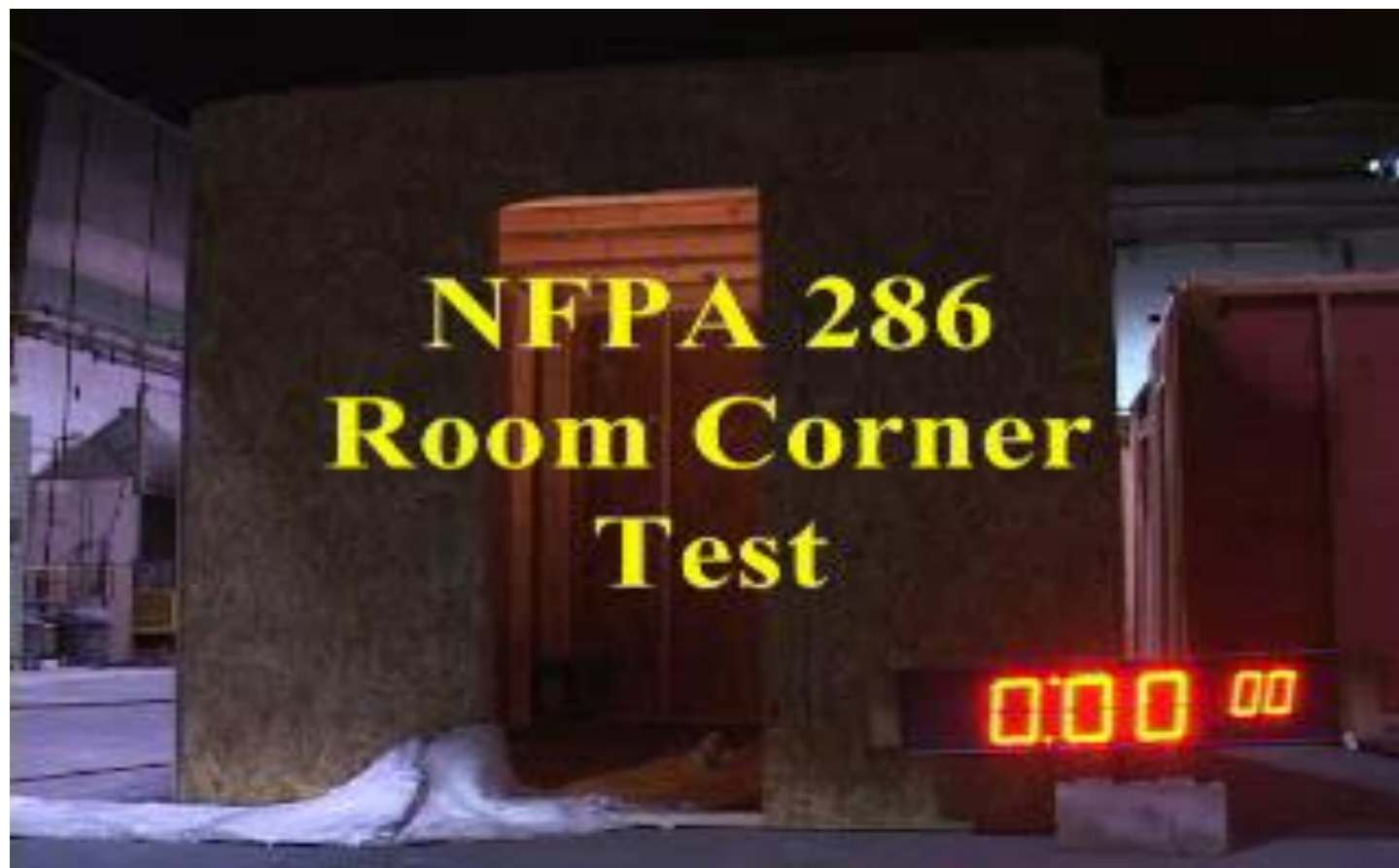
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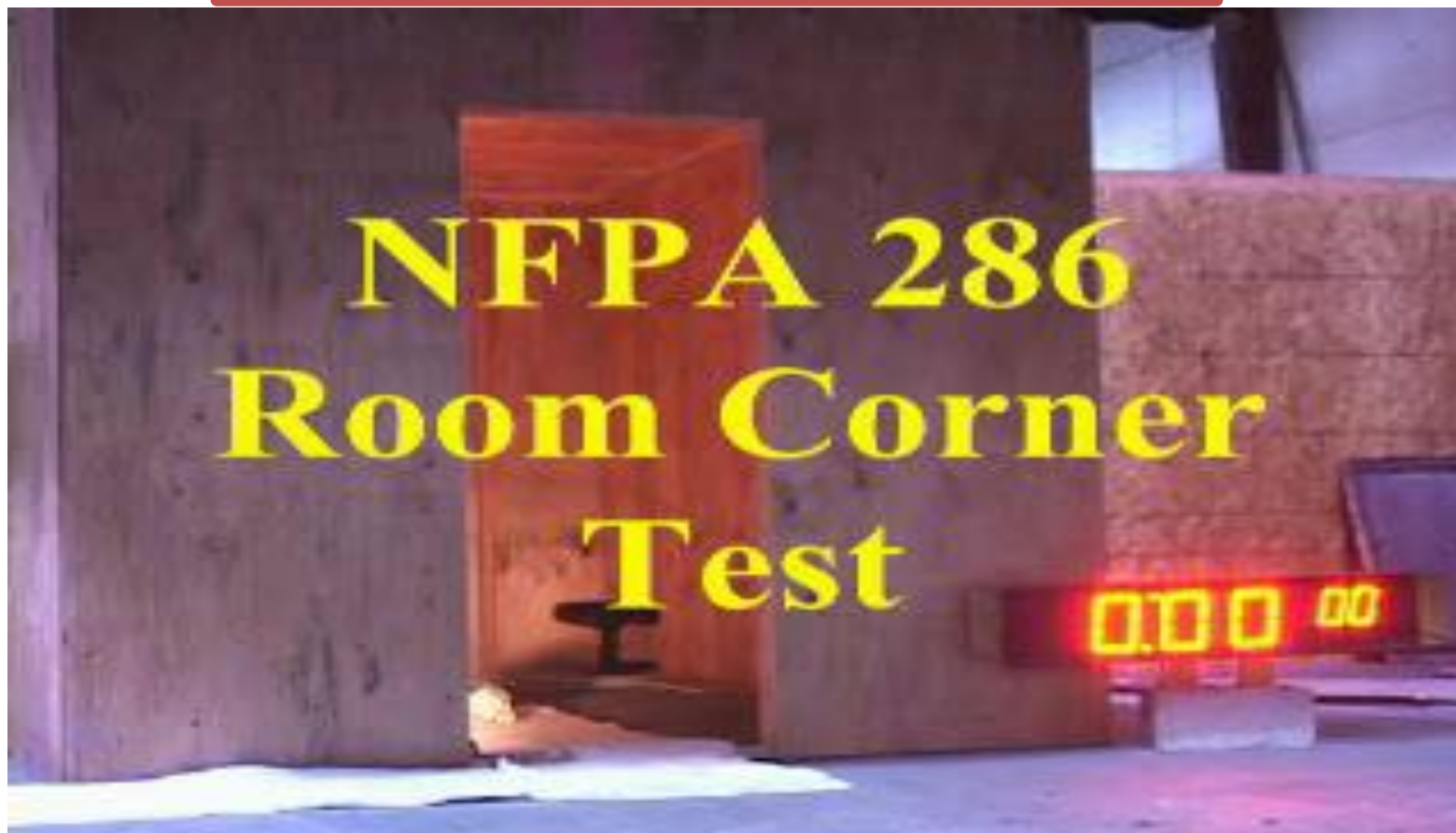
FireWalls:
To Correct
Non-rated Wood
Roof Decks,
Intumescent
Coatings applied to
Wood Roof Deck
4' From
Fire Wall meet
Code
Requirements



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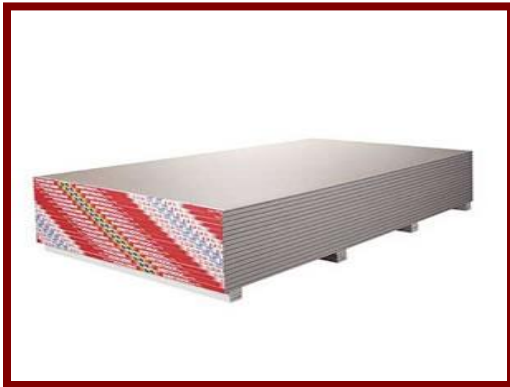


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UPGRADE FIREWALLS AND FIRE RATED CEILINGS

For existing and new construction, Certified Intumescent Applications have the ability meet and exceed the standards;

- UPGRADE 1/2" Gypsum 1 HOUR Wall with Wood or Metal Studs to 2 HOUR
- UPGRADE 5/8" Gypsum 1 HOUR Wall with Wood or Metal Studs to 2 HOUR
- UPGRADE 1/2" Gypsum 15 MINUTE Ceiling on Wood Truss to 2 HOUR



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UPGRADING A
1-HOUR FIREWALL
TO A 2-HOUR
FIREWALL



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Spray Foam Insulation – Ignition and Thermal Barrier



Examples of Spray Foam Insulation

**CODE REQUIRES ALL EXPOSED
SPRAY FOAM INSULATION TO
HAVE AN IGNITION AND/OR
THERMAL BARRIER**

**Intumescent Coatings
provide Ignition and
Thermal Barrier Ratings**



The International Building Code requires polyurethane spray foam be separated from the interior of the building by an ignition or 15 minute thermal barrier.

Ignition Barrier – Intumescent Coatings that have a Class A rating qualify for Ignition Barrier Fire Protection.

Thermal Barrier - Intumescent Coatings that have successfully passed the NFPA 286 – 15 Minute Test over closed and open cell foam qualify for Thermal Barrier Fire Protection.

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Spray Foam Insulation – Why Do Codes Require Thermal or Ignition Barriers?

Spray polyurethane foam (SPF), like most other organic materials, is combustible. SPFs are formulated with flame retardants to decrease the flame spread as measured by ASTM E-84 and other tests.

However, these flame spread indices are used solely to measure and describe properties of products in response to heat and flame under controlled laboratory conditions. The numerical flame spread indexes are not intended to reflect hazards presented by SPFs or any other material under actual fire conditions.



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Spray Foam Insulation – Why Do Codes Require Thermal or Ignition Barriers?

When exposed to fire sources, such as trash fires, welding arcs, cutting torches, or red-hot metal, unprotected SPF can ignite and may result in a flash fire.

Although burning SPF will form a surface layer of less flammable char, the initial burning can produce combustible gases and black smoke.

In confined interiors, these combustible gases can accumulate and ignite resulting in flashover, a dangerous fire situation. Under these conditions, additional foam and/or other combustibles can become involved in the fire creating additional combustible gases and feeding the fire.



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Specialty Applications



Class A rated, clear penetrating intumescent fire retardant coatings can prevent the spread of fire on raw vegetative and wood substrates. It greatly contributes in preventing ignition and spread of flames when exposed to direct flames or intense heat.

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Application Training and Certification



Applicator Training

In order to become a certified applicator, a initial 3 day program provided by GFS must be completed which covers product and application training in conjunction with regulatory and code compliance knowledge.

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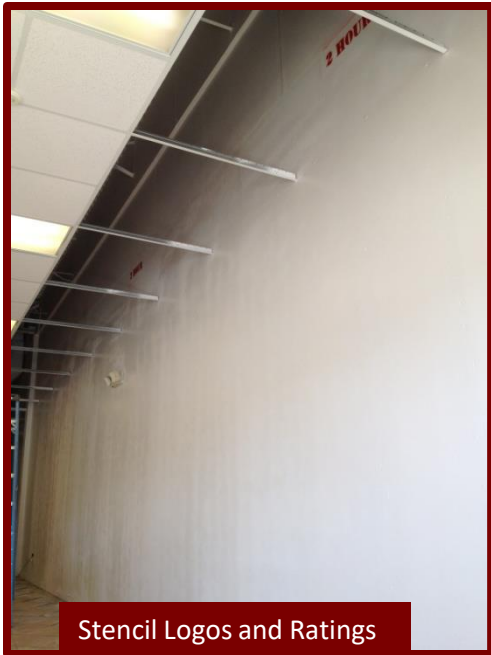
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Structural Steel – Intumescent Coating Mil Verification



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Application Identification and Verification



Stencil Logos and Ratings



Wet Mil Gauge



Dry Mil Meter

Application Identification:

In addition to the Application Certificate, stencil identification is applied.

Inspections:

During application a wet mil gauge is used to verify the amount of mils per coating.

After application is dry, a meter is used to verify mils.

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		Application Certificate	
Intumescent Coating Application			
<small>Global Fireproof Solutions, as an approved applicator, certifies that the structure(s) listed below having been treated with an Intumescent Coating in sufficient quantity to achieve the recommended film thickness associated with the fire rating and test standard(s) stated herein. Intumescent Coatings have been tested by independent laboratories and its formulation has been certified to comply with the indicated test standard(s) to achieve the stated fire rating(s). While Intumescent Coatings can increase the fire rating of the treated surface, this product is not capable of preventing any type of fire from occurring, nor can it protect from fire of a criminal nature. Global Fireproof Solutions certifies that the product applied complies with the manufacturers specifications and has not been altered or adulterated in any manner. The terms and conditions of the manufacturers warranty for this product are stated in full within the manufacturers limited warranty.</small>			
Client Information		Project Information	
Name: _____		Name: _____	
Address: _____		Address: _____	
Contact: _____		Contact: _____	
Phone: _____		Phone: _____	
Email: _____		AHJ: _____	
Description of Application			
_____ _____ _____			
Product Used: _____		Rating: _____	Lot#: _____
Applicable Test Standard(s):			
<input type="checkbox"/> ASTM E-119 - 1 Hour	<input type="checkbox"/> ASTM E-84 - Extended 30 Minutes	<input type="checkbox"/> NFPA 703 - Class "A"	
<input type="checkbox"/> ASTM E-119 - 2 Hour	<input type="checkbox"/> NFPA 255 - Class "A"	<input type="checkbox"/> Ignition Barrier	
<input type="checkbox"/> ASTM E-84	<input type="checkbox"/> NFPA 701 - Class "A"	<input type="checkbox"/> Thermal Barrier	
Date of Issuance: _____		Authorized Applicator ID#: _____	Name: _____

Application Certificate

- GFS Certified Applicators will perform the field application and provide an Application Certificate for every completed project.
- Copies of the Certificate will be forwarded to the Authority Having Jurisdiction (AHJ) and to GFS Corporate, to be added to our Certificate Database.



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Summary:

- Realistically, no building is fire proof!
- **However**, leveraging Tested and Approved Intumescent Technologies will greatly improve structural preservation and life safety for any structure

www.GlobalFire.us



Thank You For Attending

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