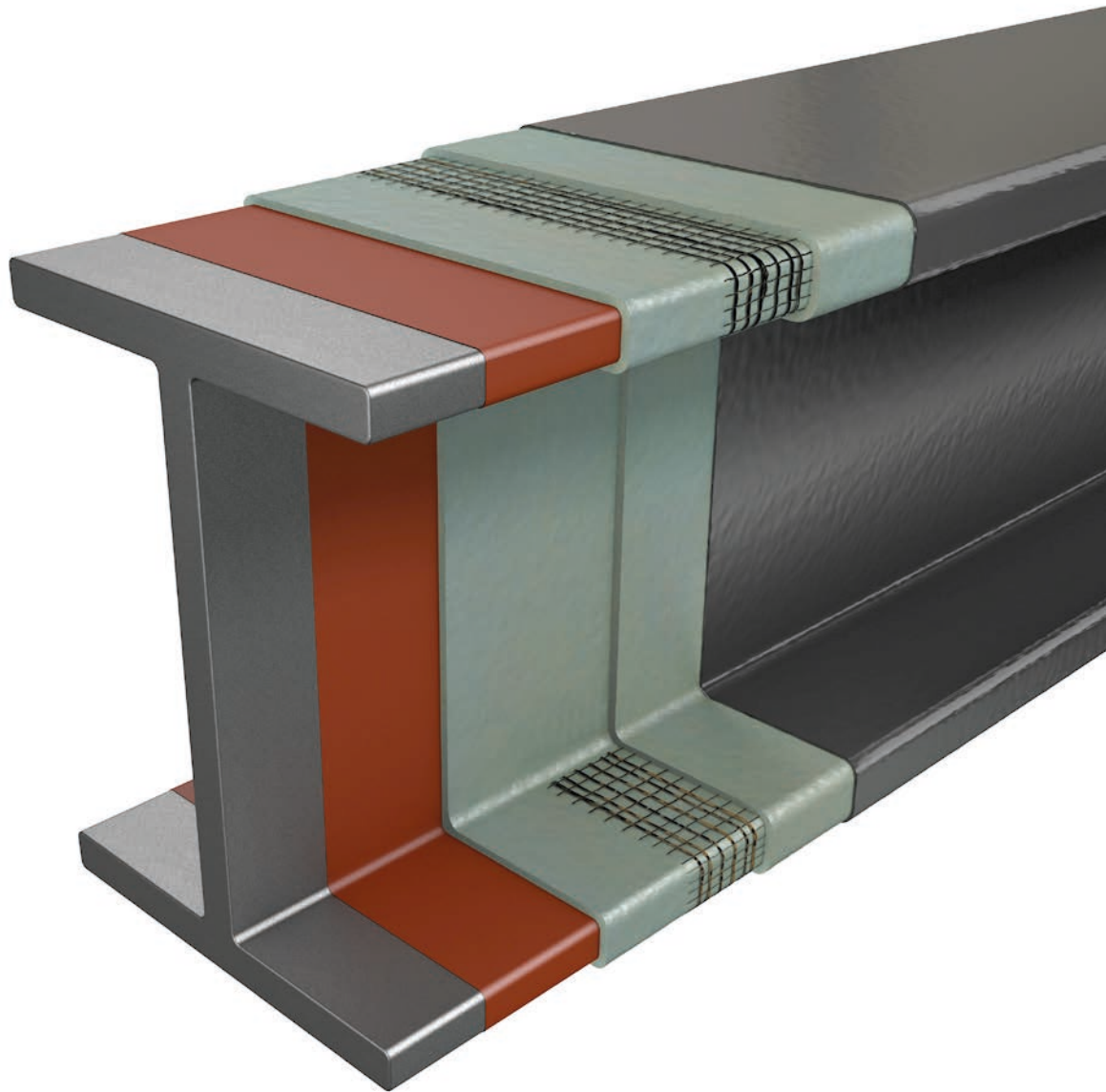


# **FIRETEX M90/03**

APPLICATION MANUAL



**FIRETEX®**  
INTUMESCENT PASSIVE  
FIRE PROTECTION

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## 1. Introduction

FIRETEX® M90/03 Epoxy Intumescent Coating is a highly reinforced, 100% solids, anticorrosive epoxy fireproofing. Having superior application properties, FIRETEX® M90/03 may be applied using plural PFP units, single-leg PFP airless equipped with ram feed, and by trowel. FIRETEX® M90/03 contributes to higher quality production rates as a result of:

- High film-build and sag resistance
- Short turn-around overcoating times
- Class leading ease of use leading to a quality spray finish with minimal finishing requirements
- Superior edge retention
- Best in class mesh: minimal mass, minimal use, deformation resistant, pliable, pattern design allows expedited cutting, installation, and overlapping with accuracy
- Low dry film requirements per UL 1709
- Short dry to handle and shop residence times
- Outstanding adhesion characteristics
- Resistant to mechanical damage during transportation and construction

FIRETEX® provides key fireproofing project advantages: durability, minimal weight, ease of application, and aesthetics. It may be applied in shops, modular yards, or onsite. Combined with certified fire protection properties, it is the fireproofing of choice of applicators, engineers, and asset owners.

### 1.1. What is FIRETEX® M90/03 and where is it used?

FIRETEX® M90/03 Epoxy Intumescent Coating is a two-component, 100% volume solids, highly reinforced epoxy intumescent coating that provides durable fire and corrosion protection of steel in refineries and chemical plants. It combines the desired properties of a fireproofing and that of a high-performance protective coating. Being highly reinforced with organic and inorganic fibres, FIRETEX® M90/03 enhances the fire resistance of steel by providing a robust layer of insulation, or char, that forms as a result of a chemical reaction initiated by fire. This insulation reduces the rate of heat transfer into the steel and extends the time period for which the structure can maintain its structural integrity during a hydrocarbon pool fire.

FIRETEX® M90/03 Epoxy Intumescent Coating is predominantly used to protect steel structures within fire risk areas, such as:

- Columns
- Beams
- Support structures: skirts, legs, and saddles
- LPG vessels, tanks, spheres, and spheroids
- Marine docks
- Modular units
- LNG and cryogenic spill when used as a duplex with FIRETEX M89/02

Refineries and chemical plants require high-performance coating protection. Many of these facilities are in corrosive environments that are: acidic, have high levels of salinity, and exposed to repeated wetness. FIRETEX® M90/03 Epoxy Intumescent Coating, as illustrated in UL2431, has proven to have excellent corrosion and acidic environment resistance.

In addition to typical pool fire exposures, FIRETEX® M90/03 has undergone extensive testing to demonstrate resistance to accidental blast overpressures, in-service impact and damage and the combined erosive effects of directional torch fire and hose stream impingement.

Although FIRETEX® M90/03 has excellent corrosion resistance, it is typical to use an approved anti-corrosive primer to preserve the required level of surface preparation. FIRETEX® M90/03 may be directly applied to properly prepared bare steel (see 2.6.1), if the surface cleanliness and profile roughness requirements are achieved at the time of application.

FIRETEX® M90/03 Epoxy Intumescent Coating does not require a finish coat. Being an epoxy-based material, discolouration and loss of gloss should be expected. This typical epoxy resin property does not compromise the longevity, fire protection or anti-corrosion properties of the coating. An appropriate finish coat may be applied to provide UV protection and obtain desired gloss and colour.

FIRETEX® M90/03 Epoxy Intumescent Coating has moderate chemical resistance. In areas that requires high chemical resistance, consult FIRETEX® Specialist for recommendation. Sherwin-Williams offers a full line of chemical resistant coatings.

The typical in-service exposure temperature range for FIRETEX® M90/03 is between ambient and 120°C (248°F). For geographical regions where fireproofed structures are subjected to subfreezing conditions, please consult with a FIRETEX® Specialist and or refer to Sherwin-Williams Technical Advice Document TAD 0040 regarding temperatures below this range.

Intumescent coatings, by design, are thermally reactive to elevated temperatures. FIRETEX® M90/03 is stable at in-service conditions up to 120°C (248°F); if the design temperature of an asset requires fire protection above this temperature range, then FIRETEX® M89/02 Epoxy Insulant may be used. Therefore, consult the FIRETEX® Specialist for system recommendations for exposure conditions, such as: elevated heat transfer and radiant heat exposure onto the outer surface (greater than 120°C/248°F), exposure to steam, or cryogenic spill.

Mechanical reinforcement may also be required in the form of a specially designed fire-resistant mesh. Full details are contained in Section [3](#).

This manual is designed to provide application guidance to ensure that the FIRETEX® system is fit for service. It provides applicators with relevant technical information regarding the application of FIRETEX® M90/03, to achieve a quality fireproofing system. To ensure that the system is properly installed, it is essential that all applicators of FIRETEX® M90/03 have completed training provided by Sherwin-Williams' technical service department prior to the application on a project. Contact Sherwin-Williams Protective & Marine technical service department for details.

Since product failure could threaten life in an emergency fire situation, applicators must not deviate from Sherwin-Williams' stated recommendations without express written agreement from an authorized Sherwin-Williams FIRETEX® technical authority.

## 1.2. **Product quality assurance**

Sherwin-Williams operates Quality Systems to ISO 9001:2015. All raw materials are subjected to Quality Testing before being released for manufacture. Representative batches of FIRETEX® M90/03 are routinely selected from production and subjected to hydrocarbon fire testing. FIRETEX® M90/03 is a UL1709 listed product and is therefore also subject to UL's regular "Follow Up" monitoring programme.

## 1.3. **Technical support**

Sherwin-Williams has a technical support network to support projects, which is staffed by: engineers, chemists, former applicators, corrosion specialists, protective coating specialist, inspectors, and other certified industry professionals. To support our customers in the field, we have a dedicated Technical Service Department working in conjunction with a dedicated Fire Research Department, staffed by degree and PhD qualified scientists.

Technical Service Department personnel have extensive experience of FIRETEX® application, both from working in the application industry and from involvement with the FIRETEX® research and development team. They provide support to applicators of FIRETEX® in the form of training and ongoing assistance before and during projects.

## 2. Surface preparation and priming

All surfaces to be protected by FIRETEX® M90/03 must be correctly prepared and primed. Surface preparation and painting should be carried out in line with 'best industry practice' as indicated in many publications by institutions such as NACE, SSPC, ICORR, ISO, etc. The standards of surface preparation contained herein are to be considered minimum requirements. Where other client company specifications or product technical data sheets demand a higher level of preparation, the higher level should be adopted. In all cases the applicator should obtain and refer to the current FIRETEX® M90/03 product technical data sheet.

### 2.1. Surface defect repair

All surface defects, including weld splatter, cracks, surface laminations, and deep pitting, are likely to be detrimental to the FIRETEX® system, and must be removed prior to abrasive blasting. All fins, burrs, and sharp edges shall be removed by grinding to a minimum radius of 2mm (0.08"). The integrity of welds must be inspected, as these are often a location where corrosion forms. Undercut welds, blow holes, discontinuous seams, and other defects must be rectified. As uneven welds prevent being properly coated, they will need to be ground smooth to ensure proper bonding of the system. It is not necessary to grind weld seams flush.

### 2.2. Blast cleaning

All surfaces must be clean, dry and free from surface contamination, refer to SSPC - SP1, prior to abrasive blast cleaning to a minimum standard Sa 2½ ISO 8501-1 (NACE No.2 / SSPC-SP10). Blast profile should generally be in the range of 50-75 microns (2 to 3 mils). When blasting has been completed, all dust arising must be removed from the cleaned surface by use of a vacuum cleaner, dry, oil free compressed air or brush.

### 2.3. Preparation of galvanized steel

Galvanized steel is used extensively within the construction of refineries and chemical plants. When galvanized steel is required to be fireproofed, the galvanizing becomes the foundation of the fireproofing system. Therefore, the integrity of the galvanizing must be thoroughly evaluated across all surfaces to be fireproofed, and the following actions, at minimum, must be taken:

- Solvent clean the galvanized surface, per SSPC SP-1 *Solvent Cleaning*, to remove all visible oil, grease, soil, drawing and cutting fluids, wet storage stains, and other contaminants that may be present. Soluble salt contamination must not exceed 30 µg/cm, as verified per SSPC-Guide 15, *Field Methods for Extraction and Analysis of Soluble Salts on Steel and Other Nonporous Substrate*.
- Using a stout knife, per ASTM A123/A123M-17 *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*, section 8.3, to confirm proper adhesion of the galvanizing, both within the galvanized film and at the steel surface.
- Remove and repair defects which may compromise bonding, such as: flaking (poor adhesion to the steel), peeling (intercoat adhesion failure within the galvanized film), and blisters. Primers used to repair galvanizing must be approved by the FIRETEX® Specialist.

- Remove excessive galvanizing, such as: puddles, drainage spikes, zinc sagging as a result of uneven zinc flow off the surface of the steel. Ideally, the galvanizing DFT will be below 304µm (12 mils).
- Abrasive sweep blast, using a non-metallic abrasive, to achieve a minimum angular profile height of 50-90 microns (2-3.5 mils) with an approximate peak count density of 35-50 peaks per linear centimeter (90-120 peaks per linear inch), confirmed per ASTM D7127-17 *Standard Test method for Measurement of Surface Roughness of Abrasive Blast Cleaned Metal Surfaces Using a Portable Stylus Instrument*, other approved instrumentation capable of measuring the required data listed in section 3.1. The profile height takes the initial nodular texture of the galvanizing into consideration.
- Confirm that the galvanized surface is free from passivators, per SSPC-SP 16 *Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals*, Section 4.3.3.

Unless approved by FIRETEX®Specialist, ASTM D6386-16a *Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting*, and only utilizing the sweep blast method described in section 5.4.1 to obtain required profile, shall be followed.

All surfaces must be clean, dry and free from surface contamination such as chromate treatment and zinc oxide prior to abrasive blast cleaning in accordance to SSPC-SP16.

Non- metallic abrasive shall be used at low pressure to ensure that the surface of the zinc is roughened but not removed. A peak count density of 35-50 peaks per linear centimeter (90-120 peaks per linear inch) is required. A profile height of 50-90 microns (2-3.5 mils) is required, to account for the nodular finish of the galvanized steel.

The galvanizing needs to be confirmed as tightly bonded prior to application of coatings. This is demonstrated via testing adhesion with a knife blade, as per instruction in ASTM A123.

Blast cleaned galvanized steel must be primed/sealed on the same day as blasting has occurred to prevent oxidization. An approved primer must be used.

**Zinc is a highly reactive metal. Therefore, blast cleaned galvanized steel shall be primed on the same day or prior to becoming contaminated or the development of zinc oxide, using an approved epoxy primer with good “wetting” properties.**

## 2.4.Repair/touch-up

For small areas of repair/touch up where blast cleaning is not possible, the primer/ intumescent system can be applied to surfaces prepared to a minimum standard of St 3 ISO 8501-1 (SPC-SP3) at the time of coating.

Suitable power tools, such as a Bristle Blaster® or equivalent, should be used to obtain an angular profile as previously described. Wire brushes are not recommended as they can cause surface polishing.



## **2.5. Other surface preparation methods**

Alternative methods of surface preparation may be acceptable, consult Sherwin-Williams for further information.

## **2.6. Priming**

It is essential in a fire situation that FIRETEX® M90/03 remains adhered to the substrate for the duration of the expected protection period. In most cases the substrate will be primed and hence the adhesion of FIRETEX® M90/03 to the primer must be verified. As a result, only primers satisfactorily tested and qualified by Sherwin-Williams shall be used under FIRETEX®.

Primers must be applied in accordance with the manufacturer's technical data sheets. However, the dry film thickness must be applied within the tested and approved range for FIRETEX, which typically range from 50 to 125µ (2-5 mils).

For details of approved primers contact Sherwin-Williams FIRETEX®Specialist or FIRETEX®Technical Service Department.

### **2.6.1. Application of FIRETEX® M90/03 to bare steel**

It is also possible to apply FIRETEX® M90/03 directly to blast cleaned steel, but in such instances, it is essential that the product be applied prior to the development of rust or the surface being contaminated. It is recommended to apply within 4 hours of blasting in a controlled environment, with conditions at or near: RH <60%; Air temperature >15°C (60°F); steel temperature minimum 3°C (5°F) above dew point.

### **2.6.2. Zinc Silicate Priming System**

The use of zinc silicate primers under epoxy PFP should be treated with extreme caution because of their inherent mechanical weakness and known failures within the industry. Zinc silicates are prone to 'splitting' within the film when subjected to impact damage, especially when over-coated with high build, high strength films. This tendency is more prevalent when primer DFT is high and/or when temperatures are low. Consequently very high levels of site control over both application & dry film thickness are essential, as is knowledge of the lowest conceivable operating temperature in service.

It is for this reason that zinc silicate is not normally recommended under FIRETEX® M90/03, although a view can be taken on a project specific basis and after testing as noted above.

### **2.6.3. Over coating of approved primers with FIRETEX® M90/03**

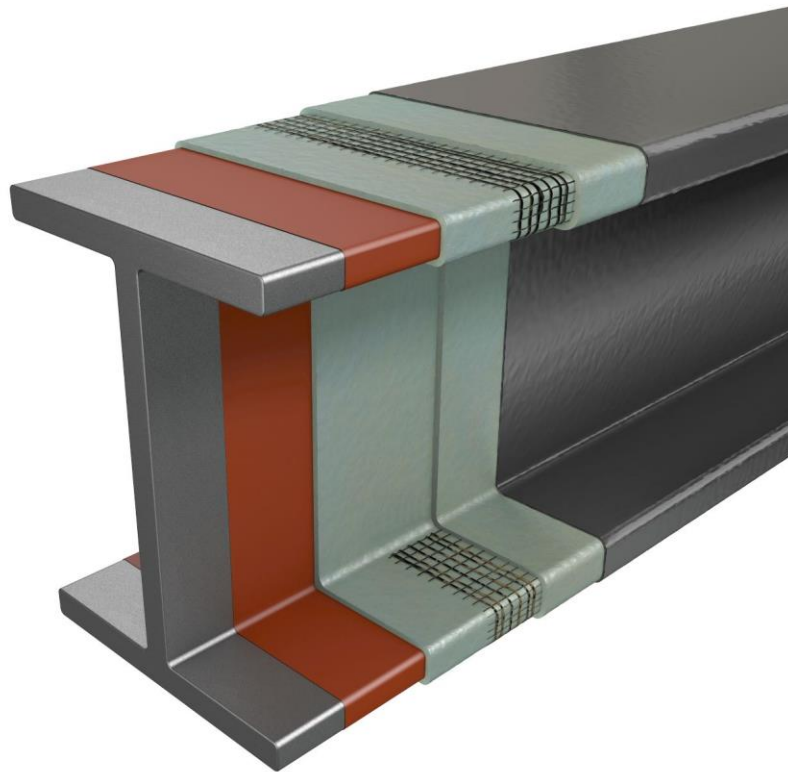
Before application of FIRETEX® M90/03, ensure the primer to be coated is dry and free from all traces of surface contaminants, such as those listed within SSPC SP-1 Solvent Cleaning and soluble salts. Ensure that the application of the primer is within the parameters stated on the manufacturer's product data sheet. Note, the maximum recoat window may be shorter for overcoating with FIRETEX® M90/03. Contact FIRETEX®Specialist or FIRETEX®Technical Service department for further details.

## 3. Reinforcement

### 3.1.Reinforcement System

For fire protection periods of 60 minutes or less, the use of FIRETEX® H240 mesh cloth is not required. For fire protection periods of greater than 60 minutes, the use of FIRETEX® H240 mesh cloth is required to add further reinforcement to the charred M90/03. This is incorporated at the time of application at approximately mid-film depth.

H240 reinforcement is installed on the outer and inner flanges of I profile beams and columns. Full wrapping around the perimeter of the protected member is not required. FIRETEX® H240 mesh cloth shall extend to the end of the inner web of the I profile beam/column as seen below:



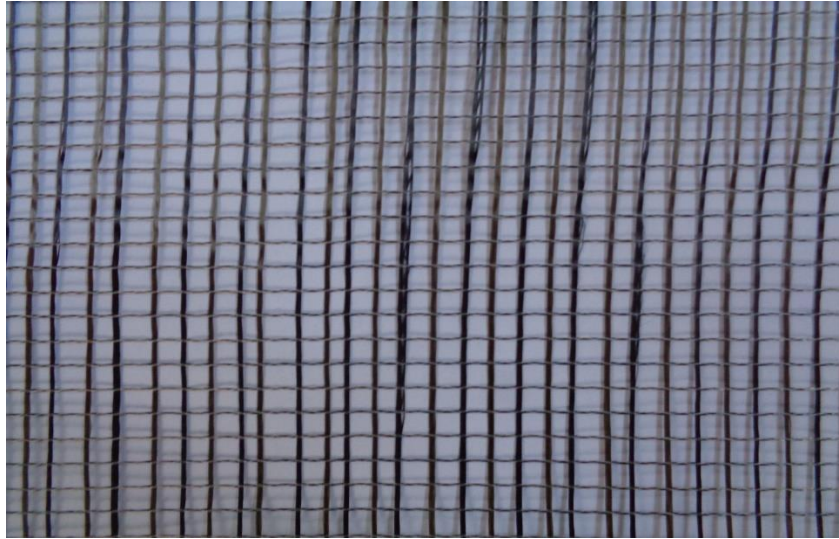
For closed (hollow) profile substrate, FIRETEX® H240 mesh cloth shall provide a full wrap around the substrate. This is installed at approximately mid-film depth.

Two methods of installation can be used depending on the total film thickness required, the complexity of the job and the applicators preference in terms of number of 'jobsite visit's'.

- A) Apply FIRETEX® intumescent to approximately one half of the total thickness required. While still wet, install the mesh cloth ensuring it is fully 'wetted out', using a trowel or roller. Within the same application shift apply a 'thin coat' (typically 1mm (40 mils) but need not be exact) such that the mesh cloth is 'sealed'. Allow to cure

sufficiently such that meaningful film thickness measurements can be taken and then apply further material to achieve the desired specification thickness.

- B) Apply approximately one third of the total thickness of FIRETEX® intumescent required and allow to cure sufficiently to take meaningful film thickness measurements. Subsequently apply a thin wet coat (about 1mm (40 mils)) and then install into this the mesh cloth, ensuring that it is fully 'wetted out', using a trowel or roller. While still wet apply a further thin coat and allow to cure sufficiently such that meaningful film thickness measurements can be taken. The aim is to get this 'mid part' of the film to be about one third the total required thickness. Finally apply the final coat to achieve the desired specification thickness.



FIRETEX® H240 Mesh Cloth

To ensure the correct durability and fire protection performance the FIRETEX® H240 Mesh must be fully wetted out during installation. At terminations the FIRETEX® M90/03 must be extended 25 to 50mm (1 to 2") past the end of the FIRETEX® H240 to completely encapsulate the mesh, see section 4.9.

### **3.2.Reinforcement requirements from certification**

FIRETEX® M90/03 has been tested and is listed under the UL1709 scheme for protection against hydrocarbon fuelled fires.

FIRETEX® H240 Mesh is not required where the period of protection is 60 minutes or less.

For all other protection periods the FIRETEX® H240 Mesh overlap distance shall be 50mm (2") as detailed in UL Design No. XR664.

In all cases where mesh is required it should be installed at approximately the midpoint of the total coating thickness, practically this means it should be located within the mid 1/3 of the applied coating.

## 4. Application

The FIRETEX® M90/03 data sheet also contains vital information regarding application parameters and must be read in conjunction with this manual. A copy of the data sheet can be obtained from Sherwin-Williams or from our web site at [www.protectiveemea.sherwin-williams.com](http://www.protectiveemea.sherwin-williams.com)

Application must only be carried out by personnel who have received training in the correct use of FIRETEX® M90/03 from Sherwin-Williams Technical Service team. After successful completion of the training each operative will receive a certificate to confirm this.

The mixing ratio is 2 parts base to 1 part additive by volume. The weight ratio is 2.37:1 (Base:Additive). Unless mixing complete small kits, correct ratio must be confirmed by weight and not by volume.

The Base component is coloured White and the Additive component is coloured Blue. When correctly mixed a homogeneous Pale Blue colour should be achieved, free from streaks of either white or darker blue.

Regular wet film thickness checks should be made during the application process.

### 4.1. Application conditions

The following conditions are the absolute limits under which FIRETEX® M90/03 shall be applied. Note that the optimum conditions are the preferred application conditions and these are also given below.

Minimum air temperature:	10°C (50°F)
Maximum Relative Humidity:	85%
Minimum steel temperature:	3°C (5°F) above dew point temperature.
Maximum Steel Temperature:	75°C (167°F)

The optimum conditions for application and curing of FIRETEX® M90/03 are:

Temperature:	15°C to 35°C (60°F to 86°F)
Relative Humidity:	<75%

The warmer the air temperature, the shorter will be the working life after application for trowel and rolling finishing.

When temperatures drop below 10°C (50°F), curing time will be significantly extended and will effectively cease below 5°C (41°F). If application has to take place in environments subject to such conditions then appropriate measures must be taken (such as enclosures, heating, dehumidification, etc.) to elevate the temperature of the work piece, the spray pump, fluid delivery lines and FIRETEX® M90/03 containers.

Care must be taken to avoid condensation in the containers and equipment and to ensure the steel substrate meets the above requirements for dew point.

## 4.2.Storage

The product shall be used within the 'use by' date stated on the container label.

The use by date refers to the long term storage of the product in a covered environment out of direct sunlight and in the temperature range 0°C (32°F) to 30°C (86°F). It is accepted that temperature control during shipping is more difficult and hence temperature may be allowed to be in the range -5°C (23°F) to +35°C (95°F) for a maximum period of 6 weeks.

### 4.2.1. Product conditioning immediately prior to application

To obtain optimum application characteristics the material should be stabilised at a temperature of 20°C to 25°C (68°F to 75°F) prior to use for single component pump or trowel application. For plural component pump application the material should be at 30°C to 35°C (86°F to 95°F).

## 4.3.Spray equipment

FIRETEX® M90/03 may be applied using a plural component specifically designed for the purpose of PFP application; it may also be applied through suitable single component pumps after proper thinning, see section 4.5.

Due to the range of factors which can affect application it is suggested that Sherwin-Williams Technical Service Department be involved at the start of a project to help ensure application progresses smoothly.

The following information is given to assist applicators in achieving satisfactory application of FIRETEX® M90/03. It is the responsibility of the application contractor to ensure all equipment is working correctly and that the operators have been correctly trained by the equipment supplier.

### 4.3.1. Single component pump

A pump with a minimum ratio of 68:1 equipped with ram feed, such as the Wiwa Herkules, Graco Xtreme X70, or equivalent, should be used to spray thinned FIRETEX® M90/03.

The maximum length of fluid line recommended for this type of application is 25m (82'), and if external temperatures are low, it will be beneficial to insulate this line. Fluid line diameter should be at least ½" (13mm) ID although a short whip end of 3/8" (9.5mm) may be used to facilitate use of the gun.

The pump should not be fitted with a mesh filter.

Suction hoses shall not be used when applying FIRETEX® M90/03.

### 4.3.2. Plural component pump

Sherwin-Williams have evaluated plural component pumps for the application of FIRETEX® M90/03. The following pumps have been found to be capable of satisfactory application of the material:

- Wiwa Duomix 333
- Graco XM PFP

Other pumps currently available may be acceptable, consult Sherwin-Williams Technical Service Department for advice.

### **4.3.3. Flushing of equipment**

Cleanser Thinner No.C9 and thinner R7K112 are recommended for flushing out lines and equipment. If preferred and agreed between interested parties, equipment may be cleaned with a blend of 1:1 volume, Xylene (CAS No: 1330-20-7, EINECS No. 215-535-7):Methyl Ethyl Ketone (CAS No: 78-93-3, EINECS No: 201-159-0), but a final flush out with Thinner No. C9 should precede use of FIRETEX® M90/03.

### **4.4.Application by plural component spray**

The pump must be configured to deliver a volumetric ratio of 2:1 (base:additive).

A ratio check must be performed before spraying commences, after any break in spraying, and a minimum of two times per shift. The correct weight ratio for FIRETEX® M90/03 is 2.37:1, measured results between 2.27:1 and 2.47:1 are acceptable.

Spraying must not take place if the weight ratio obtained in the ratio check is outside the acceptable limits.

It is possible to apply FIRETEX® M90/03 in one coat to a minimum thickness of 1mm (40 mils) and a maximum thickness of 7mm (275 mils). This can be achieved in one of two ways:

- (a) By applying the M90/03 as more of a jet than a fan, levelling off with a trowel or float prior to rolling, if required, to obtain a smooth finish. This method may be used on smaller items of structural steelwork to minimise material losses.
- (b) By applying the M90/03 with a normal spray pattern. It may still be necessary to roller to obtain a smooth finish. This method of application may be used for larger areas such as larger structural steelwork items, fire and blast walls, vessels and vessel skirts, etc.

Due to the heating and processing of the FIRETEX® M90/03 when being applied through a plural component spray the working time of the applied material will typically be around 30 minutes, dependant on ambient conditions. Mesh installation and/or surface finishing must take place within this time.

Excessive agitation of the holding tanks or recirculation of the heated material may have a detrimental effect on the performance. If spraying will be interrupted for 2 hours or more the pump should be shut down.

The temperature of the material should not exceed 50°C (122°F).

#### **4.4.1. Spray tips and operating pressure**

Typical Nozzle Size: 0.76 to 0.99mm (0.033" to 0.039") Fan angle will depend on the substrate being coated.

Operating Pressure: 210 kg/cm<sup>3</sup> (3000 psi)

The above is given as a guide only.

### **4.5.Single component spray application**

For areas where application using Plural Component spray equipment is not possible or desirable, FIRETEX® M90/03 can be spray applied using an airless spray pump of minimum ratio 68:1, fitted with a ram feed plate and wiper to fit the size of drum.

Thinning will be required but when thinned on site this must not exceed 10% and will normally be in the range from 3% to 6%. The reason is that excessive thinning post manufacture will mean a reduced tolerance to curtaining during application. The solvent used for thinning should be Sherwin-Williams Cleanser Thinner No. 2; alternatively, 100% xylene (CAS No. 1330-20-7, EINECS No. 215-535-7) can be used for thinning.

Exact levels of thinning required will depend on air temperature, M90/03 temperature and the equipment used. However, experience has shown that 3% addition of Cleanser Thinner No. 9 gives good results with M90/03 temperature in the region of 25°C (77°F) after mixing.

For any given dry film thickness, the required wet film thickness of M90/03 will vary depending on the level of thinners added. In the region of 1% to 10% thinning a reduction in volume solids as per the following table can be assumed:

Solvent Addition %	Resulting Volume Solids %
0	100
1	99
2	98
3	97
4	96
5	95
6	94
7	93
8	92
9	92
10	91

Calculation of wet film thickness (WFT) from known dry film thickness (DFT) and known volume (solids) V(S) %

$$\frac{100}{V(S)} \times DFT \text{ (mm)} = WFT \text{ (mm)}$$

E.g. 6% thinned; required DFT = 5mm

$$\frac{100}{94} \times 5\text{mm} = 5.32\text{mm (WFT required)}$$

The required volume of thinning solvent may be added to the M90/03 white base component to facilitate removal from the container but this must be done no more than 16 hours prior to use. If the additive is thinned and left for a period of time prior to use, then a reaction will occur between the additive and the solvent, rendering the product unusable. Once the additive component has been thinned mixing with the base can then commence in the normal way. Only full 20Kg (44.09 Lb) kits of M90/03 should be thinned as this ensures the correct ratio of base to additive, and hence correct curing of the mixed product.

It is recommended that a heavy-duty mixer specifically designed for high viscosity epoxy PFP is used, or alternatively a heavy-duty air or electric powered mixer with suitable paddle. The base of the mixer should have a clamp suitable for retaining the pail during mixing.

Maximum wet film thickness achievable will depend on many factors such as air and steel temperature, spray tip size and complexity of the steelwork as well as the level of thinning. Typically 4mm – 5mm (160 to 200 mils) should be achievable.

Depending on material usage rate, equipment configuration and ambient conditions, it may be necessary to flush the unit with solvent regularly to prevent build up of FIRETEX® M90/03 within the pump. This should be discussed with Sherwin-Williams' Technical Services Team.

Due to the incorporation of solvent the working time for the material will be extended compared to un-thinned product. Applicators should expect a working time of 20 to 40 minutes, depending on the ambient conditions, mesh installation and/or surface finishing must take place within this time.

Previously applied coats of FIRETEX® M90/03 must be hard to the touch prior to applying subsequent coatings. In practical terms, this equates to a Shore D of 20.

Note: After achieving a Shore D reading of 30, the coated structure may be exposed to the elements.

#### **4.5.1. Spray tips and operating pressure**

Typical Nozzle Size: 0.89 to 0.99mm (0.35" to 0.039")  
Fan angle will depend on the substrate being coated.

Operating Pressure: 280 kg/cm<sup>2</sup> (4000 psi)

The above is given as a guide only.

#### **4.6. Finishing after spray application**

Spray application of FIRETEX® M90/03 should result in a smooth uniform film, however in some circumstances it may be desired to use a trowel and/or roller to attain the required standard of finish. FIRETEX® M90/03 can be 'dry rolled' without solvent or material 'pick up'. The optimum time will be temperature dependent but for most projects it has been found to be in the region of 10 to 20 minutes after spraying. It is necessary to leave the M90/03 10 minutes after spraying before starting to roller the product. A medium pile simulated sheepskin roller has been found to give good results but other short or medium 'nap' synthetic rollers may be suitable. It is recommended that suitability of roller be established on a small area prior to use.

If preferred, solvent may be used to 'dampen' the roller as per normal site practice for application of epoxy PFP but one must ensure that the roller is suitable for use with strong solvents. The quantity of solvent used should be kept to a minimum. Spray applying solvent onto the roller by misting using a chemical resistant spray bottle will ensure that over wetting the roller will be minimised

Note: As with many epoxy PFP materials, slight discolouration to the M90/03 may occur when it is rolled. However, this is a cosmetic issue and has no effect on the in-service performance of the product

All horizontal flat surfaces must be finished to provide a slight incline designed to shed water and prevent pooling.

#### **4.6.1. Stipple finish**

FIRETEX® M90/03 when finished using a roller will have a smooth surface. The typical application of a polyurethane top coat will result in a glossy surface which will emphasize all roller or trowel marks and any unevenness in the coating system, characteristic of coating systems applied at high thickness. The creation of a stipple finish can reduce the visual impact of irregularities in the surface of the coating.



The acceptable finish should be agreed prior to the project commencement, either within the project specification or as a part of the reference areas discussion, see section 8.

Where a stipple finish is to be used the DFT of the applied FIRETEX® M90/03 should be determined and accepted before the stipple finish is created, since this makes it more difficult to accurately determine the DFT.

Sherwin-Williams think it reasonable to allocate a nominal DFT to the stipple layer such as 0.3 to 0.5mm (12 to 20 mils), hence the applied FIRETEX® M90/03 DFT can be accepted provided it is greater than the specified DFT less an agreed figure, e.g. 0.3mm (12 mils). Once the DFT has been accepted the stipple coat can be applied. Such a procedure must be agreed by the client before being implemented.

#### **4.7. Hand application**

For small areas it is also possible to apply FIRETEX® M90/03 by trowel, plaster trowel or other similar tool, and then smooth off using a roller as detailed in section 4.6. .

It is essential that the correct mixing ratio is observed; Sherwin-Williams recommend that only complete 20kg kits of material be used as these are supplied with the correct ratio of base and additive materials.

#### **4.8. Over coating**

Cleaning of contaminated surfaces between coats will be achieved by thorough washing with detergent, followed by rinsing with clean fresh water and drying. If contamination cannot be removed by this method, consult Sherwin-Williams Technical Services Department.

The use of solvent to clean between coats is not normally required but may be specified in certain circumstances. Where solvent is specified for cleaning between subsequent coats of FIRETEX® M90/03 or topcoat care must be taken not to use excessive quantities and this is best achieved by using a clean 'lint free' cloth damped with approved solvent. Solvent should not be applied directly to the substrate and must be allowed to fully evaporate prior to commencing over coating to avoid solvent entrapment. Solvent used must be clean and must not leave any residue on the surface.

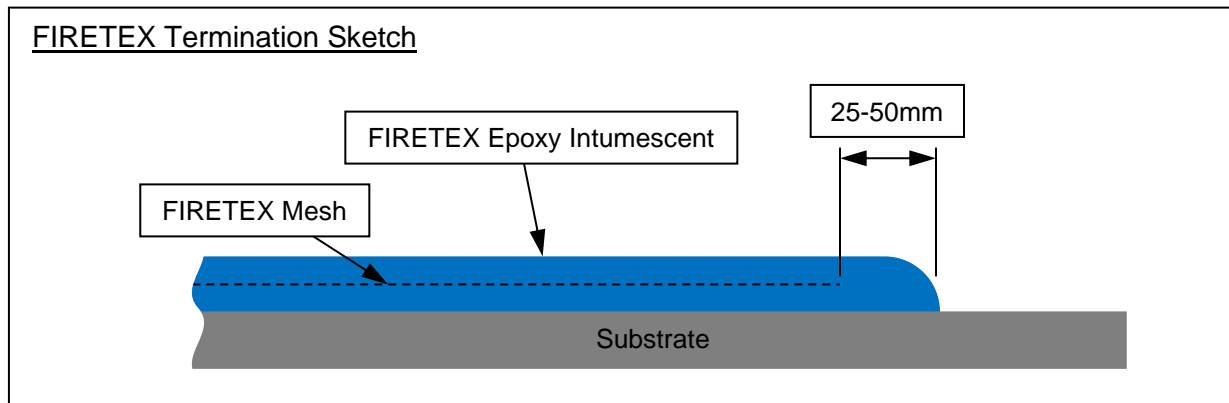
On occasions it may occur that FIRETEX® M90/03 has already been top coated when it is subsequently determined that additional thickness is required. In certain cases, depending on the topcoat applied, it may not be necessary to fully remove all the topcoat. In ALL such cases consult Sherwin-Williams Technical Services Department.

#### **4.9. Terminations**

Where the PFP terminates abruptly at the end of an I-section, Channel section or T-section, the reinforcing mesh should be folded around the edges. This measure is essential to ensure that the ends of fire-protected sections do not suffer erosion damage.

Other terminations should be protected ("masked off") prior to application of the FIRETEX® M90/03. Note: It is essential to remove such protection before the coating cures as removal after this will be substantially more difficult.

The following sketch shows the recommended method of terminating FIRETEX® where protection of the full item is not required:



To ensure the correct durability and fire protection performance, at terminations the FIRETEX® M90/03 should be extended 25-50mm (1-2") beyond the end of the mesh. The end of the mesh must be completely encapsulated.

#### 4.10. Exposed top flanges

Some designs may not allow for the coating of top flanges. This decision would form part of the fire and safety case analysis and is determined by the client's engineer. It is not a decision that can be made by Sherwin-Williams.

#### 4.11. Block Outs

Note: The information below is for fire protection periods greater than 60 minutes. For fire protection periods of 60 minutes and below, the use of mesh cloth is not required.

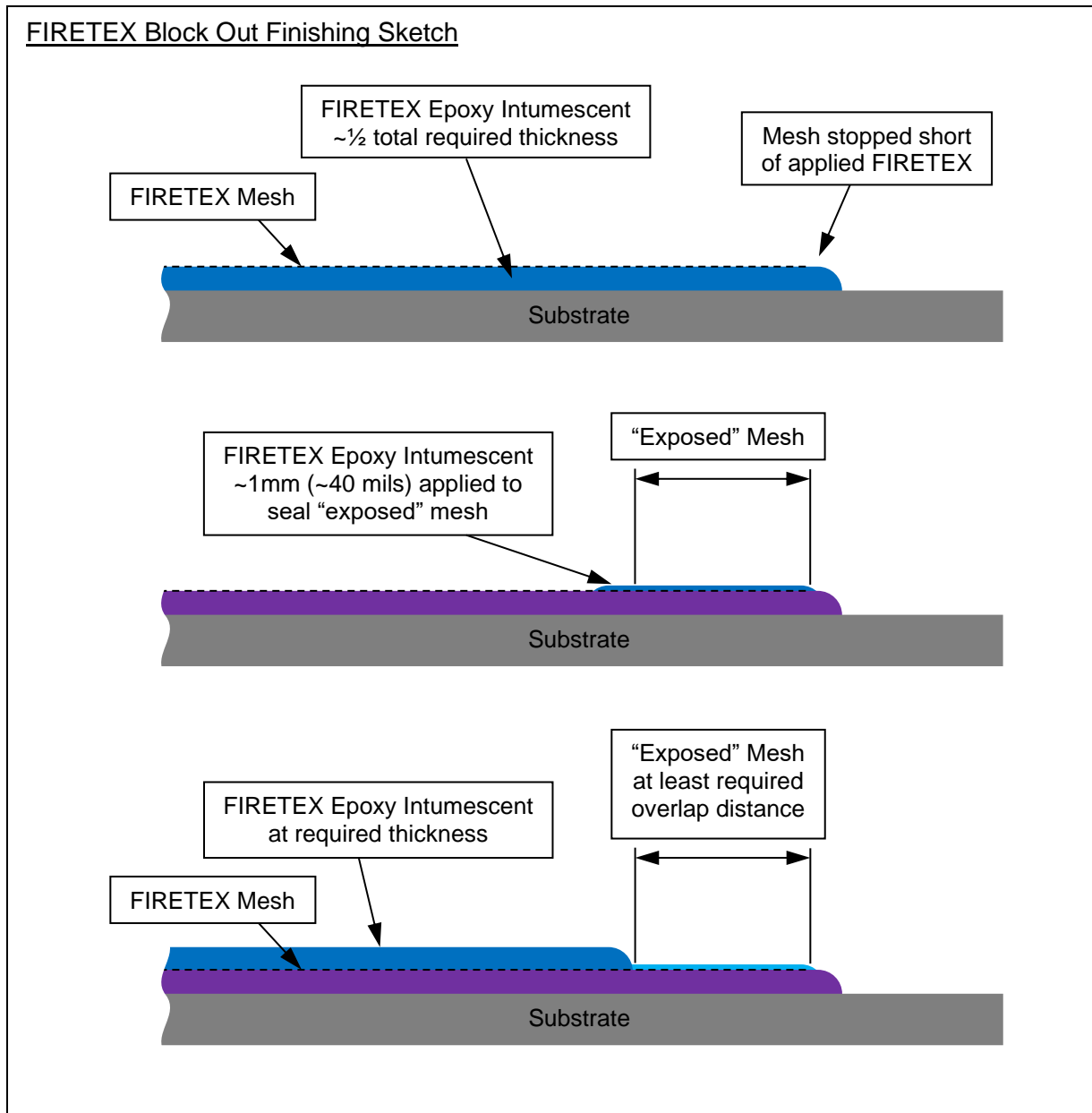
When applied in an application facility prior to erection the FIRETEX® M90/03 should be finished differently at connections due to the requirement for the mesh, when installed, to be overlapped at joints.

When applying around block outs the FIRETEX® H240 mesh shall be stopped at least 25mm (1") short of the edge of the wet FIRETEX® M90/03. The mesh shall be thoroughly bedded into the wet material as this will be exposed until the item is assembled on-site and the connection is protected with FIRETEX® M90/03, possibly a period of months.

Note:- Sherwin-Williams recommend that the mesh is sealed with around 1mm (40 mils) of FIRETEX® M90/03 immediately after it is installed to provide protection and make this area easier to clean in preparation for the on-site coating completion.

When preparing to apply the remaining FIRETEX® M90/03 the masking shall be stepped back so as to leave "exposed" mesh. The distance of this step should be sufficient to allow the required mesh overlap when the site completion work is carried out.

The following sketch shows the recommended method of finishing the FIRETEX® when further material will be applied once the item is assembled on-site:



#### 4.12. Site completion of connections

Depending on the areas which will require coating on-site this may be done by hand trowel application or airless spray.

Prior to the application of any FIRETEX® M90/03 the condition of the surfaces to be coated must be inspected and any remedial action taken to ensure that the surface is intact, clean, dry and free of contamination.

The following sketch shows the method of completion for areas blocked out at the off-site application stage.

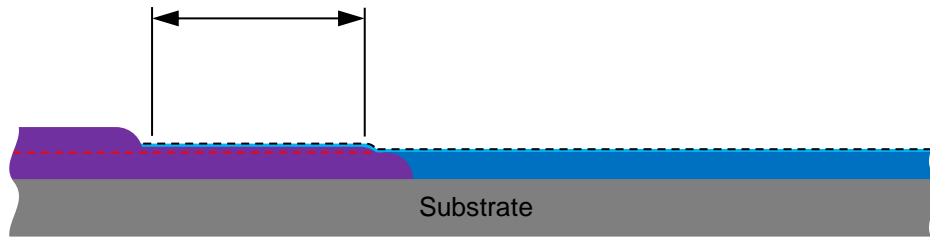
On-Site Completion of Block Outs

FIRETEX Epoxy Intumescent  
and mesh applied off-site

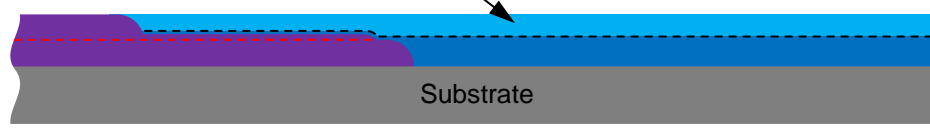
FIRETEX Epoxy Intumescent  
applied on-site to ~1/2 thickness



Mesh installed into wet FIRETEX and  
overlapped at least the specified distance



FIRETEX applied to achieve  
specified thickness



### 4.13. Repair of Damage

Damage to the applied FIRETEX® M90/03 must be repaired to ensure the correct long term performance of the coating system.

- a) Damage of the surface only, the mesh and underlying material is intact.
- b) Damage including the mesh, the primer is intact.
- c) Damage exposing the substrate

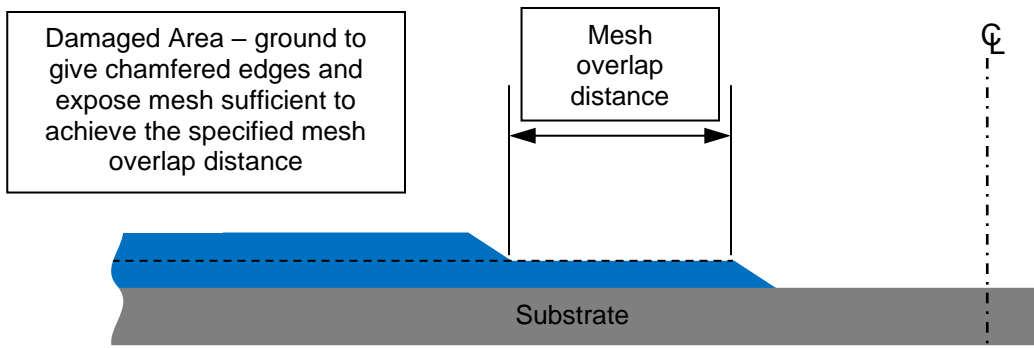
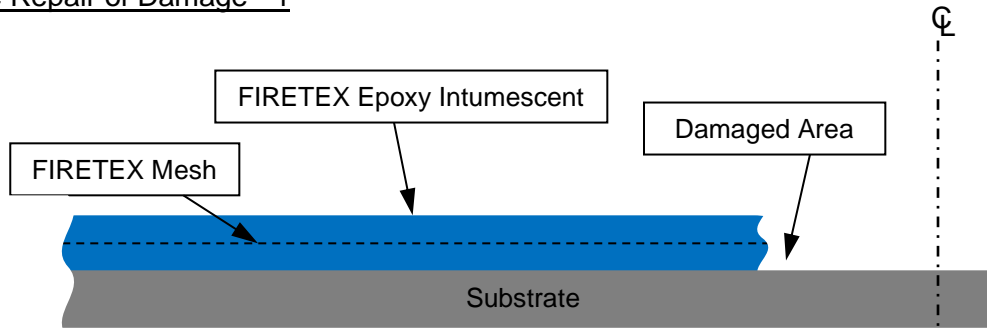
Damage to the surface, where the mesh and underlying material is sound and intact can be repaired by removing any damaged material, ensuring the exposed surface is intact, clean, dry and free of contamination, then reapplying the FIRETEX® M90/03 and top coat per specification.

The situations described in b) and c) would be repaired as shown in the following sketches. Two methods are described, the second of which results in a ridged or stepped appearance to the repair and should therefore be discussed with the client prior to using.

Notes:

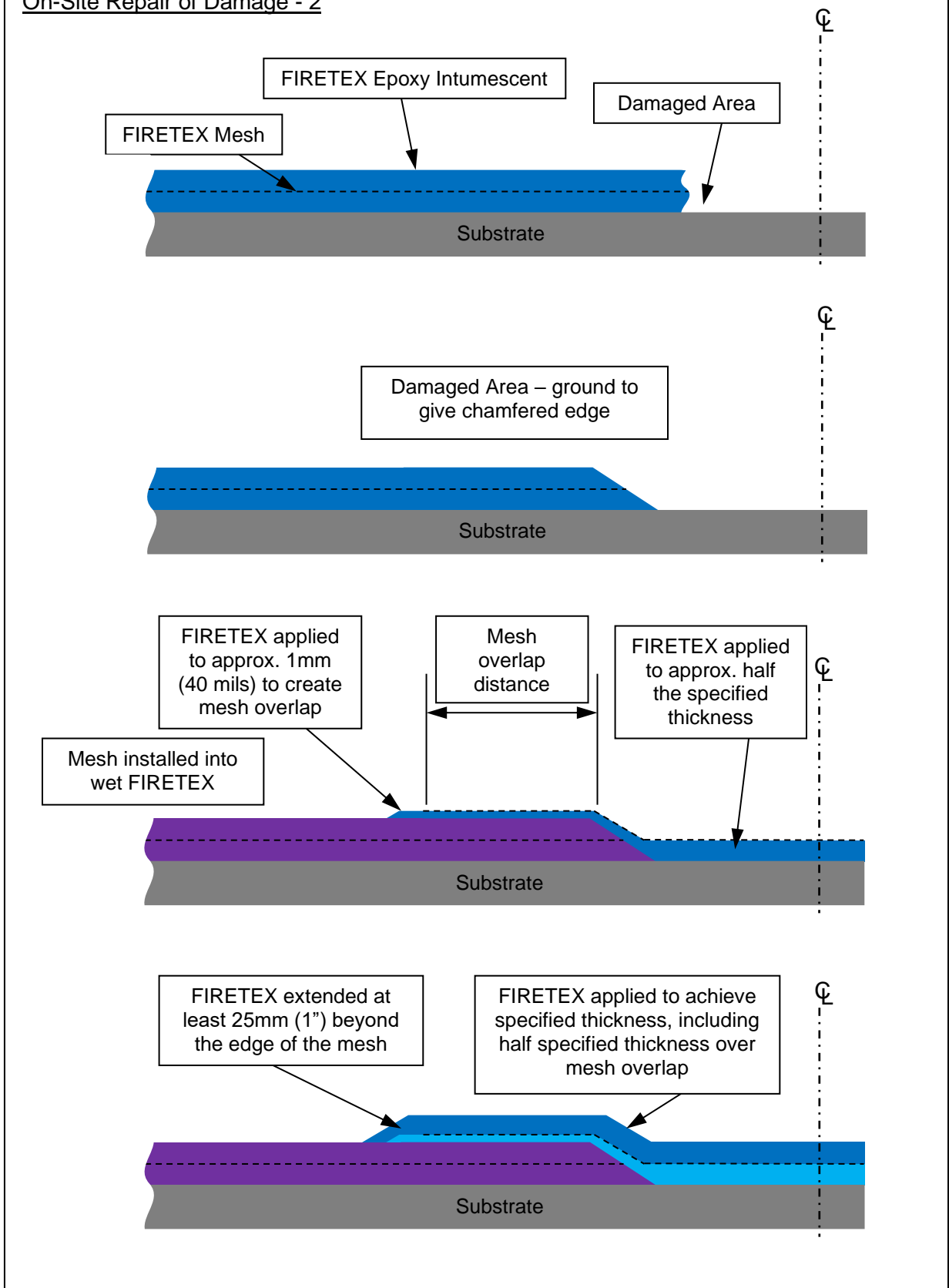
- All surfaces to be coated shall be prepared in accordance with the guidance given in the product's data sheet or application manual.
- Where the damage has exposed the substrate the affected area should be prepared in accordance with the guidance given in section 2 of this manual.
- Providing the FIRETEX® can be applied before the prepared clean surface has degraded it is not necessary to apply a primer, see section 2.6.1.
- The top coat shall be removed in areas where new FIRETEX® M90/03 will be applied over the existing (intact) coating system.

On-Site Repair of Damage - 1



Complete the repair as described in section 4.12, On-Site Completion of Connections

## On-Site Repair of Damage - 2



## 5. Coatback

Secondary steelwork and non-protected under deck areas need to be protected to an extent with FIRETEX® M90/03 to prevent heat transfer into the primary structure. There is no agreed standard for the determination of coatback required. However a commonly adopted industry norm is to coatback along secondary steelwork for a distance of 450mm (18"). It is normally considered that the distance should be measured from the point at which the secondary member connects to the primary.

Please note, however, that Sherwin-Williams have data on other coatback distances and alternative recommendations may be given. These will be project specific and dependent on the view of both the client and the verification society. If distances other than 450mm (18") are considered appropriate then please contact Sherwin-Williams.



## 6. Thickness control and measurement

One of the most important aspects of quality control in the use of FIRETEX® M90/03 is the attainment of correct dry film thickness.

The proposals given below are those considered appropriate by Sherwin-Williams, however, where these proposals differ from project requirements, the client's advice must be sought in determining which documentation takes precedence.

The following proposals for thickness measurement and tolerance are in line with those broadly adopted by the intumescent fire protection industry within the UK civil building sector.

### 6.1. Methods of measurement

For film thickness measurement of epoxy PFP two types of method are typically employed:

- Destructive - The 'drill depth gauge'
- Non-destructive - The electromagnetic gauge

#### 6.1.1. Destructive method

Drilling holes and the use of a calibrated depth gauge is acceptable provided all damage is repaired after measurements have been taken.

#### 6.1.2. Non-destructive method

The use of magnetic induction or eddy current gauges for the measurement of paint film thickness has been common for many years. More recently gauges have become available that will measure high thickness of coatings, e.g. Elcometer 456, from Elcometer.

Immediately prior to measuring the applied film thickness the gauge should be calibrated in accordance with the manufacturer's instructions. Calibration should be carried out using the designated smooth steel plate provided with the instrument. Smooth plastic shims specifically designed for calibration and traceable to a national standard must be used. Two shims should be chosen, one having a thickness no more than 50% above the maximum, the other no more than 50% below the minimum of the DFT range to be measured. Gauge accuracy should be determined by measuring, on the smooth steel calibration plate, a further traceable calibration shim of known thickness within the previously calibrated range.

Primer DFT should be determined prior to application of FIRETEX® M90/03.

FIRETEX® M90/03 DFT should be determined prior to application of topcoat. Failure to do this may require topcoat to be removed should the DFT's prove to be under specification.

### 6.2. Frequency of measurements

The following information is given for guidance only and does not seek to over-ride any project specific requirement for dry film thickness measurement. Where possible reference should be made to client project specifications or standards such as NACE, SSPC, BS, ISO, etc.

As a minimum all open (H, T or channel section) or closed profile (CHS, SHS) structural members should have thickness readings taken every 1m (3') along the length of each coated face. In the case of CHS readings should be taken on at least 4 equidistant points around the circumference and every 1m (3') along the length of the section.

### 6.3. Acceptance criteria

These criteria are Sherwin-Williams preferred requirements but in most cases the client's project specifications will take precedence.

- a) The average of all readings in the defined measurement area must be equal to or greater than the specified thickness.
- b) Where any single thickness reading is found to be less than 80% of the specified thickness, further readings in the area of the low reading should be taken as follows:
  - Where the web, flange or other face is wide enough then three, nominally equidistant readings should be taken at a distance of 150 - 300mm (6" – 12") away from the low reading.
  - Where the web, flange or other face is not wide enough to allow the above, then two nominally equidistant readings should be taken at a distance of 150 - 300mm (6" – 12") away from the low reading.
  - For CHS, 2 additional readings should be taken nominally equally spaced at a distance of 150 - 300mm (6" – 12") from the low reading along the length of the CHS.
  - If one or more of these additional readings are also less than 80% of the specified thickness further readings should be taken to establish the extent of the low area. The whole area should then be brought up to the required thickness by application of more FIRETEX® M90/03.
- c) Individual thickness readings of less than 50% of the specified thickness are not acceptable.
- d) Individual thickness readings of more than 29mm (1141 mils) are not acceptable.
- e) The measured average thickness of an item should not exceed 22mm (866 mils)

## 7. Topcoat selection

Although FIRETEX® M90/03 has a high degree of exterior durability in its own right, performance, longevity and decorative appearance will be enhanced if a topcoat is applied. For normal atmospheric exposure 50-75microns (2-3mils) of a good quality polyurethane coating will be specified, advice on suitable topcoats can be obtained from Sherwin-Williams.

## 8. Reference areas

Reference areas are suitable areas on a structure, selected to be representative of the project as a whole, which are used to:

- Establish an acceptable standard of surface preparation, unless the steelwork is already coated with a suitable primer for subsequent FIRETEX® M90/03 application.
- Check the coating system application and establish an acceptable standard of finish.
- Enable the performance of the coating system to be monitored.

Sherwin-Williams recommend that reference areas be created on all FIRETEX® projects, but consider them to be mandatory on projects meeting the following criteria:

- Projects where over 1,000m<sup>2</sup> (10,800ft<sup>2</sup>) will be protected with FIRETEX® M90/03.
- Projects where the service environment may be outside the normal conditions identified on the product data sheet or application manual.
- Projects where it is envisaged that the protected structure will be subjected to abnormal stresses, such as:
  - Large or rapid temperature fluctuations,
  - Mechanical stress resulting in significant deformation of components,
  - Exposure to corrosive chemicals,
  - Frequent or prolonged immersion,
  - Etc.

Please consult Sherwin-Williams for advice regarding whether reference areas should be prepared on a particular project.

If reference areas are to be created this should be done as per ISO 12944-7&8 and agreed between the interested parties, who as a minimum must include Sherwin-Williams and the purchaser of the FIRETEX® M90/03.

The number, size and location of the reference areas will be agreed on a project by project basis.

The application of the reference areas must be done in the presence of a member of Sherwin-Williams Technical Service Department, who must accept the application work as correct and representative of an achievable standard for the project as a whole.

## 9. Record keeping

Sherwin-Williams recommend that as a minimum the following records be kept by the applicator regarding the application of FIRETEX® M90/03.

At least two times per day and more frequently if the conditions are changing:

- Air temperature
- Substrate temperature
- Relative humidity
- Dew point

Further records should also be kept in order to provide traceability of the material usage:

- Areas coated
- Primer condition and thickness
- Product batch numbers
- Operator/sprayer
- Pump used

See appendix 2 for an example daily log sheet.

## Appendix 1, Quick application guide – Plural component spray

**Substrate:** The substrate will normally be abrasive blast cleaned and primed with a suitable primer. The primer must be clean, dry and free of contamination and/or defects at the time of FIRETEX® M90/03 application. For more details see Section 2.

**Material Pre-Conditioning:** To ensure optimum application characteristics FIRETEX® M90/03 should be allowed to stabilise at a temperature of 30°C to 35°C (86°F to 95°F) prior to application using plural component spray.

**Application Conditions:** The optimum conditions for application and curing of FIRETEX® M90/03 are given below, more details can be found in Section 4.1:

Temperature:	15°C to 35°C (60°F to 86°F)
Relative Humidity:	<75%
Minimum steel temperature:	3°C (5°F) above dew point temperature.

**Plural Component Spray Application:** The pump must be configured to deliver a volumetric ratio of 2:1.

Setup and operation of the pump is the responsibility of the application contractor, the following parameters are given for guidance, further information regarding application can be found in Section 4:

Holding tank temperature (A&B):	45°C (113°F)
Line heater temperature:	50°C (122°F)
Minimum pump output pressure:	210 kg/cm <sup>3</sup> (3000 psi)
Tip orifice:	0.76 to 0.99mm (0.030" to 0.039")
Weight ratio:	2.37:1

**Reinforcement:** FIRETEX® H240 mesh must be incorporated within the mid 1/3 of the FIRETEX® M90/03 film. It must be installed into uncured, wet coating and fully wetted out using scrapers or rollers. At joints the mesh should be overlapped, as below, for additional details see Section 3.

Pool fire:	50mm (2")
------------	-----------

**Surface Finishing:** FIRETEX® M90/03 may be worked with trowels and rollers for 10 to 30 minutes after spray application to evenly distribute the applied material, to help eliminate trapped air and to provide a smooth finish. Solvent may be applied to rollers to help minimise material pickup but if this is done the quantity of solvent used must be kept to the absolute minimum, also see sections 4.6 and Appendix 1.

**Dry Film Thickness:** Sherwin-Williams recommend that the dry film thickness (DFT) be checked after each application of FIRETEX® M90/03, this will allow the thickness of subsequent coats to be adjusted if required in order to reduce waste caused by over application or rework due to under thickness. In any case the DFT should be checked and approved before the top coat is applied, see Section 5 for further details.

**Stipple Finish:** FIRETEX® M90/03 may be left with a smooth surface after roller finishing. Frequently however, after the dry film thickness has been checked and approved, it is given a discontinuous coat of additional FIRETEX® M90/03 to create a stipple finish. This breaks the gloss of the coating system and tends to give a more pleasing visual appearance.

## Appendix 2, Example FIRETEX®M90/03 - Daily Log

Report N°:	Project Name:						
Date:	Prepared by:						
Area I.D. / Drawing number:							
Applicator & Reprs. Name:							
ENVIRONMENTAL CONDITIONS (to be recorded every hour)							
Time							
Ambient temp.							
Relative Humidity							
Dew point							
Substrate temperature							
Mesh Type:	Area (m <sup>2</sup> )/(ft <sup>2</sup> ):			Overlap (mm)/(inch):			
FIRETEX®M90/03 Storage Temperature	Part A:			Part B:			
Batch Numbers							
M90/03 Weight Ratio	Shift 1		Shift 2		Shift 3		
Part A							
Part B							
Spray Equipment type and I.D.							
Area I.D. (if different from above)							
Specified thickness (mm)/(inch)							
Thickness applied to date (mm)/(inch)							
Thickness apply today							
Area coated (m <sup>2</sup> )/(ft <sup>2</sup> )							
M90/03 Batch Numbers							
Part A							
Part B							
M90/03 Qty used (# kits)							
Part A							
Part B							
Solvent used:	Type:			Qty (L)/(USGal):			
NOTES							
Authorized name & signature:							

## Disclaimer

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# FIRETEX M90/03

## APPLICATION MANUAL

### THE SHERWIN-WILLIAMS DIFFERENCE

Sherwin-Williams Protective & Marine delivers world-class industry subject matter expertise, unparalleled technical and specification service, and unmatched regional commercial team support to our customers around the globe. Our broad portfolio of high-performance coatings and systems that excel at combating corrosion helps customers achieve smarter, time-tested asset protection. We serve a wide array of markets across our rapidly growing international distribution footprint, including oil and gas, water and wastewater, bridge and highway, steel fabrication, flooring, food and beverage, rail and power, marine and passive fire protection.

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