

3M™ FireDam™ Intumescent Coating WB 1000

WB1000 Training Module



Thinner is Better



What Is It?

Intumescent

A thermal-chemical process whereby exposure of a material to heat causes it to swell with a resulting dramatic increase in volume and thickness

Fire resistance

The term fire resistance represents the period of time that a material or object can maintain its intended performance during a fire. Most commonly equivalent to maintaining its structural integrity during a fire.



BEFORE BURN TEST



DURING BURN TEST



AFTER BURN TEST

Intumescent Coating Applications

- Most common application for Intumescent coatings is fire proofing exposed structural steel for interior applications.
- New trend to use Intumescent coatings to enhance the fire rating of other building materials such as:
 - Gypsum drywall board
 - Ignition barrier over polyurethane foam insulation
 - Burn through protection of composite materials



Product overview

3M™ FireDam™ Intumescent Coating WB 1000

- A clean, smooth finish for exposed steel
- Fire ratings up to three hours as per ULC-S101 and ASTM E 119 (UL 263)
- Water-based
- Easy application and fast drying time
- Low VOC, no chlorinated compounds
- Tested and approved with UL/ULC Environmental Test with no topcoat for general interior applications
- Ability to be top-coated with approved acrylic or silicone alkyd paint to match surroundings
- For interior use only



3M™ FireDam™ Intumescent Coating WB 1000 is a single component water-based thin film coating to fireproof interior structural steel. 3M™ FireDam™ Intumescent Coating WB 1000 for steel should be installed by trained and certified 3M authorized applicators.



Intumescent Coating Mechanism

- The intumescent coating is applied as a thin-film coating, which will expand upon exposure to high temperatures, forming an insulating layer.
- The intumescent mechanism involves the interaction of four types of compounds:
 - A carbon source: Heated, Reaction, Char
 - An acid: Simultaneously expanded
 - A blowing agent: Gases released
 - And a resin: Prevents gases from escaping



Intumescent Coating Characteristics

- The base coat is providing a strong bond to the substrate while the top coat is providing a durable finished surface.
- The Intumescent coatings provide many benefits:
 - **Lighter weight: Per surface area protected**
 - **Durability: Environmental Test**
 - **Aesthetic: Architectural Signature**
 - **And adhesion: Key during a fire**



Intumescent Coating – Environmental Test

- In Controlled Chambers for 6 months, to review:
 - UV, Aging & Humidity
- Results:
 - 1st to Succeed with **NO Top Coat in General Indoor Application**
 - Succeeded with **ICI** & **Sherwin-Williams** Top Coats



BEFORE BURN TEST



DURING BURN TEST



AFTER BURN TEST



Toxicity testing – “Dräger Tube”

REFERENCE: ABD0031, AITM 3.0005

RESULTS							
GASSES	LIMITS @ 4 MIN	FLAMING	P/F	FLAMING	P/F	FLAMING	P/F
HCN	150 PPM	2	P	3	P		
CO	1000 PPM	200	P	225	P		
NO/NO ²	100 PPM	10	P	8	P		
SO ²	100 PPM	<1	P	<1	P		
HF	100 PPM	<1	P	<1	P		
HCL	150 PPM	20	P	20	P		

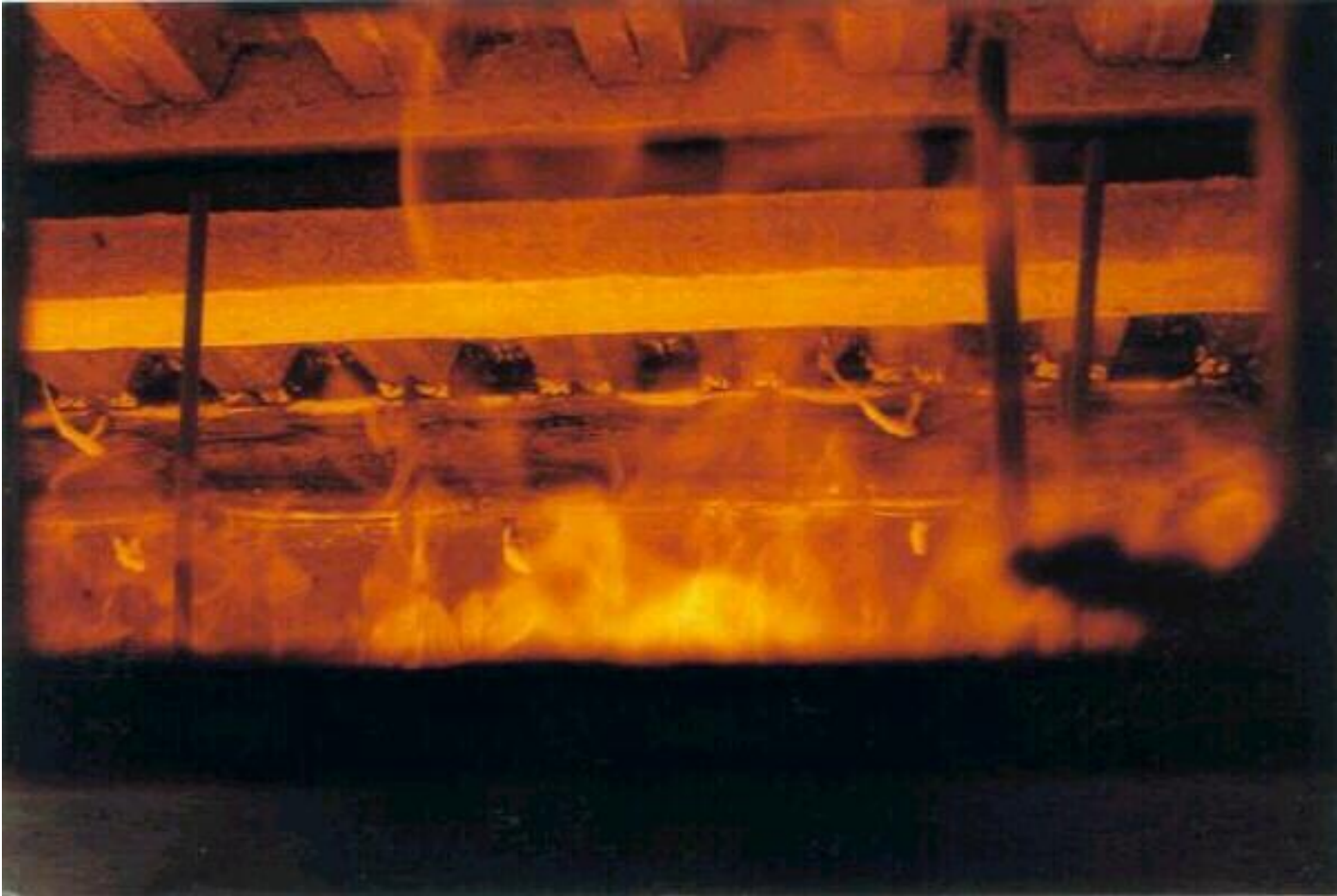
Note: IND. = Indeterminate. Test values exceed maximum limits of Dräger tube.

TESTED BY: SCOTT VAN WORMER DATE COMPLETED: 10/18/12

Satisfy Your Burning Desires



ULC-S101 testing – Structural steel beam



ULC-S101 test in progress



Applying the IC WB 1000 to composite containers

- Mix pail with paddle mixer for 2-3 minutes before applying
- Apply up to 15 mils wft (10 mils dft) with multiple quick passes
- Allow 2 days to dry
- Top coat with approved weather resistant coating for temperature and humidity protection



Spray all interior surfaces of container, except floor. Overlap spray minimum 1" onto floor



Resulting protection over composite containers

Direct flame impingement
Burn through in
approximately 30 secs



Direct flame impingement
front side after 5 mins



Direct flame impingement
back side after 5 mins



Resulting protection over composite containers

Direct flame torch test to composite material

	Uncoated composite material	3M Coated composite material
Coating thickness	0 mils	10 mils
Duration until failure	30 secs	> 20 mins
Flame side temp	> 1500 °F	> 1500 °F
Back side condition @ 10 mins	Hole	Turning brown
Back side condition @ 20 mins	Hole	Turning black
Back side temp @ 20 mins	> 1500 °F	400 °F - 500 °F
Flexibility	good	good
Adhesion to kevlar	N/A	good



Testing of Container's Aluminum

- Testing was conducted on the 2024 aluminum used in the composite container construction
- One sided fire exposure to a 13"x17" plate of 2024 aluminum, 0.063 inches thick (63 thou)

Sample	Time to reach 500F
Uncoated 2024 aluminum	2 mins
Al coated with 85 mils	25 mins
Al coated with 115 mils	33 mins
Al coated with 150 mils	47 mins



Strategy for fire protection

- The composite container contains some fire retardants, however will ultimately melt when exposed to high temperatures
- Initial fire must be contained until the present container's oxygen is depleted resulting in a smoldering fire
- Intumescent coating to provide burn through protection and structural protection during the initial fire until oxygen deprivation occurs
- Fully developed, full scale fire must be avoided



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