

**WELCOME
TO
CONTROLS SOUTHEAST INC's
CONTROTRACE INSTALLATION
PRESENTATION**

OBJECTIVES

- Required Installation Tools
- How to Install Single Element ControTrace
- How to Install ControTrace Panels
- Heat Transfer Cement (2 types)
- How to Install Hoses
- Helpful Hints
- Trouble Shooting

REQUIRED INSTALLATION TOOLS

INSTALLATION TOOLS

Only basic tools are required for installation of ControTrace. Each worker should have the following:

1. A good pair of work gloves
2. A small trowel
3. A tape measure
4. A banding tool
5. Pre-cut bands
6. Band clamps
7. Tin snips
8. A pair of side cutter or channel lock pliers for bending the ends of the banding
9. A small ballpeen hammer
10. A putty knife and a supply of rags
11. A canvas tool bag is essential for each worker to have, especially if they are working high above the ground



In addition saw horses should be available to support the trace when applying the heat transfer cement. A piece of plywood across the saw horses is helpful for laying out small pieces of trace for heat transfer cement application.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

HOW TO INSTALL SINGLE ELEMENT **CONTROTRACE**

BASIC STEPS:

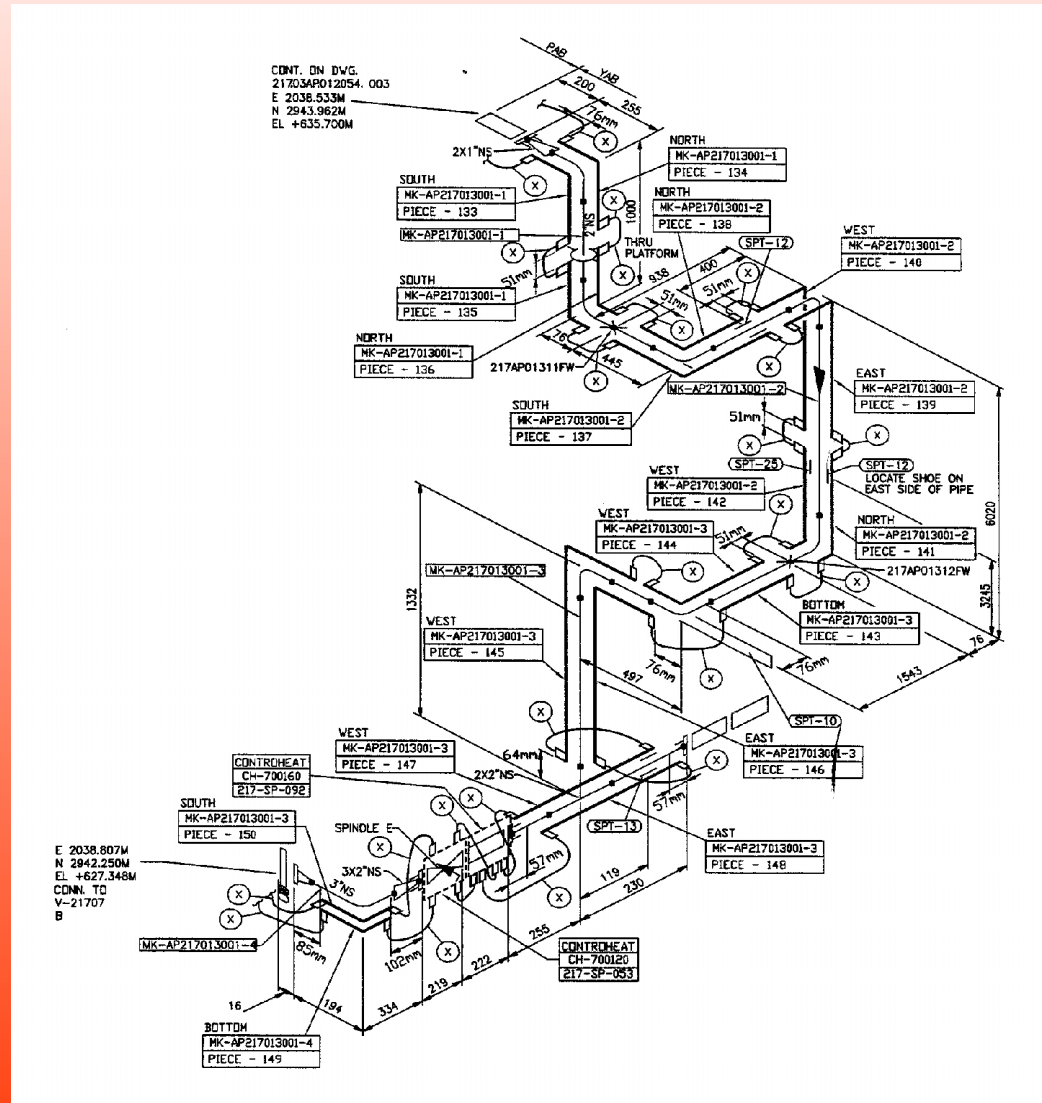
- 1) Use System Isometric to Determine Location of Each ControTrace Element
- 2) Dry Fit ControTrace Elements to Check for Accuracy of Fit
- 3) Apply Heat Transfer Cement
- 4) Secure ControTrace to Pipe with Stainless Steel Banding

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

SYSTEM ISOMETRICS

Every CSI ControTrace project is supplied with a system isometric that shows a minimum of the ControTrace mark #, location, & orientation

A more detailed system isometric may be purchased that will provide hose routing and suggested heating medium supplies and returns.



HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

CONTROTRACE TAG

A high temperature paper tag is attached to each piece of fabricated ControTrace. The information included on the tag is: mark #, design ratings, CSI sales order #, and job order #.



Locate the CT mark number on the system isometric to determine the physical location.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

DRY FIT

Once the pieces of ControTrace have been identified and located in accordance with the installation drawings, the pieces should be “dry fit” in position. This allows the correct spacing to be set between the elements and the overall system length to be verified to the as -built pipe.

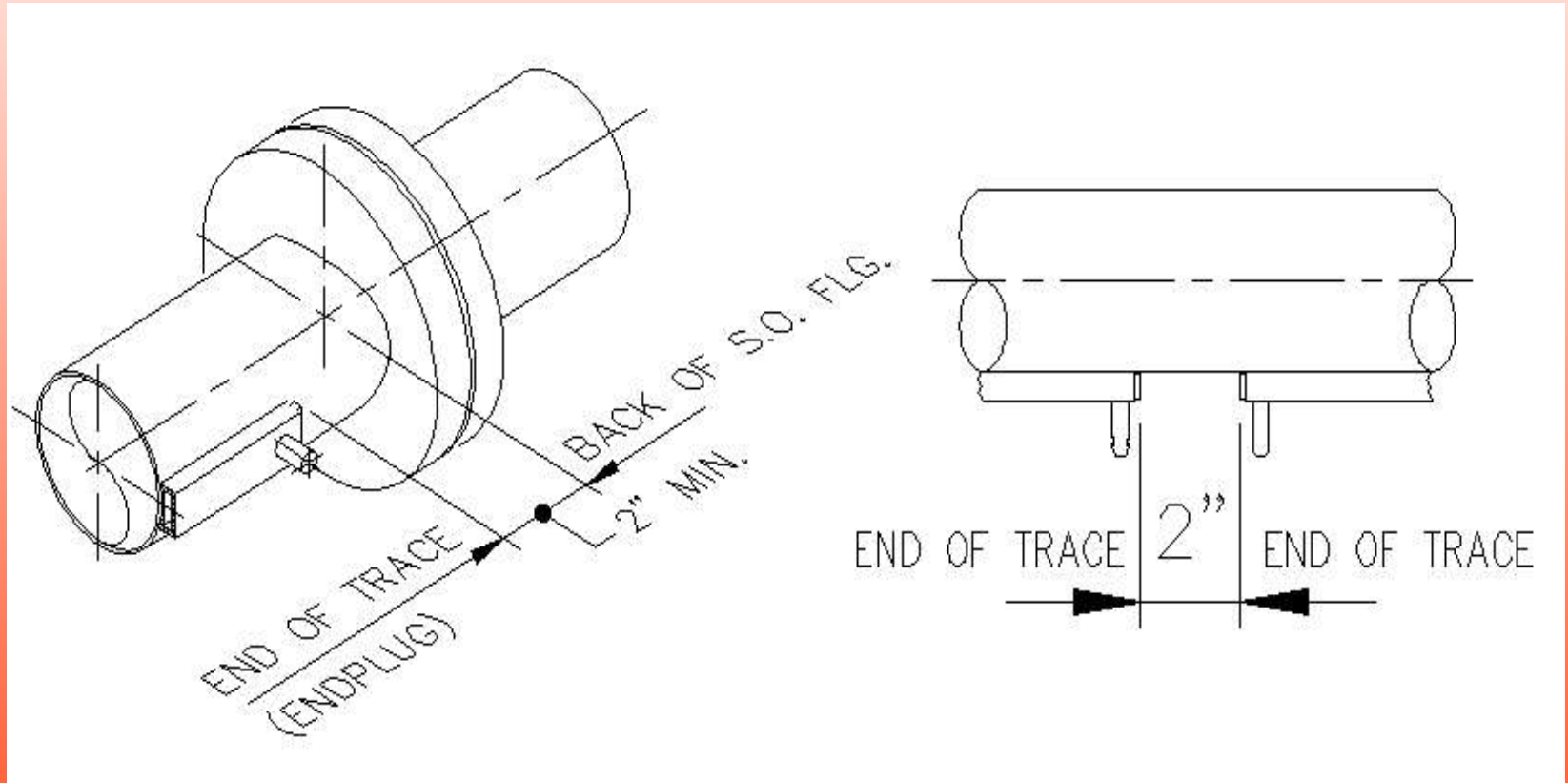
During the dry fit process, imperfections on the pipe surface, such as excessive weld crowns and O.D. mismatch, should be corrected. This will ensure optimal contact between the Contro Trace and the pipe surface.

NOTE: If weld seam exceeds 1/8” height, grind flush for optimal fit.



HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

CONTOTRACE SPACING



Standard end to end element and end to flange spacing for ControTrace is 2 inches. If the designed element spacing is not standard this will be indicated on system installation drawings.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

APPLYING CEMENT



In this photo, a small trowel is being used to apply Grade B cement to the concave side of a ControTrace element. Again, the material is used to fill in air gaps between the pipe and the trace. The trace and the pipe should be clean and dry before applying the material. Apply a 1/8" thick smooth coat across the bottom of the trace. Avoid lumps that can increase the gap between the pipe and the trace. Grade B Cement is non-hardening for 24 hours so set up time is not a constraint. Use a drop cloth to prevent stains on concrete floors or other objects.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

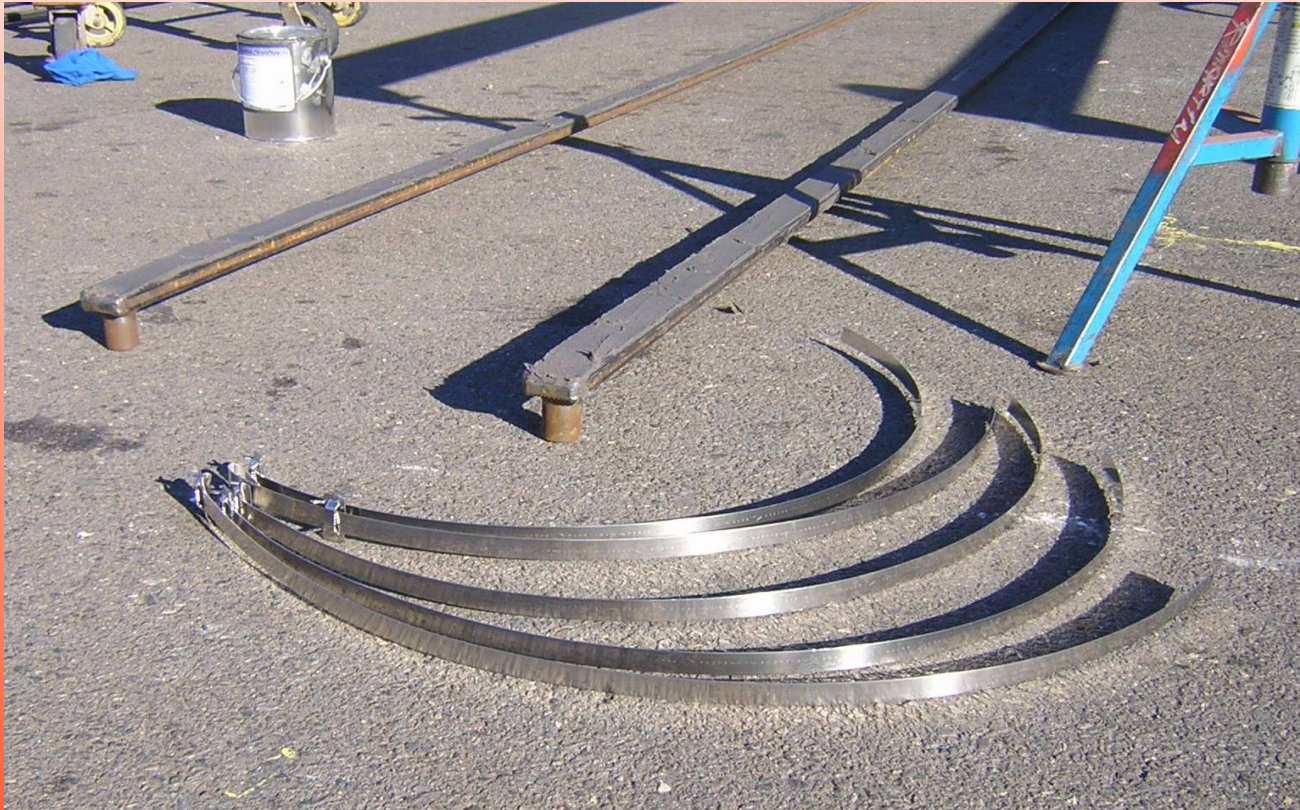
READY TO INSTALL

In this photo, it is important to note that the cement has been applied as a smooth, thin layer on the concave surface of the trace. It is important not to apply excessive amounts of cement.



HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

PRECUT BANDING



Banding should be precut prior to installation. The general formula for banding is: $(\text{band length} = \text{pipe circumference} + 12 \text{ inches})$. This will allow a sufficient amount of band length for banding tool operation.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

WHERE SHOULD BANDING START?

- If the ControTrace is a straight piece, apply the first banding in the middle of the piece. Apply banding every 4-5' working towards the ends of the ControTrace.
- If the ControTrace is fabricated for a pipe fitting application, apply the first banding in the middle of the fitting. Next, apply banding at the edge of the pipe fitting. Finally, apply banding every 4-5' on the straight section working towards the ends.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

PLACE BANDING AT
4 TO 5 FT INTERVALS



HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

APPLYING THE BANDING CLAMP



The banding clamp is slid onto one end of the band. Make certain that the clamp tabs are on the outside of the band.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

HAND TIGHTENING THE BAND



Pull the band hand tight around the ControTrace and pipe.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

INSERT THE BAND INTO THE TOOL



Slide the free end of the band inside the banding tool. Position the banding tool against the clamp.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

OPERATING THE LOCKING LEVER



In order to slide the banding inside the banding tool, the locking lever on the bottom side of the tool must be in the open position (down). After insertion of the banding, pull the locking lever up to lock the band within the tool.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

HINT:



Bending the free end of the band away from the banding tool will help prevent the band from slipping within the tool.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

TIGHTENING THE BAND



Tighten the band by turning the lever on the end of the screw. When the band is tight, the Heat Transfer Cement will protrude from under the trace. The band should securely hold the ControTrace and keep it from moving. When the band is tight, raise the banding tool to the vertical position.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

CUTTING LEVER



Push the cutting lever down and away from the banding tool. (The cutting lever is the black lever in the fore ground.)

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

HINT:



If the cutting knife on the banding tool is not sharp, a ballpeen hammer can be used to tap the tool for the final separation of the band end.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

BENDING TABS OF CLAMP



Bend the clamp tabs over the band using a ballpeen hammer and the banding tool as an anvil.

HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

PROPERLY COMPLETED CLAMP



HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

CONTROTRACE BANDED INTO POSITION

This photo shows the
Trace banded to the pipe
in four to five foot
intervals.

Note the extruded excess
cement.



HOW TO INSTALL SINGLE ELEMENT CONTROTRACE

REMOVING EXCESS MASTIC



Unwanted, excess cement can be removed with a putty knife and any remainder is wiped from the pipe and trace with a cloth. **NOTE:** If Grade #1 Cement is used it is very important that the ControTrace be insulated or protectively wrapped to prevent the cement from being washed from under the trace during rainstorms or other weather conditions.

HOW TO INSTALL CONTROTRACE PANELS

HOW TO INSTALL CONTROTRACE PANELS

PROCESS TANK



This is a photograph of a large stainless steel tank fabricated to hold process chemicals in the textile industry. The tank is approximately 8 ft. in diameter by 12 ft. in length. The black spiral on the side of the tank is a steel tube for heating the tank. CSI was contracted to design, fabricate and install ControTrace panels to heat the top surface of the tank.

HOW TO INSTALL CONTROTRACE PANELS

TOP OF TANK (HEAD)



This is the top surface of the tank. The dark spots on the head are threaded steel bosses that have been welded to the tank for the purpose of mounting and clamping the ControTrace panels.

HOW TO INSTALL CONTROTRACE PANELS

CONTROTRACE PANEL



This is a fabricated ControTrace panel for the tank head. The heads of the tanks were shipped to CSI prior to installation on the cylinders. At that time CSI took careful measurements of the heads and made templates from which the tank panels were fabricated. **NOTE:** The painting of trace panels is a purchase option.

HOW TO INSTALL CONTROTRACE PANELS

STUDS AND CLAMPS



These are the studs that are screwed into the bosses and the clamps that are used to hold the panels in place.

HOW TO INSTALL CONTROTRACE PANELS

CHASING BOSS THREADS



Prior to mounting the panels, the threads of the bosses are checked to make certain that the studs fit correctly.

HOW TO INSTALL CONTROTRACE PANELS

DRY FITTING PANELS



The panels are first “dry fit” to the tank head prior to applying the ControHeat Cement to be certain that the fit is correct.

HOW TO INSTALL CONTROTRACE PANELS

PROPER FIT



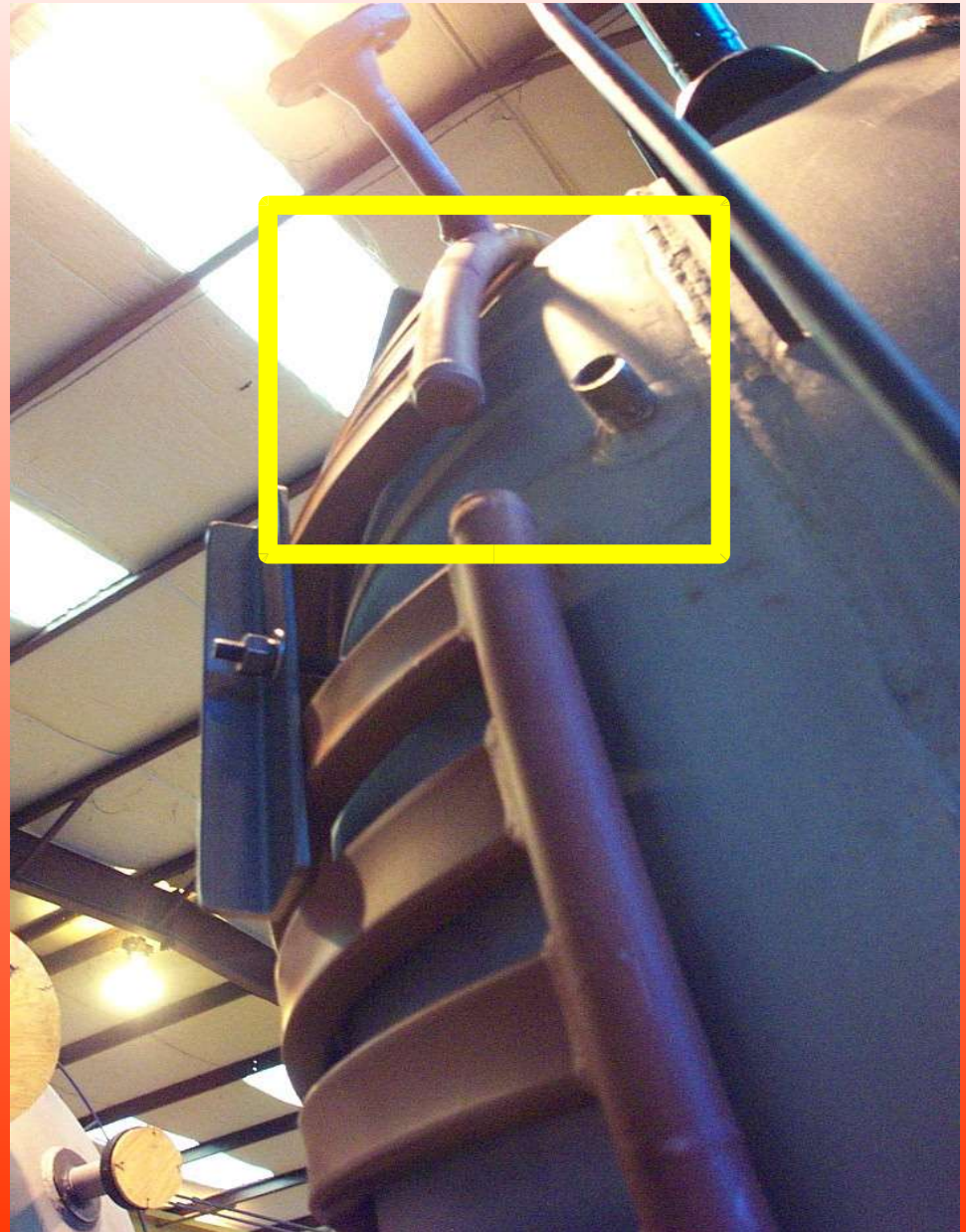
This photo shows the tight fit of the panels that is necessary on the head.

HOW TO INSTALL CONTROTRACE PANELS

UNACCEPTABLE FIT

It is not unusual to see some minor variation between the fabricated panel and the tank.

Areas with more than the 1/4" gap should be corrected. Questions or concerns about fit should be directed to the manufacturer. Before making modifications to the panels, consideration should be given to the sequence in which the clips were tightened for dry fit trial and the positioning of the panels on the tank. Ensure the location of the panels are correct and the clips are tightened a little at a time rotating tightening between clips.



HOW TO INSTALL CONTROTRACE PANELS

MARK AREA FOR CORRECTION

If the panels require minor modification, the areas on the panels that need to be corrected should be marked during the dry fit then removed from the tank. A variety of methods can be used to make minor modifications to the panels.

Questions should be directed to Controls Southeast, Inc. at **(704) 644-5000**.

(These panels were placed in a press and the curvature was corrected.)



HOW TO INSTALL CONTROTRACE PANELS

COMPLETED DRY FIT



After the corrections are made, the panels should be reinstalled and dry fit again onto the heads for a last check.

HOW TO INSTALL CONTROTRACE PANELS

APPLY CONTROHEAT CEMENT



After the satisfactory dry fit, the panels are removed and ControHeat Cement is applied.

NOTE: Make certain the proper ControHeat Cement is used in relation to the operating temperature of the ControTrace Panel.

HOW TO INSTALL CONTROTRACE PANELS

CEMENT EXTRUSION AFTER TIGHTENING CLAMPS



Once the cement is applied the panel is positioned and clamped into place in much the same way as single element trace is installed. Note the extruded material.

HOW TO INSTALL CONTROTRACE PANELS

REMOVE EXCESS CEMENT



Using a putty knife and rag, the unwanted, excess cement is removed.

NOTE: If Grade #1 Cement is used it is very important that the ControTrace be insulated or protectively wrapped to prevent the cement from being washed from under the trace during rainstorms or other weather conditions.

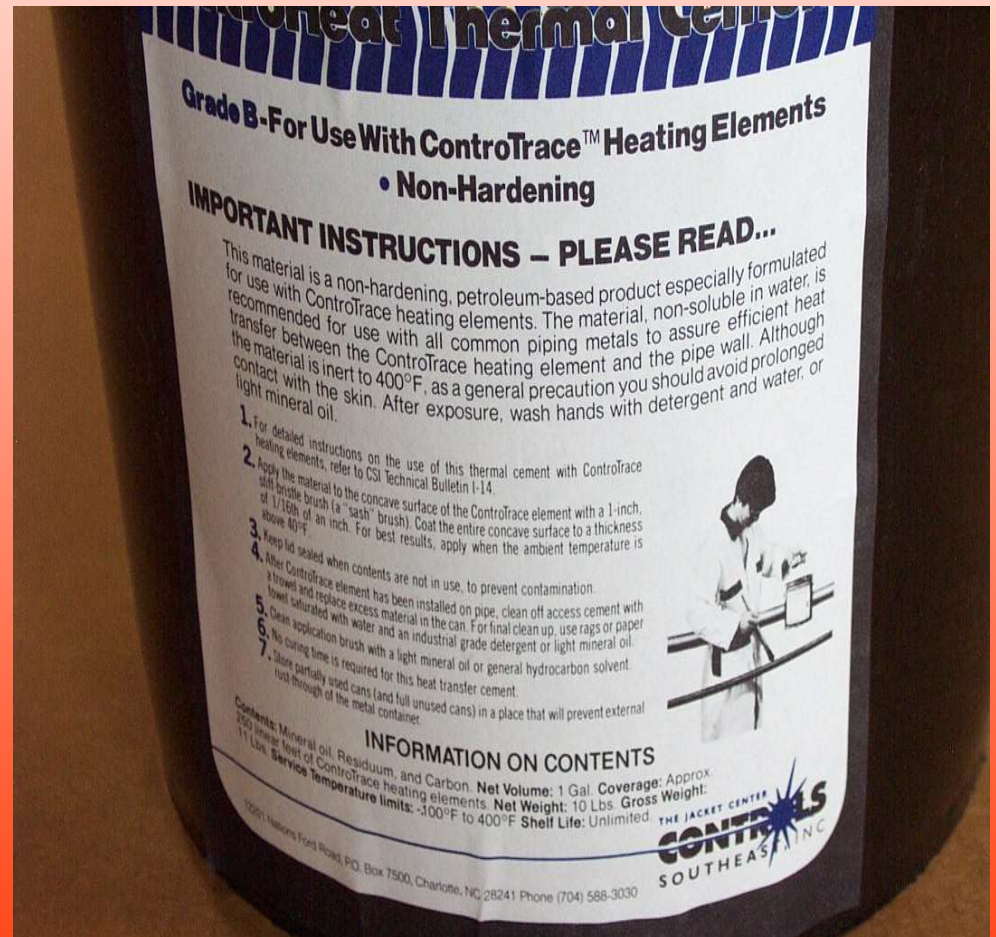
CONTROHEAT CEMENT

CONTROHEAT CEMENT

GRADE B CEMENT

The ControHeat Thermal Cement is applied after the DRY FIT has been completed. Although the label calls the material a “cement” it never completely hardens and remains actually as a mastic. The purpose of the material is to fill air spaces between the pipe and trace in order to improve the efficiency of heat transfer from the ControTrace to the pipe surface.

This photo shows a container of Grade B cement, the most common type used. In ControTrace systems Grade B is used for operating temperatures of 400 degrees or less. The cement is a mineral oil based graphite compound. It is not harmful to the skin but is difficult to remove from fabrics.



CONTROHEAT CEMENT

GRADE #1 CEMENT

The Grade #1 cement is water based and it sets up very quickly in 2 to 3 minutes depending on ambient temperature, etc. This material should be applied out of the sun if possible as direct sunlight will decrease the set up time even further.

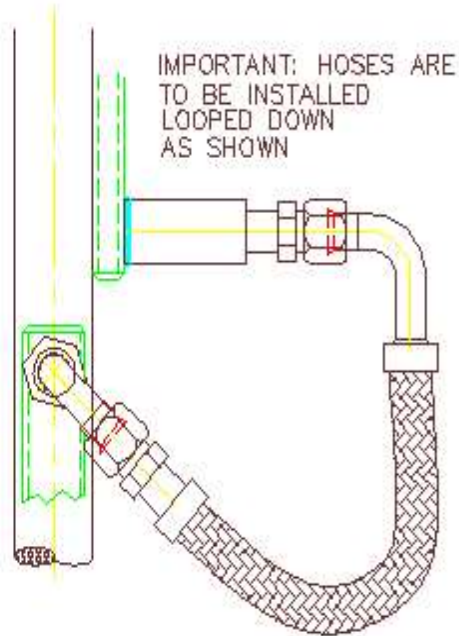
The bucket should remain covered to help prevent the unused mastic from drying out. If the cement in the bucket begins to dry, add a light film of water and mix thoroughly.

Grade #1 cement is not water proof after it has dried. Insulate the pipe and trace immediately or keep the installed trace covered to protect from weather.



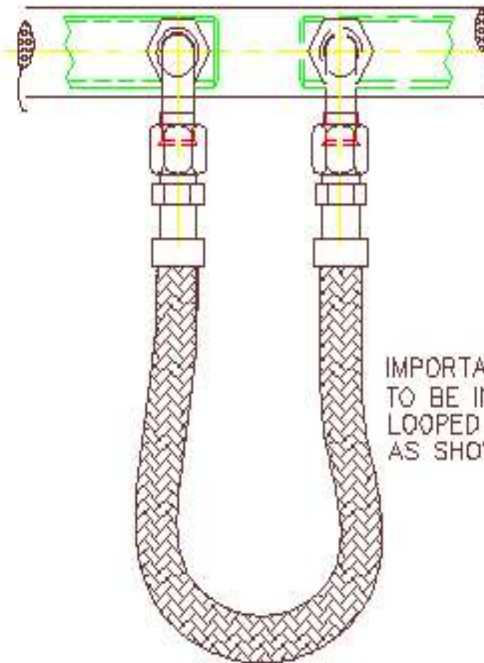
JUMPER HOSE INSTALLATION

JUMPER HOSE INSTALLATION



TYPICAL JUMPER HOSE CONFIGURATION

CONTROTRACE ON SIDE TO CONTROTRACE 90° AROUND



TYPICAL JUMPER HOSE CONFIGURATION

CONTROTRACE ON SIDE TO CONTRACE ON OTHER SIDE

The Jumper Hoses should be attached after the ControTrace has been completely installed. Again refer to the installation drawings for details. This drawing shows jumper hoses connecting two element panels.

JUMPER HOSE INSTALLATION

INSTALLING JUMPER HOSE

Jumper hoses should be installed to form a “p-trap” to hold condensate. The loop of the “p” should hang down to prevent condensate from building up inside the trace elements.

NOTE: A pipe wrench should be used to hold the pipe coupling while the hose connection is tightened. This will prevent the cement from being disrupted or the trace flexing under the banding straps.



HELPFUL HINTS

HELPFUL HINTS

SINGLE ELEMENT TRACE MOUNTING HINTS:

- Position and install trace on elbows first.
- Beginning at one end of the system, attach long straight pieces in the middle with a single band.
- Working towards the ends of the piece, add bands at a maximum interval of 5 feet.
- The last bands on a piece of straight trace should be a maximum 6 inches from each end.
- Bands should be tight enough to squeeze excess cement from under the trace and hold the trace securely in place.

HELPFUL HINTS

TWO ELEMENT TRACE MOUNTING HINTS:

1. Attach the first trace element to the pipe with a single band in the middle.
2. Position the second element over the band, holding the first element in place. (The efficiency of the second element will not be significantly reduced by the thickness of a single band.)
3. Attach the second element with a band that wraps around both the first and second elements.
4. Continue to attach the remaining bands around both elements in the same manner.

TROUBLE SHOOTING

Possible causes of poor ControTrace system performance:

- Poor Jumper Hose routing that traps condensate
- Incorrect orientation of ControTrace elements on the pipe
- Poor surface contact of elements on the pipe due to excessive weld crown or mismatched pipe
- Degradation of Grade #1 Cement due to exposure to water or weather

**THANK YOU
FOR CHOOSING
CONTROLS SOUTHEAST INC.
FOR YOUR
THERMAL MAINTENANCE NEEDS**

