



**THERMO-LAG E100 / THERMO-LAG E100 S**

**Fire Barrier System  
Application Manual**

**Commercial / Light Industrial Market**

**ASTM E119 (UL 263 / NFPA 251)**

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# 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 E100 and THERMO-LAG E100 S Fire Barrier Systems 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](http://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 E100 and THERMO-LAG E100 S materials weigh 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 E100 AND THERMO-LAG E100 S Fire Barrier Systems to steel surfaces for the commercial and light industrial markets, based on the requirements of ASTM E119 and UL 263. 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 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 E100 and THERMO-LAG E100 S 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 THERMO-LAG E100 and THERMO-LAG E100 S 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 32°F (0°C).



Prior to use with plural or single component equipment, THERMO-LAG E100 or THERMO-LAG E100 S 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 E100 and THERMO-LAG E100 S Fire Barrier Systems consist of the following materials:

#### **2.1 PRIMERS**

Prior to use, all primer systems must be accepted by CARBOLINE prior to use under THERMO-LAG E100 or THERMO-LAG E100 S. 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 E100 AND THERMO-LAG E100 S**

THERMO-LAG E100 is a 100% solids, two component, thermally activated, intumescent epoxy coating formulated for plural component and trowel applications. THERMO-LAG E100 S is a 95% solids, two component, thermally activated, intumescent epoxy coating formulated for single component, plural component and trowel applications. 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.

#### **2.3 TOPCOATS**

Topcoat systems must be acceptable to Carboline prior to use over THERMO-LAG E100. Refer to Appendix B, Carboline's Approved Topcoat List for various topcoat options.

### 3.0 EQUIPMENT (Minimum)

#### 3.1 APPROVED PLURAL COMPONENT EQUIPMENT FOR THERMO-LAG E100

The following approved plural component units (without holding tanks) are suitable for the application of THERMO-LAG E100 shall be purchased from:

**WIWA - Alger, OH (USA) Tel: (866)-661-2139**  
**Lahnau, Germany Tel:+49 6441 609 0**

**Spray-Quip, Inc. - Houston, TX (USA) Tel: (713)-923-2771**

**Graco – Minneapolis, MN (USA) Tel: (844)-241-9498**

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 E100 or THERMO-LAG E100 S 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 PLURAL COMPONENT 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 all heaters. Adjust tank heaters to 120°F (49°C ). Set inline fluid heaters and line heaters to 100°F - 120°F (38°C - 49°C). Wait at least 30 minutes for material to heat and/or recirculate the material until the temperature of the material reaches the temperatures stated above. Material temperature should not exceed 135°F (57°C).

D. The pump shall be set for a 1:1 ratio and it is important to check this ratio before beginning any work.

E. Equipment Set Up

Gun: Binks IM Mastic gun or WIWA PFP 500 gun with Graco tip adapter or equivalent Carboline approved mastic gun with swivel

Tip Size: 0.027" - 0.035" Graco Heavy duty RAC non- diffuser tips

Fan Size: 6" - 10"

Hose Bundle: ¾" (100' maximum)

Whip Hose: ½" (20' maximum)

Pressure at Gun: 2500 - 3000 psi

Air Requirements: 185 cfm @ 100 psi per unit. Use moisture and oil traps.

Static Mixer Standard 12 turn ¾" mixer (required)

F. The air pressures needed for properly delivering material may vary from pump to pump, and adjustments may vary from the stated pressures herein.

G. 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).

- H. 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 135°F (57°C). Tank mixers should be used at minimum revolutions.**

**Material shall be pre-heated to a minimum of 70°F (21°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.

- I. 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 E100 S

**Note:** When spraying THERMO-LAG E100 S through single component airless equipment, the working pot life to achieve a good spray pattern will be approximately 30 minutes once the material is mixed at 70°F (21°C).

Airless Spray Pump:	Fluid to air ratio of 45:1 or greater. Hopper feed required with quick disconnect or camlock fittings. Minimum ¾" outlet on high pressure side with an output of 3.3 gallons/minute (minimum)
Gun:	Binks 1M Mastic gun or WIWA PFP 500 gun with Graco tip adapter or equivalent Carboline approved mastic gun with swivel
Tip Size:	0.027" - 0.035" Graco Heavy duty RAC non- diffuser tips
Fan Size:	6" - 10"
Material Hose:	Solvent Resistant: ¾" I.D. 50' Max + 1/2" I.D. Whip hose 25' Max 3/8" I.D. Whip hose 5-10' Max
Pressure at Gun:	2500 - 3000 psi
Air Requirements:	185 cfm @ 100 psi per unit. Use moisture and oil traps.
Static Mixer	Standard 12 turn ¾" mixer (optional)

**Note:** In order to spray THERMO-LAG E100 S with this equipment set up, the material must be thinned up to 3% with toluene, Plasite Thinner #19, Thinner #242E or CARBOLINE approved equivalent. Maximum thinner added not to exceed 1 quart (1 liter) per 4.5 gallon (3.79 L) kit. Thinning the material will slow the curing process and reduce film build. The maximum film build with this set up is 80 mils (2 mm) per coat. CARBOLINE must approve the use of other thinners prior to start up.

### 3.2.1 SINGLE COMPONENT ELECTRIC AIRLESS OPTION FOR THERMO-LAG E100 S

**Material must be heated to a minimum of 80°F (26°C) - 100°F (38°C) to spray through this electric airless equipment set up.**

Airless Spray Pump:	Graco Mark V Hopper feed required with quick disconnect or camlock fittings.
Gun:	Binks IM Mastic gun or WIWA PFP 500 gun with Graco tip adapter or equivalent Carboline approved mastic gun with swivel
Tip Size:	0.027" - 0.035" Graco Heavy duty RAC non- diffuser tips
Fan Size:	6" - 10"
Material Hose:	Solvent Resistant: 3/8" I.D. 50' Max.
Pressure at Gun:	2500 - 3000 psi

**Note:** This equipment option is only recommended for small projects. THERMO-LAG E100 S does require additional solvent in order to be properly atomized through this equipment set up. When spraying THERMO-LAG E100 S through this electric airless equipment, the working pot life to achieve a good spray pattern will be approximately 20 minutes once the material is mixed at 70°F (21°C).

**Note:** In order to spray THERMO-LAG E100 S with this equipment set up, the material must be thinned up to 5% with toluene, Plasite Thinner #19, Thinner #242E or CARBOLINE approved equivalent. Maximum thinner added not to exceed 48 ounces (1.4 liter) per 4.5 gallon (3.79 L) kit Thinning the material will slow the curing process and reduce film build. The maximum film build with this set up is 60-80 mils (1.5-2 mm) per coat. CARBOLINE must approve the use of other thinners prior to start up.

### 3.2.2 SINGLE COMPONENT EQUIPMENT STARTUP PROCEDURE

**Material shall be pre-heated to a minimum of 70°F (21°C). For optimal results, pre-heat material to 80°F (26°C) - 100°F (38°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 before applying a further coat or top coating, solvent wiping with toluene, Thinner #19 or Thinner #242E 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 E100 and THERMO-LAG E100 S. The primer shall be applied in accordance with the manufacturer's and project's specification. Refer to Appendix A, 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 E100 or THERMO-LAG E100 S 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 E100 or THERMO-LAG E100 S.

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 E100 or THERMO-LAG E100 S, a discoloration may be noted.

This discoloration denotes that the THERMO-LAG has received too much heat and the bond to the steel is likely to have been affected. When this happens, the discolored THERMO-LAG 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 E100 or THERMO-LAG E100 S will denote that an insufficient cutback distance has been used.

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

## 4.6 MATERIAL PREPARATION

### 4.6.1 MATERIAL PRE-HEATING

Prior to introduction into plural component equipment 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 and material that is over-heated will reduce the pot-life and working time. 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.

### 4.6.2 MIX RATIO

1:1 by volume. Ratio checks shall only be performed by pumping both components into separate pails simultaneously. Part A and Part B should have equal volumes.

## 5.0 THERMO-LAG E100 AND THERMO-LAG E100 S APPLICATION PROCEDURES

THERMO-LAG 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 material over a properly cured approved primer. The material shall be applied in multiple passes of 60 - 200 mils (1.5 – 5 mm) for Thermo-Lag E100 and 60 – 120 mils (1.5 – 3 mm) for Thermo-Lag E100 S per coat. 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:



<u>Typical Overcoating Times Between THERMO-LAG E100 Coats</u>		
<u>Temperature (°F/°C)</u>	<u>Min. Time (Mins.)</u>	<u>Max. Time (Hrs.)</u>
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

<u>Typical Overcoating Times Between THERMO-LAG E100 S Coats</u>		
<u>Temperature (°F/°C)</u>	<u>Min. Time (Hours)</u>	<u>Max. Time (Hours)</u>
50°F (10°C)	5	72
77°F (25°C)	4	72
85°F (29°C)	4	72
95°F (35°C)	2	72
110°F (43°C)	2	72

If the overcoat time has been exceeded, the surface of the THERMO-LAG E100 and THERMO-LAG E100 S 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 E100 and THERMO-LAG E100 S must be solvent wiped with toluene, Plasite Thinner #19 or Thinner #242E to reactivate the surface and remove contaminants.

**7 Days or beyond**

The material must be "Sweep Blasted" or mechanically abraded to remove any contamination or particulate. The freshly blasted or abraded surface must then be solvent wiped (Toluene or Plasite Thinner 19) to reactivate the THERMO-LAG E100 and to remove contaminants.

THERMO-LAG E100 and THERMO-LAG E100 S must be protected from direct rain until it has reached sufficient cure. If water contamination does occur to uncured THERMO-LAG E100 or THERMO-LAG E100 S, any uncured material must be removed and reapplied. The material must be clean and dry prior to applying subsequent coats of THERMO-LAG 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 E100 and THERMO-LAG E100 S 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 typical minimum topcoating time for THERMO-LAG E100 is 10 hours at 70°F (21°C). The typical minimum topcoating time for THERMO-LAG E100 S is 48 hours at 70°F (21°C). **Materials are ready to be topcoated when an average Shore D hardness of 40 is achieved.**

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 E100 or THERMO-LAG E100 S product data sheet before application commences.

Excessive build-up of material in angle areas can be removed or leveled by rolling the surface with a solvent resistant foam or short napped mohair roller. Use toluene, Plasite Thinner #19 or Thinner #242E 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 TERMINATION ONTO NON-FIREPROOFED STEEL**

Where the material terminates to non-fire protected steel, the THERMO-LAG E100 or THERMO-LAG E100 S 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.

## 5.2 FINAL THICKNESS

The final thickness shall be specified in project drawings and owner specifications. Thicknesses for THERMO-LAG E100 and THERMO-LAG E100 S are outlined in Intertek designs. 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 E100 or THERMO-LAG E100 S 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 material. 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 after measurements have been taken.

## 5.3 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.

## 5.4 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, Plasite Thinner #19, Thinner #242E or Carboline approved equivalent.

Single component equipment must be flushed with toluene, Plasite Thinner #19, Thinner #242E or Carboline approved equivalent.

The spray gun, static mixer and block assembly and all hand tools must be hand cleaned at the end of each spray period using toluene, Plasite Thinner #19, Thinner #242E or Carboline approved equivalent.

## 5.5 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 E100 and THERMO-LAG E100 S 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 typical minimum topcoating time for THERMO-LAG E100 is 10 hours at 70°F (21°C). The typical minimum topcoating time for THERMO-LAG E100 S is 48 hours at 70°F (21°C). **Materials are ready to be topcoated when an average Shore D hardness of 40 is achieved.**

## **5.6 RECORD KEEPING**

The maintaining of proper records is an essential requirement for all THERMO-LAG projects. The minimum requirements will be established by the project.

## **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 E100 or THERMO-LAG E100 S 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 material from the substrate.

It is essential that proper safety precautions are taken during this operation. Reference shall be made to the products' Safety Data Sheets (SDS) and all site safety requirements.

### **7.2 REPAIRS - GENERAL**

In instances when material 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. It is important that the newly applied THERMO-LAG E100 or THERMO-LAG E100 S blends into the existing material to achieve a uniform appearance. The material shall be troweled or spray applied to the appropriate thickness 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 E100 and Thermo-Lag E100 S are suitable materials for offsite application and the steel is then 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 E100 and THERMO-LAG E100 S follow 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 until after the erection phase of the construction. These areas which are not to receive THERMO-LAG 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 E100 and THERMO-LAG E100 S have high bond strength, and cannot be easily removed. For in shop application, the specified topcoat system shall be applied to all THERMO-LAG surfaces. After steel is erected, the topcoat shall be mechanically removed from the edges and back approximately 1" (25.4 mm) from the edge of the block out.

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

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.

**APPENDIX A**  
**THERMO-LAG E100 AND THERMO-LAG E100 S**  
**ACCEPTABLE PRIMER LIST**

## THERMO-LAG E100 AND THERMO-LAG E100 S APPROVED PRIMERS

- CARBOGUARD 890
- CARBOGUARD 893 SG
- CARBOMASTIC 15
- CARBOMASTIC 242
- CARBOMASTIC 615
- CARBOZINC 858
- CARBOZINC 859
- RUSTBOND (*Interior only and 2.0 mils max.*)
- CARBOZINC 11 / RUSTBOND
- CARBOZINC 11 / CARBOGUARD 893 SG

(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 E100 AND THERMO-LAG E100 S**  
**ACCEPTABLE TOPCOAT LIST**

## **THERMO-LAG E100 AND THERMO-LAG E100 S APPROVED TOPCOATS**

- CARBOGUARD 1340 / CARBOTHANE 133 HB
- CARBOGUARD 1340 / CARBOTHANE 133 MC
- CARBOMASTIC 94

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