

**Dulux**<sup>®</sup>

PROTECTIVE  
COATINGS

Intumescent Coating Systems Dulux Protective Coatings

# Application Guideline for FirePro<sup>®</sup> 9300 and FirePro<sup>®</sup> 9310



Protection you can count on.

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# 1.0 Epoxy Systems

Epoxy based coatings due to their durability and fast cure are frequently applied off site in paint yards and at steel fabricators, these coatings contain virtually no solvents and have very low VOC's. As the epoxy intumescent coatings are chemically cured top coats they can be applied with relative ease. These coatings can reduce the time required for applying the complete coating system.

Epoxy based chemically cured intumescent coatings are the most durable intumescent coating type for all environments.

## C1-C3 Environments

For these environments a primer is not required, FirePro® 9300 and FirePro® 9310 can be applied directly to abrasive blast cleaned steel, top coats are used where there is a specific colour requirement. FirePro® 9300 and FirePro® 9310 are light grey in colour and will chalk and fade when exposed to UV light. Use a weatherable top coat if required for appearance and UV resistance.

## C4-C5 Environments

For more corrosive environments an epoxy primer is required prior to the application of FirePro® 9300 and FirePro® 9310, and a final polyurethane or fluoropolymer top coat.

## Galvanized Steel

An approved epoxy primer is required prior to the application of FirePro® 9300 and FirePro® 9310.

# 2.0 Surface Preparation

## 2.1 Abrasive blast clean

Intumescent coatings are applied to structural steel that has been dry abrasive blast cleaned in accordance with Sa 2.5 per section 4.2 of AS 1627.4 with reference to visual standard ISO 8501-1 Sa 2.5. A uniform angular anchor surface profile of 40-70µm is recommended.

## 2.2 Secondary surface preparation on site

If there is an extended time between application of the primer and the intumescent, it is important several steps be followed for long term performance to occur:

- Surface contamination such as chalking, debris collection and any collected oils and/or greases are washed off the surface utilizing Gamlen CA1, following all instructions laid out in the product data sheet.
- If zinc oxides/zinc hydroxides, oxidation, staining, and/or other insoluble contaminate are found to be present on the surface after cleaning, it must be fully removed by mechanical means.

If the maximum recoat time has been exceeded, the primed surface must be thoroughly and uniformly scarified. The preferable method of scarification is by utilizing abrasive blasting with a fine abrasive. The method of blast cleaning and the media to be used is ultimately to be selected by the contractor based on their experience and confidence in the capabilities of their equipment and components. However, it is a good practice for the contractor to contact their abrasive supplier for information regarding the efficacy of the abrasive to be used. Good mechanical adhesion is dependent upon the surface preparation being performed correctly. Dulux requires a clean, dry and contaminate free surface that is uniformly dulled, profiled and free of any fractured coating. Below is the suggested procedure:

- Clean all surfaces to be scarified before and after the surface preparation in accordance with AS 1627.1 "Removal of oil, grease and related contamination". Method chosen is to be contingent on specifier approval.
- The prime coating must be thoroughly and uniformly abrasive sweep blasted. The use of fine abrasive and reduced nozzle pressure is suggested. Oxidation, staining, and/or other insoluble contaminate on the prime coat must be removed.
- Abrasive blast test patches are further suggested to determine whether the abrasive and nozzle pressure selected will achieve the desired effect.
- If any areas of rust exist, then the areas must be prepared in accordance with the original specification.
- All edges of remaining sound, tightly adhering coating should be feathered back (beveled) to create a smooth transition from the substrate to the coatings surface. The coating maybe considered tightly adhering if an edge cannot be lifted with a dull putty knife. Any transition margins between the prime coat and exposed steel substrate should be feathered in, creating a smooth transition.
- Any fractured prime coat should be removed, the surface prepared per the original standard and recoated per the original specification.
- To a clean, dry, contaminate free and properly prepared surface, apply the specified system at the specified film thickness.

If small or isolated areas only need to be addressed, these can be thoroughly and uniformly abraded by hand and/or power tools, creating a uniformly dulled and profiled surface. Consult your local Dulux Representative for job specific surface preparation recommendations for the issues being encountered on the project.

## 2.3 Power tool cleaning

This should only be used for small areas, usually for touch up and repair areas, care must be taken not to polish steel during this method of preparation. In the small areas identified, prepare the substrate in accordance with SSPC SP-11, "Power Tool Cleaning To Bare Metal", Level 1. Consult your local Dulux Representative for further details.

## 3.0 Primers

### 3.1 Primers applied to abrasive blast cleaned mild steel

Primers shall be applied in accordance with the product datasheets and for use with intumescent coating the following maximum dry film thickness (DFT) limits shall apply:

Approved Primers for FirePro® 9300 and FirePro® 9310	DFT
Durepon® EZP	75µm
Durepon® FRX	75µm
Zincanode® 402	75µm
Luxepoxy® 4 White Primer	50µm

Note: For C1-C3 environments FirePro® 9300 and FirePro® 9310 do not require primer, always refer to the project specification for the correct coating system.

### 3.2 Primers applied to galvanized steel, tie coats and bolted connections

Clean and prepare the surface in accordance with AS/NZS 2312.2, Section 7.5.3, "Preparation for painting".

If abrasive blasting is not possible following the degreasing process the surface should be abraded with 80-120 grit sandpaper and then thoroughly cleaned before applying the primer.

In the same manner all nuts, bolts, and connectors shall be cleaned and degreased, followed by the application of the primer listed below.

Approved Primer/Tie coat	DFT
Luxepoxy® 4 White Primer	50µm

FirePro® 9300 and FirePro® 9310 should not be applied on mating steel connections. These areas, bolts and washer surfaces should be neatly masked out before applying the intumescent coating.

## 4.0 Top Coats

Top coats need to be applied in accordance with the over coating times stipulated on the relevant intumescent coating datasheet:

Approved top coats for FirePro® 9300 and FirePro® 9310	Recommended Minimum DFT
Luxathane® SPX	50µm
Luxathane® HPX	70µm
Weathermax® HBR and HBR Mio	100µm
Quantum® V90 and V92	75µm

The total top coat DFT should not exceed 150µm.

## 5.0 Application

### 5.1 Equipment

- Airless spray unit Graco® K60FH2 (60:1) or equivalent.
- 3/8" (9.5mm) or 1/2" (12.7mm) diameter material hose, max 20m in length. If using 1/2" material line, the addition of a 3/8" (2m) whip line is allowed.
- The use of a 3/8" non-restrictive SS swivel connection between the spray gun and the material line is recommended for ease of application.
- Use a Graco® XHF direct feed spray gun w/ XHD RAC switch tip and guard or equivalent.
- Graco® 4500W/240v explosion proof inline heater and heater mounting kit - Graco® part numbers 243863 and 17V573 or equivalent (material temp at nozzle needs to be 35°C for proper atomisation).
- Spray tips / nozzle sizes
  - FirePro® 9300: 482 - 584 microns (0.019 - 0.023")
  - FirePro® 9310: 533 - 584 microns (0.021 - 0.023")
- Stainless Steel Hopper fitted to allow gravity feed of the coating to the pump.
- Heavy duty paint mixer with a large diameter (160mm). Use a double helical mixing blade and a power mixer similar to an Intex® Mega Mixer AMX 620 to thoroughly and uniformly mix the material, scraping the side of the pail, folding the material back into the body of the product while mixing.

### 5.2 Procedure

- Ensure all equipment is clean (Duthin® 450).
- Remove both the pump filter and the spray gun filter.
- Do not use a suction hose on the pump, a stainless steel hopper must be fitted to gravity feed the pump.
- During flushing with solvent prior to painting ensure there are no leaks.
- Ideal temperature of the material before spraying is 16-25°C. Min temp = 10°C and Max temp = 40°C.
- First mix component A until homogeneous and then add component B, ensure all of component B is used.
- It is recommended to decant the mixed product into a container and then remix material in the new container.
- The in-line heater is used to achieve an ideal temperature of 35°C at the spray tip. A higher temperature setting may be required initially. Material should not be recirculated as heated material in mass will greatly reduce the useable life of the material.
- A pressure of approx. 200bar (3000 PSI) in the spray gun is required to achieve a good finish.
- After every 5 - 6 kits the equipment should be flushed with solvent. This is accomplished in two stages. First, Duthin® 450 or CR Reducer (either new or filtered) is run through the pump for five minutes. Then a second flush is done, again for five minutes using fresh Duthin® 450 or CR Reducer (this solvent can be used for the first flush cycle of the next flush cycle). After the end of a work shift, the pump is flushed as stated. This time, after the second flush, the lower end of the pump is disassembled and thoroughly cleaned to remove all traces of coating material. It should be noted that the amount of flushing needed is dependent on temperatures and extended spray times.
- Complete cleaning is required at the end of every shift/day.
- Ensure there is sufficient distance between the nozzle and the steel substrate to avoid a displacement of the thick coating by the spray pressure.
- Regular checks of wet film thickness should be done in order to achieve the specified coating thickness for the relevant steel item.

## 6.0 Measurement of Dry Film Thicknesses (DFT)

### 6.1 Primer Dry Film Thickness

Prior to the application of the intumescent coating the DFT of the primer needs to be measured. The average DFT of the primer needs to be recorded so this can be deducted from readings taken once the intumescent coating is applied.

Where the primer DFT exceeds specification, it should be reduced by sanding with 80-120 grade sandpaper until the required DFT is achieved.

## 6.2 Intumescent Dry Film Thickness

The relevant DFT's for each steel item is provided in a schedule, it is the applicators task to measure these and ensure the DFT's comply to achieve the required level of fire protection.

When measuring the intumescent DFT the average primer reading needs to be deducted from these readings.

Evaluate the dry film thickness in accordance with SSPC Paint Application Standard No. 2, "Level 3". Correct areas of non compliance and re-check per the standard.

Only once it is confirmed that the correct intumescent coating thickness has been achieved should the top coat be applied.

## 6.3 Frequency of Dry Film Thickness Readings for Intumescent Coatings

### **I sections, T sections, Angles, Channels**

- One measurement every 0.5m on each web face.
- One measurement every 0.5m on the outer flange face.
- One measurement every 1m on the inner flange face.

### **Square and rectangular hollow sections**

- One measurement every 0.5m on each face.

### **Circular hollow sections**

- Four measurements every 0.5m evenly spread around the section.

## 6.4 Acceptance Criteria

Follow SSPC PA 2 acceptance criteria.

## 6.5 Top Coat Dry Film Thickness

It is critical the top coat meet the specified dry film thickness (DFT) for many reasons. Among the reasons includes the need to ensure full opacity of the top coat so the coating can provide the expected performance over the epoxy intumescent.

Recommended Methods of Inspection (both methods should be utilized):

### **Visual**

The top coat should be visually evaluated for pinholes/holidays in the top coat during the application and once cured to ensure a coating has been applied in a uniform manner which fully covers the intumescent coating.

### **Measurement**

The DFT of a top coat applied over a thick film intumescent coating system can be very difficult to accurately measure using non-destructive methods. A practical approach to evaluating top coat DFT in this instance is to compute the DFT using wet film thickness (WFT) readings, the percent volume solids of the coating being applied, and any thinner addition as stated below.

- $DFT = \text{Measured WFT} \times \% \text{ Volume Solids}$ ; or
- $DFT = \text{Measured WFT} \times \% \text{ volume solids} \div (100\% + \% \text{ thinner added})$ .

Once the WFT to DFT equation is understood, then WFT readings can be measured in a manner of similar frequency to what is stated within either AS 3894.3 and/or SSPC PA2, "Level 3". This can help identify film thickness deficiencies and corrective action can be taken immediately. It should be noted that all comb marks left in the top coat film should be sprayed over immediately to fully eliminate the marks left in the film by the gauge.

## 7.0 Repair Areas

### 7.1 Repairs to top coat only

It is important that FirePro® 9300 and FirePro® 9310 are sanded in order to create a profile for the adhesion of the top coat. The edges of the existing top coat should be feathered back to create a smooth surface for the best visible appearance. The repair should overlap by at least 25mm onto sound existing top coat.

## 7.2 Repairs to intumescent coating and top coat

All areas where FirePro® 9300 and FirePro® 9310 are damaged, they must be re-instated to the specified DFT. The intumescent coating must be abraded to create a profile for adhesion. Take care not to apply intumescent coatings over the existing top coat. In accordance with the relevant datasheet and the applicable over coating time, apply the top coat over lapping at least 50mm onto sound, properly prepared top coat.

## 7.3 Repairs to primer, intumescent coating and top coat

For areas that are damaged, and the substrate is exposed, see section 2.3 for surface preparation recommendations. Once the surface is clean only the bare substrate should be primed with the specified primer. Overlapping onto the existing primer is recommended, but do not apply the primer on FirePro® 9300 or FirePro® 9310.

Once the primer is dry to overcoat apply the intumescent coating to the correct DFT and do not overlap onto the existing top coat.

In accordance with the relevant datasheet and the applicable over coating time, apply the top coat over lapping at least 50mm onto sound, properly prepared top coat.

## 8.0 Coat backs

When there are both protected and unprotected structural steel items on a project, and unprotected items join to protected items, the unprotected item should be protected (coat back) for 500mm from the protected item.

## 9.0 Junction between different fire protective systems

Best practice is to protect individual steel or structural elements with one protective system. Mixing of different systems on an individual item should be avoided. Fire testing of all possible interfaces is not practical and is impossible.

Existing fire protection that is to be overlapped or abutted must be cured.

FirePro® 9300 and FirePro® 9310 may be butt jointed to existing: fire boards, fire sprays (vermiculite) and reactive coatings.

## 10.0 Over-Cladding of Intumescent coatings

All intumescent coatings expand in the event of a fire and adequate space is required for this expansion. For FirePro® 9300 and FirePro® 9310 allow for 30x expansion. Where cladding is mounted onto continuous fixings/spacers fabricated from steel or timber these should be considered part of the steel item and should be protected from fire.

## 11.0 Surface finish and appearance

### 11.1 Basic finish appearance

The coating achieves the required fire protection and conforms to the specification.

### 11.2 Decorative finish appearance

When the coating is viewed from 5m, minor orange peel and texture is acceptable. Local repair areas may be visible. The coating achieves the requirements for fire protection and is applied in accordance with the specification.

### 11.3 Bespoke finish appearance

It is important the following considerations are taken into account and agreement is established prior to application of the intumescent: the size and shape of steel, design complexity, the required level of fire protection and therefore the DFT.

Unless otherwise stated, it is generally accepted that the basic finish appearance is to be expected. When a decorative or bespoke finish is required the specifier should request that the applicator prepare relevant samples for approval.



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