Trasor CORP.

P-116-2B
02/26/15

MI, Mineral Insulated
Pipe Heating Cable, Installation & Maintenance Manual

TABLE OF CONTENTS

GENERAL INFORMATION

General Information:

This installation manual is for use with Trasor Mineral Insulated (MI) heat tracing systems installed on metal pipes and piping components.

Since 1969, Trasor has been building safe and dependable heat tracing systems. A safe and reliable heat tracing system requires quality products, proper design, installation and maintenance. Please carefully follow these detailed instructions and do not hesitate to contact the factory or your local representative.

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Electric Heat Trace Systems:

Electric heat trace systems replace the heat that is lost through the thermal insulation. One or multiple electric resistive elements trace the length of the pipe. This allows the pipe to be maintained at a specific temperature. Freeze protection systems are designed to prevent the pipe from freezing, such as water or steam lines. Process heating systems are designed to maintain contents of a pipe at elevated temperatures, such as wax, caustics or asphalt.

Important:

All information contained in this manual is believed to be accurate and reliable. Users should independently evaluate this information for suitability for their particular application. Trasor Corporation makes no warranties as to the accuracy or completeness of the information, and disclaims any liability regarding its use. Trasor Corporations' only obligations are those such expressed in the sale of the particular product. In no case will Trasor Corporation be liable for any incidental, indirect, or consequential damages arising from the sale, resale, use or misuse of the product.

Electrical Codes:

Articles 427 and 500 of the National Electrical Code govern the installation of electric heat tracing systems in hazardous and non-hazardous areas. Installation of heat tracing system must comply will all national and local codes. Ground fault equipment protection is required for all pipe heating systems to prevent arching, fire, and shock if the cable is damaged or improperly installed.

Controls and Accessories:

All related controls and associated components must be properly rated and approved for the area and application. Controls should carry UL# XAPX or QUYX certification for non-hazardous areas and XBDV or QUZW for Hazardous areas.

Receiving and Storage:

Compare all received materials against the packing list. Verify that no items have been damaged. It is recommended to field test all MI heaters as shown on page 10 and complete the heater installation and inspection record on page 24. Do not remove any tagging information. Store all materials in a clean dry area protected from weather and mechanical abuse.

Maintenance:

Heater, junction boxes, control system and insulation sealing should be inspected annually. Follow the procedures in Heater Maintenance & Inspection Log on page 24.

HEATER CONSTRUCTION AND OPERATION

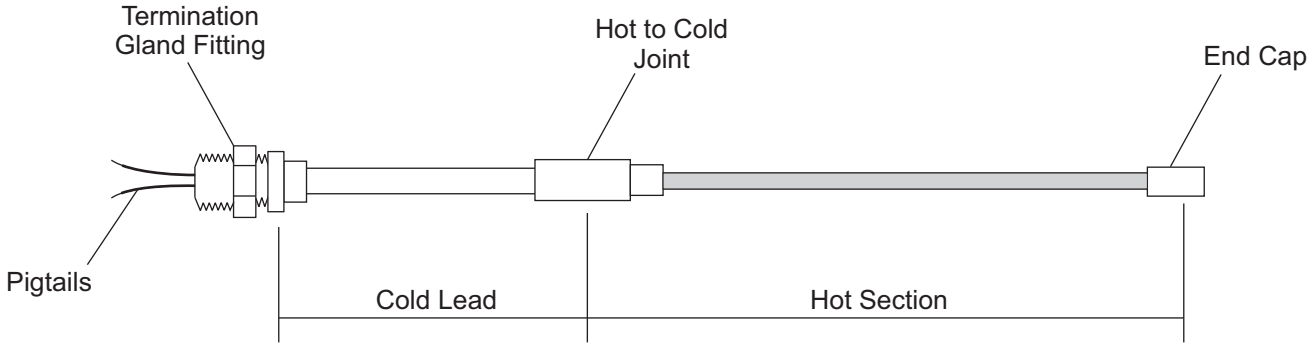


Figure 1

General Heater Construction

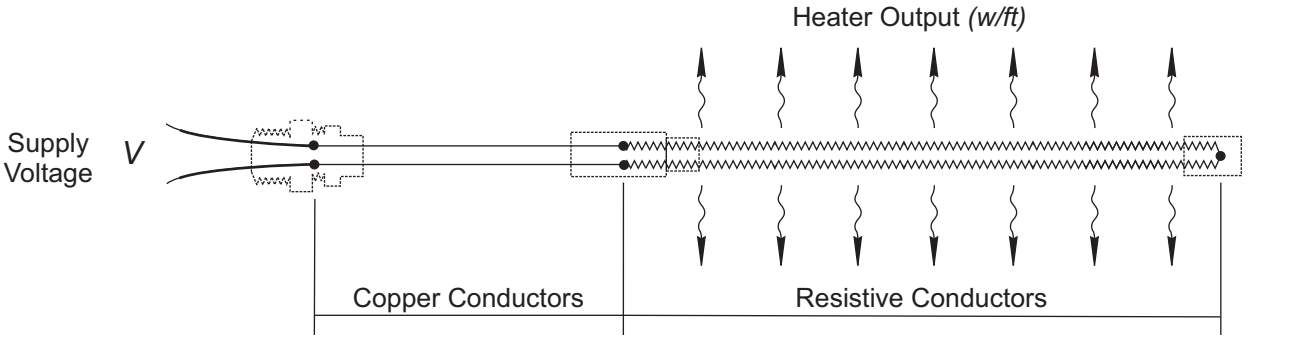


Figure 2

Internal View

General Operation:
MI heating cable is a series resistance heater that has a constant output along the entire length of the heater. It's operation is consistent with Ohm's Law.

Variables and Formulas:

V Voltage = $I * R$

I Current = $V \div R$

W Wattage = $V * I = I^2 * R = V^2 \div R$

w/ft Watts per foot = $W \div L = I^2 * \Omega/ft$

R Resistance = $L * \Omega/ft = V \div I$

L Heater length = $R \div \Omega/ft$

Ω/ft Published heater resistance ≈ $R \div L$

Note, Form "A" two conductor heater is shown in the above figures. There is also form "B" and "C" heaters. See page 6.

HEATER FORMS

Heater Forms:

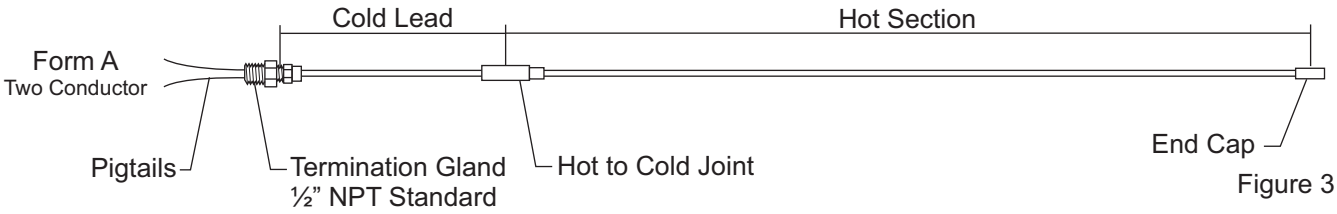


Figure 3

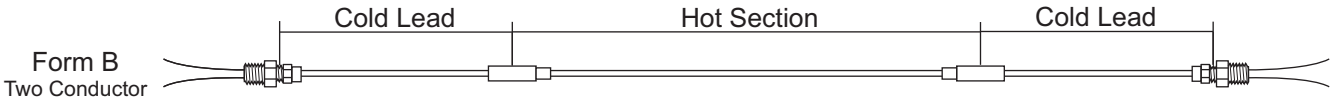


Figure 4

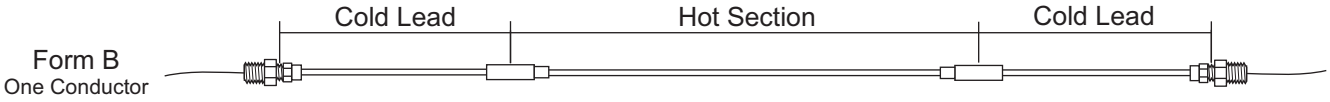


Figure 5

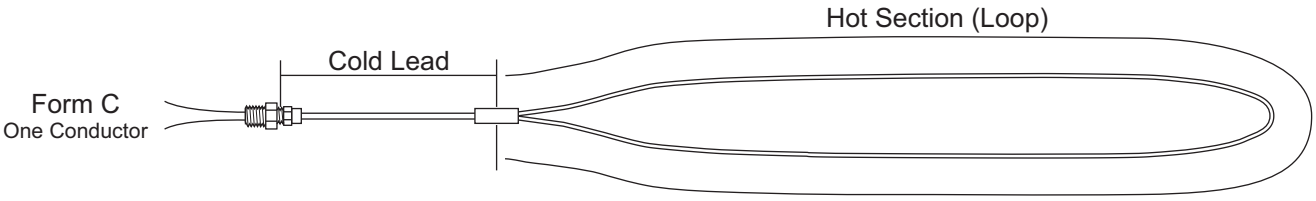


Figure 6

HEATER PART NUMBER SYSTEM

Heater Catalog Number System:

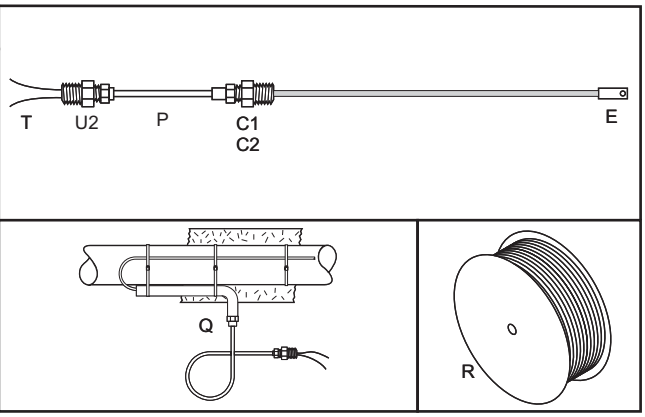
MISS-K752-AN-105-07-U2

- Special features (See table 1)
- Cold Lead Length (ft), form “B” heaters specify two lengths
- Heater length (ft)
- Heater form (See page 6)
- Heating cable reference (See Cable Data Sheet)
- MI heating cable, stainless steel sheath (Alloy 825)

Special Features:

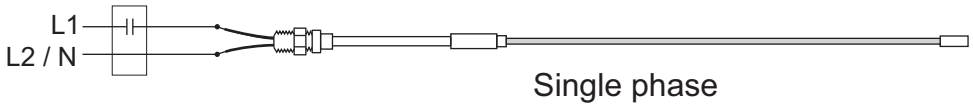
Table 1

Type	Description
C1	½” NPT reversed brass gland on hot to cold joint
C2	3/4” NPT reversed brass gland on hot to cold joint
E	Puller eye end cap (form A only)
P	High Density Polyethylene jacketed cold lead
Q	High temperature adaptor
R	Reel mounted on non-returnable reel
T**	Extended pigtail length (** Tail length in ft)
U2	Div 2 termination gland fitting
X	Special feature, specify



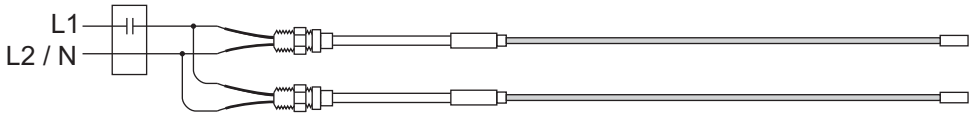
HEATER CONNECTIONS

Typical connection configurations:



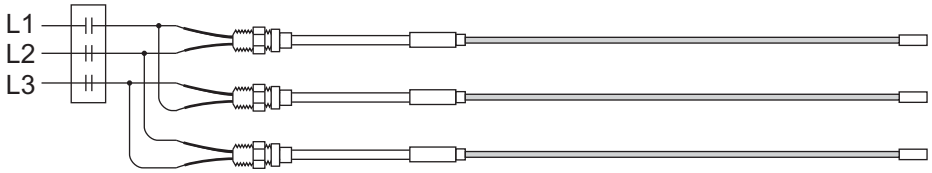
Single phase

Figure 7



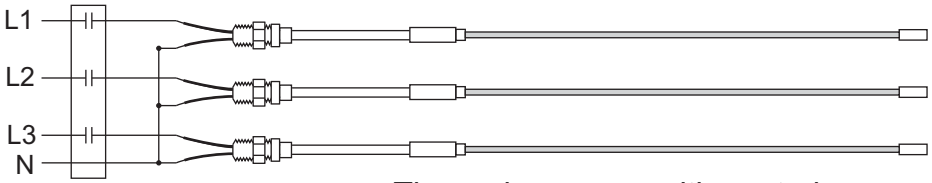
Single phase parallel

Figure 8



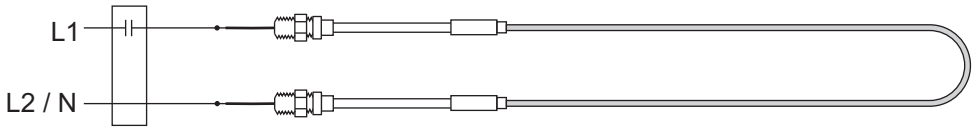
Three phase delta

Figure 9



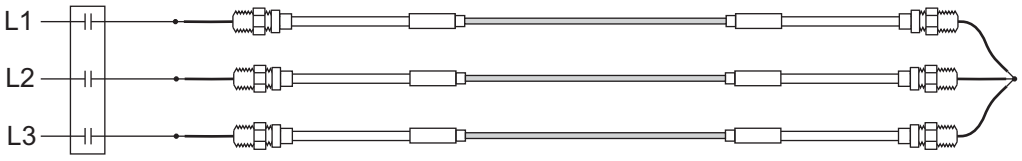
Three phase wye, with neutral

Figure 10



Single phase, (one conductor)

Figure 11



Three phase wye, (one conductor)

Figure 12

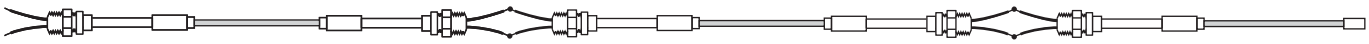
NOTE: Ground fault equipment protection or monitoring is required for all pipe heating systems.

HEATER CONNECTIONS

Series connections:

Two heaters in series
(form B with form A)

Figure 13



Multiple heaters in series
(Two or more form B's with one form A)

Figure 14

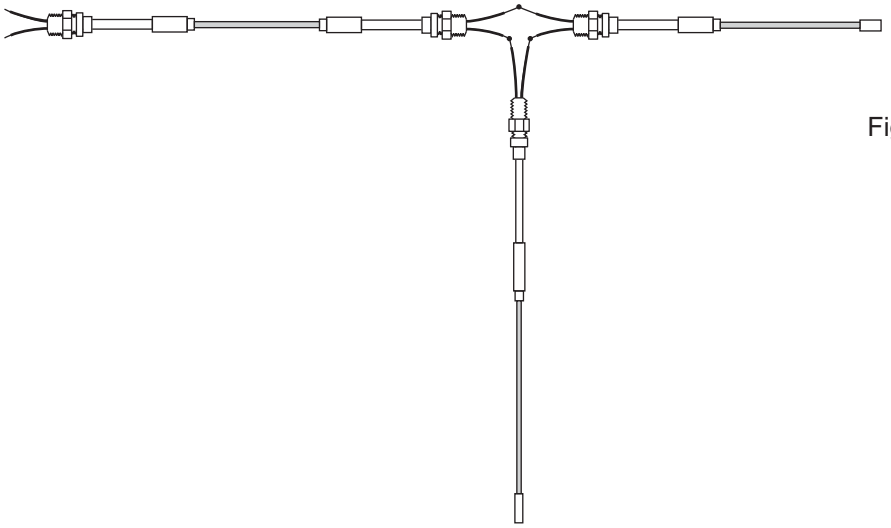


Figure 15

Multiple heaters Tee connected
(One form B with two form A's)

HEATER TESTING

Testing:

The following tests are important to verify the integrity of the heater throughout the installation. Use copies of the Inspection Log on page 24 to record these values for each heater. An annual inspection and maintenance log is provided on page 25.

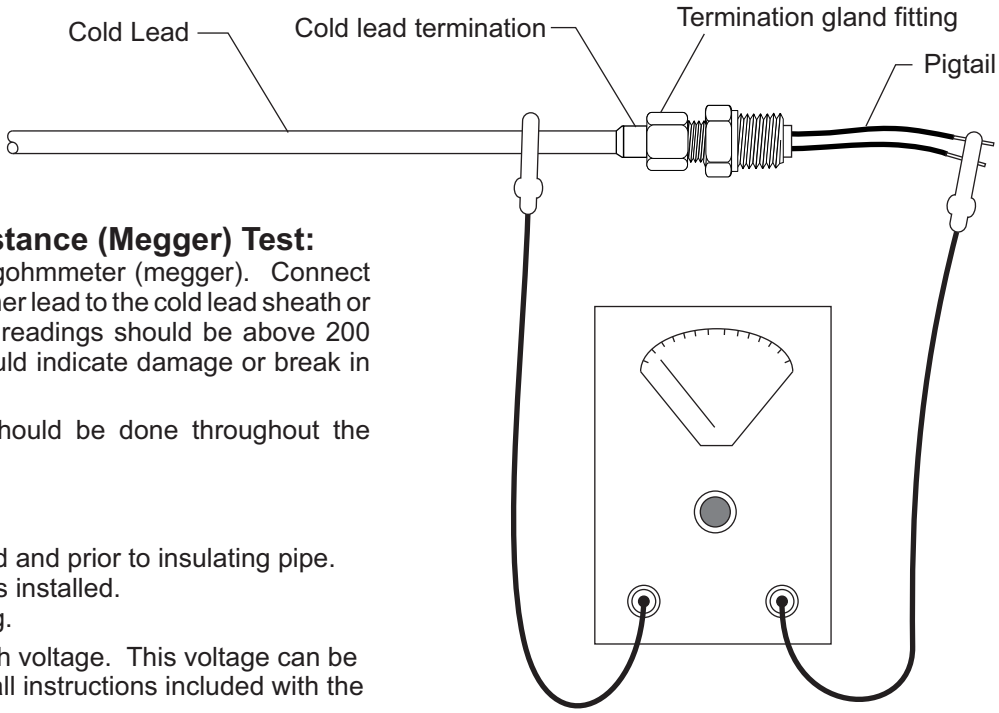


Figure 16

Heater Insulation Resistance (Megger) Test:

Use 500Vdc or 1000Vdc Megohmmeter (megger). Connect one lead to a pigtail and the other lead to the cold lead sheath or cold lead termination. Field readings should be above 200 Megohms. Low readings could indicate damage or break in the sheath.

Insulation resistance tests should be done throughout the installation as follows:

1) When it is received.
2) Prior to installing.
3) After it has been installed and prior to insulating pipe.
4) After thermal insulation is installed.
5) At time of commissioning.

Note: Meggers operate at high voltage. This voltage can be hazardous. Read and follow all instructions included with the instrument.

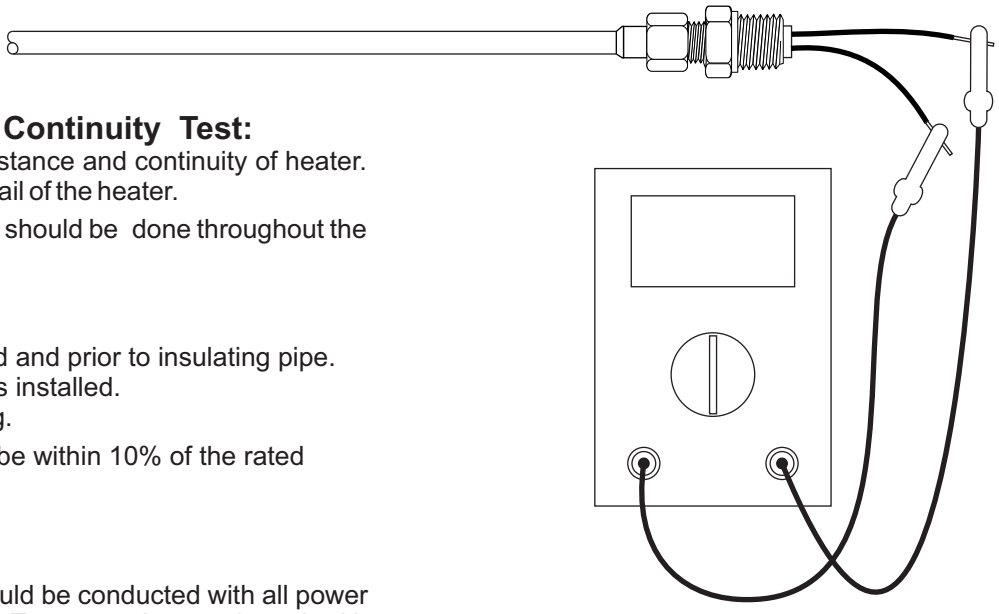


Figure 17

Heater Resistance and Continuity Test:

Use multi meter to check resistance and continuity of heater. Connect one lead on each pigtail of the heater.

Resistance and continuity test should be done throughout the installation as follows:

1) When it is received.
2) Prior to installing.
3) After it has been installed and prior to insulating pipe.
4) After thermal insulation is installed.
5) At time of commissioning.

Conductor resistance should be within 10% of the rated value.

IMPORTANT:

If heater is installed, tests should be conducted with all power disconnected to the circuit. Test must be conducted with heater pigtails removed from terminal blocks or feed wiring.

INSTALLATION GUIDELINES

General Installation Guidelines:

1. Follow all installation and layout drawings. Verify actual pipe routing and piping dimensions are consistent with the drawings.
2. Unpack and test all heaters to verify there was no damage during shipping. Reference testing procedures on page 10 and record values in table 3 on page 24. Make copies of table 3 for each heater. Test heaters again before installation, after they are secured to the pipe (prior to the thermal insulation is applied), after the thermal insulation is complete, and at time of commissioning.
2. Prior to heater installation, review piping system and plan routing of cable. Consider all heat sinks valves, flanges, supports etc.
3. The cold lead termination and pigtails must be kept dry and protected from the weather before, during and after installation.
4. Minimum bending radius of heating cable is 6 x the cable diameter.
5. Handle hot to cold joint carefully. Support both sides when moving and positioning cold lead.
6. Do not bend the cable within 3" of any hot to cold joint, termination or splice joint.
7. Do not repeatedly bend and straighten cable. Cable can be work harden and break. See detail 22 on page 19 for straightening cable.
8. Do not over tighten banding or pipe straps when securing heating cable. They should only be snug to allow for expansion and contraction.
9. Do not install cable so that it may touch or overlap. This is important in hazardous areas.
10. Do not pull cable from center of coil into a spiral. Uncoil heater along the length of the pipe.
11. When installing cable on heat sinks such as pumps, valves, strainer, etc apply cable so that it can be easily removed with minimal bending if the equipment is serviced.
12. Hand form cable on heat sinks. A soft rubber or wooden mallet may be used to help conform cable to the heat sinks. Note, on valves and flanges it is not possible to have complete contact of the heating cable and the object. Small gaps are okay. Fill gaps larger 1" with foil.
13. When adding cable to heat sinks use lengths provided on project drawings. When project drawings are not provided, use adder lengths in table 2, page 20.
14. Any excess heating cable must be distributed evenly along pipe or on heat sinks such as valves, flanges and supports.
15. Heating cables can not be randomly switched. Heating cables are design for a specific application based on several variables such as voltage, wattage, pipe size and maintenance temperatures.
16. Leave all tags on heating cables. They contain valuable electrical data, part numbers and approvals.
17. Protect heating cable from welding. Weld slag can burn small holes in heating cable. When welding, keep ground clamp close to weld area.
18. Junction boxes and entries must be properly sealed to prevent moisture entry. Install breather and drains at junction boxes and controllers.
19. If heater sheath or joint is cracked or broken, seal exposed areas with silicon until repair can be made. Do not energize damaged heater.
20. Some installations require heat transfer aids such as foil tape or heat transfer cement. Follow details 19 & 21 on pages 20 & 21 respectively.
21. IMPORTANT: The termination gland fitting is the grounding mechanism for the heater. This must be connect by an NEC approved grounding method.
22. Junction boxes and enclosures for electrical connections to the heating cable must be listed and approved for the environment in which they are installed.

Tools for installation:

Leather Gloves
Screw Driver
Lineman Pliers
Adjustable Wrench
Soft Rubber or Wooden Mallet

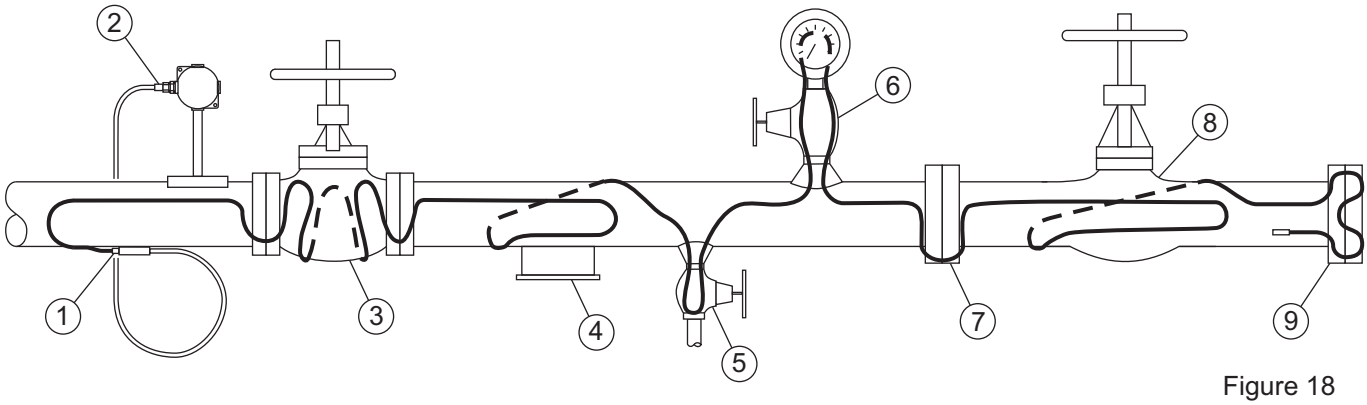


Figure 18

1. Hot-Cold Joint, Detail 2, 3 & 4
2. Heater Termination, Detail 5 & 24
3. Flanged Valve, Detail 7
4. Shoe Support, Detail 10
5. Drain, Detail 16
6. Gauge, Detail 15
7. Flange Pair, Detail 13
8. Welded Valve, Detail 8
9. Blind Flange, Detail 14

Installation Steps:

Step 1:
Secure the hot to cold joint, (Reference Details 2, 3 & 4). Do not band within three inches of this joint. When possible, uncoil the heating cable and lay it alongside the pipe. If pipe mounted junction box or controller is used, secure it before securing the hot-cold joint.

Step 2:
Temporarily secure the heating cable to the pipe approximately every ten feet, starting at the hot-cold joint and working towards the end of the pipe. Provide a loop of heating cable of the proper length at each heat sink, (valves, supports, etc), reference adder table 1, page 20. Redistribute any excess cable at heat sinks or uniformly along the length of the pipe.

Step 3:
Form cable at heat sinks as shown in the installation details on the following pages. Do not overlap cable or allow it to touch itself. Avoid sharp bends and maintain a minimum bending radius of 6 times the cable diameter.

Step 4:
Secure entire cable length with pipe straps, bands or tie wire every twelve to eighteen inches. Test heating cable and terminate into junction box or controller.

Step 1

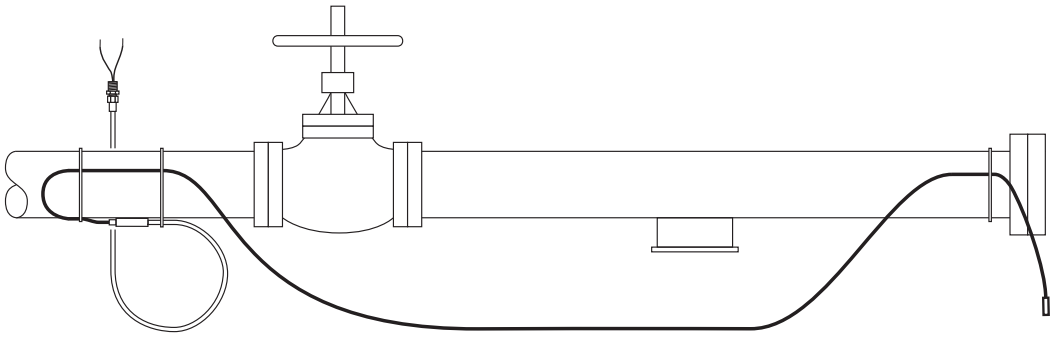


Figure 19

Step 2

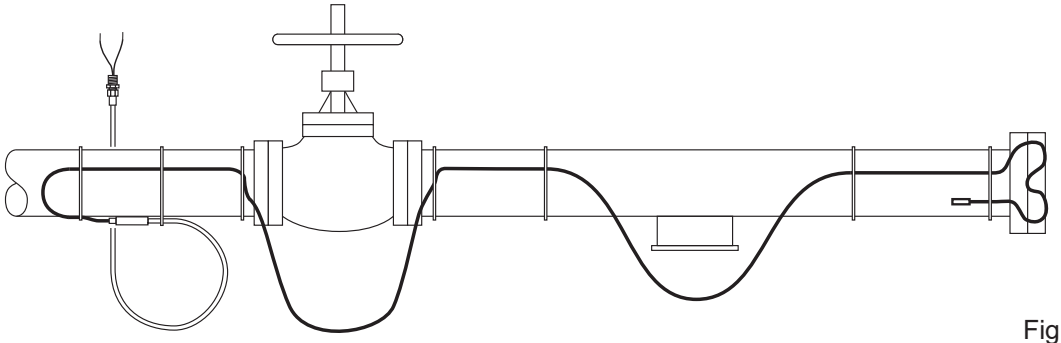


Figure 20

Step 3

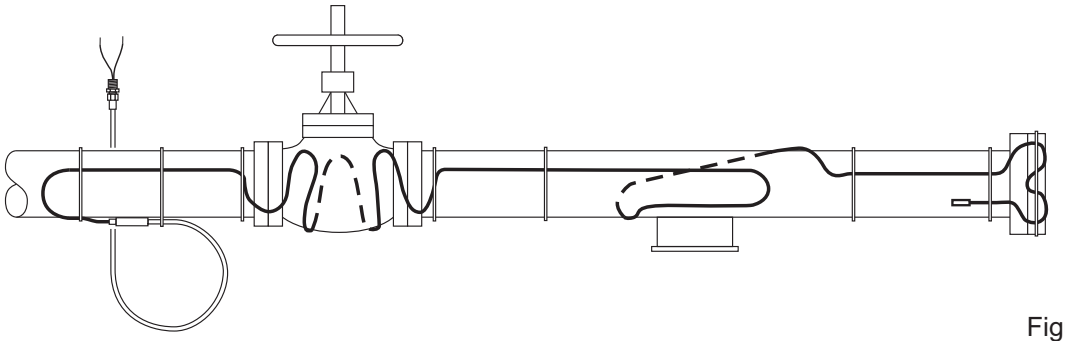


Figure 21

Step 4

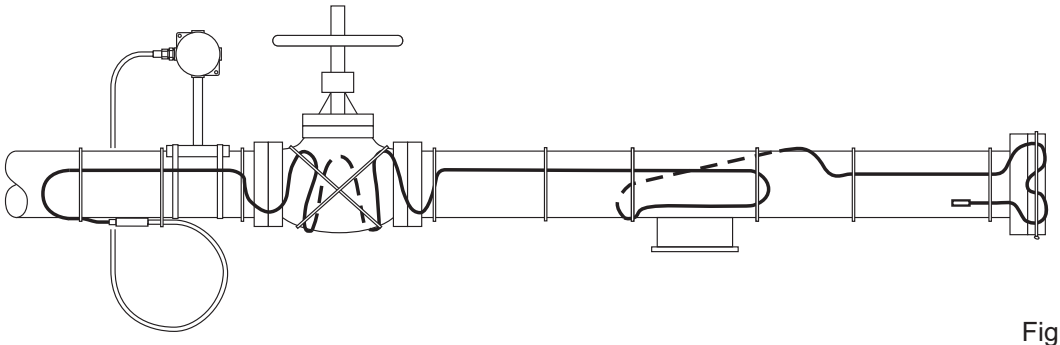
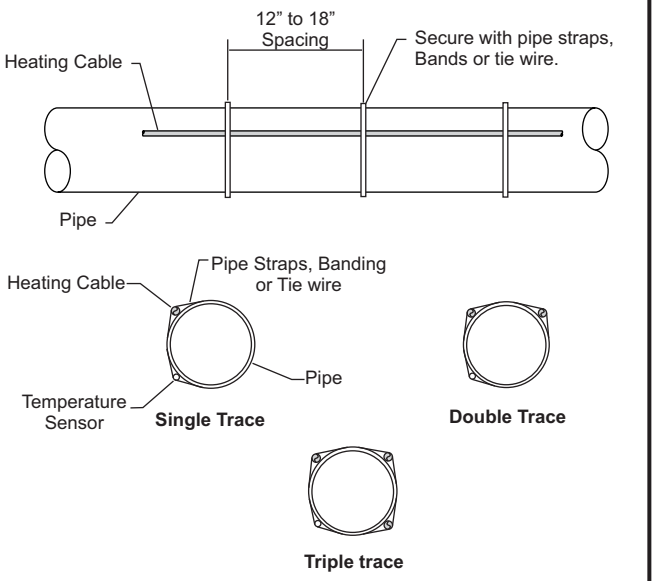


Figure 22

INSTALLATION DETAILS

Proprietary Information



Notes:

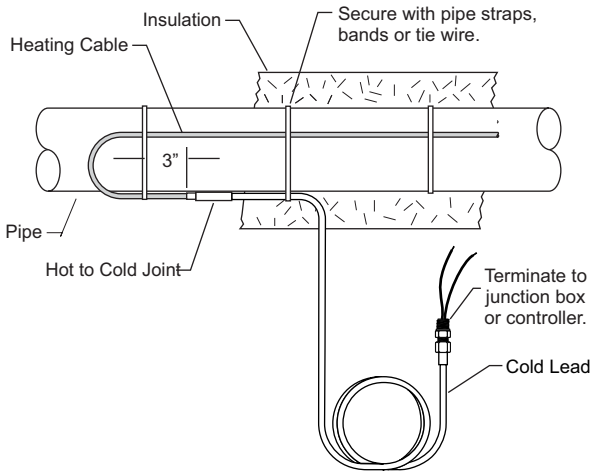
It is typically easier to install heating cable on the top of the pipe. There is minimal gain in efficiency installing the cable on the bottom of the pipe.

Keep 90° separation between heating cable and temperature sensor.

Trace Orientation

Detail 1

Proprietary Information



Notes:

Typical installation of an MI heating cable when process temperatures are less than 300°F.

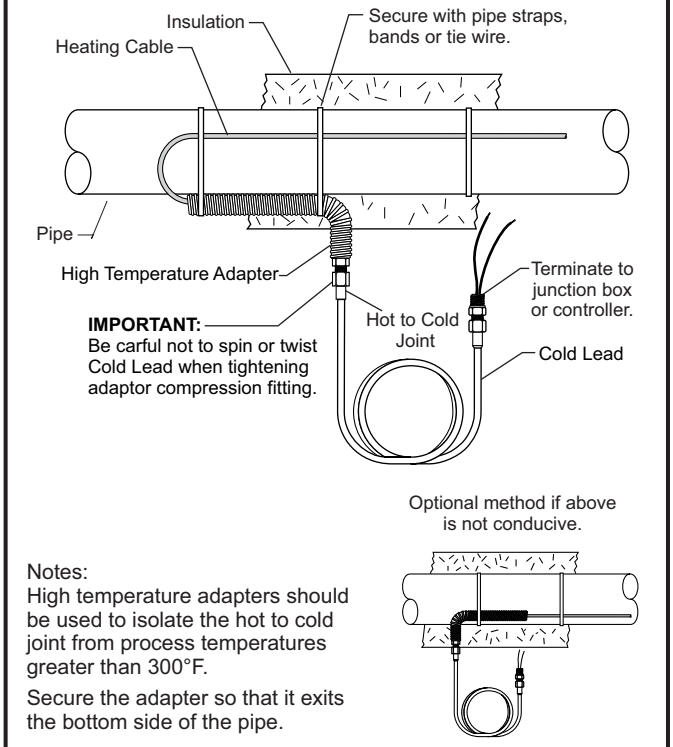
Secure the hot to cold joint as shown. Do not band within three inches of joint.

Exit the cold section at the bottom of the pipe to prevent moisture penetration.

Hot-Cold Joint on Pipe

Detail 2

Proprietary Information



Notes:

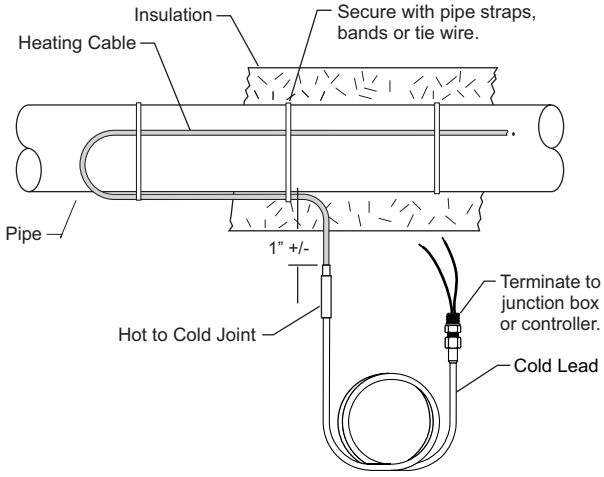
High temperature adapters should be used to isolate the hot to cold joint from process temperatures greater than 300°F.

Secure the adapter so that it exits the bottom side of the pipe.

High Temperature Adapter

Detail 3

Proprietary Information



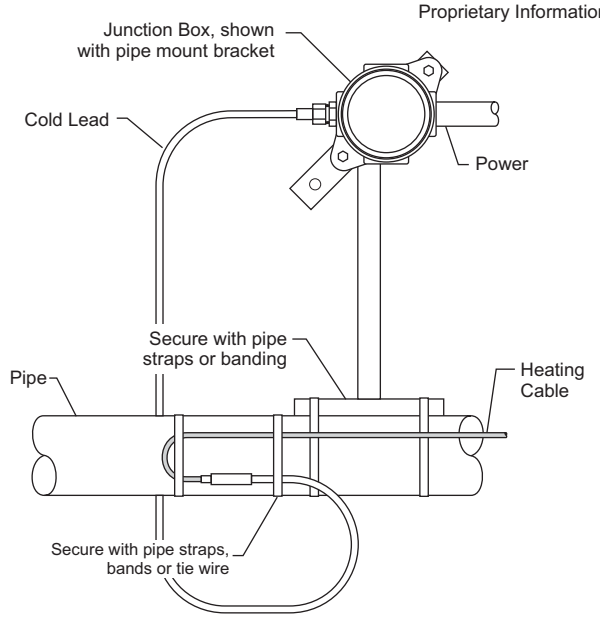
Notes:

This is a typical installation for MI cable on a high temperature freeze protection application, when the process temperatures are greater than 300ºF.

Use a high temperature adapter when heater wattage is greater than 20 watts/heater foot. See Detail 3.

Hot-Cold Joint Outside Insulation

Detail 4



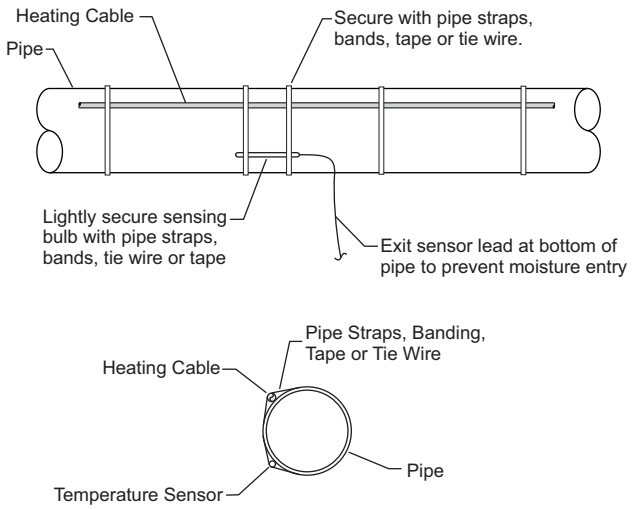
Notes:

Locate junction box within reach of the cold lead termination.

Do not cross cable with pipe straps used to mount junction box bracket. Tension is much greater than what should be used on heating cable.

Junction Box on Pipe

Detail 5



Notes:

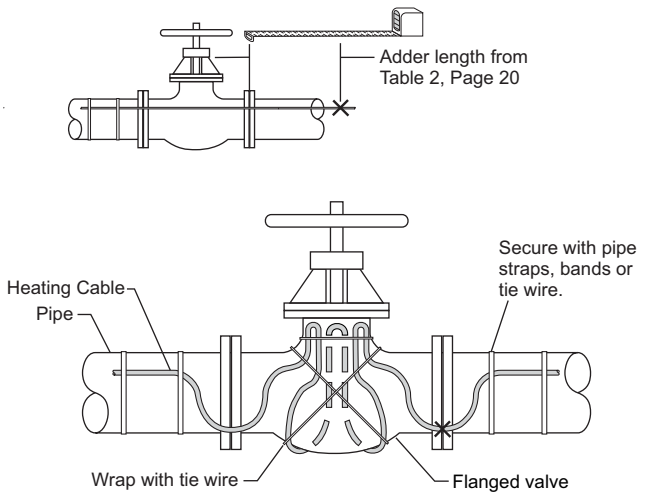
Locate temperature sensor within the heated zone. Keep away from heat sinks such as supports and valves.

Keep at least 90° separation between heating cable and temperature sensor.

Secure for good thermal contact with pipe. Do not crush or damage sensor as to cause calibration error.

Temperature Sensor Location

Detail 6

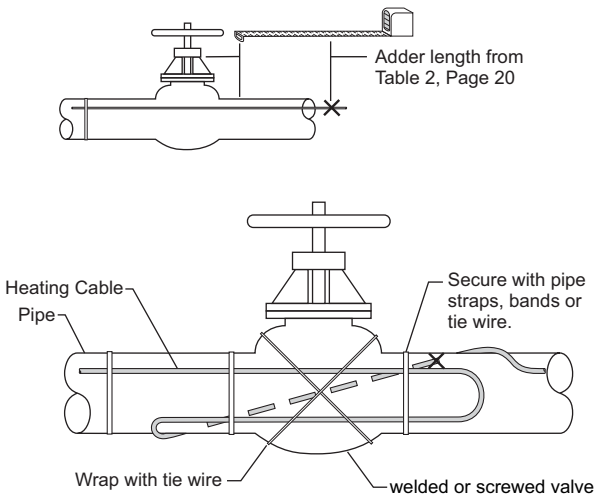


Notes:

Extra cable is added on valves to compensate for greater heat loss. The amount of cable applied is equal to the flange to flange distance plus the value shown in Table 2, Page 20. On projects always follow manufactures drawings for adders.

Large Flanged Valve

Detail 7



Notes:

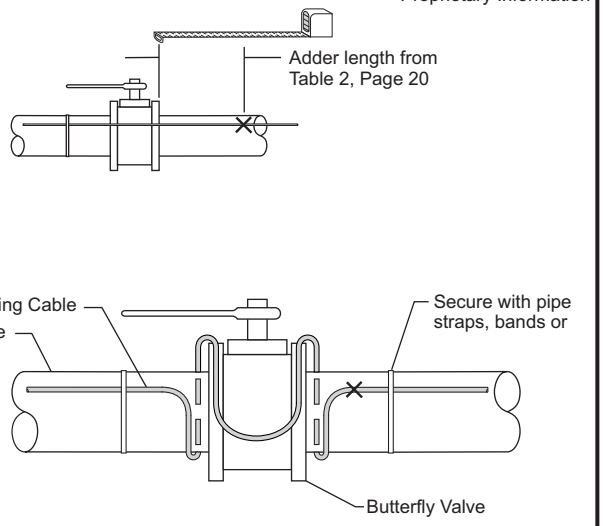
Extra cable is added on valves to compensate for greater heat loss. The amount of cable applied is equal to the length of the valve the value shown in Table 2, Page 20. On projects always follow manufactures drawings for adders.

Welded or Screwed Valve

Detail 8

INSTALLATION DETAILS

Proprietary Information



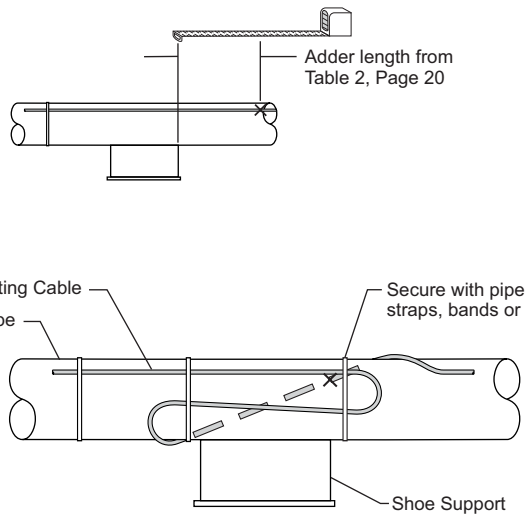
Notes:

Extra cable is added on valves to compensate for greater heat loss. The amount of cable applied is equal to the flange to flange distance plus the value shown in Table 2, Page 20. On projects always follow manufactures drawings for adders.

Butterfly Valve

Detail 9

Proprietary Information



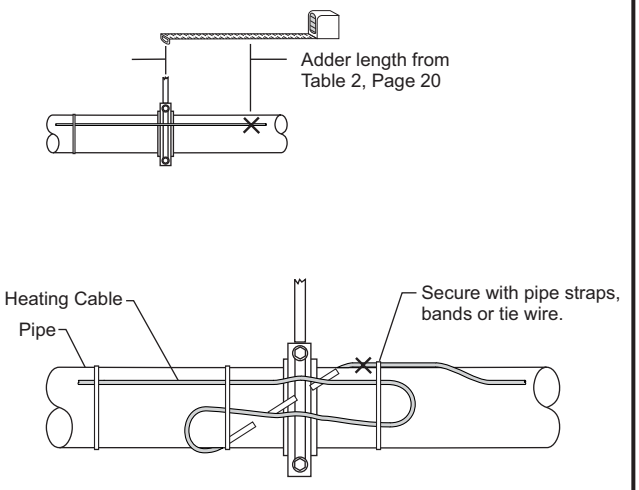
Notes:

Extra cable is added at supports to compensate for greater heat loss. The amount of cable applied is equal to the support length plus the value shown in Table 2, Page 20. On projects always follow manufactures drawings for adders.

Shoe Support

Detail 10

Proprietary Information



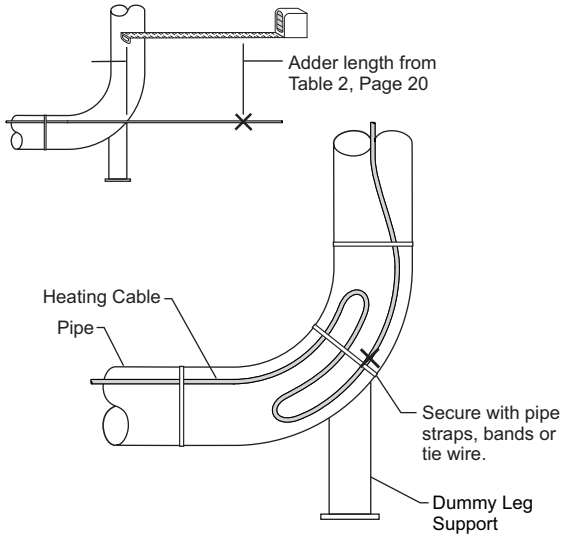
Notes:

Extra cable is added at hangers to compensate for greater heat loss. The amount of cable applied is equal to the value shown in Table 2, Page 20. On projects always follow manufactures drawings for adders.

Hanger Support

Detail 11

Proprietary Information



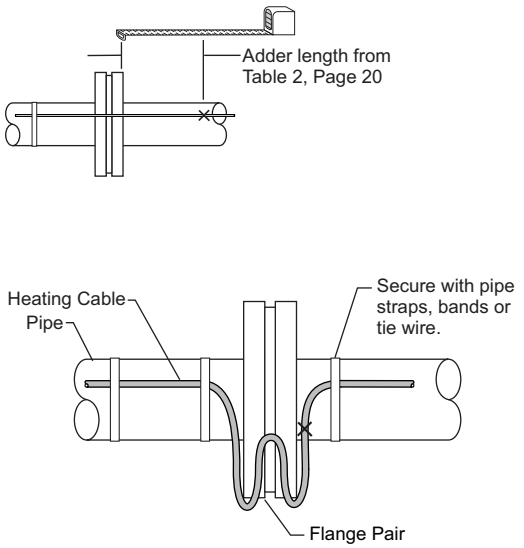
Notes:

Extra cable is added at supports to compensate for greater heat loss. The amount of cable applied is equal to the value shown in Table 2, Page 20. On projects always follow manufactures drawings for adders.

Dummy Leg Support

Detail 12

Proprietary Information



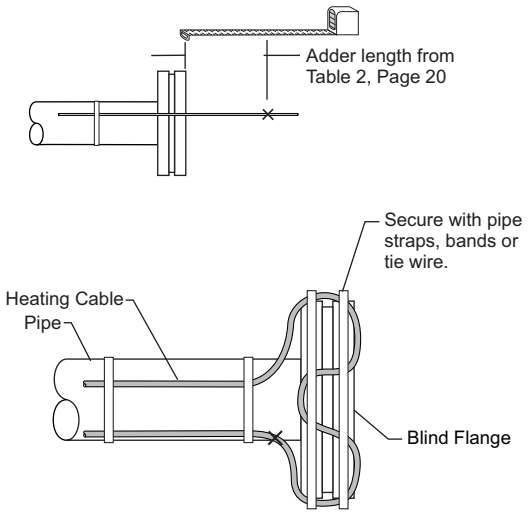
Notes:

Extra cable is added on flanges to compensate for greater heat loss. The amount of cable applied is equal to the length of the valve the value shown in Table 2, Page 20. On projects always follow manufactures drawings for adders.

Flange Pair

Detail 13

Proprietary Information



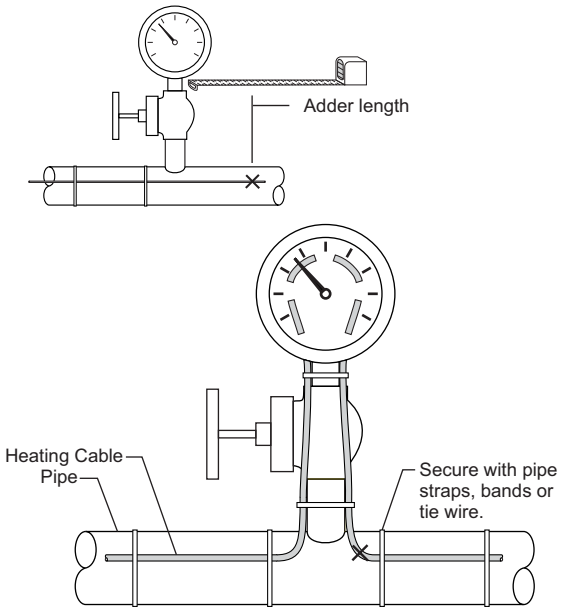
Notes:

Extra cable is added on blind flanges to compensate for greater heat loss. The amount of cable applied is equal to the length of the valve the value shown in Table 2, Page 20. On projects always follow manufactures drawings for adders.

Blind Flange

Detail 14

Proprietary Information



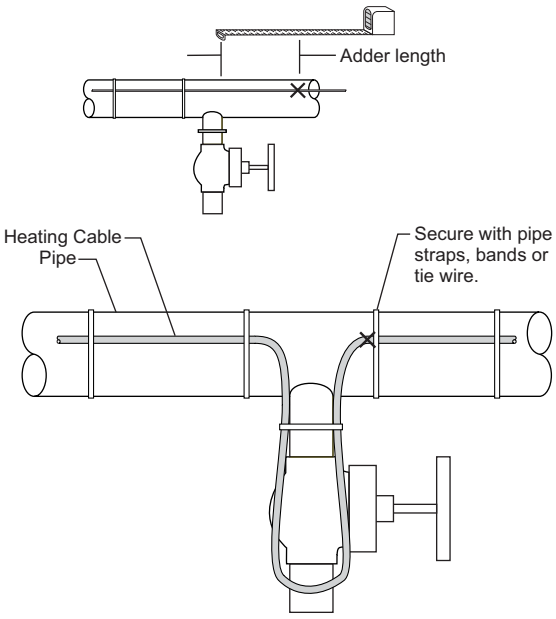
Notes:

Extra cable is added on gauges and vents to compensate for greater heat loss. Follow project drawings for adder length.

Gauges and Vents

Detail 15

Proprietary Information



Notes:

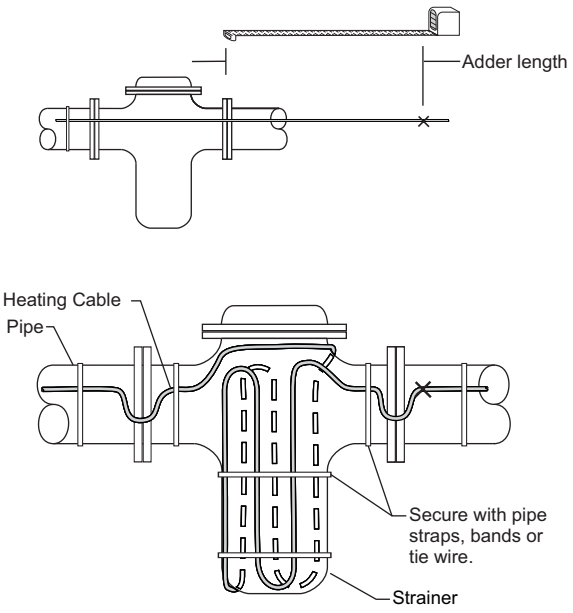
Extra cable is added on drains to compensate for greater heat loss. Follow project drawings for adder length.

Drain Valve

Detail 16

INSTALLATION DETAILS

Proprietary Information



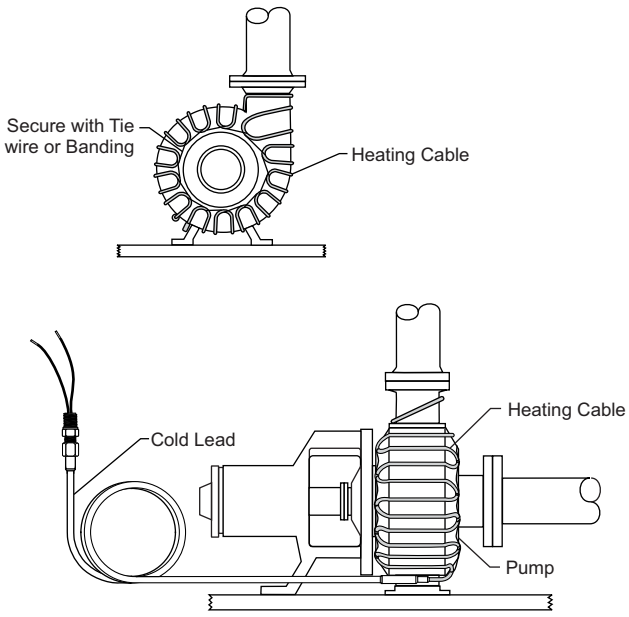
Notes:

Extra cable is added on strainers to compensate for greater heat loss. On projects always follow manufactures drawings for adders.

Strainer

Detail 17

Proprietary Information



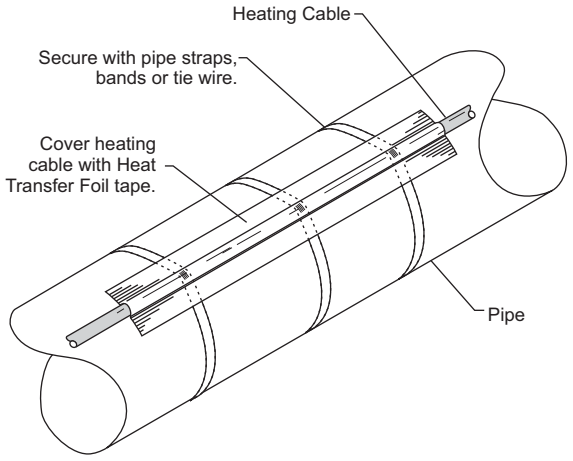
Notes:

Install cold lead at bottom of pump. Secure heating cable with tie wire or banding.

Pump

Detail 18

Proprietary Information



Notes:

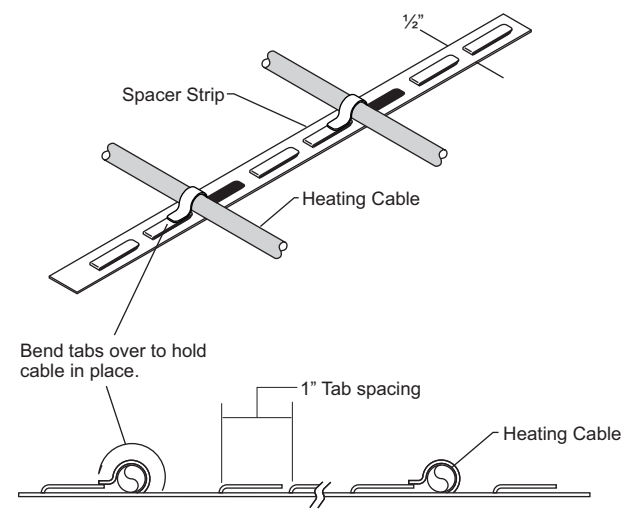
Heat transfer foil tape should be used when a soft pipe insulation such as fiberglass is used. The foil will prevent the cable from being encapsulated in insulation.

Heat transfer foil is also used to enhance heat transfer and reduce sheath temperatures.

Heat Transfer Foil

Detail 19

Proprietary Information



Notes:

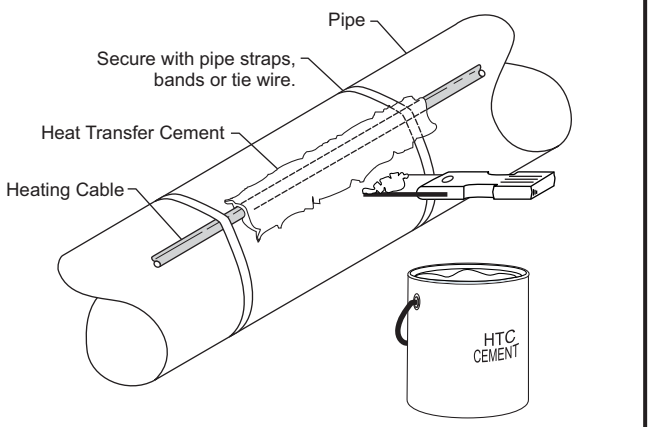
Spacer strip is used to hold heating cable at uniform spacing on flat surfaces, large pipes or vessel walls. The strip can be welded to the surface or held in place with banding or weld studs.

Spacer Strip

Detail 20

INSTALLATION DETAILS

Proprietary Information



Notes:

Heat transfer cement is used to enhance heat transfer and significantly reduces sheath temperatures. It is often used on high wattage heaters or heat up applications.

Pipe surface must be clean prior to application of cement. Remove all loose paint, grease, and oil.

After heater is secured in place, apply generous portions of cement to both sides of cable as shown. Fill all voids.

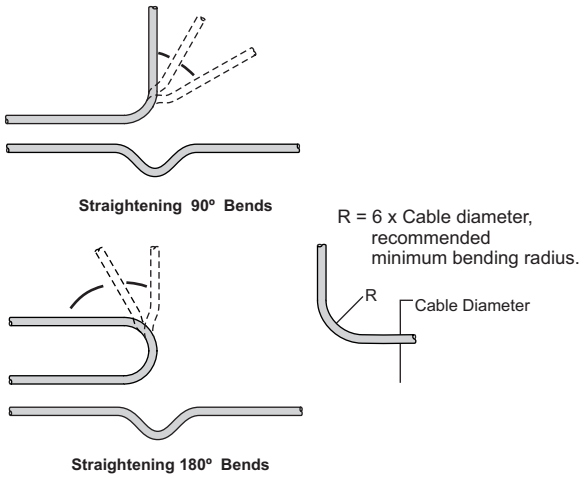
Wet tools with water for smoother application.

Before insulating, allow cement to cure at least 24 to 48 hours or until cement is rock hard.

Heat Transfer Cement

Detail 21

Proprietary Information



Notes:When reforming MI heating cable, it is important to not to overwork heating cable.

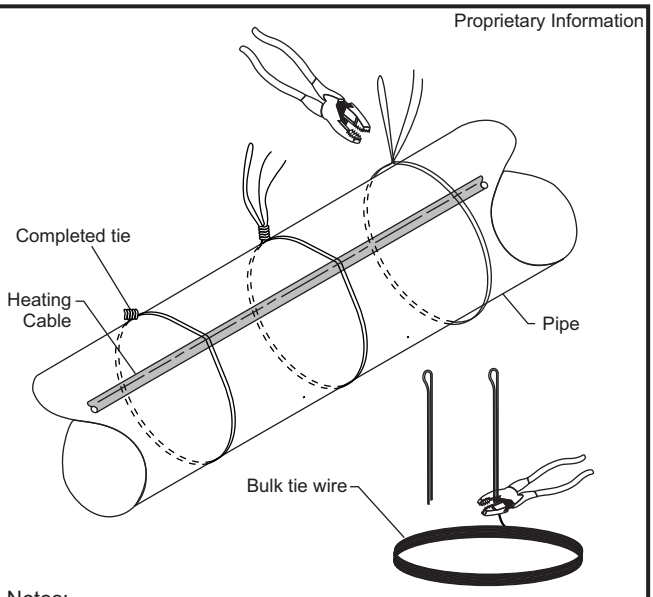
Bends should be reformed as shown. Leave major bends as small wiggles. These small bends will not affect the performance of the cable.

Excessive bending will work harden the cable. The cable can crack when overworked. Consult factory if a cable cracks or breaks.

Straightening MI Cable

Detail 22

Proprietary Information



Notes:

Hairpin ties provide maximum strength. Pre-cut ties to length. Length is equal to 2 x pipe circumference + 12".

Secure heating cable every 12" to 18".

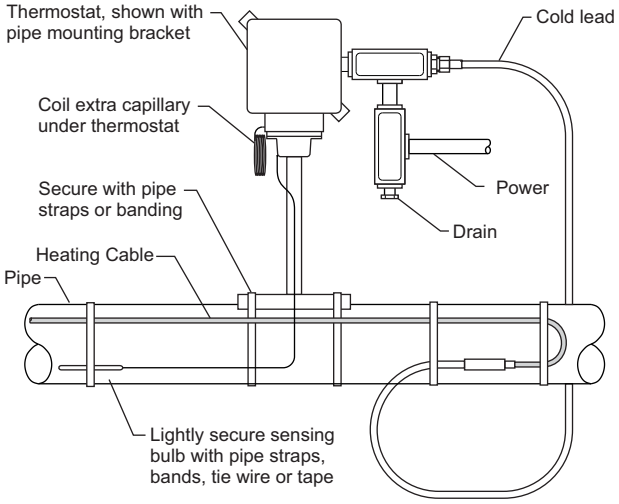
Twist tie until cable is held in place.

Cut of excess wire and fold over the remaining nub to prevent cut hazard.

Tie Wire

Detail 23

Proprietary Information



Notes:

Locate temperature sensor within the heated zone. Keep away from heat sinks such as supports and valves.

Keep at least 90° separation between heating cable and temperature sensor.

Do not cross cable with pipe straps used to mount junction box bracket. Tension is much greater than what should be used on heating cable.

Thermostat Installation

Detail 24

Heat Sink Adder Table:

Table 2

Pipe Size (N.P.S.)	Heat Sink Adder Lengths (ft.)						
	Flanged Valve	Welded Valve	Butterfly Valve	Shoe Support	Hanger Support	Flange (Pair)	Blind Flange
.5”	1	0.5	0.5	1	1	0.5	1
.75”	1.5	0.75	.5	1.5	1	0.5	1
1”	2	1	1	1.5	1	0.5	1
1.5”	2	1.5	1.5	1.5	1.5	0.5	1
2”	2.5	2	2	2	1.5	1	1.5
3”	3	2.5	2.5	2	2	1	1.5
4”	3	3	3	2.5	2	1	1.5
6”	6	5	3.5	3	3	1	2
8”	8	6	4	3	3	1.5	2
10”	9	6	4.5	3	3	1.5	3
12”	12	8	5	3	3	1.5	3
14”	12	8	5.5	3	3	1.5	3
16”	15	10	6	4	3	1.5	3
18”	18	10	6.5	4	4	1.5	3
20”	20	12	7	4	4	2	4
24”	24	14	8	4	4	2	4

1. The lengths above are the recommended amount of extra cable (Adder) to be added on these fittings to compensate for greater heat loss at these fittings. On projects always follow manufactures drawings for adders.
2. The total amount of cable applied to the fitting is equal to the value in the table plus the flange-to-flange distance of that fitting. (Eq: 4”Φ x 1’ long flanged valve will require a total of 4' of heating cable, 1’ for the valve length plus 3’ for the adder.).
3. If there are multiple traces, the total length is to be divided among the individual traces of cable. (Eq: 8”Φ x 1.5’ long flanged valve with two traces of cable will require a total of 11' of heating cable, 3’ for the length of the valve with two traces plus 8’ for the adder.).
4. For some applications, it may be physically impossible to install all of the recommended heating cable directly on the fitting or support. In this case, install the excess heating cable on either side of the fitting or support.
6. Values are based on average fitting sizes.

Adder Example:

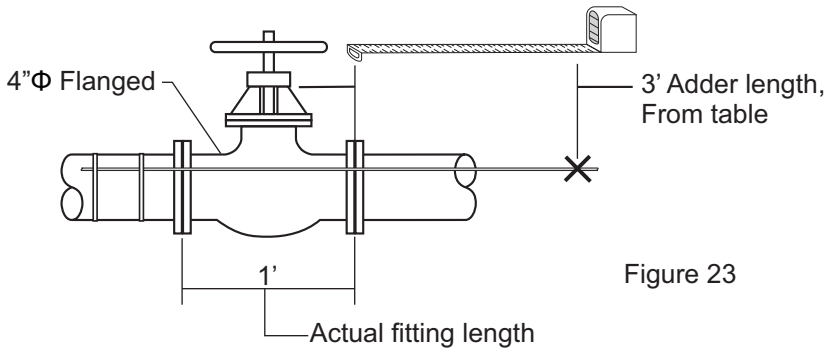


Figure 23

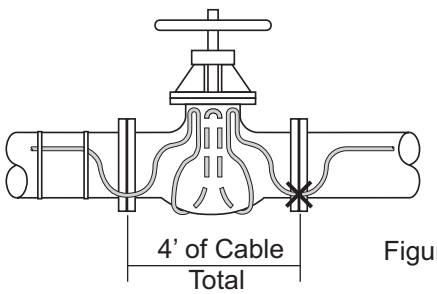


Figure 24

TROUBLE SHOOTING

Symptoms:	Possible Cause:	Corrective Action:
A. Circuit breaker trips.	1. Circuit breaker under sized. 2. Defective circuit breaker. 3. Short circuit in feed wiring or circuit connections. 4. Moisture in connection box. 5. Damaged heating cable, nicks or cuts in sheath, kinked or crushed sheath, crack at termination or hot to cold joint. 6. Ground fault protection devise is undersized, less than 30mA. Devise may wired incorrectly.	1. Calculate total current load and resize breaker. Verify feed wiring is compatible for larger breaker. 2. Replace circuit breaker 3. Locate and repair faulty wiring or connections. Check with megger. 4. Dry all connections, check all entry seals and implement conduit drains. 5. Immediately seal brake or crack with silicon and consult factory for repair or replace heating cable. 6. Replace with 30 mA GFPD or adjust controller trip point value to 30 mA. Check wiring.

Symptoms:	Possible Cause:	Corrective Action:
B. No power output or power is lower than rated value.	1. Low or no input voltage. 2. Connection to temperature controller on normally open (NO) contact. 3. Improper crimping of power connections causing high resistance. 4. Heater may have been severed. 5. Wrong heater was used. 6. Pipe temperature is above the set point of the controller. 7. Some heating cables have significant resistance change at elevated temperatures.	1. Repair electrical supply or replace equipment. 2. Confirm connection to the temperature controller is on the normally closed (NC) contact. Contacts close when temperature drops. 3. Recrimp connection using proper procedure. 4. Repair or replace heater. 5. Replace with proper heater. 6. Heater should energize when pipe temperature drops below set point of controller. 7. Consult factory with heater and process information.

TROUBLE SHOOTING

Symptoms:	Possible Cause:	Corrective Action:
C. Power output appears to be correct but pipe temperature is below design temperature.	1. Wet or missing insulation. 2. Insufficient amount of heating cable was applied on valves, supports and other heat sinks. 3. Temperature controller set point is incorrect. 4. Temperature sensor in wrong location. 5. Low product temperature entering pipe. 6. Different thermal insulation was used or insufficient thickness.	1. Remove wet insulation and replace with dry insulation and cover and seal with proper weather proofing. 2. Confirm compliance with system design. If it is only one heat sink an additional heater can be applied and wired in series with the existing heater. If there are multiple heat sinks, the heater will have to be replaced with a longer heater. 3. Reset temperature controller. 4. Sensor may be to close to heating cable or may be to close to heat sink. Relocate sensor. See page 15, detail 6. 5. Check product temperature entering pipe. 6. Modify as needed. Consult factory for recommendations.

Symptoms:	Possible Cause:	Corrective Action:
D. Heater insulation resistance low, low megger reading.	1. Rainy or high humidity. 2. Crack at termination joint. 3. Crack at hot to cold joint. 4. Nick, cut or crack in sheath. 5. Physical damage causing direct short.	1. Dry tails and termination seal. 2. Seal crack with silicon and replace termination. 3. Seal crack with silicon and replace cold lead. 4. Visually check heating cable at valves, flanges, supports and other heat sinks for damage. Replace damaged section or replace heater. 5. Replace damaged section or replace heater.

TERMS AND DEFINITIONS

Adder: Extra length of heating cable applied at heat sinks to compensate for addition heat loss.

Cold lead: Non-heating section of the heating cable that terminates heating section of the heater to the connection point. It is equivalent to extension cord.

Ground Fault: A condition when unsafe currents are passing from heater conductors or power wiring to ground, typically greater than 30 milliamps. Ground fault breakers or sensing devices are required on all pipe heating circuits.

Heat Loss: Energy lost to the environment from the pipe through the thermal insulation, typical units are in Watts/foot.

Heat Sink: Components of a piping system that draw extra heat away from pipe, such as valves, flanges, supports etc.. Extra heating cable must be added on these components to offset heat loss.

Hot Section: Segment of the heater that has resistive conductors that generate heat.

Hot to Cold Joint: The transition point of the heating cable where the resistive heat generating conductors are joined to copper non-heating conductors.

Megger: Megohmmeter, primary test instrument used to test MI heaters. Measures insulation resistance between heater conductors and sheath with 500 to 1000 Volt DC. Resistance values are in Megohms (1000 Ohms).

MI: Stands for Mineral Insulated heating cable, a series resistant constant wattage heating cable. The insulation between the conductors and the sheath is a pure inorganic mineral Magnesium Oxide (MgO).

HEATER INSTALLATION & INSPECTION LOG

This document is used to track individual heater integrity throughout installation and checkout.

Heater Catalog Number: _____ Heater Design Resistance: _____ Ohms
Tag or Circuit Number: _____ Rating: ____Volts ____ Amps _____Watts
Line or Pipe Number: _____ Heater Length: _____ Ft
Breaker / Panel Number: _____ Trasor Order Number, B- _____

Testing at Time Heaters Received:	Values / Remarks	Date	Initial
1. Inspect heater for physical damage.			
2. Heater resistance between conductors. ①			
3. Insulation resistance between conductors and sheath. ②			

Pre Installation Testing:			
1. Inspect heater for physical damage.			
2. Heater resistance between conductors. ①			
3. Insulation resistance between conductors and sheath. ②			

Post Installation Testing (Before insulating pipe):			
1. Inspect heater for physical damage.			
2. Continuity between conductors. ③			
3. Insulation resistance between conductors and sheath. ②			
4. Cable properly installed on pipe.			
5. Cable correctly installed on valves, supports and other heat sinks per system design.			
6. Junction box or controller correctly installed and heater terminated.			

Thermal insulation complete:			
1. Continuity between conductors. ③			
2. Insulation resistance between conductors and sheath. ②			

Final Testing and Commissioning:			
1. Thermal insulation complete and all penetrations properly sealed.			
2. Insulation resistance between conductors and sheath. ②			
3. Energized testing, Heater voltage			
4. Energized testing, Heater current after 10 minutes			

Circuit Approval (Heater tested, documented and approved for service):		
Contractor:		
Client:		
Comments:		

① Resistance should be within 10% of design value. See page 10, Figure 17.
② Use 500VDC megger, 200 megohms minimum. See page 10, Figure 16.
③ Use megger or ohm meter to verify continuity. See page 10, Figure 17.

HEATER MAINTENANCE & INSPECTION LOG

This document is used for periodic inspection.

Heater Catalog Number: _____ Heater Design Resistance: _____ Ohms
Tag or Circuit Number: _____ Rating: ____Volts ____ Amps _____Watts
Line or Pipe Number: _____ Heater Length: _____ Ft
Breaker / Panel Number: _____ Trasor Order Number, B- _____

Thermal insulation free of damage, moisture, missing insulation or cladding.	Initial						
	Date						
Water tight seals at valves, hangers, supports or any entries into the insulation.	Initial						
	Date						
Inside connection box is clear of moisture and corrosion.	Initial						
	Date						
Heater is properly connected and grounded at power connection.	Initial						
	Date						
Test ground fault device for circuit.	Initial						
	Date						
Controller checked for moisture, corrosion, set point, switch operation and sensor lead damage.	Set Pt.						
	Initial						
	Date						
Megger test between heater conductors and sheath with lead wires disconnected. (Megohms) ①	Value						
	Initial						
	Date						
Heater Voltage at power connection.	Value						
	Initial						
	Date						
Heater current after 5 minutes.	Value						
	Initial						
	Date						
All connection boxes and controllers have been properly sealed.	Initial						
	Date						

① Use 500VDC megger, 200 megohms minimum. See page 10, figure 16.

Comments:

NOTES

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