



THERMO-LAG 3000

**Fire Barrier System
Application Manual**

Commercial / Light Industrial Market

ASTM E119 (UL 263 / NFPA 251)

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Rev. 4

Notices and Statements

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Preface

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 THERMO-LAG 3000 Fire Barrier System 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

Safety Precautions

THERMO-LAG 3000 Bulk Grade Material weighs approximately 10.5 - 11.5 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.

1.0 GENERAL CONDITIONS

1.1 SCOPE

This Application Manual describes the requirements for the application of the THERMO-LAG 3000 Fire Barrier System to steel surfaces for the commercial / light industrial market, based on the requirements of ASTM E119. For the application of THERMO-LAG 3000 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 thick film coatings, preferably epoxy based.
- (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 THERMO-LAG 3000 MSDS and Health and Safety Data Sheets 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 THERMO-LAG 3000 is under high pressure. Any injury caused by high pressure liquids can be serious and immediate medical attention should be sought.

1.4 DELIVERY

THERMO-LAG 3000 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

THERMO-LAG 3000 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 32°F (0°C).

Prior to use with plural component equipment, THERMO-LAG 3000 A shall be heated to a minimum of 100°F (38°C).

Prior to use with plural or single component equipment, THERMO-LAG 3000 SA shall be heated to a minimum of 70°F (21°C) and a maximum of 110°F (43°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.

2.0 MATERIALS

The THERMO-LAG 3000 Fire Barrier System consists of the following materials:

2.1 PRIMERS

Prior to use, all primer systems must be accepted by CARBOLINE prior to use under THERMO-LAG 3000. The acceptable primer system shall be applied to properly prepared surfaces in accordance with the manufacturer's and project specifications in a range of 3 – 5 mils (75 – 125 microns) DFT per SSPC PA2. Refer to Appendix A, Carboline's Approved Primer List.

All steel surfaces shall be blasted to a 1.5 – 2.0 mils (37 – 50 microns) angular profile, to a minimum of a SSPC SP6 (Sa2). (For galvanized steel surfaces see Section 4.3 – Galvanized Surface Preparation)

Final dry film thickness in excess of this value shall be agreed upon by CARBOLINE in writing.

2.2 THERMO-LAG 3000

THERMO-LAG 3000 is a two component, thermally activated, intumescent epoxy coating. When exposed to flame, the material volatilizes at fixed temperatures, exhibits a volume increase through formation of a multicellular matrix and absorbs and blocks heat to protect the substrate material.

| | |
|--------------------|---------------|
| THERMO-LAG 3000 A | (100% Solids) |
| THERMO-LAG 3000 SA | (95% Solids) |

2.3 TOPCOATS

Topcoat systems must be acceptable to Carboline prior to use over THERMO-LAG 3000. Refer to Appendix B, Carboline's Approved Topcoat List for various topcoat options.

2.4 FP-FIBERGLASS MESH

The FP-Fiberglass Mesh is 5.3 oz/yd² (180 grams/m²), Type "E", and must be purchased from CARBOLINE. The application details of the FP-Fiberglass Mesh are dependent upon the design, size of steel, project requirements, etc. and can be found in the appendices of this manual.

FP-Fiberglass Mesh is utilized for Intertek Design Nos. CC/BA 180-01 and CC/CA 180-02 and UL Design No. N608.

2.5 HIGH TEMP MESH

The High Temp Mesh is an open weave carbon mesh and must be obtained from CARBOLINE. The application details of the High Temp Mesh are dependent upon the design, size of steel, project requirements, etc. and can be found in the appendices of this manual.

High Temp Mesh is utilized for Intertek Design No. CC/CA 180-03.

3.0 EQUIPMENT (Minimum)

3.1 APPROVED PLURAL COMPONENT EQUIPMENT FOR THERMO-LAG 3000 A AND THERMO-LAG 3000 SA

The following approved plural component units (without holding tanks) are suitable for the application of THERMO-LAG 3000 shall be purchased from:

AirTech Spray Systems, Inc.
4303 Piedmont Dr.
Houston, TX 77018
Tel: 713-681-0013
MODEL NO:
AT2.3/4000 (Bucket Pump)

CoverCat Spray Systems Ltd.
35A Northfield Way, Newton Aycliffe
County Durham, DL5 6UF UK
Tel: 44-1325-314120
MODEL NO:
352 F (Tank Mounted Pump)
452 F (Tank Mounted Pump)

Spray-Quip, Inc.
1754 Des Jardines
Houston, TX 77023
Tel: 713-923-2771
MODEL NO
397-884 SQ/GRACO H.D. Fixed Ratio
(Tank Mounted Pump)

Covercat U.S.A.
40 Austin Boulevard
Commack, NY 11725
631-462-2952:

We recommend the use of tank mounted pumps.

It is essential that all the equipment used by the Applicator is properly maintained. It is necessary to regularly change items such as seals, gun tips, packing and hoses.

Every Applicator shall obtain a parts list and/or manual from the manufacturer for the proper operation of the equipment and its maintenance.

Any company which has not utilized the specific pump prior to applying THERMO-LAG 3000 shall be trained in the proper operation of the pump by the pump manufacturer. CARBOLINE takes no responsibility for the lack of proper instruction on the use of the pump.

Poorly maintained equipment will not function properly and may cause the ratio of components A and B, (set at 1:1), to vary. The permitted ratio tolerance of components A and B is +/- 5% (by volume). The Applicator shall perform at least 2 ratio checks (by volume) per shift collecting a minimum of 2.5 gallons (10 liters) of components A and B during each check.

Ratio checks shall only be performed by pumping both components into separate pails simultaneously.

3.1.1 EQUIPMENT STARTUP PROCEDURE

- A. The pump and all lines shall be clean and free from any contamination.
- B. Turn off air to main pump. Be sure all pressure is removed from lines.

Prior to loading heated material under follower plates, premix Parts A and B for 2 – 3 minutes.

Load heated material under follower plates. Lower follower plates on to buckets and bleed off trapped air and then close bleed valves.

NOTE: If using pump with holding tanks, use transfer pumps and begin filling unit with material.

Turn on the main pump air to assist in the movement of material into the material lines. Continue pumping Part A and Part B until a steady flow of material is present at the end of each fluid delivery hose. Turn off all air.

- C. Turn on fluid and line heaters, and adjust temperature of the heaters to 140-160°F (60°C - 71°C). Wait at least 30 minutes for material to heat thoroughly or recirculate the material until the temperature of the material reaches the temperatures stated above.
- D. The pump shall be set for a 1:1 ratio and it is important to check this ratio before beginning any work.

Hose Bundle: ¾" (100' maximum) Whip Hose: ½" (20' maximum).

- E. The air pressures needed for properly delivering material may vary from pump to pump, and adjustments may vary from the stated pressures herein.
- F. The use of other plural component equipment (with holding tanks), shall be approved by CARBOLINE prior to use.

With the air still turned off to the main pump,

Adjust the air pressure to the "A" component transfer pump to 40 psi. Adjust the air pressure to the "B" component transfer pump to 40 psi. While directing the discharge into separate, clean and equally sized containers, turn the air on to the main pump. Keep pumping until both or one of the containers is full. Insure that the transfer pumps are not continuously cycling. If this is so, turn up the main pump to increase the back pressure or reduce the pressure on the transfer pumps (see note below).

- G. If containers contain equal volumes, the 1:1 ratio has been achieved. If not, check for restrictions in the air or material flow and material temperature. Repeat above procedure. If ratio is still not correct, inspect equipment and pump packings and replace if needed. Repeat the above procedure until a 1:1 ratio is achieved.

CARBOLINE requires that when using plural component pumps, which have holding tanks and recirculation capabilities, the material shall not be recirculated more than one time, and the temperature of the holding tanks shall not exceed 140°F (60°C). Tank mixers should be used at minimum revolutions.

Material shall be pre-heated to a minimum of 100°F (37.8°C) prior to introduction to the pumping units. Thoroughly mix Parts A and B well - separately - before using.

NOTE:

If the transfer pump pressure is adjusted too high, it will over pressure the proportioning unit, and affect the ratio.

- H. Apply enough pressure to the main pump to achieve a proper fan pattern. Apply material in accordance with the procedures recommended herein.

A minimum of two ratio checks per shift is required. An additional ratio check is required before starting a pump which has been repaired, or after a continuous down time of more than one hour. Static mixers shall be examined and changed after every 2 hours of continuous spraying, and the mixing block and valves leading to it shall be inspected and cleaned after the days work is completed. All other maintenance procedures specified by the pump supplier shall be followed.

3.2 SINGLE COMPONENT EQUIPMENT FOR THERMO-LAG 3000 SA

| | |
|---------------------|--|
| Airless Spray Pump: | Fluid to Air Ratio of 45:1 or greater. Hopper Feed required with a minimum ¾" outlet on high pressure side with an output of 3.3 gallons/minute (minimum) |
| Gun: | Binks IM Mastic Gun with Graco Tip Adapter |
| Tip Size: | 0.035" - 0.045" Graco Heavy duty RAC non- diffuser tips) |
| Fan Size: | 6" - 10" |
| Material Hose: | Solvent Resistant: ¾" I.D. 50' Max ½" I.D. Whip hose 25' Max |
| Pressure at Gun: | 2500 - 3000 psi |
| Air Requirements: | 40 -100 cfm @ 100 psi per unit. Use moisture and oil traps. |
| Static Mixer | Standard 12 turn ¾" mixer |

Refer to CARBOLINE's application instructions for complete requirements, which can be found in this manual.

Note: THERMO-LAG 3000-SP must be thinned up to 3% with Toluene or Plasite Thinner #19 only. Thinning the material will increase the pot life of the material, however it will slow the curing process. CARBOLINE must approve the use of other thinners prior to start up.

3.2.1 EQUIPMENT STARTUP PROCEDURE

Material shall be pre-heated to a minimum of 70°F (21°C)

It is important that the pump and all lines are clean and free from any contamination.

If half filled containers have been supplied, add thinner into part B and mix thoroughly. Stage Part B onto Part A and mix thoroughly. Thinning will decrease the amount of material which can be applied in one coat and decrease the rate of cure.

If full containers are supplied, it is required to mix Parts A and B before splitting containers in half. Make sure that there are equal volumes of each. Follow instructions listed above.

Pour mixed material into hopper. Remove spray gun from the end of the hose. Turn pump pressure up only high enough to move material to the end of the delivery line. Turn off air and replace spray gun. Increase air pressure until appropriate fan pattern is achieved. Apply material in accordance with the procedures detailed herein.

4.0 PREPARATIONS PRIOR TO THERMO-LAG APPLICATION

4.1 DEGREASING, BLASTING AND PRIMING

4.1.1 DEGREASING

All surfaces shall be cleaned and degreased prior to grit blasting the steel per 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 THERMO-LAG 3000 before applying a further coat or top coating, solvent wiping with Toluene or Plasite Thinner #19 is recommended.

4.1.2 BLASTING

All blasting abrasive shall be dry, clean and free from contaminants. Where grit is used, contact primer manufacturer for specific details on acceptable blast abrasive and other industry standards.

4.1.2.2 SURFACE PREPARATION

All steel surfaces shall be blasted with an angular anchor profile of 1.5 – 2.0 mils (37 – 50 microns) to a minimum of a SSPC SP6 (Sa 2).

4.1.3 PRIMING

Only primer systems acceptable by CARBOLINE shall be used under THERMO-LAG 3000. The primer shall be applied in accordance with the manufacturer's and project's specification. Refer to Appendix C, CARBOLINE's Approved Primer List.

The primer system thickness range shall be between 3 – 5 mils (75 – 125 microns) (DFT) per SSPC PA2. Any other final dry film thickness in excess of this value shall be agreed upon by CARBOLINE in writing.

4.1.3.1 PRIMER THICKNESS AND ADHESION MEASUREMENTS

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) Use the measuring device to measure individual primer coats and multi-coat thicknesses.
- (c) Record measurements at the rate specified by the project.
- (d) Thickness of primer must be sufficient to fully cover blast profile.

4.1.3.2 PRIMER REACTIVATING

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

4.1.4 PRIMER ADHESION

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

4.2 SURFACE PREPARATION WHERE AN EXISTING / NON-APPROVED PRIMER WAS INSTALLED

This SECTION applies to areas where an existing / non-approved primer system has been installed and the existing surface was prepared to SSPC SP6 (Sa 2) with a minimum of 1.5 – 2 mils (37 – 50 microns) profile.

Ultra high pressure water jetting may be employed to remove a primer or other coating where no dry blast surface preparation is permitted. Note: Ultra high pressure water jetting will not generate an accepted profile on steel that has not been previously profiled.

Thoroughly water jet the surface until the original blasted surface has been revealed. The cleaned surface should be blown dry with clean, dry compressed air to remove water residues. Immediately after, the clean surface shall be primed with an approved wet blast type primer, in accordance with the manufacturer's and project specification. Contact CARBOLINE for the current list of acceptable wet blast type primers.

No wet blast system shall be used without first consulting with CARBOLINE prior to start up of the project.

4.3 GALVANIZED SURFACE PREPARATION

Galvanizing requires a roughened surface for optimum adhesion/performance of high build epoxies. 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 (Sa1) with a minimum angular anchor profile of 1.5 – 2 mils (37 – 50 microns). Prime with Carboguard 893 SG Primer @ 3 – 5 mils (75 – 125 microns) (DFT) per SSPC PA2.

4.4 STAINLESS STEEL SURFACE PREPARATION

All steel surfaces shall be blasted to a SSPC-SP7 (Sa 1) with a minimum angular anchor profile of 1.5 – 2 mils (37 – 50 microns). Prime with Carboguard 893 SG Primer @ 3 – 5 mils (75 – 125 microns) (DFT) per SSPC PA2.

4.5 WELD CUT BACK

It is often necessary to mask off areas on the structure before the application of THERMO-LAG 3000 to allow for future welding.

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 THERMO-LAG 3000.

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 THERMO-LAG 3000, a discoloration may be noted.

This discoloration denotes that the THERMO-LAG 3000 has received too much heat and the bond to the steel is likely to have been affected. When this happens, the discolored THERMO-LAG 3000 must be removed as described in 7.0 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.

The cutback distances given below assume that the weld will be made at the center and are given as recommendations only. The precise nature of the weld, including the mass of steel and the method of preheating used, will determine the precise distance. As indicated above, discoloration of the THERMO-LAG 3000 will denote that an insufficient cutback distance has been used.

| Weld Preheat Temp °F (°C) | | Time (hr) | Total Cutback Inches (mm) | |
|------------------------------|-----|-----------|------------------------------|-------------|
| 212 | 100 | 4 - 8 | 30 | 750 |
| 212 | 100 | 8 - 12 | 40 | 1000 |
| 302 | 150 | 4 - 8 | 30 – 40 | 750 - 1000 |
| 302 | 150 | 8 - 12 | 40 – 50 | 1000 – 1250 |

5.0 THERMO-LAG 3000 APPLICATION PROCEDURES

THERMO-LAG 3000 shall be applied in good weather, following good painting practices. In general, the substrate and ambient temperature shall be no less than 41°F (5°C), and 5°F (3°C) above dew point. Humidity shall not exceed 85%. Any deviation shall be subject to approval by CARBOLINE. All attempts shall be made to maintain dry conditions throughout the application process, through the topcoat application.

The Applicator shall apply THERMO-LAG 3000 over a properly cured approved primer. The material shall be applied in 40 – 120 mil (1mm – 3mm) passes. Apply as many passes required to provide the desired film thickness. Lighter coats will provide an improved surface appearance. Allow applied material to cure sufficiently to support the weight of subsequent coats. The thickness which can be applied in a single coat will depend on the temperature, humidity, applicator technique, etc. The time between coats is largely dependent upon ambient temperatures and in general the following table should be used:

| Typical Overcoating Times Between THERMO-LAG 3000 A (100% Solids) Coats | | |
|--|--------------------------|-------------------------|
| Temperature (°F/°C) | Min. Time (Mins.) | Max. Time (Hrs.) |
| 50°F (10°C) | 60 | 72 |
| 77°F (25°C) | 30 | 72 |
| 85°F (29°C) | 30 | 48 |
| 95°F (35°C) | 30 | 48 |
| 110°F (43°C) | 30 | 24 |

If the overcoat time has been exceeded, the surface of the THERMO-LAG 3000 must be reactivated as described below:

The actual production work must follow, and conform to the approved finish / surface quality established by the site sample. The site sample is a mandatory requirement and should be kept available for all parties to have access to throughout completion of the project.

If required, contact Carboline’s Fireproofing Technical Service Group for further assistance with finishing techniques.

Greater than 72 hours but less than 7 days

THERMO-LAG 3000 must be solvent wiped with Toluene or Plasite Thinner #19 to reactivate the surface and remove contaminants.

7 Days or beyond

The surface of the THERMO-LAG 3000 must be "Sweep Blasted" or mechanically abraded to remove any contamination or particulate. The freshly blasted surface must then be solvent wiped (Toluene or Thinner 19) to reactivate the THERMO-LAG 3000 and to remove contaminants.

THERMO-LAG 3000 must be protected from direct rain until it has reached sufficient cure. If water contamination occurs to uncured THERMO-LAG 3000, any uncured material must be removed and reapplied. The material must be clean and dry prior to applying subsequent coats of THERMO-LAG 3000 or topcoating.

Topcoating shall be applied in accordance with the project specification and manufacturer's recommendations. The maximum allowable time to topcoat the THERMO-LAG 3000 is 7 days at 70°F (21°C). If this time is exceeded, the area should be sweep blasted or mechanically abraded with 40 grit paper (or approved equal), then solvent wiped, prior to topcoating. A topcoat is always required. The minimum topcoating time for THERMO-LAG 3000 A is 10 hours, and for THERMO-LAG 3000 SA is 48 hours.

The Applicator shall take frequent thickness 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 AWC Technical Manual 12-B.

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. A brush and/or roller can be used to improve the surface quality. Please read the THERMO-LAG 3000 product data sheet before application commences.

Excessive build-up of THERMO-LAG 3000 in angle areas can be removed or leveled by rolling the surface with a solvent resistant foam or short napped mohair roller. Use Toluene or Plasite Thinner #19 to keep roller moist which will prevent roller from sticking to the material. CARBOLINE recommends the use of solvent resistant spray bottles to minimize the use of solvents.

Do not use excessive solvent during rolling, as this will retard the surface cure of the material.

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.

5.1 INSTALLATION OF MESH ON STRUCTURAL STEEL I & H SECTIONS

After the first coat of THERMO-LAG 3000 has been applied, the mesh is placed in position as detailed in certification or approval documentation. See Appendix C. Ensure that the proper mesh reinforcement is utilized based on the project specific UL or Intertek Design i.e.

Design No. UL N608 (Restrained/Unrestrained Beams): FP-Fiberglass Mesh

Design No. CC/BA 180-01 (Restrained/Unrestrained Beams): FP-Fiberglass Mesh

Design No. CC/CA 180-02 (Wide Flange Columns): FP-Fiberglass Mesh

Design No. CC/CA 180-03 (Tubular Columns): High Temp Mesh

Wide Flange Section

The mesh shall be overlapped 1" (25mm) on all longitudinal seams running down the wide flange member.

Rolled Hollow Section (RHS)

Tubular and other hollow steel sections are reinforced in a similar manner except that the entire surface is reinforced by using one or two pieces of mesh. The mesh shall be overlapped 1" (25mm) on all seams.

5.2 FINAL THERMO-LAG 3000 APPLICATION

After the mesh has been installed, apply THERMO-LAG 3000 to the final required thickness in as many coats as is necessary. Any overcoating shall be done within 72 hours of the prior coat. If the time is exceeded, the surface must be prepared as stated in Section 5.0.

It is mandatory that imbedded mesh is covered with 40 mils (1 mm) of THERMO-LAG 3000 prior to daily shutdown.

5.2.1 TERMINATION ONTO NON-FIREPROOFED STEEL

Where the THERMO-LAG 3000 terminates to non-fire protected steel, the THERMO-LAG 3000 shall be sprayed to the specified thickness for the given length and beveled on a 45° angle down to the substrate. The top coat system shall continue down onto the no-fireproofed substrate (minimum 1" or 50mm) to insure a proper seal.

5.3 FINAL THICKNESS

The final thickness shall be specified in project drawings and Owner specifications. Thicknesses for THERMO-LAG 3000 are outlined in Intertek Design Nos. CC/BA 180-01, CC/CA 180-02, CC/CA 180-03 and UL Design No. N608. All are based on average thicknesses. However, on some projects, a minimum thickness may be specified from the owner or specific engineering firm. When an average thickness is specified, the minimum acceptable thickness for any one point shall not be less than 80% of the specified thickness. The overall average thickness must be equal to or greater than the specified thickness. The number of thickness checks and other issues regarding this topic are found in Technical Manual 12-B and SSPC PA2. **All matters relating to the thickness(es) shall be decided between the owner and the applicator prior to the startup of the job.**

After THERMO-LAG 3000 has cured, an approved thickness gauge shall be used to ensure the thickness requirements have been met. Thicknesses below specification shall be built up to specified thickness by the application of additional THERMO-LAG 3000. An alternate method of thickness measurement can be performed by drilling a pilot hole and using a penetrating measuring device. It is required to fill all probe holes with THERMO-LAG 3000 after measurements have been taken.

5.4 SAMPLE INSTALLATION

Prior to actual production work, a sample test area shall be prepared following all specified procedures and approved 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.

5.5 EQUIPMENT CLEANUP / FLUSHING

Plural component equipment with hot water flush components must be flushed using 150°F (66°C) water, minimum.

Plural component equipment with solvent flush components must be flushed with Toluene or Plasite Thinner #19.

The spray gun, static mixer and block assembly must be hand cleaned at the end of each spray period using Toluene or Plasite Thinner #19.

5.6 TOPCOATING (Refer to 2.3 Topcoats)

Topcoating shall be applied in accordance with the project specification and manufacturer's recommendations. The maximum allowable time to topcoat the THERMO-LAG 3000 is 7 days at 70°F (21°C). If this time is exceeded, the area should be sweep blasted or mechanically abraded with 40 grit paper (or approved equal), then solvent wiped, prior to topcoating. A topcoat is always required. The minimum topcoating times for THERMO-LAG 3000 A is 10 hours, and for THERMO-LAG 3000 SA 48 hours.

5.7 RECORD KEEPING

The maintaining of proper records is an essential requirement for all THERMO-LAG 3000 projects. The minimum requirements will be established by the project. Refer to Appendix D for typical application logs.

6.0 CLEAN-UP

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 Main Contractor.

7.0 REMOVAL AND REPAIR PROCEDURES

7.1 REMOVAL

The preferred method is to cut through the THERMO-LAG 3000 at right angles to the substrate with a disc saw around the area to be removed. Make sure that the steel substrate is not damaged. A power chisel can then be used to “chip” away the THERMO-LAG 3000 from the substrate.

It is essential that proper safety precautions are taken during this operation. Reference shall be made to the THERMO-LAG 3000 Material Safety Data Sheets (MSDS) and all site safety requirements.

7.2 REPAIRS - GENERAL

In instances when THERMO-LAG 3000 has been damaged or is in need of repair the following procedures shall be followed:

The primer system shall be reinstated to its original specification.

Remove all damaged material back to solidly adhered material. All edges can be left as butt joints to a 90 degree angle or beveled to a 45 degree angle. All edges must be solvent cleaned and allowed to dry before commencing application of THERMO-LAG 3000. It is important that the newly applied THERMO-LAG 3000 blends into the existing material to achieve a uniform appearance. The THERMO-LAG 3000 shall be troweled or spray applied to the appropriate thickness for mesh placement. The specified mesh type shall be butted up to the existing mesh (no overlaps required). The final specified thickness of THERMO-LAG 3000 can then be applied, based on the project specification and fire test certification.

The specified topcoat system shall be applied, based on the original specification, in strict accordance with Carboline’s written instructions.

8.0 IN SHOP APPLICATION – PRE-ERECTION

8.1 INTRODUCTION

THERMO-LAG 3000 lends itself to being a material which can be applied off site and later shipped to the job site. This allows for a more consistent application of the material off site and elimination of interference with other trades which may affect application flow. When this type of application is performed, contact CARBOLINE for advice. In general, the application of THERMO-LAG 3000 follows the guidelines in this manual. The following additional requirements are necessary:

8.2 BLOCK OUT AREAS

Prior to application of the shop fireproofing, define all areas of the steel structures that do not receive THERMO-LAG 3000 until after the erection phase of the construction. These areas which are not to receive THERMO-LAG 3000 shall be masked off in the proper dimensions, prior to application. The size of the block out shall be determined by the applicator, owner or engineering firm. THERMO-LAG 3000 has high bond strength, and cannot be easily removed. For in shop application, the specified topcoat system shall be applied to all THERMO-LAG 3000 surfaces. After steel is erected, the topcoat shall be mechanically removed from the edges and back approximately 1" from the edge of the block out.

Application to the block out areas may now continue, utilizing spray or trowel methods. The THERMO-LAG 3000 finish appearance must be approved by the owner.

The specified mesh type shall be installed and butted up to the existing mesh (no overlap required). The final specified thickness of THERMO-LAG 3000 can then be applied.

The blocked out edges can be left as butt joints to a 90 degree angle or beveled to a 45 degree angle.

The specified topcoat system shall be applied, based on the original specification, in strict accordance with Carboline's written instructions.

8.3 HANDLING, STORAGE AND ERECTION

8.3.1 UNLOADING

Generally the fireproofed steel is loaded and unloaded with a crane to permit maximum loading of each truck. It is not advisable to unload fireproofed steel with forklifts, as the steel is nested in ways that forklifts do not easily accommodate and damage to fireproofing may occur.

8.3.2 RIGGING

Wherever possible, steel should not be rigged to the fireproofed portion of the member. Shackles at end holes are a generally acceptable practice and provide the best method for unloading members. Follow all site specific safety standards for handling structural steel.

8.4 DUNNAGE

Members should be stored on proper dunnage (on the block out areas) to avoid exposure to the ground and moisture.

8.4.1 ORIENTATION OF MEMBERS

Members should be stacked with webs vertical to avoid ponding of water and snow. Elevate one end of the steel member to provide water run off.

8.4.2 STACKING

Where members must be double stacked, avoid placing dunnage on the fireproofed surfaces.

8.5 RIGGING

Avoid using chokers against fireproofed surfaces. Wherever possible, add erection tabs or bolt holes at the beam ends to allow top rigging without using chokers around the fireproofing. Follow all site specific safety standards for handling structural steel.

8.5.1 SWING RADIUS

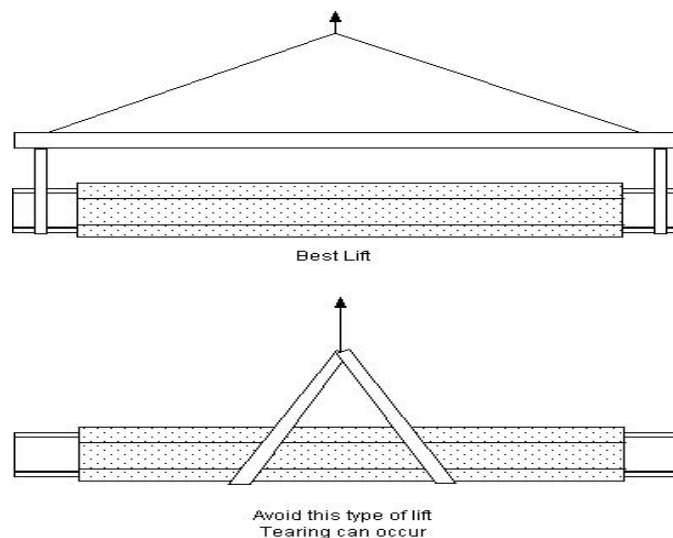
Where infill beams use framing angles, the erector must be aware of the swing radius of the member impacting the fireproofing. This type of connection has a blockout on each side of the holes on the primary member. When the block out dimension is insufficient, the erector is advised to chip out a minimal amount of fireproofing on **ONE SIDE ONLY**. It is better to chip a minimal amount of fireproofing than to make all the connections unnecessarily large. Follow all site specific safety standards.

8.5.2 CONSIDER GROUND ASSEMBLY

On repetitive structures like pipe racks, by pre-assembling the bents it will minimize the damage to the fireproofing.

8.6 LIFTING

All pre-erection projects will require the steel to be lifted onto trucks or into place on the jobsite. All lifting shall be done utilizing the block out areas for strapping, shackling to erection tabs or bolt holes. Lifting should be performed from a 2 point lift so to insure the straps are flat against the steel, so that no slipping and tearing can occur.



8.7 DAMAGE

Any damage to the coating system shall be repaired as per section 7.0 of this guide

APPENDIX A
THERMO-LAG 3000
ACCEPTABLE PRIMER LIST

THERMO-LAG 3000 APPROVED PRIMERS

- CARBOGUARD 888
- CARBOGUARD 890
- CARBOGUARD 893 SG
- CARBOMASTIC 15
- CARBOMASTIC 242
- CARBOZINC 858
- CARBOZINC 859
- RUSTBOND (*Interior only and 2.0 mils max.*)
- CARBOZINC / RUSTBOND

(THE PRIMER SYSTEM THICKNESS RANGE SHALL BE BETWEEN 3 – 5 MILS (75 – 125 MICRONS) (DFT) PER SSPC PA 2. ANY OTHER DRY FILM THICKNESS IN EXCESS OF THIS VALUE SHALL BE AGREED UPON BY CARBOLINE IN WRITING – PRIOR TO START UP OF THE PROJECT)

APPENDIX B

THERMO-LAG 3000

ACCEPTABLE TOPCOAT LIST

THERMO-LAG 3000 APPROVED TOPCOATS

- CARBOGUARD 1340 / CARBOTHANE 133 HB
- CARBOMASTIC 94

(FOR INTERIOR APPLICATIONS NO TOPCOAT IS REQUIRED, CONTACT CARBOLINE
TESCHNICAL SERVICE FOR SPECIFIC TOPCOAT REQUIREMENTS. SEE
FIREPROOFING PRODUCT DATA SHEET FOR TOPCOAT REQUIRED THICKNESS)

APPENDIX C
THERMO-LAG 3000
ASTM E119 DESIGNS



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Design No. N608
BXUV.N608
Fire Resistance Ratings - ANSI/UL 263

[Page Bottom](#)

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Listed or Classified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered as Classified, Listed, or Recognized.

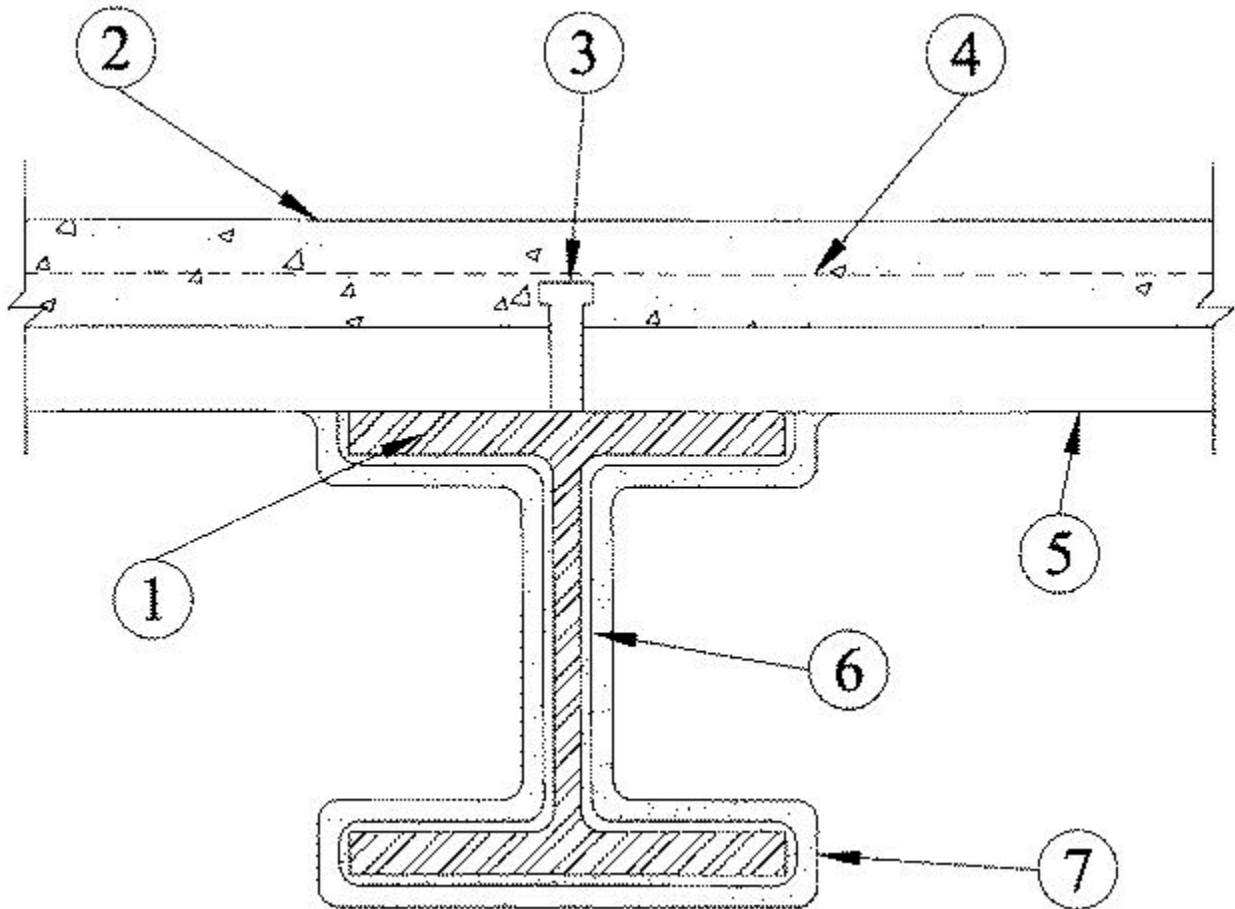
Fire Resistance Ratings - ANSI/UL 263

[See General Information for Fire Resistance Ratings - ANSI/UL 263](#)

Design No. N608
July 28, 2009

Restrained Beam Ratings—1, 1-1/2, 2, 3, 4 Hr (See Item 7)

Unrestrained Beam Ratings—1, 1-1/2, 2, 3, 4 Hr (See Item 7)



1. **Steel Beam** — W10x88 min size.
2. **Normal Weight or Lightweight Concrete** — Compressive strength, 3000 psi. For normal weight concrete either carbonate or siliceous aggregate may be used. Unit weight, 148 pcf. For lightweight concrete, unit weight 110 pcf.
3. **Shear Connector (Optional)** — Studs, 3/4 in. diam headed type or equivalent per AISC specifications. Welded to the top flange of beam through the steel floor units.
4. **Welded Wire Fabric (Optional)** — 6 x 6-10/10 SWG.
5. **Steel Floor and Form Units** — 1-1/2, 2, or 3 in. deep fluted, welded to beam.
6. **Glass Fiber Mesh** — 3/16 in. by 3/16 in. square pattern glass fiber reinforcing mesh weighing 5.3 oz per sq. yard shall be placed, following the contour of the beam, in the following manner:

| Thkns of Protection Material (in.) | Depth of Placement of Reinforcing Mesh (in.) |
|------------------------------------|--|
| .12 - .24 | Mid point of Protection Material |
| .24 and greater | .12 |

Adjacent pieces of reinforcing mesh along the length of the beam shall be overlapped a min of 2 in.

7. Mastic and Intumescent Coating* — Two component spray material applied in more than one coat as described in the manufacturer's application instructions to the thickness shown below. Beams to be primed with an epoxy primer. Flutes above beam to be completely filled with mineral wool insulation having a min density of 6 pcf.

| Rating, Hr | Min Thkns, In. Unrestrained Beams | Restrained Beams |
|-------------------|--|-------------------------|
| 1 | .12 | .12 |
| 1-1/2 | .12 | .12 |
| 2 | .13 | .12 |
| 3 | .30 | .23 |
| 4 | .47 | .39 |

CARBOLINE CO — Types Thermo-Lag 3000-SP, Thermo-Lag 3000-P, Thermo-Lag 3000-SA, Thermo-Lag 3000-A and Thermo-Lag 3000-FC subliming mastic and intumescent coatings.

8. Top Coat — Type Carboguard 1340 intermediate coat applied over mastic and intumescent coating at 0.002 in. thickness and Type Carbothane 133HB topcoat or Carbothane 133MC top-coat applied over intermediate coat at 0.003 in. thickness.

8A. Top Coat — As an alternate to Item 4, Type Carboguard 889 or Type Carbomastic 94 topcoat applied over mastic and intumescent coating (Item 2) at 0.010 in. thickness.

*Bearing the UL Classification Mark

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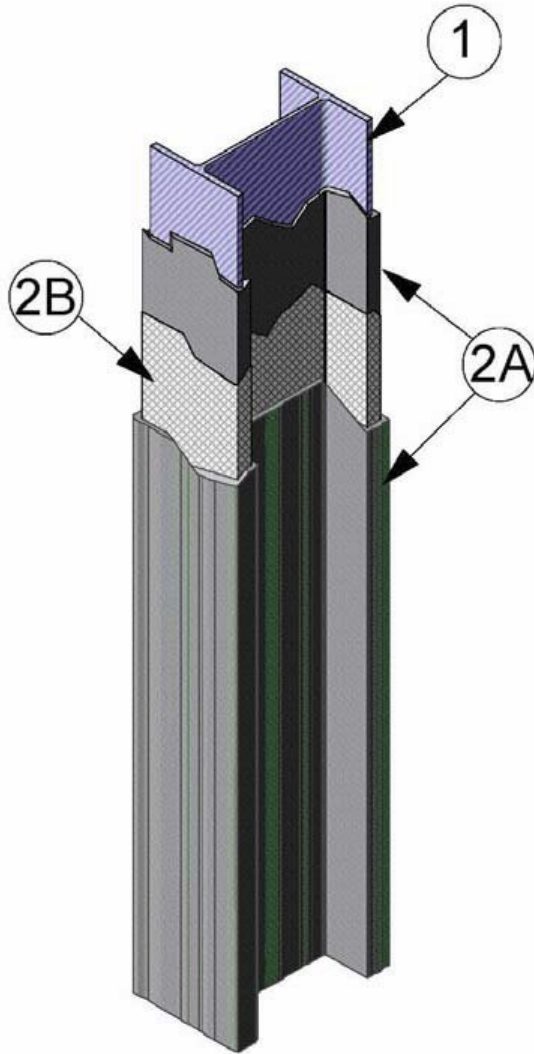
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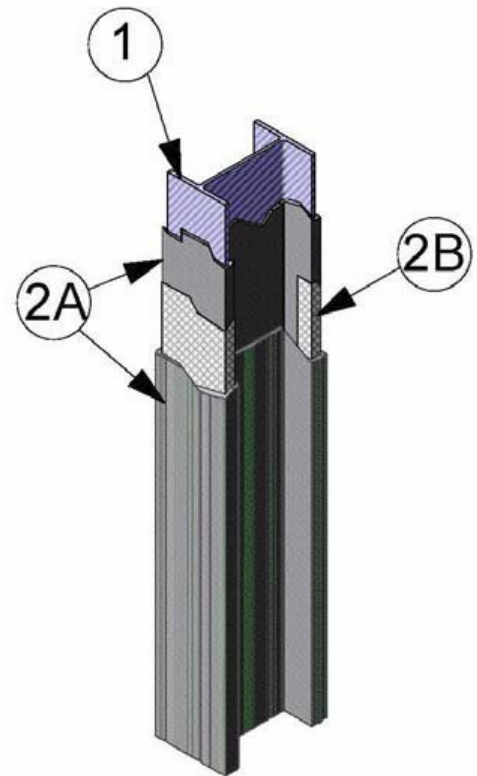
When the UL Leaf Mark is on the product, or when the word "Environment" is included in the UL Mark, please search the [UL Environment database](#) for additional information regarding this product's certification.

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL's Follow-Up Service. Only those products bearing the UL Mark should be considered to be Listed and covered under UL's Follow-Up Service. Always look for the Mark on the product.

DESIGN NO. CC/CA 180-02
(Formerly NUC/CA 180-02)
OPL DESIGN NO. C 301
CERTIFIED PRODUCT: Fire Resistive Coating. MODEL: Thermo-Lag 3000
COLUMN
RATING: 3 HOUR OR LESS



Installation Method 2Bi



Installation Method 2Bii

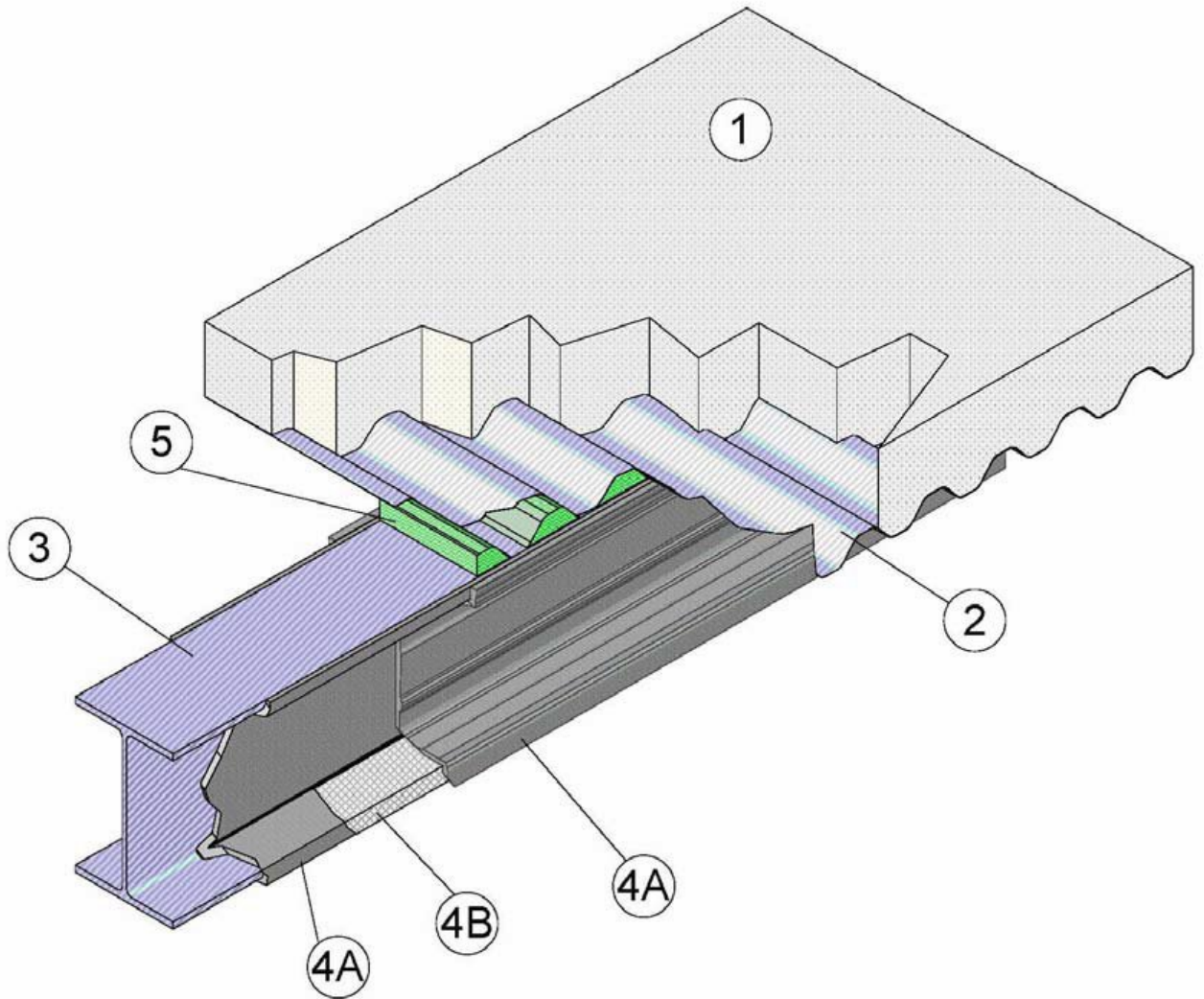
1. **SOLID STRUCTURAL STEEL COLUMN:** Use solid steel sections, I-shape or W-shape, having nominal Hp/A, W/D, or A/P section factors based on four sided exposure. Refer to Table CC/CA 180-02 for specific application thickness of intumescent fireproofing (Item 2A) based on nominal Hp/A, W/D, or A/P section factors.
2. **FIRE-RESISTIVE COATING:** Refer to Table CC/CA 180-02 for specific application thickness of fire resistive coating.
 - A. **Intumescent Fireproofing:** Spray or paint in one or more coats according to manufacturer's instructions to a nominal 1/2 the required thickness before applying fiberglass mesh (Item 2B). Spray or paint in one or more coats according to manufacture's instructions to required final thickness after installing fiberglass mesh (Item 4B).
CERTIFIED PRODUCT: Fire Resistive Coating. MODEL: Thermo-Lag 3000
 - B. **Fiberglass Mesh:** For final thickness of the intumescent fireproofing (Item 2A) of 0.24" (6mm) or less install mesh at middle depth of the intumescent fireproofing (Item 2A). For final thickness of the intumescent fireproofing (Item 2A) greater than 0.24" (6mm), install fiberglass mesh at 0.12" (3mm) from solid structural steel column (Item 1). Overlap fiberglass mesh a minimum 1/2" (13mm) at seams.
 - i) **Method for solid structural steel columns with a depth of 11-4/5" (300mm) or greater:** Wrap fiberglass mesh completely around steel structural column (Item 1).
 - ii) **Method for solid structural steel columns with a depth of less than 11-4/5" (300mm):** Wrap fiberglass mesh completely around steel structural column (Item 1) flange faces allowing a nominal 2" of the fiberglass mesh to wrap around the inner flange of the solid structural steel column (Item 1).

| Fire-Resistive Coating - Thickness | | | | | | |
|------------------------------------|--------------------|------------|------------|-------------|-------------|-------------|
| HP/A (1/m) | W/D (lb./ft/in) | 60 Min. | 90 Min. | 120 Min. | 150 Min. | 180 Min. |
| 30 | 4.46 | 0.12" | 0.12" | 0.12" | 0.12" | 0.13" |
| 40 | 3.34 | 0.12" | 0.12" | 0.12" | 0.14" | 0.17" |
| 50 | 2.67 | 0.12" | 0.12" | 0.13" | 0.17" | 0.20" |
| 60 | 2.23 | 0.12" | 0.12" | 0.15" | 0.19" | 0.23" |
| 70 | 1.91 | 0.12" | 0.13" | 0.17" | 0.21" | 0.26" |
| 75 | 1.78 | 0.12" | 0.13" | 0.18" | 0.22" | 0.27" |
| 80 | 1.67 | 0.12" | 0.14" | 0.19" | 0.23" | 0.28" |
| 85 | 1.57 | 0.12" | 0.15" | 0.19" | 0.24" | 0.30" |
| 90 | 1.49 | 0.12" | 0.15" | 0.20" | 0.26" | 0.31" |
| 95 | 1.41 | 0.12" | 0.15" | 0.21" | 0.26" | 0.32" |
| 100 | 1.34 | 0.12" | 0.16" | 0.22" | 0.27" | 0.33" |
| 110 | 1.22 | 0.12" | 0.17" | 0.23" | 0.29" | 0.35" |
| 120 | 1.11 | 0.12" | 0.18" | 0.24" | 0.31" | 0.37" |
| 130 | 1.03 | 0.12" | 0.19" | 0.26" | 0.32" | 0.39" |
| 140 | 0.95 | 0.13" | 0.20" | 0.27" | 0.34" | 0.41" |
| 150 | 0.89 | 0.13" | 0.20" | 0.28" | 0.35" | 0.42" |

| | | | | | | |
|-----|------|-------|-------|-------|-------|-------|
| 160 | 0.84 | 0.14" | 0.21" | 0.29" | 0.36" | 0.44" |
| 170 | 0.79 | 0.15" | 0.22" | 0.29" | 0.37" | 0.46" |
| 180 | 0.74 | 0.15" | 0.23" | 0.30" | 0.39" | 0.47" |
| 190 | 0.70 | 0.16" | 0.24" | 0.31" | 0.40" | 0.48" |
| 200 | 0.67 | 0.16" | 0.24" | 0.32" | 0.41" | 0.50" |
| 210 | 0.64 | 0.17" | 0.25" | 0.33" | 0.42" | 0.51" |
| 220 | 0.61 | 0.17" | 0.26" | 0.34" | 0.43" | 0.53" |
| 230 | 0.58 | 0.18" | 0.26" | 0.35" | 0.44" | 0.54" |
| 240 | 0.56 | 0.18" | 0.27" | 0.36" | 0.45" | 0.55" |
| 250 | 0.53 | 0.19" | 0.28" | 0.37" | 0.46" | 0.56" |
| 260 | 0.51 | 0.19" | 0.28" | 0.37" | 0.47" | 0.57" |
| 270 | 0.50 | 0.19" | 0.29" | 0.38" | 0.48" | 0.59" |
| 280 | 0.48 | 0.20" | 0.29" | 0.39" | 0.49" | 0.59" |
| 290 | 0.46 | 0.20" | 0.30" | 0.40" | 0.50" | 0.59" |
| 300 | 0.45 | 0.20" | 0.30" | 0.41" | 0.50" | 0.61" |
| 302 | 0.44 | 0.20" | 0.30" | 0.41" | 0.51" | 0.61" |

DESIGN NO. CC/BA 180-01
(Formerly NUC/BA 180-01)
OPL DESIGN NO. B 303

CERTIFIED PRODUCT: Fire Resistant Coating. MODEL: Thermo-Lag 3000; **CERTIFIED**
PRODUCT: Insulation
RESTRAINED OR UNRESTRAINED BEAM
RATING: 3 HOUR OR LESS

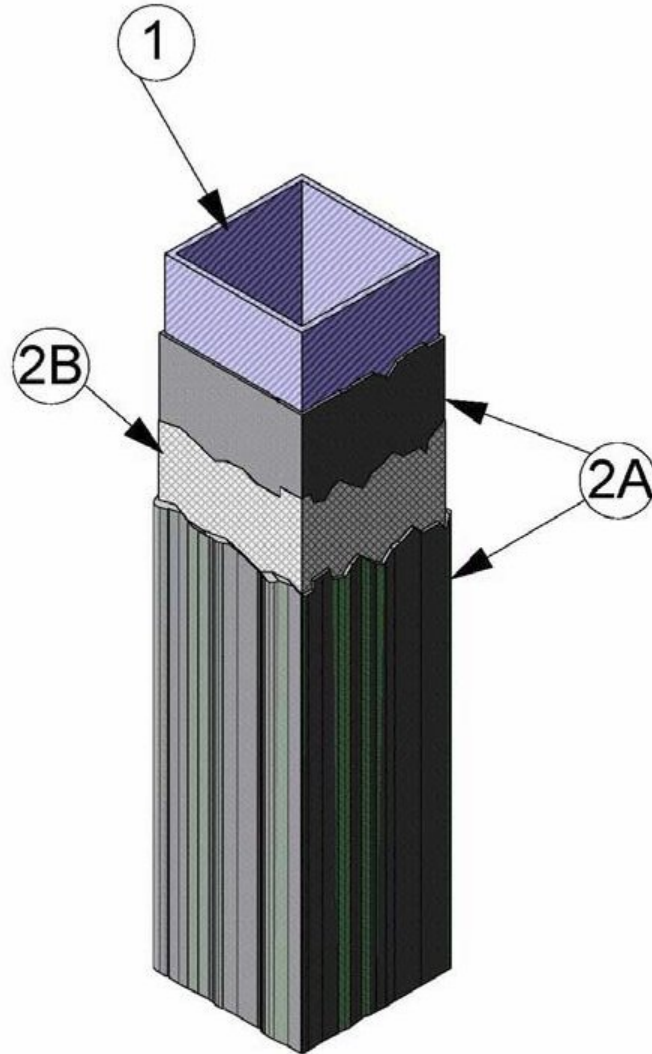


1. **FLOOR/CEILING ASSEMBLY:** Use a fire-rated floor/ceiling assembly consisting of normal weight or lightweight (minimum 105 pcf, 1682 kg/m³) reinforced concrete. Thickness of concrete Floor ceiling assembly must comply with designated fire resistive rating.
2. **FLUTED STEEL FLOOR UNITS:** Corrugated steel decking, minimum 1-1/2" deep (38mm), minimum 20 Ga.
3. **STEEL STRUCTURAL BEAM:** Use steel sections, I-beam or W-beam, sized in accordance with the Table CC/BA 180-01.
4. **FIRE-RESISTIVE COATING:** Refer to Table CC/BA 180-01 for specific application thickness of fire resistive coating.
A. Intumescent Fireproofing: Spray or paint in one or more coats according to manufacturer's instructions to a nominal 1/2 the required thickness or 0.12" (3mm) (whichever is smaller) before applying fiberglass mesh (Item 4B). Spray or paint in one or more coats according to manufacture's instructions to required final thickness after installing fiberglass mesh (Item 4B).
CERTIFIED PRODUCT: Fire Resistive Coating. MODEL: Thermo-Lag 3000
B. Fiberglass Mesh: For final thickness of the intumescent fireproofing (Item 4A) of 0.24" (6mm) or less install mesh at middle depth of the intumescent fireproofing (Item 4A). For final thickness of the intumescent fireproofing (Item 4A) greater than 0.24" (6mm), install fiberglass mesh at 0.12" from structural steel beam (Item 3). Wrap fiberglass mesh completely around bottom flange. Overlap fiberglass mesh a minimum 1/2" (13mm) at seams.
5. **LISTED MANUFACTURER:** Any Intertek certified mineral wool or ceramic fiber blanket manufacturer that meets the criteria below.
6. **MODEL:** Any Intertek certified mineral wool or ceramic fiber blanket model that meets the criteria below.
FLUTE FILLER: Completely fill the flutes between steel structural beam (Item 3) and the fluted steel floor unit (Item 2) with 4 pcf mineral wool or 4 pcf ceramic fiber blanket.
CERTIFIED PRODUCT: Insulation

| Steel Structural Beam | | | | | | |
|-----------------------|--------------------|------------|------------|-------------|-------------|-------------|
| HP/A (1/m) | W/D (lb./ft/in) | 60 Min. | 90 Min. | 120 Min. | 150 Min. | 180 Min. |
| 30 | 4.46 | 0.12" | 0.12" | 0.12" | 0.12" | 0.13" |
| 40 | 3.34 | 0.12" | 0.12" | 0.12" | 0.14" | 0.17" |
| 50 | 2.67 | 0.12" | 0.12" | 0.13" | 0.17" | 0.20" |
| 60 | 2.23 | 0.12" | 0.12" | 0.15" | 0.19" | 0.23" |
| 70 | 1.91 | 0.12" | 0.13" | 0.17" | 0.21" | 0.26" |
| 75 | 1.78 | 0.12" | 0.13" | 0.18" | 0.22" | 0.27" |
| 80 | 1.67 | 0.12" | 0.14" | 0.19" | 0.23" | 0.28" |
| 85 | 1.57 | 0.12" | 0.15" | 0.19" | 0.24" | 0.30" |
| 90 | 1.49 | 0.12" | 0.15" | 0.20" | 0.26" | 0.31" |
| 95 | 1.41 | 0.12" | 0.15" | 0.21" | 0.26" | 0.32" |

| | | | | | | |
|-----|------|-------|-------|-------|-------|-------|
| 100 | 1.34 | 0.12" | 0.16" | 0.22" | 0.27" | 0.33" |
| 110 | 1.22 | 0.12" | 0.17" | 0.23" | 0.29" | 0.35" |
| 120 | 1.11 | 0.12" | 0.18" | 0.24" | 0.31" | 0.37" |
| 130 | 1.03 | 0.12" | 0.19" | 0.26" | 0.32" | 0.39" |
| 140 | 0.95 | 0.13" | 0.20" | 0.27" | 0.34" | 0.41" |
| 150 | 0.89 | 0.13" | 0.20" | 0.28" | 0.35" | 0.42" |
| 160 | 0.84 | 0.14" | 0.21" | 0.29" | 0.36" | 0.44" |
| 170 | 0.79 | 0.15" | 0.22" | 0.29" | 0.37" | 0.46" |
| 180 | 0.74 | 0.15" | 0.23" | 0.30" | 0.39" | 0.47" |
| 190 | 0.70 | 0.16" | 0.24" | 0.31" | 0.40" | 0.48" |
| 200 | 0.67 | 0.16" | 0.24" | 0.32" | 0.41" | 0.50" |
| 210 | 0.64 | 0.17" | 0.25" | 0.33" | 0.42" | 0.51" |
| 220 | 0.61 | 0.17" | 0.26" | 0.34" | 0.43" | 0.53" |
| 230 | 0.58 | 0.18" | 0.26" | 0.35" | 0.44" | 0.54" |
| 240 | 0.56 | 0.18" | 0.27" | 0.36" | 0.45" | 0.55" |
| 250 | 0.53 | 0.19" | 0.28" | 0.37" | 0.46" | 0.56" |
| 260 | 0.51 | 0.19" | 0.28" | 0.37" | 0.47" | 0.57" |
| 270 | 0.50 | 0.19" | 0.29" | 0.38" | 0.48" | 0.59" |
| 280 | 0.48 | 0.20" | 0.29" | 0.39" | 0.49" | 0.59" |
| 290 | 0.46 | 0.20" | 0.30" | 0.40" | 0.50" | 0.59" |
| 300 | 0.45 | 0.20" | 0.30" | 0.41" | 0.50" | 0.61" |
| 302 | 0.44 | 0.20" | 0.30" | 0.41" | 0.51" | 0.61" |

DESIGN NO. CC/CA 180-03
(Formerly NUC/CA 180-03)
OPL DESIGN NO. C 304 NPD
CERTIFIED PRODUCT: Fire Resistive Coating. MODEL: Thermo-Lag 3000
COLUMN; IMO/NPD HYDROCARBON CURVE
RATING: 3 HOUR OR LESS



This Listing is based upon the hydrocarbon fire time-temperature curve conditions required by the International Maritime Organization (IMO). The Norwegian Petroleum Directorate (NPD) also defines this exposure.

1. **HOLLOW RECTANGULAR STRUCTURAL STEEL COLUMN:** Use hollow steel sections, rectangular shape, having nominal Hp/A, W/D, or A/P section factors based on four sided exposure. Refer to Table CC/CA 180-03 for specific application thickness of intumescent mastic fireproofing (Item 2B) based on nominal Hp/A or W/D section factors.
2. **FIRE-RESISTIVE COATING:** Refer to Table CC/CA 180-03 for specific application thickness of fire resistive coating.
 - A. **Intumescent Fireproofing:** Spray or paint in one or more coats according to manufacturer's instructions to a nominal 1/2 the required thickness or 3mm (0.12") (whichever is smaller) before applying high temperature fabric (Item 2B). Spray or paint in one or more coats according to manufacture's instructions to required final thickness after installing the high temperature fabric (Item 2B).
 - CERTIFIED PRODUCT:** Fire Resistive Coating. MODEL: Thermo-Lag 3000
 - B. **High Temperature Fabric:** For final thickness of the intumescent fireproofing (Item 2A) of 6mm (0.24") or less install high temperature fabric at middle depth of the intumescent fireproofing (Item 2A) (±1 mm). For final thickness of the intumescent fireproofing (Item 2A) greater than 6mm (0.24"), install high temperature fabric at 3 mm (0.12") from solid structural steel column (Item 1) (±1 mm). Wrap high temperature fabric completely around hollow rectangular steel structural column (Item 1). Overlap high temperature fabric a minimum 26mm (1") at seams.

| Fire-Resistive Coating - Thickness Data Based on 538°C (1000°F) Average | | | | | | |
|--|----------------------------|--------------------|--------------------|---------------------|---------------------|---------------------|
| HP/A (1/m) | W/D (lb./ft/in) | 60 Min. | 90 Min. | 120 Min. | 150 Min. | 180 Min. |
| 22 | 6.08 | 0.13" | 0.13" | 0.13" | 0.13" | 0.17" |
| 25 | 5.35 | 0.13" | 0.13" | 0.13" | 0.15" | 0.19" |
| 30 | 4.46 | 0.13" | 0.13" | 0.13" | 0.17" | 0.22" |
| 35 | 3.82 | 0.13" | 0.13" | 0.14" | 0.19" | 0.25" |
| 40 | 3.34 | 0.13" | 0.13" | 0.15" | 0.22" | 0.28" |
| 45 | 2.97 | 0.13" | 0.13" | 0.17" | 0.24" | 0.31" |
| 50 | 2.67 | 0.13" | 0.13" | 0.18" | 0.26" | 0.33" |
| 55 | 2.43 | 0.13" | 0.13" | 0.20" | 0.28" | 0.36" |
| 60 | 2.23 | 0.13" | 0.13" | 0.21" | 0.30" | 0.38" |
| 65 | 2.06 | 0.13" | 0.13" | 0.22" | 0.31" | 0.41" |
| 70 | 1.91 | 0.13" | 0.13" | 0.23" | 0.33" | 0.43" |
| 75 | 1.78 | 0.13" | 0.14" | 0.24" | 0.35" | 0.45" |
| 80 | 1.67 | 0.13" | 0.15" | 0.26" | 0.36" | 0.47" |
| 85 | 1.57 | 0.13" | 0.15" | 0.27" | 0.38" | 0.49" |
| 90 | 1.49 | 0.13" | 0.16" | 0.28" | 0.39" | 0.51" |

| | | | | | | |
|-----|------|-------|-------|-------|-------|-------|
| 95 | 1.41 | 0.13" | 0.17" | 0.29" | 0.41" | 0.52" |
| 100 | 1.34 | 0.13" | 0.17" | 0.30" | 0.42" | 0.54" |
| 110 | 1.22 | 0.13" | 0.18" | 0.31" | 0.44" | 0.57" |
| 120 | 1.11 | 0.13" | 0.19" | 0.33" | 0.47" | 0.61" |
| 130 | 1.03 | 0.13" | 0.20" | 0.35" | 0.49" | 0.63" |
| 140 | 0.95 | 0.13" | 0.21" | 0.36" | 0.51" | 0.66" |
| 150 | 0.89 | 0.13" | 0.22" | 0.37" | 0.53" | 0.69" |
| 160 | 0.84 | 0.13" | 0.22" | 0.39" | 0.55" | 0.71" |
| 170 | 0.79 | 0.13" | 0.23" | 0.40" | 0.57" | 0.73" |
| 180 | 0.74 | 0.13" | 0.24" | 0.41" | 0.58" | 0.75" |
| 190 | 0.70 | 0.13" | 0.24" | 0.42" | 0.60" | 0.77" |
| 200 | 0.67 | 0.13" | 0.25" | 0.43" | 0.61" | |
| 210 | 0.64 | 0.13" | 0.26" | 0.44" | 0.63" | |

APPENDIX D
THERMO-LAG 3000
TYPICAL APPLICATION LOGS

**THERMO-LAG 3000 APPLICATION
 APPLICATOR AREA QUALITY CONTROL REPORT**

REPORT NO.

| | |
|-------------------|--------------------|
| PROJECT | REPORTED BY |
| CLIENT | POSITION |
| FAB SITE | DATE |
| APPLICATOR | AREA |

| OPERATION | DATE | SIGNATURE | COMMENTS | CLIENT ACCEPTANCE |
|-------------------------------|------|-----------|----------|-------------------|
| MASKING & CLEANING | | | | |
| PINNING* | | | | |
| BLASTING* | | | | |
| PRIMING* | | | | |
| PRIMER THICKNESS | | | | |
| HAND OVER | | | | |
| SUBSTRATE | | | | |
| FIT MESH AT | | | | |
| MID-POINT | | | | |
| THERMO-LAG 3000 | | | | |
| 1st COAT | | | | |
| 2nd COAT | | | | |
| 3rd COAT | | | | |
| TOPCOAT | | | | |
| 1st COAT | | | | |
| 2nd COAT | | | | |
| 3rd COAT | | | | |
| GENERAL COMMENTS | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | | |
|---|--|-------------|--|
| AREA COMPLETE SIGNATURE (FOR CLIENT): | | NAME | |
| AREA ACCEPTED SIGNATURE (FOR CLIENT): | | NAME | |
| AREA ACCEPTED SIGNATURE (FOR FIELD INSPECTOR): | | NAME | |
| AREA ACCEPTED SIGNATURE (FOR FAB YARD): | | NAME | |

*If performed by other than THERMO-LAG 3000 Applicator, not inspection and acceptance date by Applicator QC Inspector / Supervisor.

**THERMO-LAG 3000 APPLICATION
 APPLICATOR WEEKLY STATUS REPORT**

REPORT NO. _____

| | | |
|----------------|--|------------------|
| PROJECT | | REPORT BY |
| CLIENT | | POSITION |

| | | | | | | |
|------------------------------|--|--|--|--|--|--|
| REPORT/LOG REFERENCES | | | | | | |
| DAILY LOGS | | | | | | |
| AREA QC REPORTS | | | | | | |
| FIELD SERVICE AUDIT | | | | | | |
| NON-CONFORMANCE | | | | | | |

| | |
|---|--|
| AREAS COATED MODULE/LOCATION | |
| AREAS COATED SQUARE METERS | |
| QUALITY ACHIEVED | |
| GENERAL COMMENTS | |
| | |
| | |
| | |

| | |
|---------------------------------------|--|
| SIGNED APPLICATOR | |
| SIGNED FOR CLIENT | |
| SIGNED FOR FIELD INSPECTOR | |
| SIGNED FAB. YARD | |

**THERMO-LAG 3000 APPLICATION
NON-CONFORMANCE REPORT**

REPORT NO. _____

| | |
|-------------------|-------------------------------------|
| PROJECT | REPORT BY |
| CLIENT | POSITION |
| FAB SITE | DATE |
| APPLICATOR | PAGE OF |

| REPORT/LOG REFERENCES APPLICABLE | | | | | | |
|---|--|--|--|--|--|--|
| DAILY LOGS | | | | | | |
| AREA QC REPORTS | | | | | | |
| FIELD SERVICE AUDIT | | | | | | |
| NON-CONFORMANCE | | | | | | |

| | | | |
|-------------------------|--|--|--|
| MODULE/LOCATION | | | |
| AREA INVOLVED | | | |
| SQUARE METERS | | | |
| DEFECTS NOTED: | | | |
| | | | |
| ACTION REQUIRED: | | | |
| | | | |

| | |
|------------------------|-----------------|
| SIGNATURES | |
| FIELD INSPECTOR | FAB YARD |
| APPLICATOR | CLIENT |

**THERMO-LAG 3000 APPLICATION
WEEKLY/MONTH STATUS REPORT**

REPORT NO. _____

| | | |
|-------------------|--|-------------------------------------|
| PROJECT | | REPORT BY |
| CLIENT | | POSITION |
| FAB SITE | | DATE |
| APPLICATOR | | PAGE OF |

| | | | | | | |
|------------------------------|--|--|--|--|--|--|
| REPORT/LOG REFERENCES | | | | | | |
| DAILY LOGS | | | | | | |
| AREA QC REPORTS | | | | | | |
| FIELD SERVICE AUDIT | | | | | | |
| NON-CONFORMANCE | | | | | | |

| | |
|---|--|
| AREAS COATED MODULE/LOCATION | |
| AREAS COATED SQUARE METERS | |
| QUALITY ACHIEVED | |
| GENERAL COMMENTS | |
| | |
| | |
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| | |
|---------------------------------------|--|
| SIGNED APPLICATOR | |
| SIGNED FOR CLIENT | |
| SIGNED FOR FIELD INSPECTOR | |
| SIGNED FAB. YARD | |