APPLICATION MANUAL AND RECOMMENDATIONS FOR
FIREFILM III, FIREFILM III C AND FIREFILM IV

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DOCUMENT CONTENTS

SECTION -. REVISION SUMMARY

Revision	Date	Amendments
A	04.22.20	First revision

SECTION -. INTRODUCTION

Audience

We assume that applicators of CARBOLINE products understand the terminology associated with our products and the various pieces of spray equipment and application techniques.

The installation of the FIREFILM III and FIREFILM IV Intumescent Fire Resistive Materials shall be performed only by contractor personnel trained or qualified by CARBOLINE in the installation of the materials.

Locating Information

This guide incorporates a number of aids to help you locate information easily.

Table of Contents
Figure and Table Listings
Page Headers and Footers
Frequent Section, Subsection, and Topic Headings

Numbering System

To avoid a cumbersome numbering system, only chapters, sections, and subsections have a numerical designation. For example, “2.3.1” represents Chapter 2, Section 3, Subsection 1.

Illustrations and drawings generally appear at the end of this document.

Breakdown of Information

Frequent section and subject headings highlight other significant information within a chapter. Heading type style and indentations indicate the level of importance for the topics.

Related Publications and Documents

This document occasionally refers to other Guides, data sheets, or specifications that may be helpful. Copies are available from CARBOLINE. Related information can be accessed at www.carboline.com .

Other documents that may be helpful, include:

- OSHA - Occupational Safety and Health Administration Safety Rules
- National Spray Equipment Manufacturer’s Association Precautions for Spraying
- Power tools, hand tools or other mechanical equipment operating procedures.

SECTION -. SAFETY PRECAUTIONS

FIREFILM materials weigh approximately 12 - 13 pounds per gallon. Caution should be taken when lifting and moving the material to prevent injury.

Observe the National Spray Equipment Manufacturers Association precautions for spraying.

DO NOT point spray gun at any part of the human body.

Notes on Installation

Basis for Installation Procedures in This Guide

The installation steps and procedures in this guide were prepared with the best available data. All of the steps and procedures presented in this guide are based upon tests. As additional test and installation data becomes available, including revised installation procedures, CARBOLINE may update and modify this guide.

Note: This is a general Application Manual and cannot cover all possible situations which may arise in the field. For technical assistance, contact CARBOLINE's Fireproofing Technical Service Group at 1-800-848-4645.

SECTION 1. GENERAL CONDITIONS

1.1 SCOPE

This Application Manual describes the requirements for the application of the FIREFILM III, FIREFILM III C and FIREFILM IV Intumescent Fire Resistive Materials to interior steel surfaces for the commercial and light industrial market, based on the cellulosic requirements of ASTM E 119, UL 263 and/or CAN/ULC-S101. For the application to any other substrates, markets or specifications, contact CARBOLINE Technical Service or your local CARBOLINE Sales Representative.

1.2 QUALITY CONTROL MANUAL

1.2.1 QUALIFICATIONS OF APPLICATORS/RESPONSIBILITIES OF PERSONNEL

The application shall be performed by a Qualified Applicator having CARBOLINE training with proper equipment and experience.

1.2.2 REQUIREMENTS

In order to qualify, an Applicator shall:

a) Undergo specific training by CARBOLINE
b) Be experienced in the application of thin film Intumescent coatings.
c) Have the necessary approved spray application equipment and recommended quality control instrumentation.
d) Have in place an acceptable QA/QC system and be prepared to permit CARBOLINE audits.
e) Understand and recognize their statutory obligations with regard to health and Safety.

1.3 SAFETY PRECAUTIONS

The Applicator shall follow standard industrial hygiene practices for the handling of chemical coatings and shall conform to applicable codes of practice, regulations, and Owner Safety rules in all respects. Reference FIREFILM III, FIREFILM III C and FIREFILM IV SDS for additional information and instruction.

Where power tools hand tools, spray equipment or other mechanical equipment are being used, the proper operating procedures for each tool or piece of equipment, as well as eye, hearing and respiratory protection should be followed. Equipment used to apply FIREFILM III, FIREILM III C and FIREFILM IV is under high pressure. Any injury caused by high pressure liquids can be serious and immediate medical attention should be sought.

1.4 DELIVERY

Material shall be delivered to the site in original, unopened containers, bearing clearly visible product names, batch number, name of manufacturer, expiration date, and storage instructions.

1.5 STORAGE

Material not in immediate use shall be stored off the ground in a covered area assigned for that purpose. The materials in storage shall be protected from temperatures above 100˚F (38˚C) and below 33˚F (1˚C).

Prior to use with electric airless spray equipment, FIREFILM SERIES shall be pre-heated to a minimum of 70˚F (21˚C) and a maximum of 100˚F (38˚C).

1.6 PROTECTION OF ADJACENT SURFACES

The applicator shall mask off all adjacent areas and equipment from material overspray during the application. Overspray shall be removed promptly before material has cured. When applying these coating in windy conditions, additional precautions to control overspray should be undertaken.

SECTION 2. MATERIALS

The FIREFILM III, FIREFILM III C and FIREFILM IV Intumescent Fire Resistive Materials systems consist of:

2.1 PRIMERS

All primer systems must be accepted by CARBOLINE prior to use under FIREFILM III, FIREFILM III C or FIREFILM IV. The acceptable primer system shall be applied to properly prepared surfaces in accordance with the manufacturer's and project specifications.

Refer to Appendix A, Carboline's Approved Primer List.

The general requirement for steel preparation before the application of an approved primer should meet SSPC-SP2 or SP3. Contact Carboline Technical Service for surface preparation recommendations and specific primer requirements.

Existing coatings must attain a minimum 3A rating in accordance with ASTM D3359 Method A, X cut adhesion test. If acceptable, clean and lightly abrade in accordance with SSPC-SP2 or SP3 to roughen and de-gloss the surface. If not acceptable, the coating must be removed and areas re-primed with a compatible primer. If primer coating has acceptable adhesion, but is not compatible or compatibility is unknown, a tie-coat primer can be applied as a bonding or barrier coating. Contact Carboline Technical Service for a list of approved tie-coat primers and specific primer requirements.

Primer recoat intervals may vary from the published product datasheet when using under intumescent fireproofing products. Consult Carboline Technical Service for recommended cure times before applying Carboline intumescent products.

2.2 FIREFILM III, FIREFILM III C AND FIREFILM IV

FIREFILM III, FIREFILM III C and FIREFILM IV are water based intumescent fire resistive materials designed for the fire protection of interior structural steel. FIREFILM III, FIREFILM III C and FIREFILM IV are supplied in full pails (5 gallons / 18.9 L).

2.3 TOPCOATS

All topcoat systems must be approved by Carboline prior to use over FIREFILM III, FIREFILM III C and FIREFILM IV. Refer to Appendix B, Carboline's Approved Topcoat List for various approved topcoat systems. Contact Carboline Technical Service for topcoat recommendations for interior general purpose and/or interior conditioned space environments.

SECTION 3. PUMP REQUIREMENTS

3.1 APPROVED ELECTRIC AIRLESS PUMPS FOR FIREFILM III AND FIREFILM III C

The minimum recommended pump for the application of FIREFILM III should have an output of 1.0 gpm (3.7 L) minimum to provide an operating pressure of 3,000 psi (204 bar). Must have 30 mesh inline filter installed. Remove rock catcher from siphon tube.

3.2 APPROVED ELECTRIC AIRLESS PUMPS FOR FIREFILM IV

The minimum recommended pump for the application of FIREFILM IV is a Graco Mark V with an output of 1.35 gpm (5.1 L) minimum to provide an operating pressure of 3,000 psi (204 bar). Must have 30 mesh inline filter installed. Remove rock catcher from siphon tube.

SECTION 4: SURFACE PREPARATION AND PRIMING

4.1 DEGREASING, SURFACE PREPERATION AND PRIMING

4.1.1 DEGREASING

All surfaces shall be cleaned and degreased to SSPC SP1. When selecting a cleaning method, the primer manufacturer's and project recommendations must be adhered to.

When it is necessary to clean the surface of FIREFILM III, FIREFILM III C and FIREFILM IV before applying a further coat or top coating, solvent wiping with toluene, Thinner #19 is recommended.

4.1.2 CARBON STEEL SURFACE PREPARATION

The general requirement for steel preparation before the application of an approved primer shall meet SSPC SP2 or SP3. Refer to specific primer's product datasheet for specific requirements.

4.1.3 GALVANIZED SURFACE PREPARATION

Remove any contaminants per SSPC SP1; ensure there are no chemical treatments that may interfere with adhesion; and abrade the surface to establish a suitable roughness per SSPC-SP7. Prime with Carboguard 893 SG Primer @ 3 – 5 mils (75 – 125 microns) (DFT) per SSPC PA2.

4.1.4 STAINLESS STEEL SURFACE PREPARATION

All steel surfaces shall be blasted to a SSPC-SP7. Prime with Carboguard 893 SG Primer @ 3 – 5 mils (75 – 125 microns) (DFT) per SSPC PA2.

4.2 PRIMING

Only primer systems acceptable by CARBOLINE shall be used under FIREFILM III, FIREFILM III C and FIREFILM IV. The primer shall be applied in accordance with the manufacturer's and project's specification. Refer to Appendix A, CARBOLINE's Approved Primer List.

4.2.1 PRIMER THICKNESS

As previously stated, controlling the thickness of applied primers is very important. The following method will be the only one accepted by CARBOLINE:

a) Use a flat polished steel plate to calibrate the measuring device to zero.
b) Calibrate equipment device to a known thickness using manufacturers supplied shims.
c) Use the measuring device to measure individual primer coats and multi-coat thicknesses.
d) Record measurements at the rate specified by the project.
e) Thickness of primer must be sufficient to fully cover blast profile.

4.2.2 PRIMER REACTIVATION

If multiple primer coats are required, care must be taken to ensure that the manufacturers recommended maximum recoat time has not been exceeded. If the recoat window has been exceeded refer to the specific primer manufacturers recommendations.

4.2.3 PRIMER ADHESION

The coating inspector for the project must be satisfied that the adhesion values of the primer system meet the project specification.

For field applications, existing coatings must attain a minimum 3A rating in accordance with ASTM D3359 Method A, X cut adhesion test. If acceptable, clean and lightly abrade in accordance with SSPC-SP2 or SP3 to roughen and de-gloss the surface. If not acceptable, the coating must be removed and areas re-primed with a compatible primer. If primer coating has acceptable adhesion, but is not compatible or compatibility is unknown, a tie-coat primer can be applied as a bonding or barrier coating. Contact Carboline Technical Service for a list of approved tie-coat primers and specific primer requirements

SECTION 5. MATERIAL PREPARATION & GENERAL CONSIDERATIONS

5.1 MATERIAL PRE-HEATING

Prior to use the material shall be pre-heated to a minimum of 70˚F (21˚C) for 24 hours prior to application. Cold material will not spray well. Material can be heated using heated storage units or hot rooms. These are normally constructed from storage containers that are insulated to maintain desired temperature and fitted with a suitable temperature controllable heater. Smaller custom-made hot boxes can be used for small projects to heat enough pails to maintain daily production. In hot climates the material may have to be maintained at a cooler temperature to stay within application range. Material temperature can be measured using a probe thermometer or IR gun.

Do not use electric jacket heaters that wrap around the outside of the pails. These can overheat the outside perimeter of the pails and “cook” the material around the inside making the material unusable.

5.2 MIXING

Thoroughly mix prior to use. Use 1/2" electric or air driven drill with a slotted paddle mixer. Must be 300 rpm under load (minimum). Mix material until fully incorporated (approximately 2 minutes or until completely blended and consistent color is achieved).

5.3 MOCK-UP INSTALLATION

Prior to actual production work, a representative sample shall be prepared following all specified procedures and approved thickness / finish / surface quality. This sample must then be approved by representatives of the owner, applicator, architect and any others having a vested interest in the installation. The actual production work must follow, and conform to, the standards and approved finish / surface quality of the site sample.

The site sample is a mandatory requirement and shall be made available to all parties throughout the completion of the project.

5.4 RECORD KEEPING

The maintaining of proper records is an essential requirement for all FIREFILM SERIES projects. The minimum requirements will be established by the project specification.

5.5 WELD CUT BACK AND SERVICE ATTACHMENTS

As heat is generated during the welding process, either during a preheating stage and/or during the welding itself, it is important that a suitable distance is left around the weld area to prevent damage to the adjacent FIREFILM.

For small weld attachments such as the addition of clips and hangers, a cutback distance of 2” (50mm) on each side of the weld areas should be sufficient. When carrying out welding close to FIREFILM, discoloration may be noted.

This discoloration denotes that the FIREFILM has received too much heat and the bond to the steel is likely to have been affected. When this happens, the discolored FIREFILM must be removed as described in Removal and Repair Procedures. For larger welds, i.e. full girth, a cutback of 12” (300 mm) each side of the weld area may be sufficient.

SECTION 6: FIREFILM III AND FIREFILM III C APPLICATION PROCEDURES

6.1 Surface Preparation

A. Surface must be clean, dry and free of any dirt, oil, grease or other contamination prior to surface preparation.
B. Clean surface to specified standard, typically SSPC-SP1.
C. The general requirement for steel preparation before the application of an approved primer should meet SSPC-SP2 and/or SP3. Contact Carboline Technical Service for recommendations and specific primer requirements.

6.2 Primer Application

A. All surfaces must be clean, dry and properly prepared as stated above prior to primer application.
B. All primers must be approved by Carboline prior to use and applied within manufacturers' and projects' stated specifications. If an unknown primer has been applied, contact your Carboline Fireproofing representative for recommendations.

6.3 FIREFILM III and FIREFILM III C Equipment Requirements

Electric Airless:	Minimum output of 1.00 gpm (3.7 L) minimum to provide an operating pressure of 3,000 psi (204 bar). Must have 30 mesh inline filter installed. Remove rock catcher from siphon tube.
Gun:	WIWA 500F PFP gun, Silver Gun with swivel, Contractor Gun with filter removed and/or Carboline approved equivalent.
Tip Size:	0.017" - 0.021" Graco XHD Heavy duty RAC non-diffuser tips
Fan Size:	6" - 10"
Hose:	3/8" (150' maximum)
Whip Hose:	1/4" (optional)

6.4 FIREFILM III and FIREFILM III C Application

(Environmental)

A. Before applying FIREFILM III and FIREFILM III C, confirm that proper environmental conditions are met. Minimum ambient temperature: 50˚F (10˚C) and rising, maximum relative humidity 85%, steel surface temperature must be 5˚F (3˚C) above the dew point.
B. Confirm that the surface has been prepared to specification.
C. Verify that a Carboline approved primer has been correctly installed to correct thickness and is properly cured. Ensure that the application is within the primer's recoat window.
D. Confirm that adjacent areas are properly masked off.
E. The application of FIREILM III and FIREFILM III C must be in a dry, interior, controlled environment that is not subject to exterior weathering or freeze thaw conditions.

(Material)

A. Material shall be pre-heated to a minimum of 70˚F (21˚C) and maximum 100°F (38°C) prior to introduction to the pumping units.
B. Thoroughly mix prior to use. Use 1/2" electric or air driven drill with a slotted paddle mixer. Must be 300 rpm under load (minimum).

(Equipment Setup)

A. The pump and all lines shall be clean and free from any contamination. (it is recommended to have a dedicated hose for use with FIREFILM products)
B. Prior to equipment startup, ensure all pressure is removed from lines.

C. Install inline 30 mesh filter.
D. Remove rock catcher from siphon tube.

(Application)

A. Adjust to lowest pressure required to achieve the desired fan pattern.
B. Typical film build for FIREFILM III and FIREFILM III C is 45 wet mils per coat. *(No requirement to apply a scratch coat prior to maximum film build.)*
C. Lighter coats will have a better surface appearance.
D. Care shall be taken to keep the fan pattern at an angle of 90 degrees to the surface and at 12" (305mm) to 18" (457mm) away from the surface.
E. Apply 1st coat of FIREFILM III or FIREFILM III C.
F. Check the wet film thickness with WFT gauge as required.
G. Material can typically be re-coated after 24 hours at 77°F (25°C), maximum 1 coat per day. Material must achieve a minimum Shore D hardness of 50 prior to subsequent coats.
H. Continue building material in as many coats as required, observing the minimum recoat windows as described in the technical datasheets for Firefilm III and Firefilm III C.
I. Special care should be taken when spraying flange edges on structural steel members to ensure complete coverage and a consistent thickness. The normal spray pattern on the outside and the inside surfaces of the flanges should cause the material to flow and wrap around the edge of the flange. If the coating on the flange edge is uneven after application, the edge shall be rolled lightly in order to provide an even surface.
J. The Applicator shall take frequent WFT measurements during application, using a penetrating measuring device to ensure that the coating is uniformly applied at the required film thickness. The thickness checks shall be made as required by the project based on AWCI Technical Manual 12-B.
K. The final thickness shall be specified in project drawings and owner specifications. Thicknesses for FIREFILM are outlined in published fire test designs. If no standard or guidance exists in project specification, Technical Manual 12-B and/or SSPC PA2 can be used for reference. All matters relating to thickness shall be decided between the owner and the applicator prior to the startup of the job.

6.5 Topcoat Application

A. Confirm that FIREFILM III or FIREFILM III C has been applied to the specified dry film thickness by using an electronic or magnetic dry film thickness gauge.
B. FIREFILM must be sufficiently dry/cured prior to topcoat application. The level of cure can be determined using a Shore D gauge. The minimum acceptable Shore D value prior to topcoating is 60. Once the average Shore D hardness of 60 has been achieved, the product is ready to topcoat.
C. Carboline approved topcoats or topcoat systems can be used to meet project specifications for color, finish, service requirements and UV protection.
D. FIREFILM III and FIREFILM III C must be sufficiently cured and be clean, dry and free of any contamination prior to topcoat application.
E. All topcoats must be approved by Carboline prior to use.
F. Ensure topcoat is applied within manufacturers' and projects stated ambient conditions, temperature and relative humidity specifications.
G. The topcoat shall be applied in accordance with the manufacturer and project specification. Refer to the FIREFILM III and FIREFILM III C design for topcoat requirements.

6.6 Safety

A. Only trained and qualified applicators should apply FIREFILM.
B. Follow all safety precautions on the FIREFILM III and FIREFILM III C SDS when applying this material.
C. Always use appropriate personal protective equipment and wash with hot soapy water if necessary.
D. Ensure proper maintenance and cleaning of the equipment.

SECTION 7: FIREFILM IV APPLICATION PROCEDURES

7.1 Surface Preparation

A. Surface must be clean, dry and free of any dirt, oil, grease or other contamination prior to surface preparation.
B. Clean surface to specified standard, typically SSPC-SP1.
C. The general requirement for steel preparation before the application of an approved primer should meet SSPC-SP2 and/or SP3. Contact Carboline Technical Service for recommendations and specific primer requirements.

7.2 Primer Application

A. All surfaces must be clean, dry and properly prepared as stated above prior to primer application.
B. All primers must be approved by Carboline prior to use and applied within manufacturers' and projects' stated specifications. If an unknown primer has been applied, contact your Carboline Fireproofing representative for recommendations.

7.3 FIREFILM IV Equipment Requirements

Electric Airless:	Use Graco Mark V or equivalent with a minimum 1.35 gpm (5.1 L) minimum to provide an operating pressure of 3,000 psi (204 bar). Must have 30 mesh inline filter installed. Remove rock catcher from siphon tube.
Gun:	WIWA 500F PFP gun, Silver Gun with swivel, Contractor Gun with filter removed and/or Carboline approved equivalent.
Tip Size:	0.021" Graco XHD Heavy duty RAC non-diffuser tips or RAC LTX blue tips
Fan Size:	6" - 10"
Single Hose:	3/8" (150' maximum)
Dual Hose:	Dual hoses can be run simultaneously using a Graco gun splitter valve (Graco Part No. 262826 or 3A2573E) off of a Mark V pump. Attach 50' (15.2 m) length of 3/8" (9.5 mm) material hose from pump. Set up Graco gun splitter valve at 50'(15.2 m) from the pump, then attach two 100 foot lengths of 3/8"(30.5 mm) material sections to each side of the splitter. Maximum hose length 150' (45.6 m) total when using dual hose set up.
Whip Hose:	1/4", maximum 3' (optional)

7.4 FIREFILM IV Application

(Environmental)

A. Before applying FIREFILM IV, confirm that proper environmental conditions are met. Minimum ambient temperature: 50˚F (10˚C) and rising, maximum relative humidity 85%, steel surface temperature must be 5˚F (3˚C) above the dew point.
B. Confirm that the surface has been prepared to specification.
C. Verify that a Carboline approved primer has been correctly installed to correct thickness and is properly cured. Ensure that the application is within the primer's recoat window.
D. Confirm that adjacent areas are properly masked off.
E. The application of FIREILM IV must be in a dry, interior, controlled environment that is not subject to exterior weathering or freeze thaw conditions.

(Material)

A. Material shall be pre-heated to a minimum of 70˚F (21˚C) and maximum 100°F (38°C) prior to introduction to the pumping units.
B. Thoroughly mix prior to use. Use 1/2" electric or air driven drill with a slotted paddle mixer. Must be 300 rpm under load (minimum).

(Equipment Setup)

A. The pump and all lines shall be clean and free from any contamination. (it is recommended to have a dedicated hose for use with FIREFILM IV)
B. Prior to equipment startup, ensure all pressure is removed from lines.
C. Install inline 30 mesh filter.
D. Remove rock catcher from siphon tube.

(Application)

A. Adjust to lowest pressure required to achieve the desired fan pattern.
B. Typical film build for FIREFILM III is 40 wet mils per coat. (No requirement to apply a scratch coat prior to maximum film build.)
C. Lighter coats will have a better surface appearance.
D. Care shall be taken to keep the fan pattern at an angle of 90 degrees to the surface and at 12" (305mm) to 18" (457mm) away from the surface.
E. Apply 1st coat of FIREFILM IV
F. Check the wet film thickness with WFT gauge as required.
G. Material can typically be re-coated after 4 hours at 70°F (21°C), maximum 2 coats per day.
H. Continue building material in as many coats as required, observing the minimum recoat windows as described in the technical datasheets for Firefilm IV.
I. Special care should be taken when spraying flange edges on structural steel members to ensure complete coverage and a consistent thickness. The normal spray pattern on the outside and the inside surfaces of the flanges should cause the material to flow and wrap around the edge of the flange. If the coating on the flange edge is uneven after application, the edge shall be rolled lightly in order to provide an even surface.
J. The Applicator shall take frequent WFT measurements during application, using a penetrating measuring device to ensure that the coating is uniformly applied at the required film thickness. The thickness checks shall be made as required by the project based on AWCI Technical Manual 12-B.
K. The final thickness shall be specified in project drawings and owner specifications. Thicknesses for FIREFILM are outlined in published fire test designs. If no standard or guidance exists in project specification, Technical Manual 12-B and/or SSPC PA2 can be used for reference. All matters relating to thickness shall be decided between the owner and the applicator prior to the startup of the job.

7.5 Topcoat Application

A. Confirm that FIREFILM IV has been applied to the specified dry film thickness by using an electronic or magnetic dry film thickness gauge.
B. FIREFILM IV must be sufficiently dry/cured prior to topcoat application. The level of cure can be determined using a Shore D gauge. The minimum acceptable Shore D value prior to topcoating is 50. Once the average Shore D hardness of 50 has been achieved, the product is ready to topcoat.
C. Carboline approved topcoats or topcoat systems can be used to meet project specifications for color, finish, service requirements and UV protection.
D. FIREFILM IV must be sufficiently cured and be clean, dry and free of any contamination prior to topcoat application.
E. All topcoats must be approved by Carboline prior to use.
F. Ensure topcoat is applied within manufacturers' and projects stated ambient conditions, temperature and relative humidity specifications.
G. The topcoat shall be applied in accordance with the manufacturer and project specification. Refer to the FIREFILM IV design for topcoat requirements.

7.6 Safety

A. Only trained and qualified applicators should apply FIREFILM IV.
B. Follow all safety precautions on the FIREFILM IV SDS when applying this material.
C. Always use appropriate personal protective equipment and wash with hot soapy water if necessary.

D. Ensure proper maintenance and cleaning of the equipment.

SECTION 8: CLEAN-UP PROCEDURES

8.1 GENERAL

The application area shall be maintained in a clean and orderly condition. Following the application, all overspray, debris, and equipment shall be removed and the area left in a condition acceptable to the Owner and General Contractor.

Pump, Gun, Tips and Hoses and mixer should be cleaned at least once per day with water.

SECTION 9. REPAIR PROCEDURES

PATCHING SMALL DAMAGED AREA

1. Completely remove FIREFILM slightly beyond the damaged are, using a grinder, utility knife, chisel or sandblasting.
2. Using sand paper, remove an additional ¼ inch of topcoat.
3. Clean steel surface of any dust, dirt, grease or any other material that may impair bond and reapply primer if the existing primer is damaged.
4. If a different approved primer is used over an existing primer, ensure that they are compatible.
5. Apply FIREFILM to the thickness specified for the required hourly protection.

SECTION 10: CONNECTIONS POST APPLICATION

CLAMP ON CONNECTIONS INSTALLED AFTER APPLICATION OF FIREFILM

Examples of clamp on connections include pipe, sprinkler pipe and utilities support brackets. Small to medium size clamps and clips are usually left unprotected. Large clamps and clip supports are usually protected with the same thickness as the structural member, due to the possibility of heat transfer. These connection details are not usually addressed in the fire test design information. It is recommended that the Authorities Having Jurisdiction be consulted for approval.

Where support clamps are required to be protected, the coating should be applied where the clamps are in contact with the structural member, and for four inches beyond the structural member. Refer to the FIREFILM Application Instructions for information including product limitations, required surface preparation, humidity, temperature, application rates, cure times, and topcoat application.

If FIREFILM is damaged when the clamped connections are removed, the affected area should be touched up in accordance with “PATCHING SMALL DAMAGED AREAS” above.

WELDED CONNECTIONS INSTALLED AFTER APPLICATION OF FIREFILM

Welded items such as plates and wide bracket supports are usually protected with the same FIREFILM III thickness as the supporting member due to the possibility of heat transfer. These details are usually not addressed in the fire test design information. We recommend the Authorities Having Jurisdiction be consulted for approval and confirmation of their requirements.

Prior to welding connections, remove the FIREFILM a minimum of three inches beyond the area to be welded by using a grinder, utility knife, chisel or sandblasting. Remove an additional ¼ inch of topcoat by using a medium grit sandpaper.

After welding is complete, clean the steel surface to remove all dust, grease, dirt, etc…that would affect the bond, and reapply the specified primer. Apply the FIREFILM to the areas in need of repair and to the connecting items if required.

BOLTED STEEL CONNECTIONS INSTALLED AFTER THE APPLICATION OF FIREFILM

Bolts of threaded rods of ¾ inch diameter or less are usually left unprotected. Bolts or threaded rods greater than ¾ inch diameter are usually protected with the same thickness of FIREFILM as the supporting member, due to the possibility of heat transfer.

These connection details are usually not addressed in the fire test design information. We recommend the Authorities Having Jurisdiction be consulted for approval and confirmation of their requirements. If drill oil is used, oil should be cleaned as soon as possible.
If FIREFILM is damaged after drilling, the damaged area should be touched up in accordance with “PATCHING SMALL DAMAGED AREAS” above. If there is no damage to the FIREFILM system after drilling, no additional treatment is required

APPENDIX A. ACCEPTABLE PRIMER LIST

Primer (see footnote)	VOC (g/l)	A/D Firefilm III	A/D Firefilm III C	Firefilm IV	Notes
Carbocoat 115[2]	419	2	2		(1) Designates primers that require a minimum 24 hr. cure @ 70°F before applying intumescent fireproofing. (2) Designates primers that require a minimum 7 day cure @ 70°F before applying intumescent fireproofing. (3) Designates primers that can only be used as tie-coat primers under intumescent fireproofing. (4) For exterior applications, contact Carboline Technical Service before applying Rustbond. (5) Designates primers that require a minimum 4 hr. cure @ 70°F before applying intumescent fireproofing. (6) Designates primer that can be used for clean room applications. (7) Designates primer that is NORSOK compliant.
Carbocoat 115 VOC[2]	340	2	2	2	
Carbocoat 150 UP[2]	409	2	2	2	
Carbocoat OEM[5] Universal Primer	407	5	5		
Carbocoat 8229[2][6]	268	2,6	2,6	2,6	
Sanitile 120[2][3]	98	2,3	2,3	2,3	
Carbocrylic 3350[2][3]	250	2,3	2,3	2,3	
Carbocrylic 3357 HB[1,3]	99	1,3	1,3	1,3	
Carbocrylic 3358[2]	153	2	2	2	
Carbocrylic 3359 DTM[2]	217	2	2	2	
Carbocrylic 3359 DTMC[1]	44	1	1	1	
Carboguard 553[1]	80	1	1	1	
Carboguard 635[1]	296	1	1	1	
Carboguard 893 SG LT[1]	318	1	1	1	
Carboguard 893 SG[1]	336	1	1	1	
Carbomastic 94[1][7]	120	1,7	1,7	1,7	
Carbomastic 94 MC[1]	95	1	1	1	
Phenoline 353[1]	206	1	1		
Rustbond[1][4]	85	1	1	1	

APPENDIX B. TOPCOAT LIST

Topcoat (see footnote)	VOC (g/L)	A/D Firefilm III	A/D Firefilm III C	Firefilm IV	Notes
Carbocoat 30	300	2	1,2,4		(1) Approved for interior general purpose - exposed to temperature and humidity fluctuations during changing construction conditions. (2) Approved for interior conditioned space - fireproofing is under constant heat; temperature and humidity do not fluctuate. (3) Approved for exterior ratings- exposed to the elements. (4) Approved topcoats tested for clean room applications - Consult Carboline Technical Service for specific details prior to application.
Carbocoat 8215 VOC	336	2	2,4		
Carbothane 133 MC	97	2	2,4	2,4	
Carbothane 134 WB	95	2	2,4	2,4	
Carbothane 134 HG	264	2	2		
Sanitile 155	250	1,2	1,2	1,2	
Sanitile 655	335				
Sanitile 845	97	2,4	2,4	2,4	
Carbocrylic 3350	250	1,2	1,2	1,2	
Carbocrylic 3358	153			2	
Carbocrylic 3359 DTMC	100			2	
Carbocrylic 3359 MC	60			2	
Carbomastic 94	120	2	2	2	
Carbomastic 94 MC	95			2	