Intumescent Coatings Steel Protection

FCIA
Scottsdale, AZ
Steel Coatings is a Fast Growing Market in US

- Decline in required fire ratings in IBC (sprinkler trade-off)
- Upcoming increase in bond strength requirement for sprays for multi story buildings in IBC
- Increase in coatings due to architectural trends

Source: Steel Fire Protection Market Assessment for the US; Ducker Research, 2003; Steel Fire Protection Market Assessment Update for the US; Ducker Research, 2006; Steel Fire Protection Market Assessment Update for the US; Ducker Research, 2008
Architects Decide Type, Installers Decide Brand

Design phase

- Fire Proofing Consultant
- Structural Engineer
- Building Owner
- Architect
- Spec Writer
- Selection of Type

Construction phase

- GC / CM
- Installer
- Bid
- Selection of Brand

Contractor coating purchases by source

- 97% Direct from Manufacturer
- 3% Distributor

Commonly for intumescent coating due to low familiarity

Source: US Focus Groups ntumescent Fire Protection Coatings; Ducker Research, Jun 2006


- Spec data sheet
- Fire test literature
- Take off software
- Submittal documents
- Field support
Building Types, Steel Framework Construction

- Predominantly found in: Airports, Hotels, Hospitals, Sky scrapers, Shopping Centers, Public Buildings
- Applied on load bearing steel construction in visible areas
Intumescent Coatings Pros & Cons

+ Light weight
+ Architectural features possible
+ Space saving
+ Decorative finish
+ Can be cleaned
+ Can adapt to surrounding, by use of Top coats
  - Applied in wet state
  - Requires clean, primed steel
- Cost
Factors Affecting Steel Protection Performance

• When exposed to fire, the intumescent layer can expand up to 50 times the thickness of the applied layer.

• Due to protection times depending on the layer of formed char, the initial painted layer thickness relates directly to the fire rating and the steel geometry that has to be protected.

• Dry film thickness is affected by the following factors:
  - Fire rating: 1, 2, 3 or 4 hours
  - Type(s) of steel member
  - Dimension(s) of steel member
  - Orientation of steel member (Beam or column)
  - Exposed areas of the steel member (e.g. might be covered by floor or block work)
Application Steps

System Build up for Intumescents

- Preparation of surface
- Primer
- Intumescent coating
- Topcoat (may be optional)
The Intumescent Process

**STAGE 1: Initial Fire Exposure**
- FIRE
- Unreacted Material
- Substrate

**STAGE 2: Short Term Fire Exposure**
- FIRE
- Char
- Reaction Zone
- Unreacted Material
- Substrate

**STAGE 3: Mid Term Fire Exposure**
- FIRE
- Char
- Reaction Zone
- Unreacted Material
- Substrate

**STAGE 4: End of Term Fire**
- FIRE
- Char fully reacted
- Substrate
3rd Party Inspection Requirements

AWCI Steel Protection Inspection
Technical Manual 12 B
Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire Restrictive Materials

Scope
General Information
Substrate Conditions
Site Conditions
Inspection Procedure
Method of Test
Condition of Finished Application
Patching
Typical application setup - Atrium
Typical Atrium with Intumescent Coating Applied
Orange Peel

During application of steel coating products, a certain texture appears on the surface. This is known as orange peel. There is no steel coating without orange peel.

Acceptable orange peel

Heavy orange peel (Maybe wrong tip)

Orange peel can be influenced by:

• Reducing Layer thickness per coat
• State of the surface – smoother primer results in less orange peel
• Choice of right combination of tip and pressure