DATE: January 27, 2016

RFP NUMBER: FM2016-004 General Contractor for SEIR Building Infrastructure Connection Project

RFP SUBMITTAL DEADLINE: February 10, 2016 at 3:00 PM CST

CHANGE:

1. FROM: Contractor will provide and erect security fence around site of project. Fence must be chain-link temporary fencing with own supports (no posts will be driven into ground).
   TO: Temporary fencing will be provided by UT-Arlington.

2. FROM: Completion date is approximately July 31, 2016.
   TO: Completion date is approximately June 1, 2016 (12 weeks from start of project). On pricing and delivery form, Proposer to insert number of days to complete project.

3. FROM: Agency HUB goal 41.88% on HUB Subcontracting Plan
   TO: Agency HUB goal 38.25% on HUB Subcontracting Plan

CLARIFICATION:

4. Storm Water Pollution Prevention Plan (SWPPP) including silt fence will be provided by Contractor. Requirements of SWPPP are listed in the RFP under Storm Water Requirements in Environmental Health & Safety Construction Site Procedures for Contractors.

5. Compaction testing will be performed by third-party hired by UT-Arlington.

6. Thermacor drawings will prevail if there is a difference between the drawings/specifications in the RFP and the Thermacor drawings. Thermacor drawings are attached.

7. UT-Arlington will provide means of egress into the tunnel system.
8. Disregard the 4" conduits shown on original drawing sheet M1.01. The 4" conduits will be installed by UT-Arlington.

This addendum forms a part of the contract documents and modifies the original solicitation documents. Acknowledge receipt of this Addendum in the space provided on the Pricing & Delivery Submittal Form, or by returning one (1) signed copy of this notice with your proposal.

Make all changes identified above to the solicitation documents. All other terms and conditions in the solicitation documents remain unchanged and in full force and effect.

SIGNED: ____________________________________________

COMPANY NAME: ____________________________________
SUBMITTAL DATA FOR:

PROJECT: UNIVERSITY OF TEXAS SEIR BUILDING
ARLINGTON, TEXAS

CONTRACTOR: UNIVERSITY OF TEXAS
Arlington, TX 76019
Phone: (817) 272-6324
Attn: Cindi Walker

EQUIPMENT: DUO THERM ‘505’
FERRO THERM
Thermacor Process Job # Job 35400-03

MANUFACTURER: THERMACOR PROCESS INC.
1670 Hicks Field Road, East
Post Office Box 79670
Fort Worth, Texas 76179
Phone: (817) 847-7300
Fax: (817) 847-7222

REPRESENTATIVE: Mech Tech Sales
5005 Brentwood Stair Road, Suite 202
Fort Worth, TX 76112
Phone: (817) 501-5476
Attn: Steve Hildebrand

SIGNED __________________________ DATE __________

TITLE __________________________

COMPANY __________________________

PLEASE CHECK ONE
○ RELEASED AS SUBMITTED, NO CHANGES.
○ RELEASED WITH CHANGES, AS NOTED.
○ REVISE AND RESUBMIT AS NOTED.

Rhonda Slates
January 13, 2016
REV 0
DUO THERM “505”

Service: Steam piping materials.

Pipe: A106B, seamless, extra heavy weight (same as Schedule 80 up to 8") domestic steel, in SRL’s. MTR’s furnished for Source Quality Control.

Insulation: Mineral wool, manufactured by IIG, LLC, (formerly Mineral Products of Texas), K=.29 @ 200° F per attached chart, having passed the 96-hour boiling test.

Conduit: Welded smooth-wall black steel, 10 gauge per ASTM A-139 or A-135.

Support: One foot long, corrugated steel alloy insulated supports on approximate nine (9) foot intervals.

Terminal Ends of Conduit: Steel plate, ASTM A36, ½” thick, welded to conduit and carrier pipe, equipped with one (1) inch drain and vent opening. Gland seals are provided when no anchor is within five (5) feet of terminal end. Terminal ends coated per manufacturer’s recommendation. Vents must be open and piped to the atmosphere to prevent water intrusion.

Anchors: Steel plate, ASTM A36, ½” thick, welded to carrier pipe and conduit; fabricated to allow air circulation and drainage, corrosion coated per manufacturer’s recommendations.

Fittings: Pre-fabricated/Pre-insulated. Tees and long radius 90° EL/45°, butt weld fittings conforming to ASTM A-234 and ANSI B 16.9. Fittings for pipe smaller than 2.5” shall be socket weld conforming to ANSI B16.11. Minimum 2D radius bends used where possible, complying with ASME B31.1. All carrier pipe welders are certified to the weld procedure used, where applicable. Visual inspection is per ASME B31.1. No NDE.

Conduit Insulation: Spray applied polyurethane, k = .16 @75° F per ASTM C518, 90 – 95% closed cell, 2 to 3 pcf, to a thickness per attached chart A-5261 with a tolerance of ± 1/8” on the ends and ¼” in the middle.

Jacketing Material: Extruadded, black high-density polyethylene (HDPE) in accordance with ASTM D3350, minimum thickness 100 mils for jacket sizes less than or equal to 12”, 125 mils for jacket sizes larger than 12” to 24”, and 150 mils for jacket sizes greater than 24”.

Field Joint Kit: Conduit closures with welded, 10 gauge steel rolled sleeve applied in two halves, after carrier pipe insulated with specified insulation, held in place with two 1/2” stainless steel bands. Steel sleeve, insulated with polyurethane, jacketed with an HDPE sleeve and sealed with a heat shrink sleeve.

Field Testing: Hydrostatically test carrier pipe per specification, prior to field joint insulation, Air test conduit to 15 psi for two hours prior to insulating conduit sleeve. Carrier pipe ID of Conduit and Insulation must be dried in the event of water intrusion in Conduit prior to or during installation.

Field Assistance: By local Field Service Technician. **Quoted with limited specifications.**
January 16, 2012

To Whom It May Concern:

Re: Stress Analysis

Our Standard Practice is to prepare a stress analysis after the routing has been revised using the field verified dimensions supplied by the installing contractor. Many times dimensions change after field-verification which would then require another stress analysis before pipe can be approved.

Upon receipt of the field verified dimensions, the layout can be revised and the Stress Analysis can be prepared. If a PE stamp is required, the Stress Analysis will be reviewed and stamped prior to sending.

Thank you,

Clint Riggin
Engineering
Thermacor Process Inc.
817.847.7300 x 609
MPT® Pre-Formed Pipe Insulation

HIGH TEMPERATURE INSULATION

DESCRIPTION
MPT Pre-Formed Mineral Wool Pipe Insulation is made of inorganic fibers derived from basalt, a volcanic rock, with thermosetting resin binder. Advanced manufacturing technology ensures consistent product quality, with high fiber density and low shot content, for excellent performance in thermal control and fire resistance applications. MPT-PF is a factory "V" grooved mineral wool board formed to specific pipe sizes and provided in half cylinder sections with a variety of facing options.

ADVANTAGES
Thermal Performance. Good thermal conductivity values help maximize control of heat loss, contributing to reduced operating costs and greater energy savings.

Light Weight, Low Dust, Protected Outer Surface. Easy to handle and fabricate, MPT-PF is easy to cut with a knife. Clean handling properties and factory applied facers help reduce skin irritation and minimize job cleanup time and expense.

Mold Resistant. MPT-PF does not support the growth of fungi.

APPLICATIONS
MPT-PF is produced to fit NPS & tubing sizes for commercial and industrial applications at temperatures ranging from ambient to 1200°F (650°C). This formed pipe insulation is easily fabricated, cutting cleanly and easily with a knife. Very low in-service shrinkage helps prevent gaps from forming at joints, preventing costly thermal leaks. The insulation is designed to be factory or field jacketed. It may be installed directly on hot surfaces; system shutdown and staged heat-up are not required.

AVAILABLE TYPES
Standard Thicknesses
- Single Layer 1" thick up to 4" thick
- Double Layer Over 4" thick in 1/2" increments
- Sizes range from 1/2" to 36" pipe sizes
- Available in iron and copper tubing sizes

Facings Available
- No facing offered on pipe sizes 1/2" through 2 1/2"
- For 1" thickness, no facing on 1/2" through 4" pipe sizes
- Standard is fiberglass mat
- Available with ASJ/SSL (self sealing lap) and FSK

LINEAR SHRINKAGE AFTER 24 HRS. AT TEMPERATURE

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Shrinkage (%)</th>
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<tr>
<td>°F</td>
<td>°C</td>
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<tr>
<td>1050</td>
<td>566</td>
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<tr>
<td>1200</td>
<td>649</td>
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SPECIFICATION COMPLIANCE INSULATION

<table>
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<tr>
<th>Standard</th>
<th>Specification</th>
<th>Compliance</th>
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<tr>
<td>ASTMC447 Maximum Service Temperature</td>
<td>1200°F (650°C)</td>
<td>Passes</td>
</tr>
<tr>
<td>ASTMC547 Material Specification</td>
<td></td>
<td>Passes</td>
</tr>
<tr>
<td>ASTMC585 Dimensions of Pipe Insulation</td>
<td></td>
<td>Passes</td>
</tr>
<tr>
<td>ASTM C795/C871/C692</td>
<td></td>
<td>Passes</td>
</tr>
<tr>
<td>ASTM C1335 Shot Content</td>
<td>&lt;25%</td>
<td>Passes</td>
</tr>
<tr>
<td>ASTM C1338 Fungi Resistance</td>
<td></td>
<td>Passes</td>
</tr>
<tr>
<td>ASTM E84 Flame Spread/Smoke Developed</td>
<td>25/50 or less</td>
<td>Passes</td>
</tr>
<tr>
<td>CAN/UL C.S. 102</td>
<td>25/50 or less</td>
<td>Passes</td>
</tr>
<tr>
<td>Nuclear Regulatory Guide 1.36</td>
<td></td>
<td>Passes</td>
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<tr>
<td>MIL-I-24244</td>
<td></td>
<td>Passes</td>
</tr>
<tr>
<td>Recovery after 10% compression</td>
<td>100%</td>
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ADDITIONAL INFORMATION AND MSDS
Please visit our website at www.iig-llc.com.
MPT® Precision Cut

PIPE INSULATION

DESCRIPTION
MPT Precision Cut Mineral Wool Pipe Insulation is made of inorganic fibers derived from basalt, a volcanic rock, with thermosetting resin binder. Advanced manufacturing technology ensures consistent product quality, with high fiber density and low shot content, for excellent performance in thermal control and fire resistance applications. MPT-PC is made using a vacuumpack or pocketed bag, as well as a vapor barrier. It ships flat in 4 mil plastic and allows easy forming at the job site.

ADVANTAGES
Ships Flat. Packaged flat in 4 mil plastic for some weather protection (see guide spec), freight efficiency and storage space utilization.

Thermal Performance. Good thermal conductivity values help maximize control of heat loss, contributing to reduced operating costs and greater energy savings.

Light Weight, Low Dust, Protected Outer Surface. Easy to handle and fabricate, MPT-PPF is easy to cut with a knife. Clean handling properties and factory applied facers help reduce skin irritation and minimize job cleanup time and expense.

Mold Resistant. MPT-PPF does not support the growth of fungi.

APPLICATIONS
MPT-PC is produced to fit NPS & tubing sizes for commercial and industrial applications at temperatures ranging from ambient to 1200°F (650°C). This formed pipe/vessel insulation is easily fabricated, cutting cleanly and easily with a knife. Very low in-service shrinkage helps prevent gaps from forming at joints, preventing costly thermal leaks. The insulation is designed to be factory or field jacketed. It may be installed directly on hot surfaces; system shutdown and staged heat-up are not required.

AVAILABLE TYPES
Standard Thicknesses
Single Layer - 1” thick up to 4” thick
Double Layer - Over 4” thick in 1” increments
Sizes range from 1/2” to 3” pipe sizes
Available in iron and copper tubing sizes

Facings Available
Sizes 1/2” through 2” is supplied with no facing
Sizes 2.5” and above are supplied with a fiberglass mat facing
Other facings available include ASJ and FSK/FRK

MPT® Precision Cut
OPERATING TEMPERATURE LIMIT: 1200°F (650°C)

LINEAR SHRINKAGE AFTER 24 HRS. AT TEMPERATURE

<table>
<thead>
<tr>
<th>Temperature Shrinkage</th>
</tr>
</thead>
<tbody>
<tr>
<td>°F</td>
</tr>
<tr>
<td>1050</td>
</tr>
<tr>
<td>1200</td>
</tr>
</tbody>
</table>

SPECIFICATION COMPLIANCE INSULATION

- ASTM C447 Maximum Service Temperature: 1200°F (650°C)
- ASTM C547 Material Specification: Passes
- ASTM C585 Dimensions of Pipe Insulation: Passes
- ASTM C795/C871/C692: Passes
- ASTM C1335 Shot Content: <25%
- ASTM C1338 Fungi Resistance: Passes
- ASTM E84 Flame Spread/Smoke Developed: 25/50 or less
- CAI/UL C-S-102: 25/50 or less
- Nuclear Regulatory Guide 1.36: Passes
- MIL-I-24244: Passes
- Recovery after 10% Compression: 100%

ADDITIONAL INFORMATION AND MSDS
Please visit our website at www.iig-llc.com.
PRODUCT CERTIFICATION
When ordering material to comply with any government specification or any other listed specification, a statement of that fact must appear on the purchase order. Government regulations and other listed specifications require specific lot testing, and prohibit the certification of compliance after shipment has been made. There may be additional charges associated with specification compliance testing. Please refer to IIG-CSP-3 for Certification Procedures and Charges. Call customer service for more information.

QUALITY STATEMENT
IIG Products are designed, manufactured and tested to strict quality standards in our own facilities. This, along with third party auditing is your assurance that this product delivers consistent high quality.

Industrial Insulation Group, LLC is a Johns Manville company. IIG manufactures MiniWool® mineral fiber pipe, block and a variety of other insulations; Thermo-12® Gold Calcium Silicate pipe and block insulation; Super Firetemp® fireproofing board; SproutleVR-1200® Perlite pipe and block insulation; high temperature adhesives, and insulating finishing cement.

FOR CUSTOMER SERVICE,
TECHNICAL & GENERAL INFORMATION
(800) 866-3234
www.iig-llc.com

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IIG-423 08-12 (Replaces 07-10)
DIMENSION REQUIRED FOR THERMAL EXPANSION

POLYURETHANE INSULATION WITH MIN. 200 MIL HDPE INSULATION

24 GA. SHEET METAL AFFIXED WITH METAL SCREWS.

DRILL & PLUG WELD OUTER CONDUIT TO 10 GA. STEEL PIPE EXPANSION SUPPORT.

10 GA. STEEL PLATE WELDED TO 10 GA. STEEL PIPE SECTION & SIZED TO ACCOMODATE THERMAL EXPANSION & CONDUIT REDUCER TRANSITION.

10 GA. STEEL PIPE SECTION SAME DIA. AS CONDUIT. CUT AND WELDED TO FIT INSIDE CONDUIT.

NOTE:

1. INSULATION CAN BE MINERAL WOOL

2. CONDUIT WITH EXPANSION PIPE SUPPORTS SHALL HAVE SHIPPING BARS TACK WELDED ON CARRIER PIPE AND CONDUIT AND SHALL BE PAINTED TO SHOW TOP OF CONDUIT FOR PROPER SHIPPING, HANDLING, AND INSTALLATION.

THERMACOR PROCESS INC.
1670 HICKS FIELD RD. FT. WORTH, TEXAS

DUO-THERM 505 EXPANSION SINGLE PIPE SUPPORTS

DRAWING NO. SK-3D
DIMENSION REQUIRED FOR THERMAL EXPANSION

POLYURETHANE INSULATION WITH MIN. 200 MIL HDPE

CARRIER PIPE

STEEL CONDUIT

10 GA. STEEL PLATE WELDED TO 10 GA. STEEL PIPE SECTION & SIZED TO ACCOMODATE THERMAL EXPANSION & CONDUIT REDUCER TRANSITION.

INSULATION

24 GA. SHEET METAL AFFIXED WITH METAL SCREWS.

DRILL & PLUG WELD OUTER CONDUIT TO 10 GA. STEEL PIPE EXPANSION SUPPORT.

10 GA. STEEL PIPE SECTION SAME DIA. AS CONDUIT. CUT AND WELDED TO FIT INSIDE CONDUIT.

NOTE 1

CALICUM SILICATE

24 GA. SHEET METAL

EXPANSION PIPE SUPPORT

12"

8"

DRILL & PLUG WELD OUTER CONDUIT TO 10 GA. STEEL PIPE EXPANSION SUPPORT.

PROFILE VIEW

NOTE:

1. INSULATION SHALL BE MINERAL WOOL

2. CONDUIT WITH EXPANSION PIPE SUPPORTS SHALL HAVE SHIPPING BARS TACK WELDED ON CARRIER PIPE AND CONDUIT AND SHALL BE PAINTED TO SHOW TOP OF CONDUIT FOR PROPER SHIPPING, HANDLING, AND INSTALLATION.

THERMACOR PROCESS L.P.
1870 HICKS FIELD RD. FT. WORTH, TEXAS

DUO—THERM 505 EXPANSION SINGLE PIPE SUPPORTS

DRAWING NO. SK—3D
STEEL PIPE ANCHOR SPECIFICATIONS

ANCHOR PLATES ARE 1/2" STEEL CENTERED ON CONDUIT WITH DIMENSIONS 1 1/2" LARGER HORIZONTALLY AND 1 1/2" LARGER VERTICALLY THAN NOMINAL HDPE JACKET DIAMETER. THE CONCRETE ANCHOR BLOCK SHOULD EXTEND A MINIMUM OF 12" INTO THE TRENCH WALL, UNDISTURBED EARTH OR COMPACTED BACK FILL (MINIMUM 95 PROCTOR) IN ALL DIRECTIONS, WITH A MINIMUM OF 36" IN LENGTH ON EITHER SIDE OF THE ANCHOR PLATE. THE ANCHOR BLOCK SIZE IS BASED ON THE SOIL CONDITIONS AND THE FORCES EXERTED ON THE ANCHOR. SIZING OF THE ANCHOR BLOCK IS BY OTHERS.
NOTES:

* WALL RING INCREASE OUTSIDE DIAMETER OF HDPE JACKET BY 1/2".

** CONTRACTOR TO VENT TO ATMOSPHERE TO PREVENT CONDUIT FLOODING IN ACCORDANCE WITH CONTRACT DRAWINGS IN THE EVENT THE VAULT FLOODS. VENT MUST BE OPEN AND INSTALLED PRIOR TO STARTING SYSTEM. INSTALL CHECK VALVE TO PREVENT WATER INTRUSION.

*** DRAIN SHOULD BE OPENED DURING START-UP TO ALLOW CONDUIT TO DRAIN.
UNDERGROUND PIPE CAP DETAIL

PROFILE VIEW

HDPE CAP
JACKET
HIGH TEMP. INSULATION
CARRIER PIPE
AIR GAP
CONDUIT
POLYURETHANE FOAM

SCALE: NONE
INSTALLATION PROCEDURE FOR JOINT CLOSURES FOR DUO-THERM PIPING SYSTEM

Materials & Equipment

<table>
<thead>
<tr>
<th>MATERIALS:</th>
<th>EQUIPMENT PROVIDED BY CONTRACTOR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sectional Insulation</td>
<td>1. Clean Rags</td>
</tr>
<tr>
<td>2. (2) 1/2&quot; Stainless Steel Bands (for insulation)</td>
<td>2. Duct Tape</td>
</tr>
<tr>
<td>3. Split Conduit Sleeve</td>
<td>3. Hole Saw, 1&quot; Hoe Cutter</td>
</tr>
<tr>
<td>4. HDPE Split Sleeve</td>
<td>4. Safety Equipment as Prescribed by Local Regulations</td>
</tr>
<tr>
<td>5. Pour Foam, Components &quot;A&quot; &amp; &quot;B&quot;</td>
<td>5. Tape Measure</td>
</tr>
<tr>
<td>6. ERM Jumper Cable (Per Kit)</td>
<td>6. Propane Torch</td>
</tr>
<tr>
<td></td>
<td>8. Crimpers</td>
</tr>
</tbody>
</table>

Step 1.

Carefully cut and remove shipping straps from carrier pipe and conduit. Factory recommends use of a grinder to remove straps. **DO NOT CUT OR GOUGE PIPE WHEN REMOVING STRAPS.** Weld carrier pipes together at joint. After weld has cooled, hydro-test as per specifications.

Step 2.

After pressure test, insulate the joint using sectional insulation.

Step 3.

Secure insulation in place using (2) 1/2" stainless steel bands.

IMPORTANT: THE JOINT AND JOINT MATERIALS **MUST** BE KEPT DRY!!
Step 4.

Place split conduit sleeve over joint and weld in place. After weld has cooled, pressure test as per specifications.

Step 5.

Use a propane torch with a light, billowy flame to dry the area out.

Step 6.

Clean both the HDPE jacket and HDPE sleeve with a rag to remove any dust or dirt. Center the sleeve over the weld joint. Mark each end of the sleeve on the HDPE jacket. On top of the sleeve, make a mark 9" from the edge on each side to locate pour holes.

Step 7.

Wrap the HDPE sleeve tightly over insulated joint with longitudinal seam at 2 o'clock position. After the sleeve is wrapped around the joint, make sure the ends are square to each other at the overlap area. Seal ends with duct tape.

IMPORTANT: THE JOINT AND JOINT MATERIALS MUST BE KEPT DRY!!
Step 8.

Drill two 1" holes in the top of the sleeve. Mix required foam per Foam Kit Instructions and pour into 1" hole. Allow foam and gas (Air) to escape through holes and cover the holes with duct tape when the foam comes out of the holes. See Foam Kit Instructions for quantities, etc. (Foam Quantities over 64oz. requires multiple pours). After allowing 4 to 5 minutes for foam to completely fill the void, trim excess foam from the joint and remove the duct tape.

Step 9.

Allow 4 to 5 minutes reaction time for foam to completely fill the void. If the total foam quantity is over 64 oz., perform multiple pours until the total volume is delivered. Trim excess foam from the joint with a knife. Remove duct tape used temporarily seal seams.

Step 10.

Using a soft billowy flame, heat the patch with a smooth brushing motion until it becomes soft and shiny. Remove heat and press the patch to the sleeve with a gloved hand to form a bond. Heat the rest of the heat shrink sleeve into place, starting at the bottom center of the sleeve and working up and out toward the ends. The mastic should be visible on both sides after the sleeve has cooled.

IMPORTANT: THE JOINT AND JOINT MATERIALS MUST BE KEPT DRY!!
## STANDARD POUR FOAM MIXING QUANTITIES

<table>
<thead>
<tr>
<th>Conduit Size (in)</th>
<th>HDPE Jacket (in)</th>
<th>Foam Thickness</th>
<th>HDPE Sleeve</th>
<th>“A” Component (fl. oz)</th>
<th>“B” Component (fl. oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 5/8</td>
<td>9.0</td>
<td>1”</td>
<td>30”W x 14”</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>8 5/8</td>
<td>11.0</td>
<td>1”</td>
<td>30”W x 14”</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>10 3/4</td>
<td>13.2</td>
<td>1”</td>
<td>30”W x 14”</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>12 3/4</td>
<td>15.2</td>
<td>1”</td>
<td>30”W x 20”</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>14</td>
<td>16.4</td>
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<tr>
<td>16</td>
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<td>23</td>
</tr>
<tr>
<td>18</td>
<td>20.5</td>
<td>1”</td>
<td>30”W x 24”</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>20</td>
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<td>30”W x 24”</td>
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<td>29</td>
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<tr>
<td>22</td>
<td>24.5</td>
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<td>24</td>
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<td>28.5</td>
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<td>28</td>
<td>30.5</td>
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<td>(2) 30”W x 20”</td>
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<tr>
<td>30</td>
<td>32.5</td>
<td>1”</td>
<td>(2) 30”W x 20”</td>
<td>42</td>
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<td>36.5</td>
<td>1”</td>
<td>(2) 30”W x 20”</td>
<td>47</td>
<td>47</td>
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<tr>
<td>36</td>
<td>38.5</td>
<td>1”</td>
<td>(2) 30”W x 24”</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

*Contact Thermacor for pour foam amounts where foam insulation thickness is greater than 1”.

**IMPORTANT:** THE JOINT AND JOINT MATERIALS MUST BE KEPT DRY!!
## INSTALLATION INSTRUCTIONS

### UNLOADING & HANDLING
Lift joints from trucks. DO NOT DROP SHARP OR HEAVY OBJECTS ON INSULATED UNITS. DO NOT use chains or other devices which might puncture insulation jacket.

### STORAGE
Pipe is stockpiled off the ground. Do not exceed a stacking height of 6’. Prevent dirt and debris from entering pipe. Fittings, joining materials, etc. must be stored indoors to protect them from freezing, overheating, moisture, or loss.

### LAYING OF PIPE UNITS – TRENCHING
All sharp rocks, roots, and other abrasive material must be removed from the trench. The trench bed should be 6” of sand or backfill as specified by the engineer, providing a smooth and uniform stabilizing surface (sandbags may be used as a means to keep pipe off the ground until backfilling is started). The trench width should provide a minimum of 6’ from trench wall to jacket O.D. and a minimum of 6” between pipe units. Trench depths will be indicated on the contract drawing and in line with good construction practices. Trench depth should allow for a minimum cover of 24” on top of the insulated unit. Pipe is to be sloped 1” per 40’ towards the drains. Pieces that are marked top should have “top” up.

### FIELD JOINING METHODS
Piping shall be joined in the field using approved methods of welding for appropriate pipe. Installation drawings will be provided to indicate location of each individual piece of pre-insulated pipe. Pre-insulated pipe will be marked with Job and Piece Number correlating to those on the installation drawings. Installation of pipe must follow the installation drawings. Shipping bars should be removed prior to welding. Care should be taken in removing shipping bars so as not to damage carrier pipe. Thermacor strongly recommends the use of a grinder when removing the bars from the carrier pipe. Field changes to fabricated units must be authorized in writing by the factory.

### ANCHORS AND COLD SPRINGING
All carrier pipe welds, with the exception of the cold spring welds, should be made and anchors poured prior to the cold springing. Anchors should be 1’ above, 1’ below, and 3’ in length, extending into the undisturbed dirt of the trench wall. Cold springing is to be performed per the Engineer’s instructions and as shown on the installation drawings. Bridging the conduit may be used when circumstance does not allow traditional methods.

### HYDROSTATIC TESTING
The hydrostatic pressure test shall be performed per the engineer’s specification with a factory recommendation of one and one-half times the normal operating pressure for not less than two hours. Inspect all welds at this time. Appropriate safety precautions shall be taken to guard against possible injury to personnel in the event of a failure.

### INSULATION
Joints should be insulated after the hydro-test to the thickness and material specified, making sure that the insulation is cut to length and secured with two stainless steel bands, as provided. **The insulation and/or the inside of the conduit must be kept dry during the entire insulation process.**

### CASING SLEEVES
Sleeves are welded and air tested at 15 psi for two hours. After testing, sleeves are to be cleaned of any weld splatter and either coated, heat shrink is applied, or both.

### JOINT CLOSURES
An HDPE split sleeve is put in place and foam is poured and heat shrink sleeve applied. If a pressure testable sleeve has been specified, then follow the instructions provided.

### BACKFILL FINAL
Before backfilling is started, the trench should be cleaned of any trench wall cave-ins and general trash, especially metal. Backfilling should be done with sand or other engineer-approved material 6” below the casing to 6” above. Engineer-approved backfill may be used to fill the rest of the trench. This material should be free of rocks, roots, large clods, or anything that could cause damage to the casing or casing coating. Casing should have a minimum of 2’ cover.

WHEELED OR TRACKED VEHICLES SHALL NOT BE USED FOR TAMPPING!
SHIPPING & HANDLING INSTRUCTIONS

HANDLE COATED PIPE WITH EXTRA CARE! THIS PIPE CAN DAMAGE WHEN HANDLED, MOVED, OR STORED IMPROPERLY!

UPON RECEIPT OF MATERIALS
Make an overall inspection of the load, checking all bands and braces to see if they are intact. Also, check the load for shifting. If the load has shifted, or if the braces and bands are broken, examine each pipe for damage. HAVE THE TRUCK DRIVER MAKE AN ITEMIZED NOTATION OF ANY DAMAGE ON THE DELIVERY RECEIPT AND HAVE IT SIGNED BY THE DRIVER.

CHECK PACKING LIST
Compare materials received with those listed on the packing list. Count all pipe and boxes. NOTE ANY SHORTAGES ON DRIVER’S DELIVERY RECEIPT.

CHECK BOXES
Open all boxes and inspect for damages, shortages, and correct size. REPORT ANY DISCREPANCIES WITHIN 30 DAYS AFTER RECEIPT.

CLAIMS FOR DAMAGES
Claims for damages in transit or lost goods must be made within 30 days. The filing of any claim is the Purchaser’s Responsibility. Thermacor will file any claim on Purchaser’s behalf upon receipt of the following:

1. Written authority to file such a claim.
2. Written notice of loss or damage (signed and noted Bill of Lading) by truck driver or carrier freight agent.

UNLOADING PIPE
Pipe may be unloaded by hand or with fork lifts*, cherry pickers, or cranes. DO NOT HOOK pipe ends. Minimum 4" wide straps or slings should be used.

*Fork Lift – When using Fork Lift, wide tines or a large surface covering the fork tines must be used to prevent coating damage. Fork Lift must be able to handle the weight of the insulated pipe length.

PIPE STOCKPILING
Pipe should be stored on level ground, elevated to be as dry as possible, and in such a way that the pipe ends do not lie in water or on the ground. To prevent deformation of the jacket and insulation due to the weight of the pipe, place a series of supports (3 for 20’ or 5 for 40’) of ample size generally constructed from 2” x 4”s under the pipe as shown below. Supports should increase in width as weight load increases so that the top supports of a fully loaded stockpile should be approximately 10” wide, gradually increasing to the bottom level, approximately 18” wide. Pipe can be pyramided (within reasonable and safe limits) approximately 6’ high after a properly braced or chocked base is formed. Pipe stored outside for long periods of time can be covered with blue mesh tarpaulin (plywood can also be used). Do not prevent airflow as jacket can be deformed from heat buildup.

BE VERY CAREFUL NOT TO DROP THE PIPE!

NOTE: Thermacor does not approve of the practice of installing pipe and fittings, and backfilling the pipe before testing. Thermacor will not allow or pay claims for charges which arise in locating and digging up leaks regardless of cause.
Operating and Maintenance Procedures
Duotherm 505 Underground Conduit Systems

**THERMACOR PROCESS** Duotherm 505 underground conduit systems are designed and constructed to provide many years of trouble-free service.

**THERMACOR PROCESS** Duotherm 505 underground conduit systems are also designed and constructed to be drainable, dryable, and testable.

Like any mechanical system, a reasonable amount of maintenance is necessary to insure maximum life.

The greatest danger to any Duotherm 505 underground conduit system is the entry of water into the system. Immediate removal of water and drying of carrier pipe insulation is of utmost importance. It is equally important that field joints be made properly at the time of installation to prevent water ingress into the polyurethane.

Conduit System Monthly Inspections

Underground conduit systems should be inspected monthly. Walk over the routing of the underground conduit lines and visually inspect for:

- Steam or vapors coming out manholes--this can indicate that the underground conduit lines or the manholes are flooded with water.
- Steam, steam vapors, or wet areas above the underground conduit routing -- this can indicate that the underground conduit system has been damaged.
- Recent excavations over or near the underground conduit lines -- inspect to make certain that the underground conduit system is not damaged.
- Installation of poles, posts, stakes, etc. over or near the underground conduit lines -- inspect to make certain that the underground conduit system is not damaged.
- Browning of grass -- this can indicate that excessive heat is being transferred to the soil surrounding the underground conduit system. Inspect the underground conduit system for damage or flooding.
- Any unusual ground conditions over or near the underground conduit lines -- this can indicate that excessive heat is being transferred to the soil surrounding the underground conduit system. Inspect the underground conduit system for damage or flooding.
Check all underground conduit lines for dryness as described below in “Test for Dryness”.

Remove all underground conduit drain plugs and inspect the internals of the underground conduit system for the presence of water. Replace all underground conduit line plugs.

Check all valves, expansion joints, and ball joints that are connected to the underground conduit system for functionality.

Retorque nuts and bolts on all flange connections.

Inspect and clean all strainer screens.

Check probe leak detection system if applicable

Check sump pump by manually raising float.

**Conduit System Annual Inspections**

Underground conduit systems should be inspected annually. All of the monthly checks should be performed plus the following:
- Air test the underground conduit system outer casing to prove its tightness.

**Manhole and Building Pit Inspections**

Manholes and building pits used for terminations of underground conduit lines are a common source of problems for underground conduit systems.

Manholes and building pits should be visually inspected monthly---particularly after periods of heavy rainfall.

Manholes and building pits must be kept dry. If water accumulates within a manhole or building pit, it should be pumped out immediately. Water within a manhole or building pit should never be allowed to rise to the bottom of the underground conduit system.

Hot, moist conditions within a manhole or building pit can quickly corrode valves and piping as well as underground conduit terminal ends and accessories. All exposed metal surfaces of the underground conduit system should be coated with corrosion resistant coatings and recoated as necessary.

During manhole and building pit inspections, all underground conduit terminal ends should be inspected. Visually inspect for:

- End seals - End seals are steel plates welded directly to the underground conduit outer steel casing and to the carrier pipe. End seals are initially factory coated with a corrosion resistant coating to prevent corrosion. Check the end seals to determine if they require recoating. End seals should only require an occasional recoating with a corrosion resistant coating to prevent corrosion.
• Gland seals - Gland seals are packed stuffing boxes around the carrier pipe, with bolted gland followers. Gland seals require periodic inspections, tightening, and replacement of packings because of wear due to friction and heat hardening. If gland seals are not maintained, they will allow water to enter the underground conduit system if the manhole or building pit is flooded. Gland seals are initially factory coated with a corrosion resistant coating to prevent corrosion. Check the gland seals to determine if they require recoating. Gland seals should only require an occasional recoating with a corrosion resistant coating to prevent corrosion.

• Drains - Underground conduit drains are located on the bottom of the underground conduit terminal ends. On the low end of the underground conduit line, the drain connection is plugged or it may be piped with a valve for easier inspection of the underground conduit. This drain must be kept closed after installation tests have been completed and the underground conduit interior has been tested for dryness as described below in "Test for Dryness".

• During the inspection of manholes and building pits, all underground conduit system drain plugs should be removed and the internals of the underground conduit system should be opened to check for the presence of water. If water is in the underground conduit system, it should be drained out immediately as described below in “Drying Procedures.”

• In the event that water has entered the underground conduit system, determine how much water has entered the underground conduit, and correct the condition. The underground conduit system must then be tested for dryness as described below in “Test for Dryness”. If the underground conduit system will not pass the dryness test, drying procedures must be started immediately as described below in “Drying Procedures”.

• If the inspection proves there is no water in the underground conduit system, close the drains.

• Vents - Underground conduit vent plugs are furnished on the top of all underground conduit terminal ends. The underground conduit vent plugs should be piped to atmosphere, if possible, or to the top of the manhole to a point above any possible flood level.

**Test for Dryness**

To test for dryness within an underground conduit system, hold a cool mirror next to the end of the underground conduit vent discharge or vent discharge pipe, while circulating dry and clean air through the underground conduit outer casing. If the cool mirror does not fog, the carrier pipe insulation should be considered to be dry.

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**Drying Procedures.**

In the event that water has entered the underground conduit system, it is imperative that the water be drained immediately. After the water has been drained from the underground conduit system, determine how the underground conduit system got wet and correct the cause. After the water has been drained from the underground conduit system and after the cause has been corrected, the following drying procedure should be followed:
1. Open the drain in the terminal end of the underground conduit system at the low end of the underground conduit line and open the vent in the terminal end at the high end of the underground conduit line.

2. With heat on the carrier pipe, force air through the underground conduit casing at a rate of not less than 2 CFM, by the use of a pneumatic air compressor attached to the vent opening in the terminal end of the underground conduit system at the high end of the underground conduit line. **Do not exceed 15 psig pressure.**

If it is more convenient, connect an industrial vacuum cleaner to the vent opening in the terminal end of the underground conduit system to pull air through the underground conduit system. Using an industrial vacuum cleaner is usually faster if the air being pulled-in is relatively dry air.

Air should enter through the underground conduit system vent opening in the terminal end of the system at the high end of the underground conduit line. This will assist in the removal of water at the low end drain of the underground conduit line.

For better control of the drying procedure, the vent connection from the underground conduit system should be equipped with a 30 psig gauge, a control valve, and should be pipe or hosed out of the manhole or building pit to a point where the surrounding air will not fog a cool mirror.

3. After all water has been drained out of the underground conduit system, and air has been circulated through the conduit, test for dryness as described above in “Test for Dryness”.

4. Continue circulating air through the underground conduit casing and continue testing for dryness until the discharged air does not fog a cool mirror.

**Conduit System Outer Casing Damage**

Should the outer casing of the underground conduit system be penetrated or damaged in any manner, it should be repaired immediately. Contact Thermacor Process INC. for recommendations and assistance in making any repairs to the underground conduit system.

Locate the damage to the underground conduit system. Excavate the area around the damaged portion of the underground conduit system and make all necessary repairs to the outer casing in accordance with the recommendations of Thermacor Process INC.

After any repair to the underground conduit system, the underground conduit outer casing should be air-tested to prove its tightness.

If the damaged underground conduit system has been flooded with water, it should be drained and dried as described above in “Drying Procedures.”
Conduit system Carrier Pipe Damage

Should the carrier piping within the underground conduit system be damaged in any manner, it should be repaired immediately. Contact Thermacor Process INC. for recommendations and assistance in making any repairs to the underground conduit system.

Locate the damage to the underground conduit system. Excavate the area around the damaged portion of the underground conduit system and make all necessary repairs in accordance with the recommendations of Thermacor Process INC.

After any repair to the underground conduit system, the underground conduit outer casing should be air-tested to prove its tightness.

If the damaged underground conduit system has been flooded with water, it should be drained and dried as described above in “Drying Procedures”.
Ferro THERM

Service: Condensate and chill water piping system.

Pipe: A106B, seamless; standard weight (same as Schedule 40 up to 10") domestic steel in SRL's for chilled water. A106B, seamless; extra heavy weight (same as Schedule 80 up to 8") domestic steel in SRL's for condensate. MTR's are furnished for Source Quality Control.

Fittings: Pre-fabricated/Pre-insulated. Bolster are used for expansion on condensate water lines. Tees and long radius 90° EL/45°, butt weld fittings conforming to ASTM A-234 and ANSI B16.9. Fittings for pipe smaller than 2.5" shall be socket weld conforming to ANSI B16.11. Minimum 2D radius bends used where possible, complying with ASME B31.1. All carrier pipe welders are certified to the weld procedure used, where applicable. Visual inspection is per ASME B 31.1. No NDE.

Insulation: Polyurethane, 90-95% closed cell content, 2.0 to 3.0 pcf, K = .16 @ 75°F, operating temperature not to exceed 250 °F. Insulation thickness is per attached chart A-5059J with a tolerance of ± 1/8" on ends, ± 1/4" in middle.

Jacket: Extruded black high-density polyethylene (HDPE), manufactured in accordance with ASTM D-3350, minimum thickness 100 mils for jacket sizes less than or equal to 12", 125 mils for jacket sizes larger than 12" to 24", and 150 mils for jacket sizes greater than 24".

Field Joint Insulation: Polyurethane foam, sleeve, and heat shrink sleeve; to be field applied.

Fitting Insulation: Factory applied polyurethane foam and fitting cover.

Note: Pipe to be shipped with caps in place.

Note: Condensate lines will have cool anchors.

**Quoted with limited specifications. **
HIGH DENSITY POLYETHYLENE JACKET

POLYURETHANE FOAM

ASTM A106B, SEAMLESS, STANDARD WEIGHT DOMESTIC STEEL FOR CHW AND EXTRA HEAVY WEIGHT DOMESTIC STEEL FOR CONDENSATE

END SEALS AS SPECIFIED, IF APPLICABLE

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>INSULATION THICKNESS</th>
<th>JACKET SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10&quot; chw</td>
<td>1.5&quot;</td>
<td>14.1&quot;</td>
</tr>
<tr>
<td>3&quot; cond</td>
<td>2.5&quot;</td>
<td>8.7&quot;</td>
</tr>
</tbody>
</table>
PRE-FABRICATED PRE-INSULATED FITTINGS

HDPE JACKET

POLYURETHANE FOAM

* FITTINGS INCLUDE: TEES, WELD-O-LETS, 45° ELBOWS, ETC.
TO WHOM IT MAY CONCERN

RE: EXPANSION PADS

Steel or copper pipe expands when it is heated and contracts when it is cooled. The longitudinal movement of the pipe must be accommodated or it will either overstress the pipe, or at changes of direction, the pipe will crush the insulation and the jacket which surrounds it. The most commonly used method for accommodating movement is by the use of expansion elbows, z-bends, and expansion loops to provide flexibility in long straight runs of piping.

Ferro-Therm (or Copper-Therm) is referred to as a “bonded” system whereby the urethane adheres to both the pipe and the jacket making it a composite structure. As the pipe moves, the urethane and the jacket move with it. This is due to the fact that the urethane and the jacket are elastic materials and tend to stretch with the pipe on an incremental basis as it expands or contracts.

Thermacor for many years recommended that movement be accommodated by building a “soft” chamber within an oversize elbow or group of elbows. Through experience, we found that even though this method provided space for movement of the pipe at the change of direction, it did not account for the corresponding movement of the bonded insulation and jacket on either side of the elbow. This resulted in a potential weak spot in the jacket at the transition point where the oversized casing began. The potential for leaks at this point existed.

In recent years we have strongly recommended the use of expansion pads or bolsters placed externally around the jacket to accommodate this movement. Our experience has shown that this is a more effective and economical method. It has also become a standard practice with the low temperature systems in Europe.

The thickness of the expansion pad should be equal to or greater than the calculated amount of movement. Friction force from the weight of the backfill offers some restraint so that a pad thickness equal to the movement will be satisfactory for both expansion and the slightly compressed expansion pad displacement.

Please feel free to contact Thermacor’s Engineering Department for further information or clarification with respect to the use of expansion pads in your underground piping system.
INSTALLATION INSTRUCTIONS:

EXPANSION BOLSTERS PROCEDURE

1. EXPANSION BOLSTER MATERIAL IS SUPPLIED IN PADS:
   6'-0" LONG x 3" THICK x HEIGHT SPECIFIED ON CHART.
   4'-0" LONG x 1" THICK x HEIGHT SPECIFIED ON CHART.

2. PLACE BOLSTER PADS AGAINST JACKET AND CURVE AROUND
   ELBOW AS SHOWN. HOLD IN PLACE BY ATTACHING PADS TO
   JACKET WITH DUCT TAPE OR EQUIVALENT ON TOP AND
   BEDDING SAND ON THE BOTTOM. BE CERTAIN THAT THE
   BOLSTER PADS FITS SNUG TO JACKET.

3. BOLSTER PAD CONFIGURATION IS DEPENDENT ON LAYOUT &
   WILL BE SHOWN ON THE INSTALLATION DRAWING.

* NOTE:
   DUCT TAPE TO BE 1'-0" ON CENTERS.

<table>
<thead>
<tr>
<th>PVC JACKET OD (INCHES)</th>
<th>HDPE JACKET OD (INCHES)</th>
<th>PAD HEIGHT (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>7</td>
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<tr>
<td>4</td>
<td>5.40</td>
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<td>8.88</td>
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</tr>
<tr>
<td>10</td>
<td>10.85</td>
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<tr>
<td>12</td>
<td>12.85</td>
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<td>14.1</td>
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<tr>
<td>16</td>
<td>16.1</td>
<td>17</td>
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<td>18.2</td>
<td>17</td>
</tr>
<tr>
<td>-</td>
<td>20.28</td>
<td>17</td>
</tr>
<tr>
<td>-</td>
<td>22.2</td>
<td>25</td>
</tr>
<tr>
<td>-</td>
<td>24.38</td>
<td>25</td>
</tr>
<tr>
<td>-</td>
<td>28.25</td>
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</tbody>
</table>

SCALE: NONE

CROSS SECTION

14.701 Expansion Padding Installation Instr.
5/14/2012 Rev: Initial
STEEL PIPE ANCHOR SPECIFICATIONS

1. STEEL ANCHOR PLATE AND WELDED RINGS FURNISHED BY THERMACOR. ANCHOR PLATE SHALL MEET ASTM A36 AND ON ALL SIZES SHALL BE 1/2" THICK. ANCHOR PLATE SHALL EXTEND 2-1/2" BEYOND THE CASING DIAMETER ON ALL SIDES. ANCHOR PLATE SHALL BE CORROSION COATED WITH A HIGH TEMPERATURE COATING MATERIAL AFTER WATERSHED RINGS HAVE BEEN SEALED TO CASING BY HEAT SHRINK TAPE.

2. ANCHOR ASSEMBLY SHALL BE POURED IN A CONCRETE BLOCK BY THE CONTRACTOR IN THE FIELD. (MINIMUM 3000 psi) GENERALLY, THE ANCHOR BLOCK EXTENDS A MINIMUM OF 12" IN ALL DIRECTIONS BEYOND THE ANCHOR O.D. AND HAS A OVERALL LENGTH OF 36". THE JOB SITE CONDITIONS SHALL BE THE FINAL DETERMINING FACTOR FOR ANCHOR BLOCK SIZING.

3. DEPENDING ON ANCHOR BLOCK SIZE, STEEL REINFORCEMENT BARS MAY BE REQUIRED.

NOTE:
IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO DESIGN THE ANCHOR BLOCKS APPROPRIATELY.
PROFILE VIEW

UNDERGROUND PIPE CAP DETAIL

SCALE: NONE
THERMACOR® Thermafab System pre-insulated piping products and kits are supplied to provide optimum thermal efficiency with maximum ease of installation. The following instructions are for use in field insulating fittings, anchors, and straight pipe joints on THERMACOR® Thermafab systems. Carrier pipes, jacket and tape materials, and pipe joining methods may vary based on different piping requirements and project specifications. Check your approved submittal to verify specification compliance before proceeding with these instructions.

**Notes & General Instructions**

1) These instructions are applicable to a range of material types and size combinations. Be sure you are using the correct procedure and have chosen the correct tape size, length, and amount of foam from the Foam & Tape table.

2) Check the packing slip accompanying your order to insure all kit materials have been received. Shortages **must** be noted on shipper’s packing list in order to file a claim for replacement materials.

3) Store all kit material in a dry place. Liquid foam components shall be stored at room temperature (75°F ± 15°F). Do not allow liquid foam components to freeze.

4) The following supplies and hand tools may be needed to complete the procedures listed below: work gloves, eye protection, sharp knife, ½” wide strapping tape, 2” wide duct tape, drill with 1” bit, and if you are using heat shrink products; a butane or propane brush burning torch that has a hillow flame.

5) When called for, refer to the Polyurethane Foam Mixing Instructions for the correct procedure in using these materials.

6) When insulating mechanically coupled pipe joints or fittings (e.g., Victaulic type), it is recommended to wrap the couplings with plastic (Saran Wrap or similar) to prevent foam from fouling the bolt threads should disassembly ever become necessary.

7) All sealing tape products should be applied with firm tension without stretching the tape. Each winding should be half-lapped over the previous layer. Tape wraps should start and end with one full wrap around the jacket at least two inches before any seam to be sealed. Be sure the surface to which you are applying tape is clean and dry to maximize adhesion.

8) Minor shipping damage to the jacketing on factory sections of insulated pipe may be repaired with a tape overwrap after any cracks have been stop-drilled.

9) If you are unsure about any of these instructions, or if you have a special installation condition, please contact your local Thermacor Sales Representative for assistance or feel free to call us direct at (817) 847-7300. We want your installation to go in smoothly and correctly!

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**A Note On SAFETY**

*For complete safety and handling instructions, please refer to the MSDS sheets provided with the shipment.*

Do not eat, drink, or smoke while handling the liquid foam components. Precautions should be taken to limit skin exposure to the liquid materials. The foam will generate some heat while reacting, and confined foam may create considerable pressure while reacting. Eye protection in the form of goggles or a face shield is recommended in case of a sudden release of pressure.
Polyurethane Foam Mixing Instructions

Materials Included:
- 1 Container of Isocyanate (Part "A")
- 1 Container of Resin (Part "B")
- 2 Measuring Cups (8 oz or 32 oz) for Measuring Each Foam Component Separately
- Wooden Stir Sticks
- Disposable Foam Mixing Pails.

1. Determine Foam Requirement:
   Locate proper carrier pipe and jacket size combination in the Foam Table on page FKII 14.102. The quantity listed is the total of both the “A” and “B” components. Measure one-half the listed amount of Part “A” using the “A” measuring beaker, and one-half the listed amount of Part “B” into the “B” measuring cup.

2. Mix and Pour Foam:
   Pour Part “A” (iso) into the mixing pail first. Using wooden stir stick, mix vigorously as Part “B” (resin) is added. Stir for 20 to 25 seconds and immediately pour material through the hole in fitting cover or sleeve. (Be prepared for a quicker reaction time on warm days.)

3. Allow to Cream:
   Allow four to five minutes foam reaction time before continuing. If the total foam quantity is over 64 oz., perform multiple pours until the total volume is delivered.

Straight Run Joint Kit

1. Slide a pre-cut sleeve of jacket material onto one end of the pipe. Make the field weld and pressure test as specified for your project.

2. After testing, slide the sleeve over the joint so that there is an equal overlap at each end. Use duct tape to seal each end of the sleeve.

3. Drill (2) one-inch diameter holes in the top of the sleeve.

4. Follow foam mixing instructions precisely using correct quantity (see Foam & Tape Table on FKII 14.102) and pour immediately into one of the holes in the sleeve.

5. Allowing 4 to 5 minutes reaction time for foam to completely fill the void. If the total foam quantity is over 64 oz., perform multiple pours until the total volume is delivered. Trim excess foam from the joint with knife. Remove duct tape used to temporarily seal seams.

6. Remove the release paper from the back of the heat shrink sleeve and loosely wrap the shrink sleeve around the joint area, overlapping at the top and with one inch droop at the bottom of the sleeve. Remove the release film from the closure patch, warm the patch, then place the heat shrink patch over the sleeve seam area and hold in place.

7. Using a soft billowy flame, heat the patch with a smooth brushing motion until it becomes soft and shiny. Remove heat and press the patch to the sleeve with a gloved hand to form a bond.

8. Heat the rest of the heat shrink sleeve into place, starting at the bottom center of the sleeve and work up and out towards the ends. The mastic should be visible on both sides after the sleeve has cooled.
### Field Insulation Kit Installation Instructions

**FIELD KIT FOAM & TAPE TABLE**

<table>
<thead>
<tr>
<th>Pipe Size (4)</th>
<th>Jacket Size</th>
<th>Fitting Cover #90/other</th>
<th>Tape Width (5)</th>
<th>Field Joint or Red.</th>
<th>Field Joint or Red.</th>
<th>Field Joint or Red.</th>
<th>TOTAL Liquid Ounces of A &amp; B Foam (1,2,3)</th>
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<td>90 E1 45 E1 Toe Anchor 90 E1 45 E1 Toe Anchor 90 E1 45 E1 Toe Anchor</td>
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<td>3</td>
<td>9</td>
<td>2</td>
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<td>55</td>
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<td>2</td>
<td>4.9</td>
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<td>4.9</td>
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<td>or 1-1/4&quot; Copper</td>
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<td>2</td>
<td>7.6</td>
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<td>28</td>
<td>55</td>
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<td>15</td>
<td>2</td>
<td>7.6</td>
<td>37</td>
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(1) Foam quantity listed is the total of both A & B components.
(2) Keep foam containers sealed when not in use.
(3) Use multiple pours for foam quantities over 64 oz. total.
(4) IPS sizes include Steel, PVC, PE, and FRP pipe.

Field Kit Foam & Tape Table
5/21/2012 Rev: Initial
INSTALLATION INSTRUCTIONS

UNLOADING & HANDLING
Lift joints from trucks. DO NOT DROP SHARP OR HEAVY OBJECTS ON INSULATED UNITS. DO NOT use chains or other devices which might puncture insulation jacket.

STORAGE
Pipe is stockpiled off the ground. Do not exceed a stacking height of 6'. Prevent dirt and debris from entering pipe. Fittings, joining materials, etc. must be stored indoors to protect them from freezing, overheating, moisture, or loss.

LAYING OF PIPE UNITS – TRENCHING
All sharp rocks, roots, and other abrasive material must be removed from the trench. The trench bed should be 6” of sand or backfill as specified by the engineer, providing a smooth and uniform stabilizing surface (sandbags may be used as a means to keep the pipe off the ground until backfilling is started). The trench width should provide a minimum of 6” from trench wall to jacket O.D. and a minimum of 6” between pipe units. Trench depths will be indicated on the contract drawing and in line with good construction practices. Trench depth should allow for a minimum cover of 24” on top of the insulated unit.

FIELD JOINING METHODS
Ferro-Therm piping and fittings shall be joined in the field using approved methods of welding for appropriate pipe.

FIELD ALTERATIONS
Pipe will be cut in the field, based on the appropriate field measurements for fabrication of loops, fittings, and/or making manhole or wall entries unless the system is pre-engineered with piece mark sections and/or with pre-fabricated/pre-insulated fittings. If special short pieces are required, measure distance needed for field alteration and cut through unit with saw. Using factory insulated pipe as guide, cut back insulation and bevel pipe (simultaneously removing burrs, cuts, nicks, and scratches). Apply end seal to the clean, dry, exposed insulation surface, if required.

HYDROSTATIC TESTING
Anchor blocks shall be poured and cured, prior to testing. Bleed all air from lines to eliminate possible incorrect readings. The hydrostatic pressure test shall be performed per the engineer's specification with a factory recommendation of one and one-half times the normal operating pressure for not less than two hours. Inspect all fittings, valves, and couplings at this time. Appropriate safety precautions shall be taken to guard against possible injury to personnel in the event of a failure.

FIELD JOINT & FITTING INSULATION
See Drawings furnished with job material.

BACKFILL FINAL
Before backfilling is started, the trench should be cleaned of any trench wall cave-ins and general trash, especially metal. Backfilling should be done with sand or other engineer-approved material 6" below the casing to 6" above. Engineer-approved backfill may be used to fill the rest of the trench. This material should be free of rocks, roots, large clods, or anything that could cause damage to the jacket. Jacket should have a minimum of 2' cover.

WHEELED OR TRACKED VEHICLES SHALL NOT BE USED FOR TAMING!
SHIPPING & HANDLING INSTRUCTIONS

HANDLE COATED PIPE WITH EXTRA CARE! THIS PIPE CAN DAMAGE WHEN HANDLED, MOVED, OR STORED IMPROPERLY!

UPON RECEIPT OF MATERIALS
Make an overall inspection of the load, checking all bands and braces to see if they are intact. Also, check the load for shifting. If the load has shifted, or if the braces and bands are broken, examine each pipe for damage. HAVE THE TRUCK DRIVER MAKE AN ITEMIZED NOTATION OF ANY DAMAGE ON THE DELIVERY RECEIPT AND HAVE IT SIGNED BY THE DRIVER.

CHECK PACKING LIST
Compare materials received with those listed on the packing list. Count all pipe and boxes. NOTE ANY SHORTAGES ON DRIVER’S DELIVERY RECEIPT.

CHECK BOXES
Open all boxes and inspect for damages, shortages, and correct size. REPORT ANY DISCREPANCIES WITHIN 30 DAYS AFTER RECEIPT.

CLAIMS FOR DAMAGES
Claims for damages in transit or lost goods must be made within 30 days. The filing of any claim is the Purchaser’s Responsibility. Thermacor will file any claim on Purchaser’s behalf upon receipt of the following:
1. Written authority to file such a claim.
2. Written notice of loss or damage (signed and noted Bill of Lading) by truck driver or carrier freight agent.

UNLOADING PIPE
Pipe may be unloaded by hand or with fork lifts*, cherry pickers, or cranes. DO NOT HOOK pipe ends. Minimum 4” wide straps or slings should be used.

*Fork Lift – When using Fork Lift, wide tines or a large surface covering the fork tines must be used to prevent coating damage. Fork Lift must be able to handle the weight of the insulated pipe length.

PIPE STOCKPILING
Pipe should be stored on level ground, elevated to be as dry as possible, and in such a way that the pipe ends do not lie in water or on the ground. To prevent deformation of the jacket and insulation due to the weight of the pipe, place a series of supports (3 for 20' or 5 for 40') of ample size generally constructed from 2” x 4”'s under the pipe as shown below. Supports should increase in width as weight load increases so that the top supports of a fully loaded stockpile should be approximately 10” wide, gradually increasing to the bottom level, approximately 18” wide. Pipe can be pyramided (within reasonable and safe limits) approximately 6’ high after a properly braced or chocked base is formed. Pipe stored outside for long periods of time can be covered with blue mesh tarpaulin (plywood can also be used). Do not prevent airflow as jacket can be deformed from heat buildup.

BE VERY CAREFUL NOT TO DROP THE PIPE!

NOTE: Thermacor does not approve of the practice of installing pipe and fittings, and backfilling the pipe before testing. Thermacor will not allow or pay claims for charges which arise in locating and digging up leaks regardless of cause.
NEW UNDERGROUND PIPING SITE PLAN

DIMENSIONS ON DETAIL 2 ON SHEET 1 DO NOT MATCH THE SCALE INDICATED. ENGINEER/CONTRACTOR TO PROVIDE TRUE LENGTH FOR CH1 AND THE ANGLE OF ROLL FOR THE ELBOWS ON ALL SERVICES.