



10/5/91

APPENDIX III
TO THERMAL SCIENCE, INC.'S RESPONSE TO THE
UNITED STATES NUCLEAR REGULATORY COMMISSION'S
LETTER DATED 10 SEPTEMBER 1991

Enclosure 41

TSI Technical Note 20684-EIH

THERMO-LAG 330 Fire Barrier System Installation Procedures Manual

Prepared For Bechtel Power Corporation, For Georgia Power Company, Edwin

I. Hatch Power Plant

REV O October 23, 1985

999001226

52 pp.

TS1 TECHNICAL NOTE 20684 - EIH

THERMO-LAC 330 FIRE BARRIER SYSTEM
INSTALLATION PROCEDURES MANUAL

DATE OF ISSUE: AUGUST 15, 1985

REVISION 0

BECHTEL COMMENT

PREPARED FOR:

BECHTEL POWER CORPORATION

EDWIN I. HATCH POWER PLANT

FOR

GEORGIA POWER COMPANY

TSI TECHNICAL NOTE 20684

TABLE OF CONTENTS

		PAGE NO.
SECTION I	GENERAL DESCRIPTION	1-0
1.0	INTRODUCTION	1-1
2.0	FIRE BARRIER DESIGNS	1-1
	2.1 Prefabricated Panel Design	1-2
	2.2 Preshaped Conduit Section Design	1-2
	2.3 Direct Trowel-On Design	1-2
	2.4 Flexi-Blanket Design	1-3
3.0	MATERIAL COMPONENTS	
	3.1 THERMO-LAC Stress Skin Type 330-69	1-4
	3.2 THERMO-LAC 330-1 Subliming Material	1-4
	3.3 THERMO-LAC 351-2 Primer	1-4
	3.4 THERMO-LAC 350 Two Part Topcoat	1-4
	3.5 Approved Tie Wires and Banding	1-4
SECTION II	INSTALLATION PROCEDURES	2-0
1.0	GENERAL REQUIREMENTS	2-1
	1.1 Qualification of Contractor	2-1
	1.2 Safety Precautions	2-1
	1.3 Storage	2-1
2.0	PREFABRICATED PANEL INSTALLATION PROCEDURES	2-2
	2.1 Prefabricated Panel Ready Access Designs for Cable Trays	2-2
	2.2 Prefabricated Panel Design for Junction Boxes	2-5
3.0	WRAP ZONE INTERFERENCES	2-5
4.0	2.3 PRESHAPED CONDUIT SECTION DESIGN FOR CONDUIT, CABLE DROPS AND INSTRUMENT TUBING	2-12
2.4	2.3.1 Installation of One Hour or Three Hour Fire Barrier Design	2-12
2.5	(SEE page ii) INSERT B	

TSI TECHNICAL NOTE 20684

TABLE OF CONTENTS

CONTINUED

PAGE NO.

4.0 5.0	RECHIEF COMMENT	INTERFACES	2-13
4.1		Installation of One or Three Hour Interfaces Between a Cable Tray or Conduit and a Penetration Seal	2-13
4.2		Installation of One or Three Hour Self Supporting Interface Between Conduit or Instrument Tubing and a Wall or Ceiling	2-14
4.3		Installation of One and Three Hour Interface Between a Cable Tray and a Conduit	2-14
5.0 6.0	RECHIEF COMMENT	DIRECT TROWEL-ON DESIGN	2-14
5.1		THERMO-LAG 351 Primer Application	2-15
5.2		THERMO-LAG 330-1 Subliming Material Trowel Application	2-15
5.3		Dry Film Thickness Measurements	2-15
6.0 7.0	RECHIEF COMMENT	SECTION VIII - FLEX BLANKET	3-0
6.1		THERMO-LAG 330-660 FLEXI BLANKET THERMAL BARRIER DESIGN FOR CONDUITS, CABLE DROPS, FLEX CONDUIT, AND INSTRUMENT TUBING AND STRUCTURAL SUPPORTS	3-1
6.2		Installation of a One Hour Fire Rated Design - Blanket Wrap	3-1
6.3		Installation of a Three Hour Fire Rated Design - Blanket Wrap	3-4
7.0 8.0	RECHIEF COMMENT	PREPARED PANEL DESIGN FOR STRUCTURAL SUPPORTS AND HANGERS	3-7
7.1		Installation of the One Hour Fire Barrier Design	3-7
7.2		Installation of a Three Hour Fire Barrier	3-9

TS1 TECHNICAL NOTE 20684

TABLE OF CONTENTS

CONTINUED

		PAGE NO.
3.0	TROWEL ON DESIGN FOR STRUCTURAL SUPPORTS AND HANGERS	3-9
4.0	3.1 Installation of the Fire Barrier Design	3-9
	THERMO LAG 330-660 FLEXI-BLANKET THERMAL BARRIER DESIGN FOR STRUCTURAL SUPPORTS AND HANGERS	3-10
6.3	4.1 Installation of a One Hour Fire Rated Design - Cut Layers	3-10
6.4	4.2 Installation of a Three Hour Fire Rated Design - Cut Layers	3-12
7.0	REPAIR PROCEDURES	3-14
8.0	CABLE ADDITION/REPLACEMENT PROCEDURES	3-15
9.0	POST APPLICATION PROCEDURES	3-15
ATTACHMENT A	RECOMMENDED ON SITE QUALITY CONTROL PROCEDURES	3-16
ATTACHMENT B	RECOMMENDED LIST OF INSTALLATION TOOLS	3-18

TSI TECHNICAL NOTE 20684

LIST OF FIGURES

FIGURE NO.

TITLE

PAGE NO.

	<u>TYPICAL INSTALLATION DETAILS</u>	
1	THERMO-LAG 330 FIRE BARRIER SYSTEM PREFABRICATED PANEL READY ACCESS DESIGN FOR CABLE TRAYS SOLID BOTTOM OR LADDER TRAY- BOTTOM TRAY DETAILS	2-3
2	THERMO-LAG 330 FIRE BARRIER SYSTEM PREFABRICATED PANEL READY ACCESS DESIGN FOR CABLE TRAYS SOLID BOTTOM OR LADDER TRAY FIRE BARRIER ASSEMBLY	2-4
3	THERMO-LAG 330 FIRE BARRIER SYSTEM PREFABRICATED PANEL DESIGN FOR JUNCTION BOXES SURFACE MOUNTED JUNCTION BOX	2-6
4	THERMO-LAG 330 FIRE BARRIER SYSTEM PREFABRICATED PANEL DESIGN FOR JUNCTION BOXES JUNCTION BOX NOT SURFACE MOUNTED	2-8
5	TYPICAL WRAP ZONE INTERFERENCES	2-10
6	TYPICAL <u>STRUCTURAL SUPPORT PROTECTION</u> WRAP ZONE INTERFERENCES	2-11
7	THERMO-LAG 330 FIRE BARRIER SYSTEM PRESHAPED CONDUIT SECTION DESIGN FOR CONDUIT, CABLE DROPS AND INSTRUMENT TUBING	12 2-13
8	TYPICAL THERMO-LAG RACEWAY INTERFACE WITH A <u>PENETRATION SEAL</u> USING PREFABRICATED PANELS <u>WALL OR CEILING</u>	2-17
9	TYPICAL THERMO-LAG RACEWAY INTERFACE WITH A PENETRATION SEAL USING PREFABRICATED PANELS	2-18

TSI TECHNICAL NOTE 20684

LIST OF FIGURES

CONTINUED

<u>FIGURE NO.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
10	THERMO-LAC 330-660 FLEXI-BLANKET THERMAL BARRIER ONE HOUR DESIGN	3-3
11	THREE HOUR THERMO-LAC 330-660 FLEXI- BLANKET	3-6
12	THERMO-LAC 330 PREFABRICATED PANEL AND THERMO-LAC 330-660 FLEXI-BLANKET DESIGNS FOR STRUCTURAL SUPPORTS AND HANGERS	3-8

THERMO-LAG 330 FIRE BARRIER SYSTEM
INSTALLATION PROCEDURES MANUAL

SECTION I
GENERAL DESCRIPTION

SECTION I

GENERAL DESCRIPTION

1.0 INTRODUCTION

This section ⁵described the THERMO-LAC 330 Fire Barrier System and its material components. The System is comprised of THERMO-LAC Stress Skin Type 330-69 and THERMO-LAC 330-1 Subliming Material. The System may be installed as Prefabricated Panels, Preshaped Sections, Flexi-Blanket, or by direct trowel methods. It is used to protect cable trays, conduit, ~~and~~ drops (cables in free space), junction boxes and structural supports and hangers.

2.0 FIRE BARRIER DESIGNS

Four (4) basic designs of the THERMO-LAC 330 Fire Barrier System have applications in nuclear power generating installations. These four (4) designs are:

.....	Prefabricated Panels Design
.....	Preshaped Conduit Sections Design
.....	Direct Trowel On Design
.....	Flexi-Blanket Design

Each of these basic designs have been approved for installation in nuclear plant facilities by the American Nuclear Insurers and are installed in a number of plants accepted for operational licensing by the Nuclear Regulatory Commission.

The material components of each design are identical with the exception of the Direct Trowel On Design. Each of the first two (2) designs are comprised of THERMO-LAC Stress Skin Type 330-69 and THERMO-LAC 330-1 Subliming Material.

The following paragraphs highlight the major steps involved in installing these designs. The more detailed sequential steps involved in installing these designs are described in Section II.

2.1 Prefabricated Panel Design

The Prefabricated Panel Design is fitted and installed at the jobsite from THERMO-LAC 330-1 Prefabricated Panels. This installation involves cutting the number of sections required to form the Fire Barrier from the THERMO-LAC Prefabricated Panels and then mounting the sections on the component to be protected using approved stainless steel tie wires or other approved fasteners. The assembly is completed by filling in the scored areas and joints with THERMO-LAC 330-1 Subliming Material - Trowel Grade. The ~~CABLE~~ Prefabricated Panel Design shall be used to protect cable trays, ~~air drops~~, (cables in free space), conduit, instrumentation tubing, junction boxes, and structural supports. This design is preferred over alternative spray application designs because it eliminates the overspray protection requirements of the direct spray-on method.

2.2 Preshaped Conduit Section Design

The Preshaped Conduit Section Design is shipped to the jobsite ready for installation. Installation involves mounting the preshaped conduit sections on the conduit or cable drops to form cylindrical sections around the conduit or cable drop, and then fastening the sections together with approved stainless steel tie wires or banding material. The precoating of the sections prior to installation and the filling in of gaps or openings at the edges or joints of the assembled sections is accomplished using THERMO-LAC 330-1 Subliming Material - Trowel Grade, as required.

The Preshaped Conduit Section Design shall be used to protect conduit, cable drops and instrumentation tubing. As with the Prefabricated Panel Design, this design is also preferred over alternative spray application designs because it eliminates the overspray protection requirements of direct spray-on methods.

2.3 Direct Trowel On Design

The Direct Trowel On Design shall be used for protecting cable tray, conduit, cable drops, junction boxes and structural supports. This design involves an initial spray brush or roller application of THERMO-LAC 351 Primer over the properly prepared surface, or 330.69 stress skin installation, followed by the trowel application of THERMO-LAC 330-1 Subliming Material - Trowel Grade, in the dry film thickness required to provide the specified level of fire resistance.

2.4 THERMO-LAG 330-660 Flexi-Blanket Thermal Barrier Design

The THERMO-LAG 330-660 Flexi-Blanket Thermal Barrier Design is comprised of a high temperature, subliming, heat blocking, flexible thermal barrier which is reinforced on both sides with a low density, fiberglass cloth, further implemented by a heat blocking thermal catalizer. One and three hour fire rated designs are assembled from these materials as follows:

- The one hour fire rated design consists of two each 0.250 inch minimum thickness layers of the THERMO-LAG 330-660 Flexi-Blanket Material.
- The three hour fire rated design consists of five each 0.250 inch minimum thickness layers of the THERMO-LAG 330-660 Flexi-Blanket Material.

The THERMO-LAG 330-660 Flexi-Blanket Thermal Barrier Design is used to protect conduit, flex conduit, cable drops, pullboxes, condulets, structural supports and hangers.

3.0 MATERIAL COMPONENTS

The material components which shall be utilized in the various designs of the THERMO-LAC 330 Fire Barrier System are as follows:

3.1 THERMO-LAC Stress Skin Type 330-69

This material provides the strong mechanical base for the THERMO-LAC 330-1 Subliming Material. It is comprised of a pretreated open weave, self stiffened, steel mesh and is used to provide an enclosure over cable trays, conduits and other items.

3.2 THERMO-LAC 330-1 Subliming Material

This material provides the level of fire resistance specified for the installation. It is a water based, subliming, thermally activated fire resistive material which volatilizes at fixed temperatures, exhibits a volume increase through the formation of a multi-cellular matrix, and blocks heat to protect the substrate material to which it is applied.

This material can be supplied in a sprayable grade (THERMO-LAC 330-1 Subliming Material - Spray Grade) for direct spray-on applications, or in a trowel grade consistency (THERMO-LAC 330-1 Subliming Material - Trowel Grade) which is suitable for troweling or caulking type applications. It is further used in the fabrication of Prefabricated Panels and Preshaped or Preformed Sections.

3.3 THERMO-LAC 351-2 Primer

This is a corrosion-inhibiting primer which is applied to properly prepared steel surfaces at a spread rate of circa 200 sq. ft. per gallon. This material will be applied to structural supports prior to the application of the Direct Trowel-On THERMO-LAC Subliming Material.

3.4 THERMO-LAC 350 Two Part Topcoat

This material provides protection against water flow and climatic variations, chemical attack and physical abuse. It is applied at a spread rate of 50 sq. ft. per gallon.

3.5 Approved Tie Wires and Banding

The tie wires and the banding material approved for attaching the THERMO-LAC 330 Fire Barrier System shall be 18 ga. minimum standard stainless steel wire and 0.020 inch minimum by 1/2 inch minimum standard stainless steel banding. The use of other fasteners requires engineering approval prior to installation.

THERMO-LAC 330 FIRE BARRIER SYSTEM
INSTALLATION PROCEDURES MANUAL

SECTION II
INSTALLATION PROCEDURES

SECTION II

INSTALLATION PROCEDURES

This section sets forth the sequential steps involved in the installation of the THERMO-LAC 330 Fire Barrier System to cable trays, conduit, cable drops, junction boxes, and structural supports.

1.0 GENERAL REQUIREMENTS

1.1 Qualification of Contractor

The application shall be performed by a qualified contractor who has had prior training in applying the materials and who has the equipment required to perform the application.

1.2 Safety Precautions

The contractor shall follow standard industrial safety practices established for the handling of chemical coatings and shall conform to applicable OSHA and safety rules in all aspects.

1.3 Storage

The THERMO-LAC 330 Fire Barrier System materials shall be stored off the ground when not in use in totally enclosed and weather protected areas provided for this purpose.

The Prefabricated Panels and Preshaped or Preformed Sections do not require any temperature protection. The Bulk Materials such as THERMO-LAC 330-1 Subliming Material -Spray or Trowel Grade, or the THERMO-LAC 350 Series Topcoat and THERMO-LAC 351 Series Primer shall be protected against freezing and from temperatures above 100F.

2.0

PREFABRICATED PAEL
INSTALLATION PROCEDURES

SEE NOTE COMMENT

2.1 PREFABRICATED PANEL READY ACCESS DESIGNS FOR CABLE TRAYS

Installation of the Prefabricated Panel Ready Access Design to cable trays involves cutting the number of sections required to form the Fire Barrier from one or three hour fire rated THERMO-LAG Prefabricated Panels, and then mounting the sections on the cable tray to be protected using stainless steel tie wires. The sequential steps involved in installing this fire barrier design onto the cable trays are described in the following paragraphs. The one hour fire panel has a nominal thickness of $\frac{1}{2}$ " and the three hour panel has a nominal thickness of 1".

2.1.1 Installation of the One Hour Or Three Hour Ready Access Fire Barrier Design

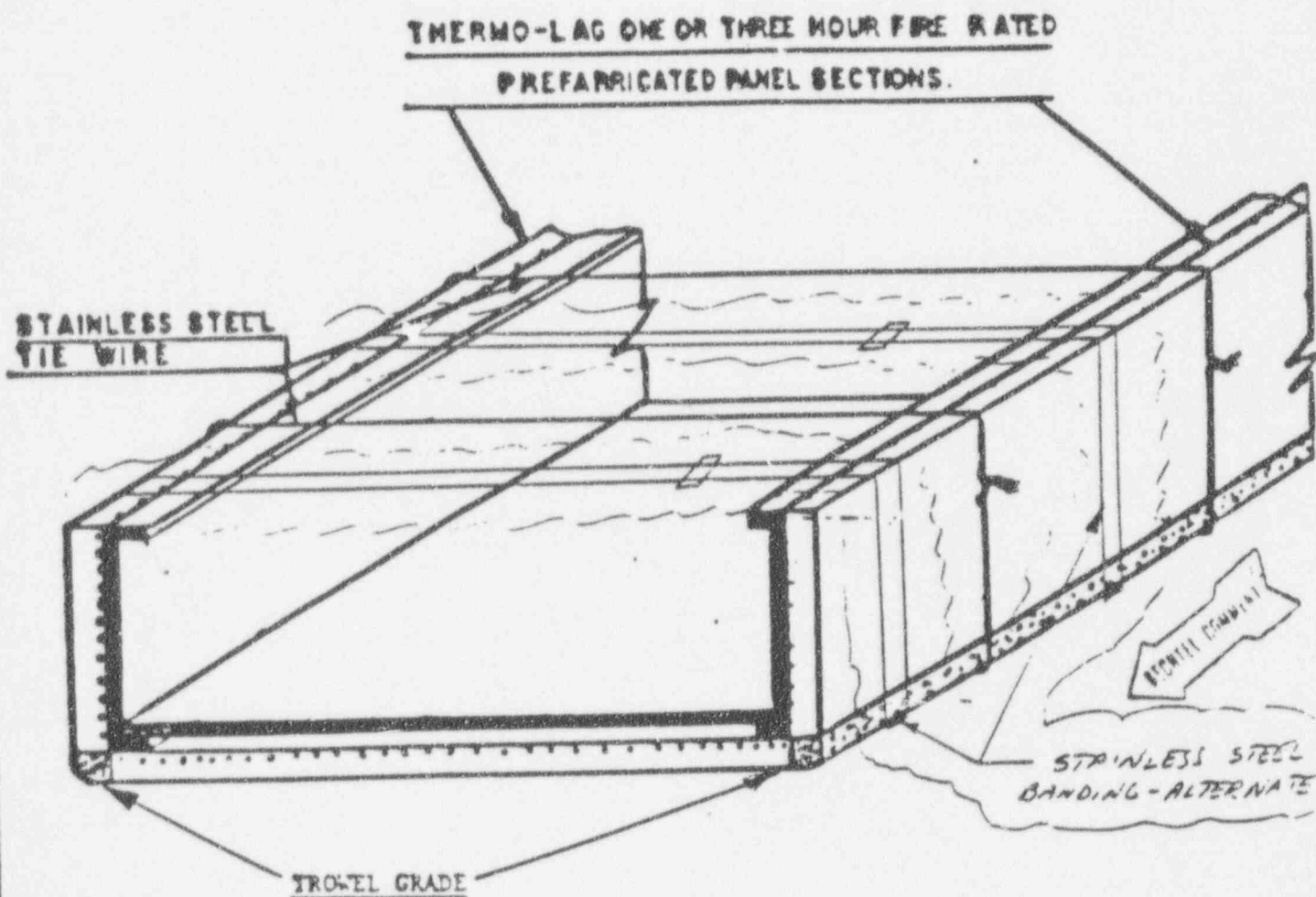
- a. Cut a piece of material large enough to form the bottom section from a one hour or three hour rated Prefabricated Panel. The width of the bottom section shall be equal to the sum of the base plus both side rails of the cable tray plus an allowance for the height of the v-stiffeners. The length of the bottom section shall not exceed 6.5 feet.
- b. Form a "U"-shaped bottom section by scoring the panel and bending 90 degrees to provide for the side panels. Note that the stress skin shall always be placed inward, up against the surface requiring protection.
- c. Cut a piece of material large enough to form the top section from a one hour or three hour rated Prefabricated Panel. The width of the top section shall be equal to the base of the cable tray, plus the thickness of each of the two sides of the bottom U-shaped section. The length of the top section shall not exceed 6.5 feet.
- d. Mount the U shaped bottom section on the cable tray using stainless steel tie wires as shown in Figure 1. The maximum spacing between the tie wires shall not exceed 12 inches.
- e. Attach the flat top section to the installed bottom section using stainless steel tie wires or banding as shown in Figure 2. The maximum spacing between the tie wires or banding shall not exceed 12 inches. Distance from the end of panel should be specified.
- f. Attach additional top and bottom sections to previously installed sections by butt joining them together at their ends.
- g. Complete the installation by filling in the edges and joints with THERMO-LAG 330-1 Subliming Material - Trowel Grade.

SEE NOTE COMMENT

FIGURE 1

THERMO-LAG 330 FIRE BARRIER SYSTEM
PREFABRICATED PANEL READY ACCESS DESIGN
FOR CABLE TRAYS

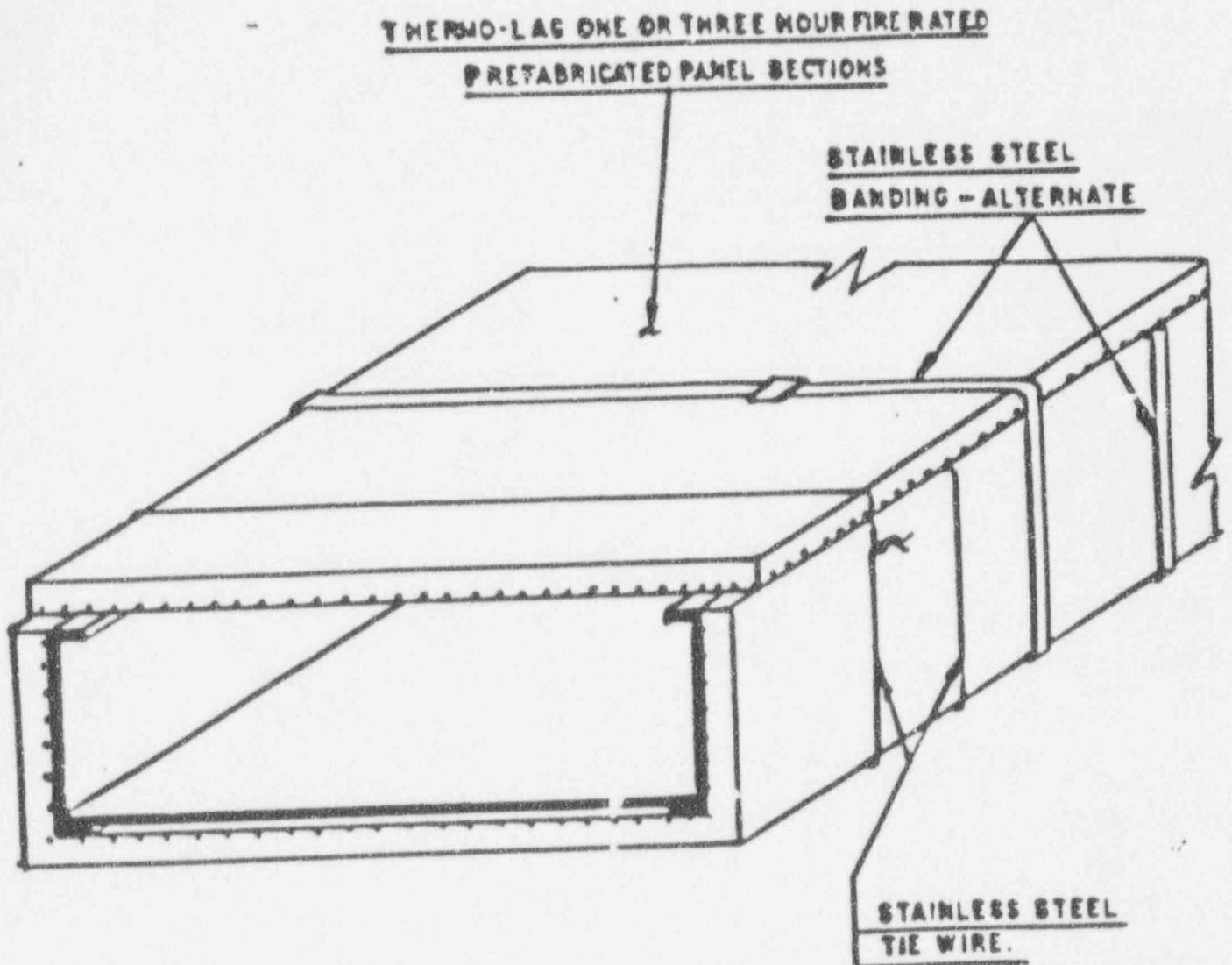
SOLID BOTTOM OR LADDER TRAY- BOTTOM
TRAY DETAILS.



TST		2200 CASSENS DRIVE	
TST, Inc.		ST. LOUIS, MISSOURI 63026	
BY: NONE	DATE: 8-10-85	APPROVED BY:	DR: 8-10-85
Thermo-Lag 330 Fire Barrier System			

FIGURE 4

THERMO-LAG 330 FIRE BARRIER SYSTEM
PREFABRICATED PANEL READY ACCESS DESIGN FOR CABLE TRAYS
SOLID BOTTOM OR LADDER TRAY FIRE BARRIER ASSEMBLY.



"TYPICAL" INSTALLATION DETAILS

TST	2200 CASSENS DRIVE	
	ST. LOUIS, MISSOURI 63026	
BY NAME NONE	DATE 8-10-85	BY NAME
Thermo-Lag 330 Fire Barrier System Prefabric		ST. LOUIS, MISSOURI

2.2 PREFABRICATED PANEL DESIGN FOR JUNCTION BOXES

Installation of the Prefabricated Panel Design on a junction box involves cutting sections of one or three hour fire rated THERMO-LAG Prefabricated Panel large enough to provide a "U" shape around the junction box and then mounting the sections onto the junction box, using stainless steel bands or other approved fasteners. The sequential steps involved in installing the fire barrier design are described in the following paragraphs.

2.2.1 Installation of One Hour or Three Hour Fire Barrier Design

FOR A SURFACE MOUNTED JUNCTION BOX

- a. Cut a section from a one hour or three hour fire rated Prefabricated Panel large enough to form the top, front and bottom panels and required top and bottom flanges of the fire barrier assembly. The width of the section shall be equal to the width of the junction box plus an additional 1/4 inch to provide for sufficient clearance when installed. The length shall be equal to the sum of the top, front and bottom of the junction box plus 2 flanges large enough to accommodate the approved fasteners and an additional 1/2 inch to provide sufficient clearance when installed. An additional allowance shall be provided for the height of the "v"-stiffeners. *BECHTEL COMMENT*
- b. Score the Prefabricated Panel section to shape the top, front and bottom panels and two flanges of the fire barrier enclosure.
- c. Form the top, front, and bottom panels and top and bottom flanges by making 90 degree bends. Note that the stress skin shall be placed inward *BECHTEL COMMENT* against the surface requiring protection.
- d. Mount the *BECHTEL COMMENT* formed section *ENCLOSURE* on the wall or ceiling using approved concrete fasteners. The concrete fasteners shall be spaced at a maximum distance of 12 inches with at least two concrete fasteners being used per flange. The concrete fasteners shall be site approved anchors of 1/4 inch minimum diameter *BECHTEL COMMENT* installed per standard site procedure. *and 3 1/2" min. in length* *BECHTEL COMMENT*
- e. Cut two sections from a one hour or three hour fire rated Prefabricated Panel for the side panels of the fire barrier enclosure. Cut holes for conduit penetrations in the top, front and bottom panels as required and then cut the panel or panels into two pieces to facilitate installation around the conduit. Mount the side panels on the installed top, front and bottom section enclosure using stainless steel banding as shown in Figure 3. *BECHTEL COMMENT*

FIGURE 3

Hole spacing-max. 12"
Large enough to accommodate
anchor.

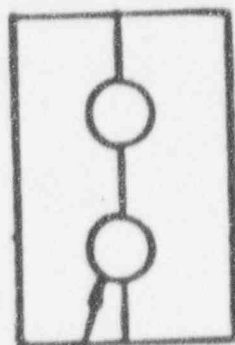
APPROVED STAINLESS STEEL BA

THERMO-LAG ONE OR THREE
HOUR RATED PREFABRICATED
PANEL-SECTIONS

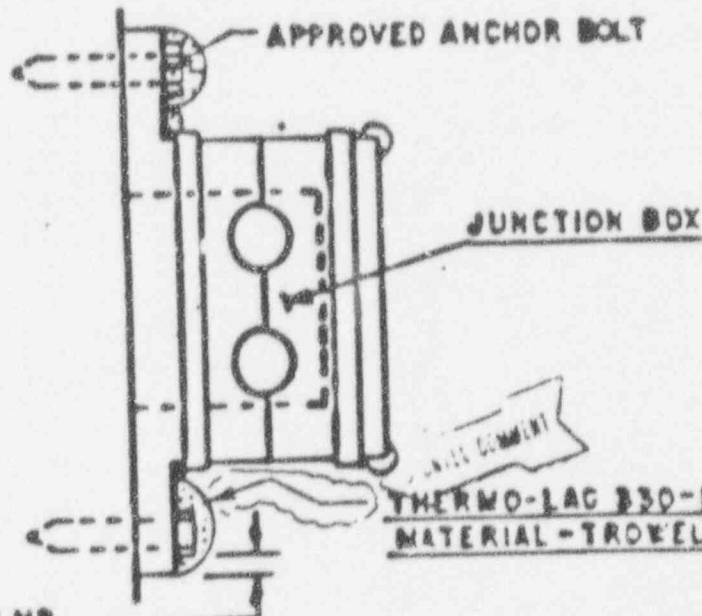
ALL NON-PROTECTED CONDUIT
MUST BE WRAPPED FOR 18"

measured from the outer surface of
the THERMO-LAG 330-1 envelope

THERMO-LAG 330 FIRE BARRIER SYSTEM
PREFABRICATED PANEL DESIGN FOR JUNCTION BOX
SURFACE MOUNTED JUNCTION BOX.



HOLE FOR
CONDUIT OPENING



1/2" = 1HR

1" = 3HR

2200 CASSENS DRIVE	
ST LOUIS, MISSOURI 63026	
DATE 8-10-85	APPROVED BY
THERMO-LAG 330 Fire Barrier System Prefabricated Panel Design for Junction boxes	

- f. Complete the installation by filling all edges and joints and covering exposed anchorages with $\frac{1}{4}$ " or 1", as applicable, of THERMO-LAC 330-1 Subliming Material - Trowel Grade.

FOR A JUNCTION BOX NOT SURFACE MOUNTED

- g. Cut a section from a one or three hour fire rated Prefabricated Panel large enough to form the top, front, and bottom panels of the fire barrier assembly. The width of the section shall be equal to the width of the junction box plus an additional $\frac{1}{4}$ inch to provide for sufficient clearance when installed. The length shall be equal to the sum of the top, front, and bottom of the junction box plus an additional $\frac{1}{2}$ inch to provide sufficient clearance when installed.

- h. Score the Prefabricated Panel section to shape the top, front, and bottom panels of the fire barrier enclosure.

1. *FORM* For the top, front, and bottom panels by making 90 degree bends. *NOTE THAT THE STRESS SKIN SHALL BE PLACED INWARD AGAINST THE SURFACE REQUIRING PROTECTION.*

- j. Cut another section from a one or three hour fire rated Prefabricated Panel large enough to form the side and back panels of the fire barrier assembly. Cut holes for conduit penetrations in the side and back panels as required and then cut the panel or panels into two pieces to facilitate installation around the conduit.

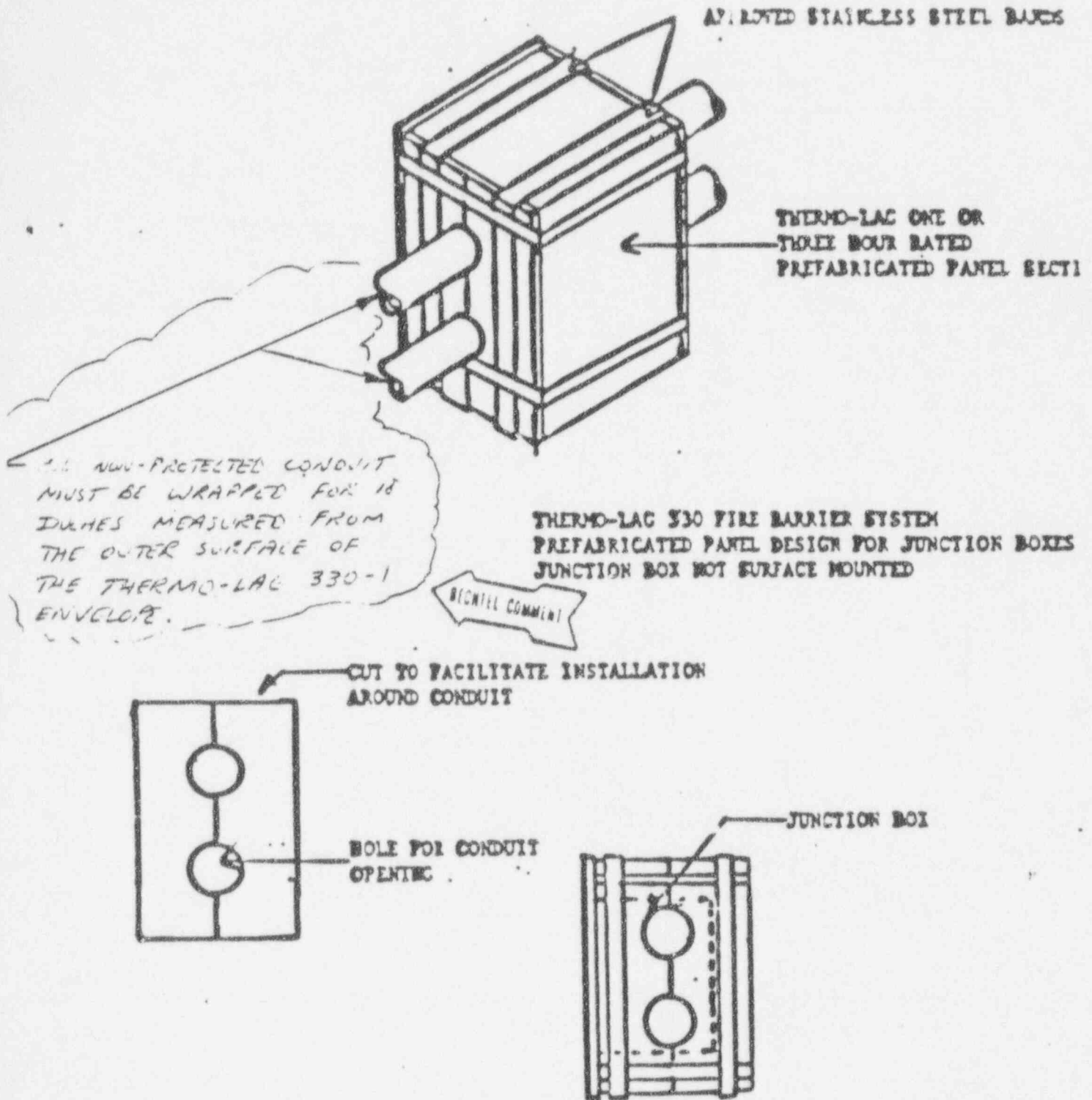
- k. Score the Prefabricated Panel section to shape the side and back panels of the fire barrier enclosure.

1. Form the side and back panels by making 90 degree bends.

- m. Mount the two fire barrier sections on the junction box and fasten the two sections together using stainless steel banding *AS SHOWN IN FIGURE 4.*

- n. Complete the installation by filling all edges and joints with THERMO-LAC 330-1 Subliming Material - Trowel Grade.

FIGURE 4



TYPICAL INSTALLATION DETAILS

2200 CASSENS DRIVE		
ST. LOUIS, MISSOURI 63026		
BY NONE	DATE 6-1-85	BY J. H. H. H.
6-1-85		6-1-85

2.3
4.0

SECRET COMMENT

PRESHAPED CONDUIT SECTION DESIGN FOR CONDUIT, CABLE DROPS AND INSTRUMENT TUBING

Installation of the THERMO-LAG Preshaped Conduit Section Design on conduit, cable drops and instrument tubing involves mounting two of the semi-circular preshaped conduit sections at a time, and fastening them together using stainless steel tie wires or banding. The sequential steps involved in installation of this fire barrier design are described in the following paragraphs.

INSTALLING

SECRET COMMENT

4.1
2.3.1

Installation of One Hour or Three Hour Fire Barrier Design

- a. Precoat the edges on one of the one or three hour fire rated THERMO-LAG Preshaped Conduit Sections with a one quarter to a one half inch bead of THERMO-LAG Subliming Material - Trowel Grade.
- b. Mount the coated section and one other one or three hour fire rated section on the conduit, cable drop or instrument tube with the edges flush with each other to form a cylindrical section around the conduit, cable drop or instrument tube. Fasten the two sections together using stainless steel tie wires or banding installed at 12 inch intervals, maximum, as shown in Figure 7. Distance from the end of preshaped section should be specified.
- c. Complete the installation by filling gaps and joints with THERMO-LAG 330-1 Subliming Material - Trowel Grade, as required.
- d. Apply a one quarter to one half inch bead of THERMO-LAG 330-1 Subliming Material - Trowel Grade to the end of the installed section, and attach the next section making sure that the ends are butted and flush.

SECRET COMMENT

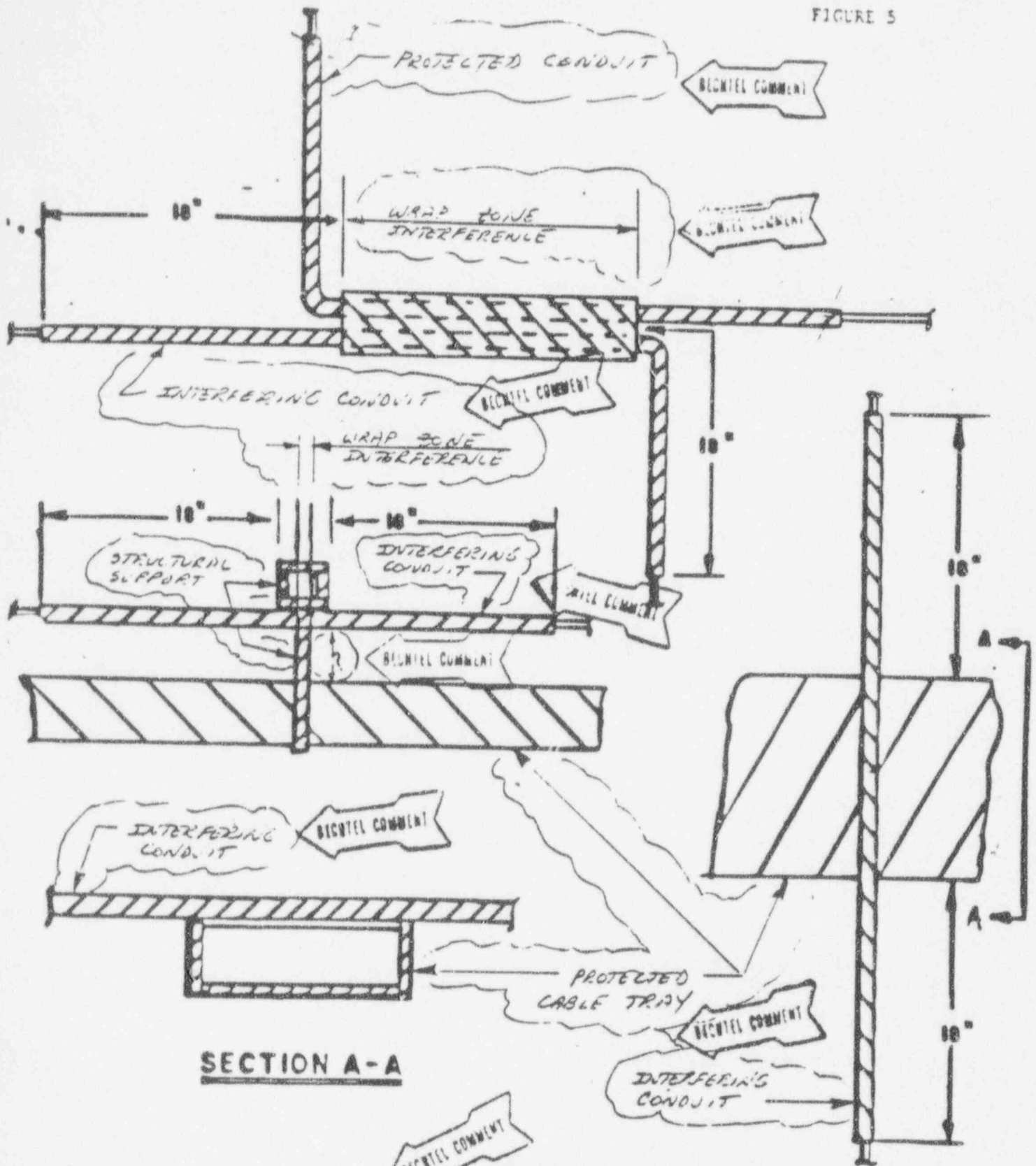
AS AN OPTION

- e. Assemble two one or three hour Preshaped Conduit Sections on the conduit, cable drop or instrument tube without preapplication of the THERMO-LAG 330-1 Subliming Material - Trowel Grade to the edges and end joints. After installation, fill in all gaps or openings at the edges or joints with THERMO-LAG 330-1 Subliming Material - Trowel Grade.

SECRET COMMENT

9
2-11

FIGURE 3



SECTION A-A

NOTE: CROSS-MATCHING IS USED TO DENOTE FIRE BARRIER.

SECRET COMMENT

AGENT COMMENT

INTERFERIN'S
CONJUGATE

2-10

TST	<u>2200 CASSENS DRIVE</u>	
	<u>ST LOUIS, MISSOURI 63026</u>	
W OOL NONE	00000000 00	00000000 00
00-10-85		00000000 00

Typical Wrap Zone Interferences

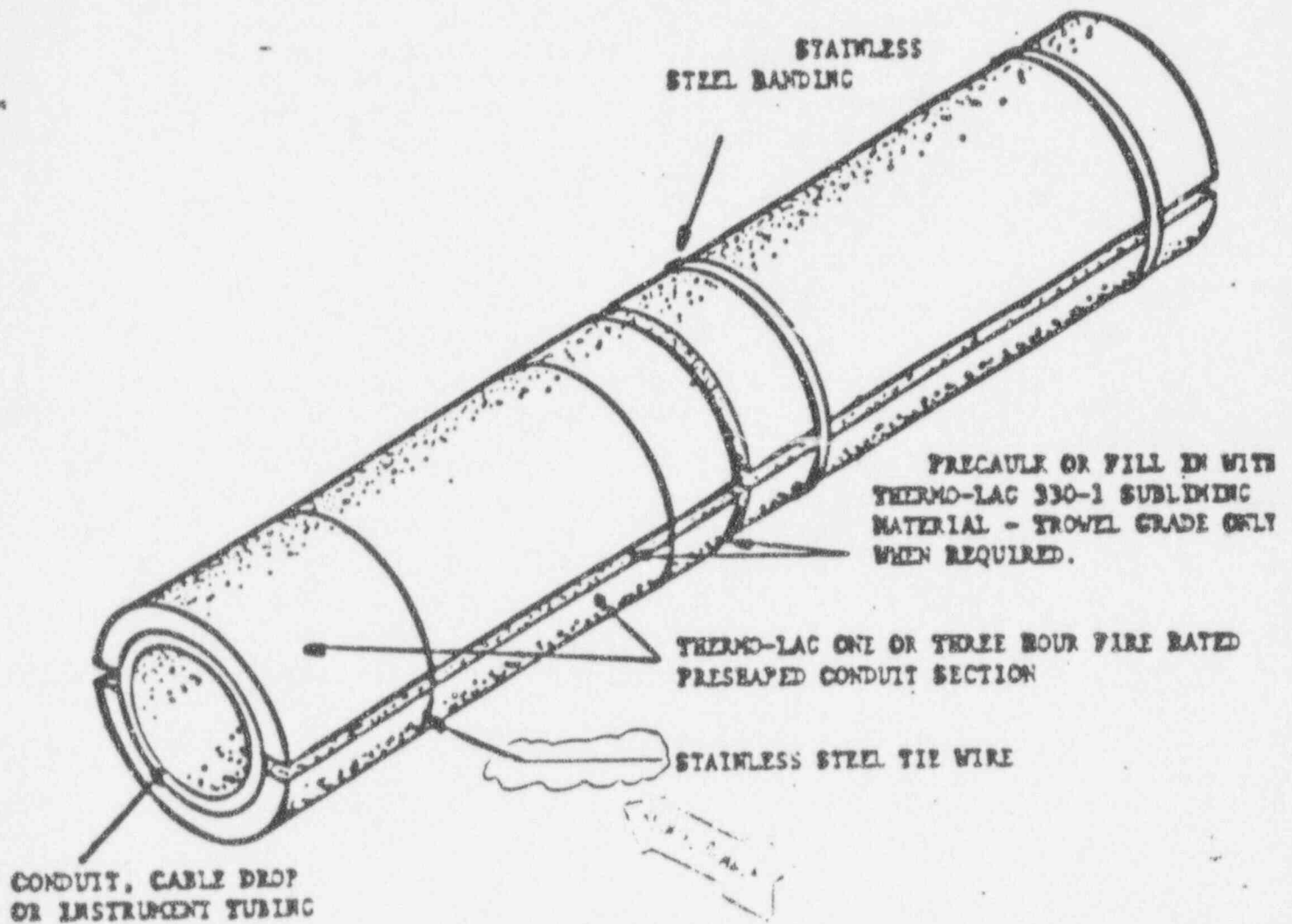
INSERT C
SEE PAGE 3-743-9

3.0 WRAP ZONE INTERFERENCES

- COMPONENT
- RECHTEL COMMENT
- a. To prevent thermal shorts into the fire barrier system, all penetrations (i.e. secondary supports, electrical or seismic) into the fire barrier system, should be fire protected to the same level of fire resistance as the ~~seeway~~ for a distance of at least 18 inches minimum as measured from the outer surface of the fire barrier; covering all continuous paths. (A fire test report regarding the eighteen inch minimum fire protection requirement is presented in TSI's Technical Note 84-12-181).
 - b. Figure 5 and 6 show typical examples.
 - c. All 4 designs can be used - prefabricated panels, preformed conduit section, flexi-blanket and direct trowel on.

FIGURE 7

THERMO-LAC 330 FIRE BARRIER SYSTEM
 PRESHAPE CONDUIT SECTION DESIGN
 FOR CONDUIT, CABLE DROPS AND INSTRUMENT TUBING



"TYPICAL" INSTALLATION DETAILS



TST. INC. 3260 BRANNON ST. LOUIS, MO 63		
IN CHARGE NAME	APPROVED BY NAME	DATE

40
5.0

INTERFACES

Installation of cable tray, conduit and instrument tubing interfaces with penetration seals, walls, ceilings, and other raceways is accomplished using either Prefabricated Panel or direct trowel on methods. Typical installations using these methods are briefly described and illustrated in the following paragraphs.

5.1 Installation of One or Three Hour Interfaces Between a Cable Tray or Conduit and a Penetration Seal

5.1.1 Cut and form a box shaped and flanged section from a one or three hour rated Prefabricated Panel as is shown in Figure 5. The minimum height of the flange shall be sufficient to cover the wall opening and accommodate approved concrete fasteners. Note that the stress skin shall always be placed inward, up against the surface requiring protection.

ACCOMMODATE

BECKILL COMMENT

5.1.2 Mount the four sided and flanged section, using approved concrete fasteners, installed at 12 inch intervals maximum, and two per flange minimum, to fasten the section to the concrete wall. Use stainless steel tie wires or banding installed at 12 inch maximum intervals to secure the four sided section to the tray or conduit. Fill in gap seams and cover mounting bolts with trowel grade material.

5.2 Installation of One or Three Hour Self Supporting Interface Between Conduit or Instrument Tubing and a Wall or Ceiling

5.2.1 Cut and form a three sided and flanged section from a one or three hour rated prefabricated panel as shown in Figure 6. The minimum height of the flange shall be sufficient to provide for the concrete fasteners.

5.2.2 Mount the three sided and flanged section on the cable tray or conduit using approved concrete fasteners to secure the section to the wall or ceiling.

5.2.3 Apply a coating of THERMO-LAC 330-1 Subliming Material - Trowel Grade in a dry film thickness of .500" (+.125, -0) for one hour protection and 1.000" (+0.25, -0) for three hour protection to the edges and joints of the installed section using a trowel or stiff bristle brush to fill in any gaps or holes.

BECKILL COMMENT

BECKILL COMMENT

3.3 Installation of One and Three Hour Interface Between a Cable Tray and a Conduit

3.3.1 Install a one hour or three hour fire rated Prefabricated Panel Ready Access Design on the cable tray following the instructions given in Section 2.1.

3.3.2 Install a one hour or three hour fire rated Preshaped Conduit section on a conduit or cable bundle penetrating a cable tray fire barrier for a minimum distance of eighteen inches from the point of penetration.

3.3.3 Apply a coating of THERMO-LAC 350 Primer to the horizontal structural support member and to the vertical structural supports from the horizontal support member to the ceiling, wall or floor support prior to the trowel application of one or three hour fire protection. Also apply the primer coating to a penetrating structural member for a minimum distance of 18 inches from its point of intersection with a cable tray fire barrier prior to the trowel application of one or three hour fire protection.

3.3.4 Trowel apply a coating of THERMO-LAC 330-1 Subliming Material - Trowel Grade in a dry film thickness of .500" (+.125, -0) for one hour fire protection and 1.000 (+.25, -0) for three hour fire protection.

3.0 DIRECT TROWEL-ON DESIGN

3.1 THERMO-LAC 351 Primer Application

3.1.1 Prepare the surface of the bare or previously painted steel component for application of the THERMO-LAC 351 Type Primer by removing any dirt, scale, rust, or other contaminants. Never apply the primer directly over any hard or glossy painted surface without roughening the surface in accordance with standard painting practices.

3.1.2 Make sure that the cleaned steel surface is compatible with the THERMO-LAC 330-1 Subliming Material by making cross hatch adhesion tests as follows:

- NOTE: a. Dull galvanized (hot dipped) structural members need not be primed.
- b. Previously painted structural members may be wrapped with stress skin (330-69) as an alternate.

..... Cross Hatch Adhesion Test

The primer is cut over an area approximately 4" by 4" in a square matrix, each square being approximately $\frac{1}{4}$ " by $\frac{1}{4}$ ". A high quality tape is applied diagonally to the square. Upon completion of the tape application, it is rubbed in firmly to assure good adhesion. With one complete jerking motion, the tape is removed. If more than 3 percent of the Primer is removed from the surface, the application is faulty. This test should be performed in areas which are deemed critical. Upon completion of the Cross Hatch Adhesion Test, the test areas should be coated again with the THERMO-LAC 351-2 Primer by either brushing or light spray. Always apply a barrier coat of THERMO-LAC 351 Type Primer over steel surfaces which have been previously primed with a zinc based primer. All doubtful surfaces should be removed using mechanical cleaning methods.

- 1.3 Apply the Primer to the properly prepared steel surface in one continuous coat using spray equipment, brush or roller. The minimum acceptable dry primer thickness should be 0.002 inches which is normally achieved by applying at a spread rate of circa 200 sq. ft. per gallon.
- 1.4 Measure Primer thickness using an approved magnetic direct reading gauge.
- 1.5 Make cross hatch adhesion tests on the primed surface to assure proper adhesion between the primer and the surface of the steel item prior to proceeding with the application of the THERMO-LAC 330-1 Subliming Material.

- 1.6 Coat the primed steel surface area with ~~the~~ THERMO-LAC 330-1 Subliming Material *IN ACCORDANCE WITH SECTION 2.2*

2.2 THERMO-LAC 330-1 Subliming Material Trowel Application

- 2.1 Trowel the material to a uniform thickness using moderate pressure and avoid overworking. The trowel should be wetted with water when a smooth finish is required. *A DRY FILM THICKNESS OF 0.500" (T.125, "O) FOR ONE HOUR PROTECTION AND 1.000" (T.0.25, "O) FOR THREE HOUR PROTECTION SHALL BE PROVIDED.*

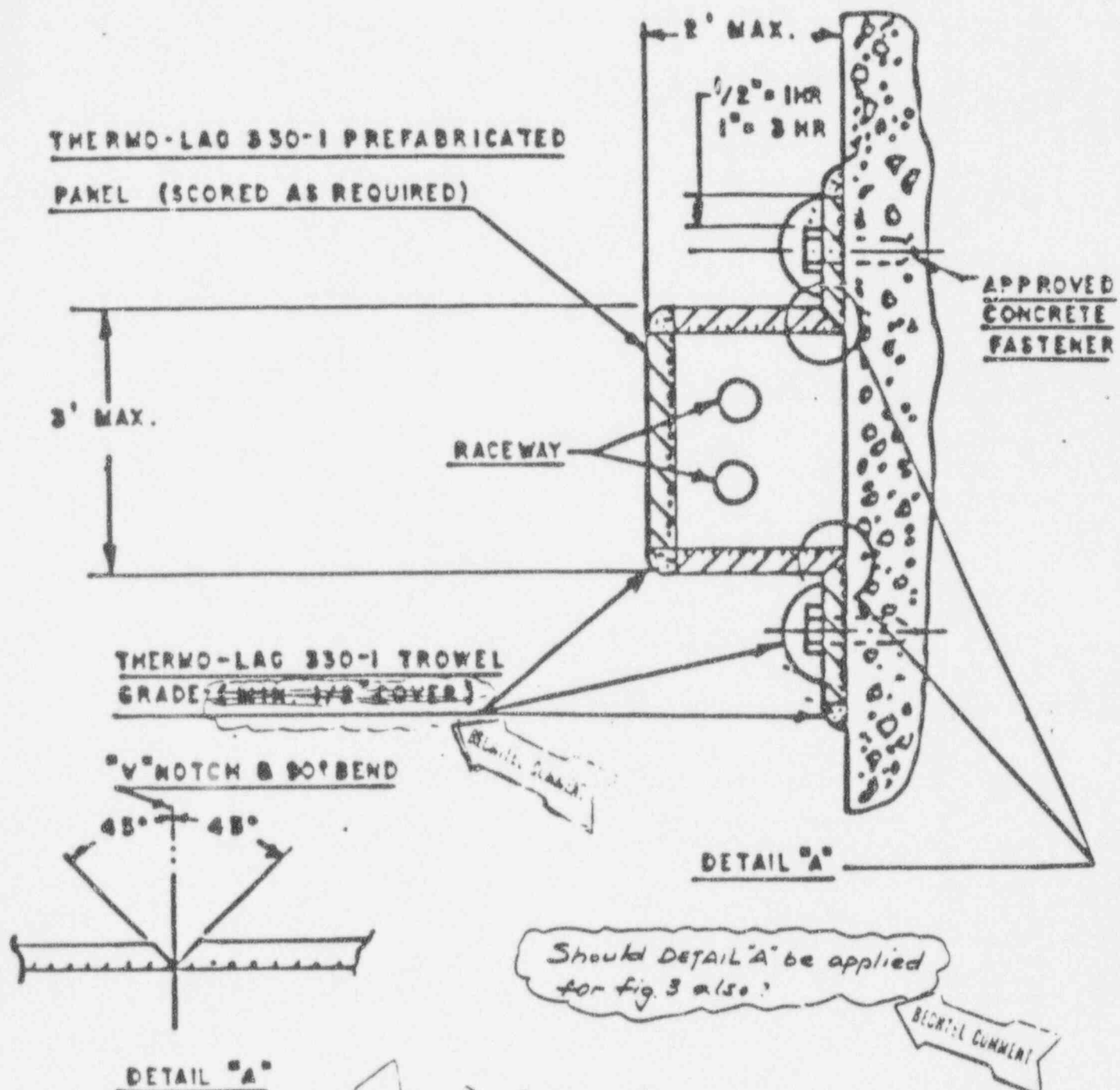
3 Dry Film Thickness Measurements

- 3.1 Take dry film thickness measurements after the applied material has cured. Measurement shall be made using electrical, penetrating, or magnetic measuring instruments.

RECEIVED COMMENT

RECEIVED COMMENT

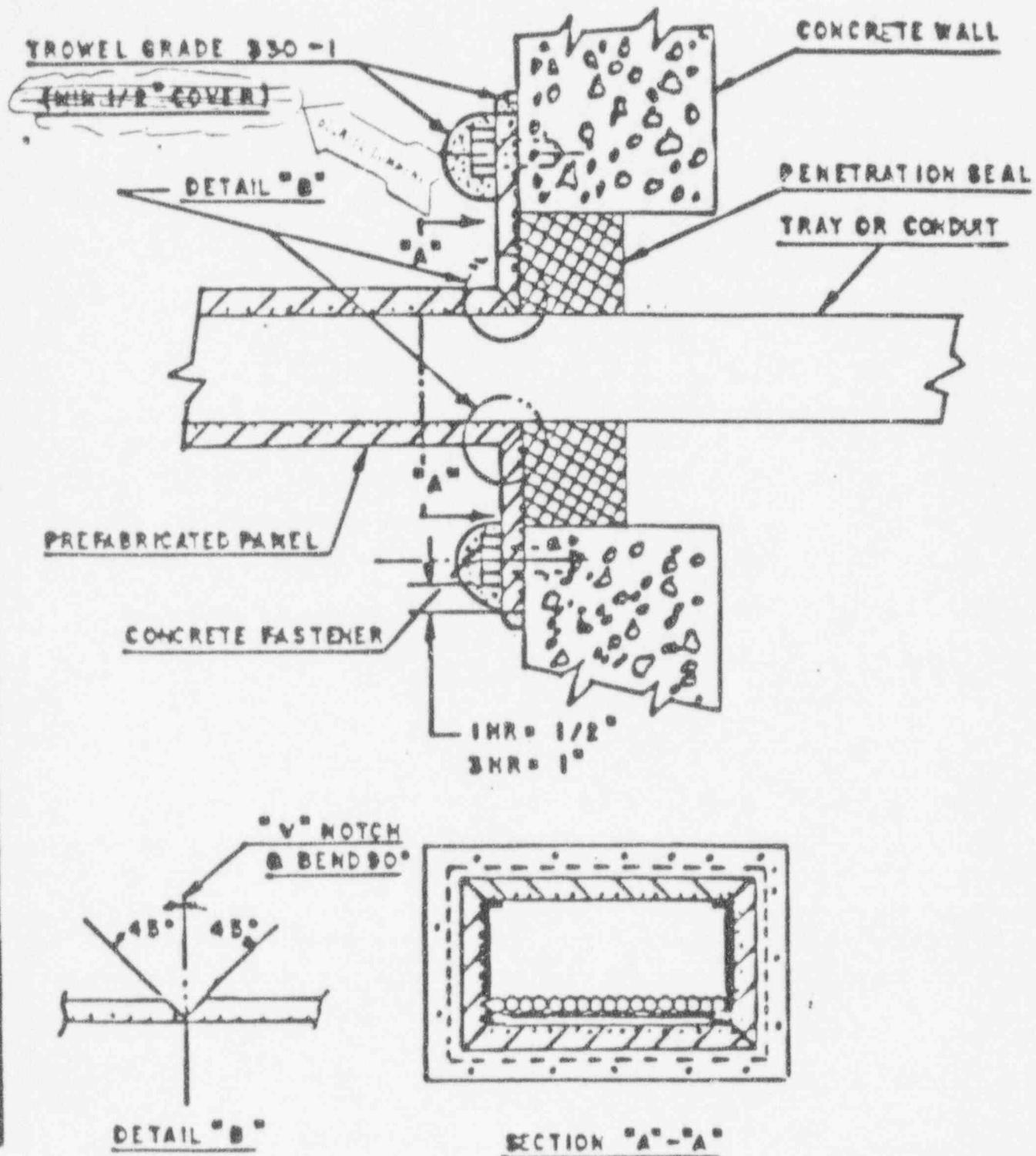
FIGURE 8



WALL OR CEILING USING

2200 CASSENS DRIVE		
ST. LOUIS, MISSOURI 63026		
DATE: NONE	DESIGNED BY:	DR: J. J. J. J.
DATE: 8-10-83		

FIGURE 9



151		2200 CASSENS DRIVE ST. LOUIS, MISSOURI 63025	
DRAWN BY NONE	CHECKED BY 8-10-85	DESIGNED BY 8-10-85	DATE 8-10-85
Typical Thermo-Lac Raceway Interface with a			

THERMO-LAG 330 FIRE BARRIER SYSTEM
INSTALLATION PROCEDURES MANUAL

SECTION III
FLEX BLANKET

NOTE: THERMAL SCIENCE, INC. HAS SUCCESSFULLY PASSED BOTH ONE AND THREE HOUR FIRE TESTS, USING THERMO-LAG 330-660 FLEX BLANKET MATERIAL. THE TESTS WERE WITNESSED BY A REPRESENTATIVE OF THE AMERICAN NUCLEAR INSURERS (ANI). THERMAL SCIENCE, INC. IS AWAITING WRITTEN ACCEPTANCE BY ANI, WHICH WE ANTICIPATE RECEIVING IN THE NEAR FUTURE. BECHTEL POWER CORPORATION WILL BE NOTIFIED UPON THERMAL SCIENCE INC.'S RECEIPT OF FORMAL ANI ACCEPTANCE LETTERS.

SECTION III

FLEX-BLANKET

SECRET COMMENT

6
1.0

SECRET COMMENT

THERMO-LAC 330-660 FLEXI-BLANKET THERMAL BARRIER DESIGN FOR CONDUITS, CABLE DROPS, FLEX CONDUIT, AND INSTRUMENT TUBING

Installation of the THERMO-LAC 330-660 Flexi-Blanket Thermal Barrier Design to conduit, cable drops, flex conduit, and instrument tubing involves cutting blanket wrap sections from a sheet of THERMO-LAC 330-660 Flexi-Blanket Material, and then wrapping the entity to be protected with the required number of layers of blanket, to provide one or three hours fire resistance. The sequential steps involved in applying the fire barrier design are described in the following paragraphs.

SECRET COMMENT

6
1

Installation of a One Hour Fire Rated Design - Blanket Wrap

6
1.1

Cut the first blanket wrap layer from a sheet of one hour THERMO-LAC 330-660 Flexi-Blanket Thermal Barrier material in the width required to overlap the diameter of the conduit, flex conduit, ~~or cable~~ ^{or cable} drop ~~or~~ bundle or instrument tubing by at least two (2) inches. The length of the first layer shall be sufficient to enclose the total or a portion of the total length of the entity to be protected.

SECRET COMMENT

6
1.2

COMMENT

Wrap the first layer of the one hour Flexi-Blanket material around the entity to be protected, taking care to overlap the material by at least two (2) inches.

6
1.3

Secure the first layer of the one hour Flexi-Blanket material to the entity using 18 ga. minimum stainless steel tie wires or 0.5" x 0.020" minimum stainless steel banding material, installed at a maximum of six (6) inch intervals. Distance from the end of blanket should be Specified.

6
1.4

Cut and install additional first layers of one hour Flexi-Blanket material in the same manner as described in Steps 1.1.1 through 1.3, taking care to butt join the first layer pieces.

6
1.5

Cut the second blanket wrap layer from a sheet of one hour THERMO-LAC 330-660 Flexi-Blanket Thermal Barrier material in the width required to overlap the installed first layer by at least two (2) inches. The length of the second layer shall be at least four (4) inches less than the first layer to provide for an adequate overlap when installing an additional second layer over the first layer.

REV. 77
JUNE 1985

REVIEW COMMENT

6
1.1.6

Wrap the second layer of the one hour Flexi-Blanket material around the installed first layer taking care to overlap the material by at least two (2) inches, and locate the overlap 180 degrees opposite from that of the prior layer.

6
1.1.7

Seal the overlapped seam using THERMO-LAC 330-1 Subliming Trowel Grade Material.

6
1.1.8

Secure the second layer of the one hour Flexi-Blanket material around the first layer using 18 ga. minimum stainless steel tie wires or 0.5" x 0.020" minimum stainless steel banding material, installed at a maximum of six (6) inch intervals.

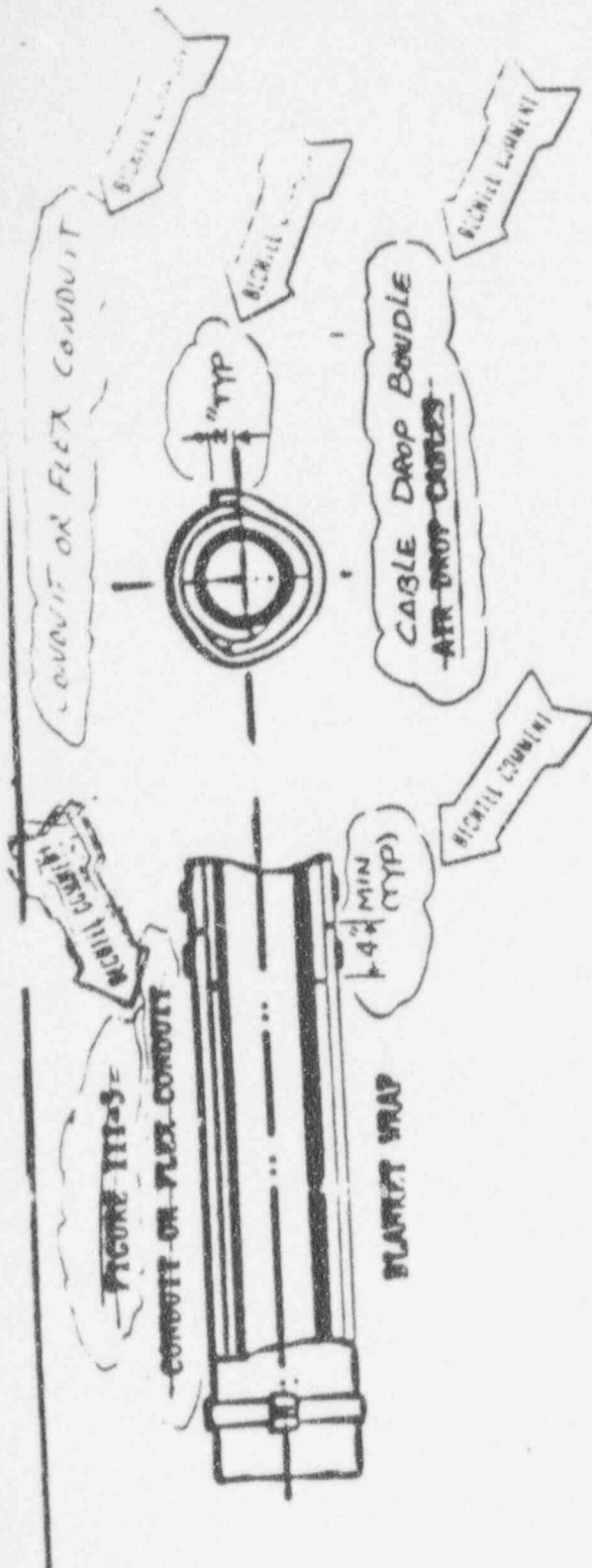
6
1.1.9

Cut and install additional second layers of the one hour Flexi-Blanket material in the same manner as described in Steps 1.1.5 through 1.1.7 taking care to butt join the second layer pieces and to secure the butt joint using 18. ga. minimum stainless steel tie wires or 0.5" x 0.020" minimum stainless steel banding material. A schematic of this fire barrier design is shown in Figure 1-3.

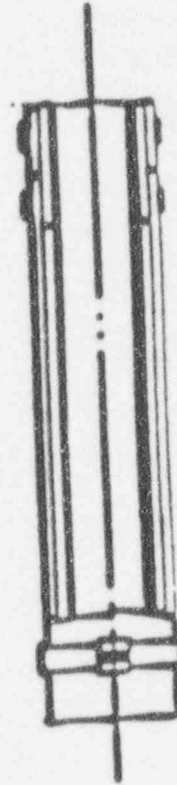
6
1.1.10

Fill in any gaps and joints with the THERMO-LAC 330-1 Subliming Trowel Grade Material.

FIGURE 10



UNISTRUT



BLANKET WRAP

(CONCEPTUAL)

2200 CASSENS DRIVE	
ST. LOUIS, MISSOURI 63103	
NO MORE	L. J. Mc
DATE 2-28-83	DATE 6-83
THERMO-BAG 330-660 FLEXI-BLANKET	
THERMO-BAG 330-660 FLEXI-BLANKET	

BECHTEL COMMENT

Installation of a Three Hour Fire Rated Design - Blanket Wrap

6.2.1

Cut the first blanket wrap layer from a sheet of three hour THERMO-LAC 330-660 Flexi-Blanket Thermal Barrier material in the width required to overlap the diameter of the conduit, flex conduit, ~~or deep~~ cable bundle or instrument tubing by at least two (2) inches. The length of the first layer shall be sufficient to enclose the total or a portion of the total length of the entity to be protected.

6.2.2

Install the first layer of the three hour Flexi-Blanket material in the same manner as described in Steps ~~6.1.1~~ through ~~6.1.4~~ for the one hour fire rated design.

6.2.3

Cut the second blanket wrap layer from a sheet of three hour THERMO-LAC 330-660 Flexi-Blanket Thermal Barrier material in the width required to overlap the installed first layer by at least two (2) inches. The length of the second layer shall be at least four (4) inches less than the first layer to provide for an adequate overlap when installing an additional second layer over the first layer.

6.2.4

Install the second layer of the three hour Flexi-Blanket material in the same manner as described in Steps ~~6.1.6~~ through ~~6.1.9~~ except ~~eliminating~~ sealing the overlapped seams with the THERMO-LAC 330-1 Subliming Trowel Grade Material.

6.2.5

Install the third blanket wrap layer from a sheet of three hour THERMO-LAC 330-660 Flexi-Blanket Thermal Barrier in the same manner as that described for the second layer in Step ~~6.2.4~~ EXCEPT POSITION THE OVERLAP 90 DEGREES FROM THAT OF THE SECOND LAYER.

6.2.6

Install the fourth blanket wrap layer from a sheet of three hour THERMO-LAC 330-660 Flexi-Blanket Thermal Barrier in the same manner as that described for the third layer except positioning the overlap 180 degrees from that of the third layer.

SECRET COMMENT

C
+ 2.7

Install the fifth blanket wrap layer from a sheet of three hour THERMO-LAC 330-660 Flexi-Blanket Thermal Barrier in the same manner as that described for the fourth layer except positioning the overlap 90 degrees from that of the fourth layer, and sealing the overlapped seam with THERMO-LAC 330-1 Subliming Trowel Grade Material. Be sure that one (1) stainless steel tie wire or band is used to secure the installed five (5) layers at their butt joint junctions with adjoining layers. A schematic of this fire barrier design is shown in Figure III-6.

SECRET COMMENT

C
2.8

Fill in any gaps and joints with THERMO-LAC 330-1 Subliming Trowel Grade Material.

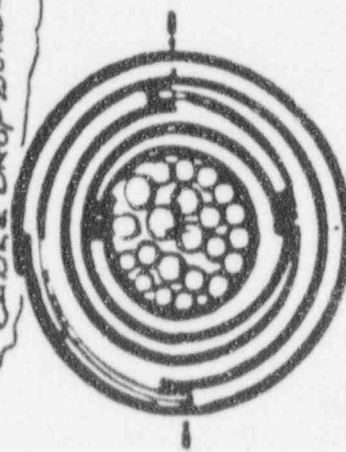
FIGURE 11

CONCEPTUAL A PLAN CONCEPT



AIR DROP CABLES
CABLE DROP BUNDLE

SECRET



UNIT TEST



(CONCEPTUAL)



BLANKET WRAP



BLANKET WRAP



BLANKET WRAP

2209 5533 M DIVE SENT	
151	7000
NOV 1954	7000
4-16-54	7000

STRUCTURAL SUPPORTS

Provide an introduction on support protection, detail and criteria. See attached for suggested text. (INSERT 4 SEE 3-7A)

PREFABRICATED PANEL DESIGN FOR STRUCTURAL SUPPORTS AND HANGERS

Installation of the Prefabricated Panel Design to structural ~~steel~~ and hangers involves cutting the number of panel sections required to form the fire barrier from one or three hour fire rated THERMO-LAG Prefabricated Panels, and then mounting the sections of panel onto the ~~steel~~ to be protected using 18 ga. minimum stainless steel tie wires or 0.5" x 0.020" minimum stainless steel banding material. The sequential steps involved in installing this fire barrier design are described in the following paragraphs.

2.4.1 ~~2.1.1~~ *move the following 2.4.1, 2.4.2, 2.4.3 to page 2-11 INSERT C*
Installation of the One Hour Fire Barrier Design

2.4.1 ~~2.1.1~~ Cut two pieces from a one hour fire rated Prefabricated Panel large enough to form two equal sections for enclosing the structural support or hanger. The width of each piece shall be equal to the sum of the width of the ~~steel~~ plus an additional 1/4 inch for clearance. The length of each piece shall not exceed 6 1/2 feet which is the standard length of a Prefabricated Panel.

2.4.2 ~~2.1.2~~ Form an "L" shaped section with the Stress Skin side ~~out~~ from each of the two pieces of Prefabricated Panel. The width and depth of each "L" shaped section shall be sufficient to enclose 1/2 of the ~~width~~.

2.4.3 ~~2.1.3~~ Mount the two "L" shaped sections on the structural support or hanger, using 18 ga. minimum stainless steel tie wires or 0.5" x 0.020" minimum stainless steel banding material as shown in Figure 12.

2.4.4 ~~2.1.4~~ *AS AN OPTION* *INSTALLED AT 12 INCH INTERVALS, MAXIMUM,*

2.4.4 ~~2.1.4~~ Cut four individual pieces from a one hour Prefabricated Panel large enough to enclose the structural support or hanger.

2.4.5 ~~2.1.5~~ Mount the four pieces on the structural support or hanger using 18 ga. minimum stainless steel tie wire or 0.5" x 0.020" minimum stainless steel banding material, *INSTALLED AT 12 INCH INTERVALS, MAXIMUM.*

2.4.6 Attach additional Prefabricated Panel sections to previous installed sections by butting them together.

2.4.9 COMPLETE THE INSTALLATION BY FILLING ALL EDGES AND JOINTS WITH THERMO-LAG 330-1 SUBLIMING MATERIAL - TROWEL GRADE.

INSERT A ^{TO} (PAGE 3-7)

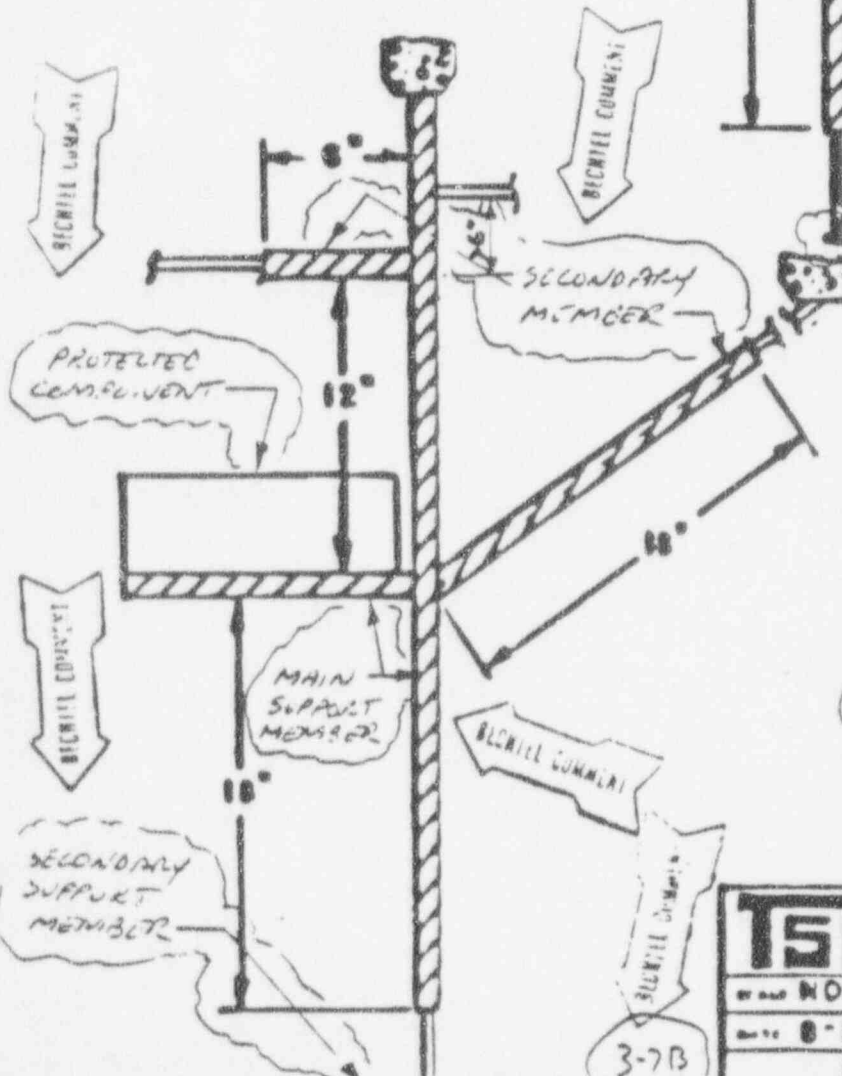
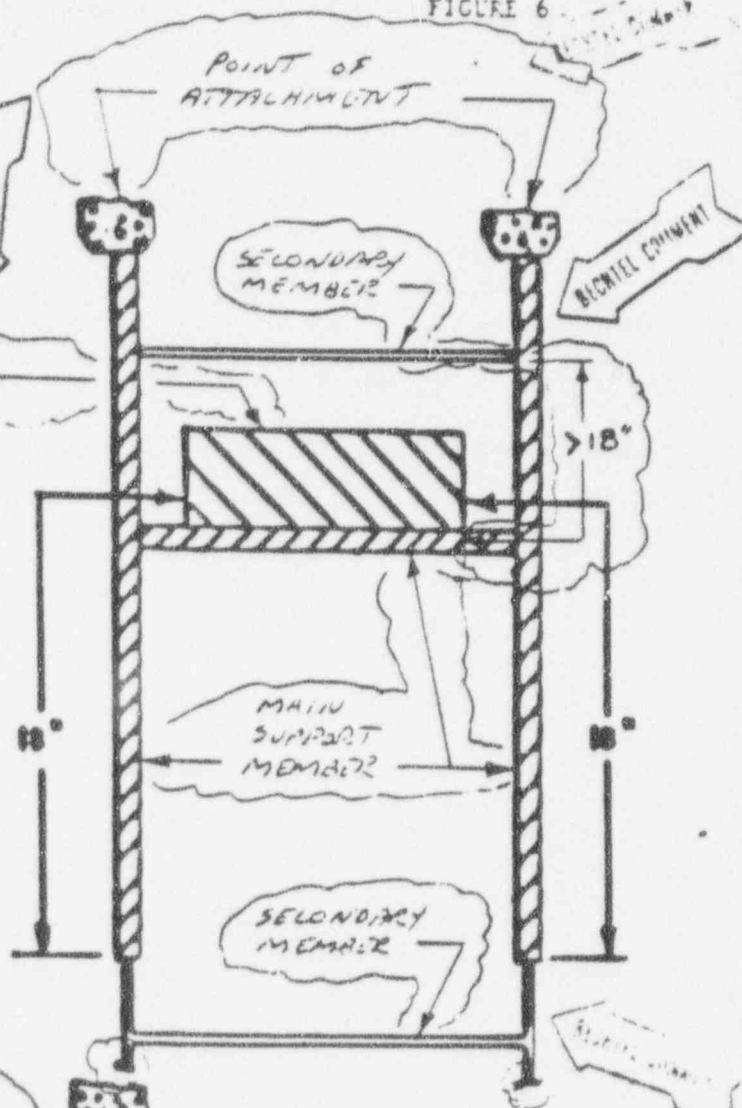


All structural supports forming a part of or supporting the Thermo-Lag 330 fire barrier and the structures, systems, and components contain therein shall be protected to provide fire resistance equivalent to that required by the barrier. Prefabricated panel Design, Direct Trowel On Design or Flex-Blanket Design may be used for this purpose.

Structural supports are, in general, composed of primary and secondary members. Primary members are the main load carrying members for the protected component. Secondary members are defined as bracing and unrelated support arms and members. Primary support members shall be protected from their point of attachment to a point at least 18 inches below the support arm carrying the protected component. Only those portions of secondary supports within eighteen inches, as measured linearly along the support, from the outer surface of the protected component need to be protected. Typical examples are shown in Figure 6.

FIGURE 6

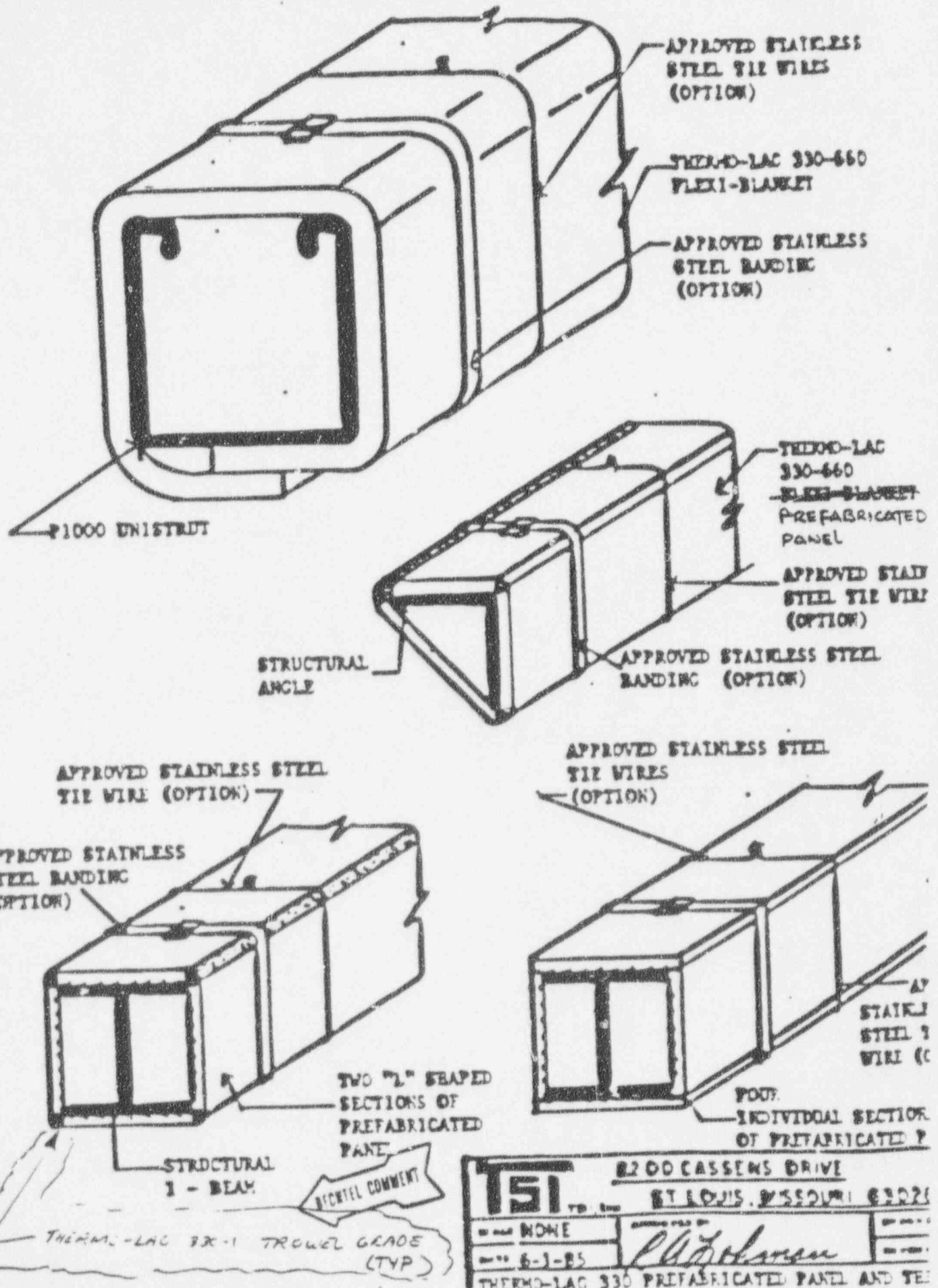
Give this sketch to the section on structural support. Revise figure number as necessary.



NOTE: CROSS-HATCHING IS USED TO DENOTE FIRE BARRIER.

TST		2200 CASSENS DRIVE	
ST. LOUIS, MISSOURI 63026		DATE 8-10-85	
BY NONE	DATE 8-10-85	BY 3-7B	DATE 8-10-85
STRUCTURAL SUPPORT PROTECTION			

FIGURE 12



2.5
2.2 Installation of a Three Hour Fire Barrier

2.5.1
2.2.1 Using three hour fire rated Prefabricated Panels, form and mount a three hour fire barrier on a structural support or hanger following the procedures described in steps 2.4.1 through 2.4.9

BECHTEL COMMENT

3.0 TROWEL ON DESIGN FOR STRUCTURAL SUPPORTS AND HANGERS

Installation of the Trowel On Design to structural supports or hangers involves applying an initial coat of THERMO-LAG 351-2 Primer, followed by an application of an outer coat of THERMO-LAG 330-1 Subliming Material. The sequential steps involved in applying the fire barrier design to conduit and instrument tubing are described in the following paragraphs.

3.1 Installation of the Fire Barrier Design

3.1.1 Prepare the surface of the structural support or hanger and apply the THERMO-LAG 351-2 Primer. SEE NOTES IN SUBSECTION 6.1.1 - SECTION II

BECHTEL COMMENT

3.1.2 ~~Spray or~~ Trowel apply the THERMO-LAG 330-1 Subliming Material to the primed surface area in the minimum required dry film thickness to provide the specified fire resistance rating. The coating dry film thickness required to produce a one hour fire resistance rating is 0.500 inches, ~~minimum~~. The coating dry film thickness required to produce a three hour fire resistance rating is 1.00 inch, ~~minimum~~.

BECHTEL COMMENT

(0.125, 0)

BECHTEL COMMENT

(0.25, 0)

BECHTEL COMMENT

4.0 THERMO-LAG 330-660 FLEXI-BLANKET THERMAL BARRIER DESIGN FOR
STRUCTURAL SUPPORTS AND HANGERS

BECHTEL COMMENT

COMPONENT

Installation of the THERMO-LAG 330-660 Flexi-Blanket Thermal Barrier Design to structural supports and hangers involves cutting layers of blanket from a sheet of THERMO-LAG 330-660 Flexi-Blanket, and then wrapping the entity to be protected with the required number of layers to provide one or three hours fire resistance. The sequential steps involved in applying the fire barrier design are described in the following paragraphs.

6.3 Installation of a One Hour Fire Rated Design - Cut Layers

BECHTEL COMMENT

Perimeter

BECHTEL COMMENT

6.3.1 Cut the first blanket wrap layer from a sheet of one hour design THERMO-LAG 330-660 Flexi-Blanket Thermal Barrier material in the width required to overlap the perimeter of the structural support or hanger by at least two inches. The length of the first layer shall be sufficient to enclose the total or a portion of the total length of the entity to be protected.

6.3.2 Wrap the first layer of one hour Flexi-Blanket material around the entity to be protected, taking care to overlap the material by at least two inches.

6.3.3 Secure the first layer of one hour Flexi-Blanket material to the entity using 18 ga. minimum stainless steel tie wires or 0.5" x 0.020" minimum stainless steel banding material, installed at a maximum of six inch intervals.

6.3.4 Cut and install additional first layers of one hour Flexi-Blanket material in the same manner as described in Steps 4.1.1 through 4.1.3, taking care to butt join the first layer pieces.

6.3.5 Cut the second blanket wrap layer from a sheet of one hour Flexi-Blanket Thermal Barrier material in the width required to overlap the installed first layer by at least two inches. The length of the second layer shall be at least four inches less than the first layer to provide for an adequate overlap when installing an additional second layer over the first layer.

RECHTEL COMMENT

6.3.6
~~4.1.6~~

Wrap the second layer of one hour Flexi-Blanket material around the installed first layer taking care to overlap the material by at least two (2) inches, and locate the overlap 180 degrees opposite from that of the first layer.

6.3.7
~~4.1.7~~

Seal the overlapped seam using THERMO-LAC 330-1 Subliming Trowel Grade Material.

6.3.8
~~4.1.8~~

Secure the second layer of one hour Flexi-Blanket material around the first layer using 18 ga. minimum stainless steel tie wires or 0.5" x 0.020" minimum stainless steel banding material, installed at a maximum of six (6) inch intervals.

6.3.9
~~4.1.9~~

6.3.5
6.3.8
Cut and install additional second layers of one hour Flexi-Blanket material in the same manner as described in Steps ~~4.1.5~~ through ~~4.1.7~~, taking care to butt join the second layer pieces and to secure the butt joint using 18 ga. minimum stainless steel tie wires or 0.5" x 0.020" minimum stainless steel banding material.

6.3.10
~~4.1.10~~

Fill in any gaps and joints with the THERMO-LAC 330-1 Subliming Trowel Grade Material.

BECHTEL COMMENT

Installation of a Three Hour Fire Barrier - Cut Layers

- 6.4
4.2.1 Cut the first blanket wrap layer from a sheet of ~~three hour~~ THERMO-LAG 330-660 Flexi-Blanket Thermal Barrier material in the width required to overlap the parameter of the structural support or hanger by at least two inches. The length of the first layer shall be sufficient to enclose the total or a portion of the total length of the structural support or hanger.
- 6.4
4.2.2 Install the first blanket wrap layer of ~~three hour~~ Flexi-Blanket material in the same manner as described in Steps 4.1.1 through 4.1.4 for the one hour fire rated design.
- 6.4
4.2.3 Cut the second blanket layer of ~~three hour~~ Flexi-Blanket material in the width required to overlap the installed first layer by at least two inches. The length of the second layer shall be at least four inches less than the first layer, to provide for an adequate overlap when installing an additional second layer over the first layer.
- 6.4
4.2.4 Install the second blanket wrap layer of ~~three hour~~ Flexi-Blanket material in the same manner as the second layer described in Steps 4.1.6 through 4.1.9, except ~~eliminating~~ sealing the overlapped seams with the THERMO-LAG 330-1 Subliming Trowel Grade Material.
- 6.4
4.2.5 Install the third blanket wrap layer of ~~three hour~~ Flexi-Blanket material in the same manner as the second layer described in Steps 4.1.6 through 4.1.9, except ~~eliminating sealing the overlapped seams with the THERMO-LAG 330-1 Subliming Trowel Grade Material, and taking care to position the overlap 90 degrees from that of the second layer.~~
- 6.4
4.2.6 Install the fourth blanket wrap layer of ~~three hour~~ Flexi-Blanket material in the same manner as the ~~second~~ layer described in Steps 4.1.6 through 4.1.9, except ~~eliminating sealing the overlapped seams with the THERMO-LAG 330-1 Subliming Trowel Grade Material, and taking care to position the overlap 90 degrees from that of the third layer.~~

ELIMINATE

BECHTEL COMMENT

BECHTEL COMMENT

THIRD

BECHTEL COMMENT

BECHTEL COMMENT

180

6.4.7
SECOND
Install the fifth blanket wrap layer from a sheet of ~~three-hour~~ THERMO-LAG 330-660 Flexi-Blanket Thermal Barrier in the same manner as the ~~fourth~~ layer described in Steps 4.1.4 through 4.1.6 of the one hour fire rated design except positioning the overlap 90 degrees from that of the fourth layer, and sealing the overlapped seam with THERMO-LAG 330-1 Subliming Trowel Grade Material. Be sure that one 18 ga. minimum stainless steel tie wire or 0.5" x 0.020" minimum stainless steel banding material is used to secure the installed five layers at their butt joint junctions with adjoining layers.

9
BUTT JOINT

6.4.8
Fill in any gaps and joints with THERMO-LAG 330-1 Subliming Trowel Grade Material.

BUTT JOINT

BECHTEL COMMENT

3.0

REPAIR PROCEDURES

The repair of a damaged section in a THERMO-LAC 330 Fire Barrier is easily accomplished by cutting out and removing the damaged material and then filling in the cut out section with new material.

The first step in this procedure is to remove the damaged and loose material using a knife and scraper. Care should be exercised that the damaged material is cut back until sound adhering material is reached.

The next step is to undercut the edges around the cut out section to form a beveled edge. All foreign matter is then removed from the exposed substrate surface in the cut out section.

Finally, the THERMO-LAC 330 Subliming Material is troweled into the cut out section. If necessary, several coats can be applied to achieve the desired film thickness. Care should be taken to allow for shrinkage of the repair patch by building up a slight dome shape on the surface of the patch.

~~Also, allow repairs to be performed using prefabricated panels and pre-shaped conduit sections.~~

NOTE: Whole sections can be replaced using procedures outlined in Sections 1 and 2.

2

3

BECHTEL COMMENT

THE

PREVIOUSLY

BECHTEL

8.0
6.0

RENTAL COMPANY

CABLE ADDITION/REPLACEMENT PROCEDURES

The addition or replacement of a cable in a THERMO-LAC 330 Fire Barrier is accomplished by removing sections of the fire barrier, adding or replacing the cable, and then reinstalling the sections.

The first step in this procedure is to remove the required number of fire barrier sections by cutting away the material at the edges and the butt flanges.

Next, the stainless steel tie wires or banding are cut and the fire barrier section removed from the cable raceway.

After the cable has been added or replace, the fire barrier sections are reinstalled using stainless steel tie wires or banding. A coating of THERMO-LAC 330-1 Subliming Material - Trowel Grade is then applied in the specified wet thickness to the edges and joints of the reinstalled sections using a trowel or stiff bristle brush to fill in any uncoated areas.

7.0

RENTAL COMPANY

POST APPLICATION PRACTICES

A clean and orderly condition shall be maintained in the installation area. Following the application, all debris and equipment and any overspray shall be removed and the area left in a condition acceptable to the owner.

RECOMMENDED ON SITE QUALITY

CONTROL PROCEDURE



The following is a recommended quality control procedure to be followed on site in the installation of the THERMO-LAC 330 Fire Barrier System.

RECEIVING PROCEDURES

1. Prefabricated Panels and Preshaped Conduit Sections
 - a. Make a visual inspection for damage.
2. THERMO-LAC 330-1 Subliming Compound
 - a. Make a visual inspection for damage.
 - b. Read temperature recorder strip chart to verify that temperature limitations were not exceeded.
 - c. Test as an option that:
 1. Weight per gallon is as specified in A-2 TQAPM.
 2. pH value is as specified in A-3 TQAPM.

INSTALLATION PROCEDURES

1. Ensure that the proper one hour or three hour fire barrier design has been installed.
2. Check to see that the protected component is completely enveloped.
 Note: A concrete surface, such as a wall, ceiling, or floor, can be a part of the envelope.
3. Check to see that the primary structural support of the protected component is coated with the designated thickness to the point of attachment.
4. Ensure that all seams and joints are filled and sealed with THERMO-LAC 330-1 Trowel Grade in order to prevent flame penetration into the envelope system.

- 
- 
5. Check to see that all fasteners, such as banding, tie wire, nuts and bolts, and concrete fasteners, are of proper type and spacing.
6. Ensure that all penetrations into the envelope are protected for a minimum of 18 inches from the envelope with the same fire rating as the envelope.

RECOMMENDED LIST OF INSTALLATION TOOLS

The following is a recommended list of typical installation tools and equipment for installation of the THERMO-LAC 330 Fire Barrier System. These parts can usually be obtained from local suppliers.

Work Tables -7'x4'

2" Nylon Brushes

All Purpose Caulking Guns

Hand Circle Saws with carbide blades

Box Knives

1" Putty Knives

6" Putty Knives

Wire Cutters

Vice Grips

Trowels - 1" to 5"

Long Nose Pliers

Work Gloves

Dust Masks

Goggles

Protective Clothing

Organic and Particulate Matter Respirators

18 ga. Stainless Steel Tie Wire or Larger

or

Stainless Steel Banding .020 x 1/2" or Heavier