

*Technical document: TD-018, English translation*

## **FIRESTOP Steel X-MART 111 Application Manual**

### **I Obligatory References**

**1.1. Prior to use of FIRESTOP Steel X-MART 111 expanding fireproof coating, it is necessary to read the instructions in this TD. Producer assumes no liability for damages caused by inadequate use of products and non-compliance with these instructions.**

1.2. Definitions of terms: producer, customer, fire-proof coating are given in section 1.2. of Technical document TD-017. Instructions in this TD can be changed in time due to technological improvement of the product. These changes will be noted and issued in amendments of this TD.

1.3. Additional data are available on reasonable request.

1.4. FIRESTOP Steel X-MART 111 is coating for indoor and outdoor use - internal and semi-exposed structures. Compared to standard intumescent coating intended for the protection of steel elements in the interior, FIRESTOP steel X-MART 111 has increased resistance to precipitation and other atmospheric influences which enables additional application in the exterior (semi exposed structures - limited exterior conditions). For long-term resistance to atmospheric and mechanical influences and use in the exterior FIRESTOP steel X-MART 111 must be protected with a top coating.

### **II Base and Surface Preparation**

#### **2.1. Preparation:**

##### **General:**

FIRESTOP Steel X-MART 111 is applied to a previously prepared surface: clean, dry steel surface, with previously applied anticorrosive primer. Surface preparation consists of grease and dirt removal with agents like nitro thinner, Motofus or Play Ox degreasers and sandblasting.

##### **Steel:**

Steel preparation prior to first coating should be in accordance with recommendations for the base anticorrosive coating given in the manufacturer's specification. FIRESTOP Steel X-MART 111 should be applied exclusively onto compatible primers. We recommend:

**PRIMTEC Steel B100, alkyd synthetic primer,  
PRIMTEC 2K EPOX S200, 2K epoxy primer.**

Fireproof coating may be applied onto them after drying – usually after 24 hours. Other primers can also be acceptable. For more information, contact FIRESTOP Internacional technical service. FIRESTOP Steel X-MART 111 should not be applied onto chlorinated rubber, bitumen - based primers or thermoplastic preparatory coatings.

##### **Iron-free metal surfaces:**

FIRESTOP Steel X-MART 111 may be applied onto iron-free metal surfaces, such as galvanized surfaces, with the application of a corresponding primer. For advice, contact FIRESTOP Internacional technical service.

#### **2.2. General guidelines:**

Prior to use of FIRESTOP Steel X-MART 111, it is necessary to do the following:

- Equipment, tools and accessories needed for application should be clean, free of dried material residues.
- Base coating should be compatible with FIRESTOP Steel X-MART 111 and applied in an appropriate way.

- Period of application of FIRESTOP Steel X-MART 111 over the primer should not be longer than prescribed.
- An appropriate primer should be used for galvanized steel.
- Damages to the primer should be eliminated and prepared for further coating.
- Surface should be dry, clean and degreased.
- Wet film thickness gauges should be at your disposal.

### III Tools

#### Mixer:

Use 1/2" boring machine with an average or instantaneous mixer.

#### Pumps – airless spray gun:

- Working pressure / 1450-1750 psi (102-122 kg/cm<sup>2</sup>)
- Pumping ratio / minimum\* 50:1 (\*teflon packages are recommended)
- Tip size / 19-23
- Fan angle / 10-40 degrees (depending on the sprayed part)
- Hose diameter / 10 mm (inner diameter 3/8")
- Hose length / maximum 60 meters

#### Spray guns:

We recommend

Mfg	Model
Graco	205 591
Silver	208 663

#### Brush and Roller:

For application with brush and roller, ensure a continuous coat to avoid thick brush finishing. Use of a small hairy fabric roller will produce a light and lasting final layer.

Maximum wet film per layer when applied with a roller or brush is 0.51 mm. These recommendations should be in compliance with tools producer recommendations.

### IV Mixing and Thinning

FIRESTOP Steel X-MART 111 is delivered in a ready-to-use form and need no thinning. Mix well before use with a mixer, while observing the above listed instructions. If thinning is required, it is made with maximum 3%-5% water.

### V Application Conditions

#### 5.1. Temperature and atmospheric conditions

It is recommended to apply and use FIRESTOP Steel X-MART 111 onto dry and protected steel profiles. Air and steel temperature should be min 3°C. Relative air humidity should be max 80-90% for a successful application.

Conditions	Base	Ambience	Humidity
Normal	15°C - 29°C	15°C - 29°C	0 - 80%
Minimum	3°C	3°C	0%
Maximum	32°C	40°C	90%

Steel surface temperature should be minimum 2°C above the dew point. Spraying of intumescent coating is not recommended if wind speed exceeds 5 m/s due to the large dispersal or material consumption.

Compared to intumescent coating FIRESTOP Steel X-MART 110 intended for the protection of steel elements in the interior, FIRESTOP steel X-MART 111 has increased resistance to atmospheric influences. After complete

drying, depending on the conditions and exposure of protected construction, the coating can resist atmospheric influences over a period of 3-6 months before coating with a top coat. In that period it is necessary to monitor atmospheric conditions because intumescent coating should not be exposed to high intensity rainfall over a longer period of time due to possible damage.

During application and until it is completely dry, the coating must be protected against precipitation and high humidity. If FIRESTOP steel X-MART 111 is wetted during application, it may be damaged in the form of bubbles, surface cracking and wrinkling, blisters and lift-off of the product.

Smaller defects can be repaired according to data XII of this TD, while larger damage requires removal of intumescent coatings from the entire surface and application of a new one.

## 5.2. Protection of Surrounding Surfaces

Finished surfaces should be protected from damage and repeated spraying. In the event of a rainfall during open-air work, profiles - support beams can be covered with PVC foil or similar material.

## VI Application Procedure

### Pumps – Airless Spray Gun:

An individual layer consisting of several coatings applied in swift moves enables better control of quantities, thickness and the final layer. The maximum wet film thickness (WFT) of FIRESTOP Steel X-MART 111 is 0.8 mm. In certain cases, application of two thinner layers instead one thicker is recommended. In favourable weather conditions (21°C) and at air circulation exceeding 2 m/sec, it is possible to apply two layers per day. In any case, the first layer must be dry, particularly on joints of vertical parts of profiles and along edges.

### Brush/Roller:

For application with brush, the brush has to be filled to the top. The stroke technique should be such to reduce brush marks. A short hairy roller can be used, but this will effect the look of final layer. The maximum wet film per layer when the application is with roller or brush is 0.51 mm.

### Application Ratios:

At the ambience temperature of 21°C, the following ratios may be used per coating:

Method	Maximum filling
Airless spray	800 µm WFT*
Brush/roller	510 µm WFT*

\*WFT – wet film thickness

Finished surfaces should be protected from damage and repeated spraying.

### Special recommendation:

Organized training by qualified persons from FIRESTOP Internacional technical service is recommended to the contractors who are inexperienced in application of fireproof coating.

## VII Measurement of Coating Thickness during Application

When applying the coating, wet film thickness should be checked with a thickness gauge. It is used by inserting teeth into the wet coating. The last teeth with a coating on it, shows the primer thickness.

Prior to the application of the top coat, dry film thickness should be checked by using the electronic dry thickness gauge. The top coat should not be used until the appropriate thickness of FIRESTOP Steel X-MART 111 is applied.

It is important to ensure that the wet film is thick enough to obtain the desired film thickness after drying. During the drying process, the coating will shrink as a result of water evaporation.

The following formula can be used to calculate the desired thickness of wet film:

$$\text{WFT*} = \text{DFT*} / \text{SOLID MATERIAL CONTENT (70)} \times (100)$$

\*WFT – wet film thickness DFT - dry film thickness

Dry film thickness measurement can be performed as soon as the coating is hard enough to enable reading without furrowing it.

## VIII Drying Time

Drying period depends on several factors:

- Temperature
- Air circulation
- Humidity
- FIRESTOP Steel X-MART 111 thickness
- Application method.

Great humidity and poor air circulation or low temperatures of steel may result in condensation on steel parts, causing prolongation of drying time and poor adhesion.

The following table shows adhesion/drying time in different conditions:

Air temperature→		10°C	20°C	30°C
Air humidity ↓	Coating thickness	With air circulation	With air circulation	With air circulation
30%	WFT 0,7 mm	2-3 h	1-2 h	1 h
50%	WFT 0,7 mm	3-4 h	3 h	2-3 h
70%	WFT 0,7 mm	8 h	6-7 h	5-6 h

The following is to be mentioned as it affects the drying time:

- Drying time of the coating is prolonged by approx. 20% if coating is done with the roller or brush (in comparison to the application with airless spray or compressor gun).
- Data listed in the table are measured on constant conditions; temperature variations will cause different values of drying time.
- Minimum drying time of the last layer prior to top coating is 15 hours.
- Drying time doubles at the temperature of 5°C or at air humidity exceeding 75%.

## IX Practical Thicknesses - Consumption

### 9.1. Coating thickness

Coating thickness depends on the cross section factor (F/V) of the protected steel profile, desired protection period, number of sides exposed to fire, as well as the purpose of the construction.

Steel profiles with smaller cross-section factor values have greater fire resistance and require a lower level of fire protection or less thickness of intumescent coatings for the required protection period. Profiles with higher cross section factor values have lower fire resistance and require a higher level of fire protection or greater thickness of intumescent coatings for the required protection period. Detailed information on dependence of the coating thickness on the cross section factor (F/V) of the steel profile and the desired protection time is shown in the certification documentation issued as part of the Technical Documentation.

### 9.2. Consumption

Consumption depends on factors mentioned in section 9.1. of this TD. It refers to assumed consumption of 1.9

kg/m<sup>2</sup> for 1000µm DFT and it is increased by producer by 5% due to packaging wastage. Assumed consumption is tested and measured using producer's Internal method specified in the technical document: TD-012, and any further audit producer accepts only by this method.

**Wastage** is quantity of product that remains on packaging and on application equipment and tools.

Practical consumption is conditioned by many factors which are monitored by customers and which also affect wastage of product.

**Dispersal** is formed while application - spraying and dripping of material. It is conditioned by state of the equipment - regularly maintenance, application (atmospheric) conditions, training of contractors, preparation on worksite and other effects. Based on our knowledge and practice average dispersal is about 20%.

Before making the Offer to the customer, producer or distributor always calculates product consumption according to factors listed in section 9.1. of this TD, increased by 5%. All other factors that affect real consumption are customers' liability without liability of producer, unless contract includes supplies and installation (executions of works) by producer/distributor.

## **X Gauging Final Coating Thickness**

Dry film thickness can be measured with gauging equipment such as electro - magnetic meter (dry film thickness measuring device).

Measurement of the final coating thickness is made when the coating is hard enough to perform gauging without furrowing the surface.

The read value of anticorrosion primer is to be deducted from the total measured dry layer thickness.

The top decorative coating should not be applied until measured values of fireproof coating thickness are in line with the prescribed thickness.

## **XI Top Coat Application**

When fireproof FIRESTOP Steel X-MART 111 is applied in the required DFT\* (\*dry film thickness) and when it is completely dry, a top decorative coat may be applied. We recommend:

**CENTURION B100, alkyd enamel**

**CENTURION 2K PUR S200, polyurethane top coat**

in shades according to RAL. Other compatible top coats can also be used. Topcoat is not always mandatory in the system. It is used for decoration and as a protection of PP coatings from atmospheric and mechanical influences, especially for steel structures in the exterior.

## **XII Maintenance and Cleaning**

### **12.1. Maintenance and reparation**

Damaged parts (mentioned in section 5.1. of this TD) should be scraped off or rubbed down. Approx. 2.5 cm of the finishing coat around the damaged spot should be removed. The surface has to be clean and dry prior to FIRESTOP Steel X-MART 111 is applied again. The primer is to be applied in the original thickness, and it has to be dry before the final layer is applied. Small scratches and chips can be remedied with FIRESTOP putty (filler) which is applied with putty knife (single application), and when it is dry, the finishing coat is applied. Reparation is usually done by brush, and in cases of greater damages other application tools can be used (according to section III of this TD).

### **12.2. Cleaning**

**Cleaning:** the pump, mixer and hose should be washed with water at least each 4 hours at 21°C and more frequently if the temperature is higher.

**Cleaning due to inadequate handling:** Spilled coating should be cleaned with an absorbent material. Brushes

and equipment should be washed out with water and detergent immediately after use. Waste handling and environment protection in accordance with regulations are responsibility of the customer and contractor.

### **XIII Conclusion**

To our best knowledge, technical data contained herein are true and accurate as of the day of publishing and may not be modified without prior notification.

#### **13.1. Producer liability**

Producer is liable for claim that its product fire resistance is tested in accordance with valid Serbian and EN standards by certified institutes and published as a part of Technical documents. Technical data contained herein (and in our other technical documents, internal standards and recommendations) are true and they can be checked only according to methods mentioned in these documents. No other warranty and liability are implied. Our liability, if any, is limited to the substitution of products with other delivery. We assume no liability for execution of works, except in special cases defined in special contract. All the other liabilities of producer, mentioned in section 6.1. of TD-017 are also valid along with claims in this TD.

#### **13.2. Trademark**

FIRESTOP STEEL X-MART 111 is a trademark of our company, legally protected in Serbian Intellectual Property Office. It is within a proprietary programme: FIRESTOP - expanding fireproof coatings – state of the art protection of steel and wooden structures: registration No. 4117, report No. A-727/08/01 and registered FIRESTOP trademark (signet) No. 57833.

### **XIV Date of Issue of this TD**

01.05.2017.

(Basic document)

03.02.2020.

(Amendments)

Reference number: 108/2020, 1010/2018, 335/2018

Reference number of basic document: 348/2017

### **XV Signature**



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