

SECTION 15010

GENERAL PROVISIONS

PART 1 GENERAL

1.01 CONDITIONS OF THE CONTRACT

- A. The Conditions of the Construction Contract, as well as these General Provisions, shall apply to all Sections of Division 15.

1.02 SCOPE

- A. The work to be done under this Division of the Specifications shall include the furnishing of all labor, materials, equipment and services necessary for the proper completion of all of the mechanical work as shown on the drawings and herein specified.
- B. In general, this shall include the furnishing and installing of all plumbing and heating systems, complete with auxiliaries, as may be required to make a complete and properly operating installation.
- C. Only such items as are hereinafter specified or indicated on the drawings to be furnished by others, shall be considered to be furnished by others. All other items are to be considered as a part of this Contract, and shall be so bid.
 - 1. Pre-manufactured underground steam conduit system will be purchased by Duluth Steam – see Section 15184 for additional information.
- D. The omission of specific reference to any parts necessary to, or reasonably incidental to, a complete installation shall not be construed as releasing the Contractor from furnishing and installing same.
- E. Applicable provisions of the following sections shall apply to all sections for Mechanical Work.

1.03 DEFINITIONS

- A. Provide: Under this Contract, Contractor shall furnish and install item or items specified. Contractor shall perform all labor and furnish all materials and equipment necessary to that specified item or system will be complete and operational in every respect.
- B. Furnish: Under this Contract, Contractor shall deliver to the site item(s) specified, as well as additional specialized materials and/or accessories necessary for the use and operation of item or items specified.
- C. Install: Under this Contract, Contractor shall set in position, connect (including sub-assemblies furnished), and adjust for use. Contractor shall furnish miscellaneous specialty items such as hangers, valves, unions, piping, sheet metal, etc., as obviously necessary for a complete and operating installation.

1.04 DRAWINGS

- A. In general, the drawings of the Mechanical Systems and Equipment are to scale, however, to determine exact locations of walls and partitions, the Contractor shall verify all existing conditions. Drawings shall not take precedence over field measurements. Plans of piping and ductwork, although shown on scale drawings, are diagrammatic only. They are intended to indicate the size and/or capacity where stipulated, approximate location and/or direction, and approximate general arrangement of one phase of work to another, but not the exact detail or exact arrangement of construction.

- B. If it is found before installation of any or all construction phases, that a more convenient, suitable or workable arrangement of any or all phases of the project would result by varying or altering the arrangement indicated on the drawings, the A/E may require any or all Contractors to change the location or arrangement of their work without additional cost to the Owner. Such rearrangement shall be in accordance with directions from the A/E.
- C. Where discrepancies are discovered after certain portions or phases of any Contract have been installed, the A/E reserves the right to have any or all Contractors make minor changes in pipe, duct, fixture or equipment locations or arrangements to avoid conflict with other work at no additional cost to the Owner.
- D. Because the drawings are to a relatively small scale to show as large a portion as is practical, the fact that only certain features of the system are indicated does not mean that other similar or different features or details will not be required. Contractor shall furnish all incidental labor, materials, or equipment for the systems under his control, so that each system is a complete and operating one unless otherwise specifically stipulated in the detailed body of the Specifications.
- E. The Contractor shall be responsible for determining all field measurements before commencing construction, giving due consideration to building design and other equipment to be installed. Mechanical equipment not dimensioned on the drawings shall be field located, giving due consideration to the work of other trades. The Contractor shall verify all dimensions before proceeding with the work. Where cutting and patching is required, each Contractor shall be responsible for his own work.
- F. Dimensions shall not be scaled from the drawings. If the Contractor discovers any discrepancy between actual measurements and those shown on the drawings which prevents good practice, good arrangement, or which is contrary to the intent of the drawings and specifications, he shall notify the A/E before proceeding with the work.

1.05 SITE INSPECTION

- A. Before submitting a proposal for the work contemplated in these specifications and accompanying drawings, each bidder shall examine the site and familiarize himself with all the existing conditions and limitations, including the extent of demolition, cutting and patching to be done by the Contractor for Mechanical Work. No extras will be allowed because of the Contractor's misunderstanding as to the amount of work involved, or his lack of knowledge of any condition in connection with the work.

1.06 CODES AND STANDARDS

- A. The entire project shall comply with any and all OSHA, Federal, State and local codes, including, but not limited to State Building Code, State Plumbing Code, MnDOT Specifications (utility work), City of Duluth Requirements, National Electrical Code, and the Model Energy Code (insulation).
- B. Code requirements shall supersede details shown on the drawings or described in these specifications. Size of all pipe must conform to the requirements of all Codes except where larger sizes are shown on the drawings.

1.07 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. Where the Bid Documents stipulate a particular Product, substitutions will be considered by the Engineer up to 7 days before receipt of bids.
- B. The submission shall provide sufficient information to determine acceptability of such products.
- C. When a request to substitute a Product is made, the Engineer may approve the substitution and will issue an Addendum to known bidders.

- D. The submission shall provide sufficient information to determine acceptability of such products.
- E. Provide Products as specified unless substitutions are submitted in this manner and subsequently accepted.
- F. The cost of any changes of other trades as a result of use of the substitution material or equipment must be borne by the Contractor submitting such material or equipment.
- G. Fax or telephone requests for substitution will not be accepted. E-mail requests are acceptable, provided they are received in the time period stated below.
- H. Those vendors wishing written approval shall include a return copy and a self-addressed stamped envelope with their request.

1.08 EQUIPMENT

- A. All equipment shall be new and in first-class condition. Equipment shall not be used for purposes other than intended by the manufacturer.
- B. Manufacturer's nameplate, name or trademark shall be permanently affixed to all equipment and material furnished under this Specification. Nameplate of Subcontractor or distributor will not be acceptable. Nameplate shall be masked prior to any painting. Remove masking after completion.
- C. Equipment specified and furnished shall be of a type and manufacturer that has a local representative and a local replacement and service outlet to give complete coverage on parts and service at all times.
- D. The following material and equipment has been pre-purchased (FOB jobsite) by Duluth Steam. Contractor is responsible for receiving the equipment on behalf of the Owner (at the Steam Plant), transporting it to the location where it is to be installed, and installing in accordance with manufacturer's recommendations. Pre-purchased material/equipment includes:
 - 1. Underground pre-insulated pipe material (including prefabricated and pre-insulated fittings for exterior buried piping).
- E. Contractor will be responsible for furnishing and installing all pipe and fittings which is installed inside of buildings, unless noted otherwise.

1.09 WARRANTY

- A. The Contractor shall be held responsible for any and all defects in equipment and workmanship (provided under this contract), which appear for one (1) full year after the date of Substantial Completion. All such defects must be repaired or defective equipment promptly replaced by the Contractor at no expense to the Owner.

1.10 INSPECTIONS AND FEES

- A. The Contractor shall obtain all permits and licenses required in connection with the work under Division 15. Cost for such shall be paid by the Contractor.

1.11 SUBMITTALS

- A. List of Suppliers & Subcontractors:
 - 1. The Contractor shall submit a list of suppliers, Subcontractors, and manufacturers for equipment installed under Division 15 for approval. Contractor shall make such submittal within 15 days after Notice to Proceed, prior to ordering any equipment. Approval of such list does not relieve the Contractor from submittal of shop drawings, nor shall it constitute final approval should the shop drawings be found not in agreement with the Specifications.

2. If a list of materials is not submitted, it shall be assumed that the Contractor has waived his option of equipment selection in favor of selection by the A/E.
- B. Cost Breakdown:
1. Before submittal of the first Request for Payment, the Contractor shall submit to the A/E, an itemized cost breakdown, including separation of labor and material, for work under Division 15. The breakdown shall be divided in such detail as requested to aid in approval of Payment Requests based on work completed. Breakdown shall include, but not be limited to:
 - a. Special Mechanical Conditions (Bonds, Mobilization, etc.)
 - b. Insulation
 - c. Excavation & Backfill
 - d. Heating
- C. Shop Drawings:
1. Shop drawings shall be submitted for all major equipment under each Section of this Specification.
 2. Shop drawings must first be checked by the Contractor for capacities and space conformance, and so stamped prior to submittal to the A/E.
 3. Submit a minimum of eight (8) copies of shop drawings.
- D. Record Drawings:
1. The Contractor shall keep a complete set of all mechanical drawings in his job site office for purposes of showing "As-Built" installation of mechanical systems and equipment.
 2. This set of drawings shall be used for no other purpose. Where any material, equipment or system components are installed different from that shown on the Drawings, such differences shall be clearly and neatly shown on this set of drawings using ink, or indelible pencil. The change notations shall be kept up-to-date on a daily basis. This set of drawings shall be transmitted to the A/E as directed, and after the A/E has examined the drawings, the set will be returned to the Contractor for further use. At the completion of the project, the set of drawings shall be turned over to the A/E for approval and delivery to the Owner.

1.12 TEMPORARY UTILITIES

- A. Contractor shall be responsible for temporary water, sewer and heating requirements during construction.

PART 2 - PRODUCTS - NOT USED.

PART 3 - EXECUTION

3.01 WORKMANSHIP

- A. Workmanship shall be first-class in every respect. Standard accepted practice in the various trades shall be considered as minimum. The A/E reserves the right to reject any workmanship not in accordance with the specifications, either before or after installation of equipment.

3.02 COORDINATION

- A. The Contractor shall coordinate locations and arrangements of his equipment with all other Contractors working on the project. Before starting work, the Contractor shall examine the drawings and specifications, as well as shop and vendor drawings, for all divisions, to ascertain locations, levels, arrangements and dimensions of other work and shall confer and cooperate with all other Contractors to avoid all interferences. He shall also provide Contractors for other trades with information regarding locations, arrangements and dimensions of his equipment. He shall also coordinate his own cutting and patching requirements with those of other Contractors so that it will not be necessary for any Contractor to remove or re-do work improperly scheduled.

- B. In cases of interferences between various items of equipment or between equipment and building members, if simplified construction is made possible by the relocation of certain equipment, changes in arrangements may be made only if authorized by the A/E.
- C. Interferences between the work of different divisions which cannot be resolved by the parties involved shall be submitted to the A/E who shall decide upon final location and arrangement without respect to which work was installed first.

3.03 JOB INSPECTION

- A. Periodic job site observations will be made throughout the construction to review applications for payment, observe methods and materials of construction, and review requirements of the Bid Documents.
- B. Contractor shall notify the A/E, or authority having jurisdiction, and arrange for observation of installation prior to backfill or concealing of systems. Contractor shall, to the maximum practical extent, schedule work to allow for the observation of systems' installation in groups rather than individually.
- C. Upon completion of all work, and submittal and approval of Test Reports, Maintenance Manuals and Record Drawings, shall notify the A/E and shall make arrangements for a Substantial Completion inspection.
- D. After the inspection is made, the Contractor will receive a list of items requiring adjustment, correction, replacement or completion.
- E. The Contractor shall promptly comply completely with all the listed requirements. Should the Contractor fail to perform promptly, the A/E reserves the right to have the work completed by others and the cost deducted from the contract price.

3.04 INSTRUCTION

- A. Contractor shall instruct the Owner's personnel in the operation and maintenance procedures of all equipment and systems. Contractor shall confirm in writing prior to the final inspection that Owner has been instructed to his satisfaction in the operation of all systems. Coordinate with the Owner.

END OF SECTION

SECTION 15082
PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.

1.02 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E 84, NFPA 255, or UL 723.

2.02 UNDERGROUND PIPING INSULATION

- A. Pre-fabricated underground steam pipe and fittings will be factory insulated and jacketed.
- B. Where buried condensate line is installed from the manhole to the storm sewer, pour Dri-Therm insulation around the buried piping prior to backfill. Installation shall be in accordance with Dri-Therm installation recommendations.
- C. Field pipe and fittings inside and outside manholes shall be insulated with .

2.03 CELLULAR GLASS

- A. Insulation: ASTM C 547 and ASTM C 795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'Ksi' ('K') value: ASTM C 177, 0.035 at 24 degrees C (0.24 at 75 degrees F).
 - 2. Maximum service temperature: 343 degrees C (650 degrees F).
 - 3. Maximum moisture absorption: 0.2 percent by volume.
- B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E 96/E 96M of 0.029 ng/Pa s m (0.02 perm-inches).
- C. Vapor Barrier Lap Adhesive:
 - 1. Compatible with insulation.

2.04 GLASS FIBER

- A. Insulation: ASTM C 547 and ASTM C 795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'K' value: ASTM C 177, 0.24 at 75 degrees F.
 - 2. Maximum service temperature: 650 degrees F.
 - 3. Maximum moisture absorption: 0.2 percent by volume.

- B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E 96 of 0.02 perm-inches.
- C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- D. Vapor Barrier Lap Adhesive:
 - 1. Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.03 SCHEDULES

- A. Field-installed piping and fittings inside manholes shall be insulated in accordance with State Energy Code requirements based on the fluid and temperature. Insulate steam and condensate piping inside the manhole with fiberglass - minimum thickness shall be 4" (two 2" layers, with staggered joints). Pipe and fittings outside the structure shall be insulated with cellular glass insulation (FoamGlas), 3" thick, installed in accordance with manufacturer's recommendations.
- B. Insulation blankets for any field-installed steam valves or trap assemblies in manholes will be furnished and installed by Duluth Steam.

END OF SECTION

SECTION 15100

TRENCHING FOR SITE UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Trenching, backfilling and compacting for heating lines between the buildings.

1.02 PROJECT CONDITIONS

- A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where designated.
 - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
 - 2. Prevent contamination.
 - 3. Protect stockpiles from erosion and deterioration of materials.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.
- D. Protect plants, lawns, rock outcroppings, and other features to remain.
- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. General Fill: Subsoil excavated on-site.
 - 1. Graded.
 - 2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
- B. Granular Fill - Gravel: Pit run stone; free of shale, clay, friable material and debris.
 - 1. Graded in accordance with ASTM C 136, within the following limits:
 - a. 2 inch sieve: 100 percent passing.
- C. Granular Fill - Pea Gravel: Natural stone; free of clay, shale, organic matter.
 - 1. Graded in accordance with ASTM C 136, within the following limits:
 - a. Minimum Size: 1/4 inch.
 - b. Maximum Size: 5/8 inch.
- D. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
 - 1. Graded in accordance with ASTM C 136; within the following limits:
 - a. No. 4 sieve: 100 percent passing.
- E. Topsoil:
 - 1. Graded.
 - 2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
 - 3. Acidity range (pH) of 5.5 to 7.5.
 - 4. Containing a minimum of 4 percent and a maximum of 25 percent inorganic matter.

2.02 ACCESSORIES

- A. Geotextile Fabric: Non-biodegradable, woven.
- B. Rebar – Epoxy coated steel for curb & gutter construction (use stainless steel for fabricated steam manholes).

2.03 CONCRETE

- A. Concrete for curb and gutter shall be MnDOT 3A22 mix, and for sidewalks shall be 3A32 mix. Specific details shall be as noted on the drawing.

2.04 SOURCE QUALITY CONTROL

- A. Provide independent testing agency to verify site preparation, fill placement, in-place density, and for taking concrete samples and testing for strength.
- B. If tests indicate site materials do not meet specified requirements, change material and retest.
- C. Provide materials of each type from same source throughout the Work.

2.05 STRUCTURES

- A. Manholes shall be cast-in-place concrete conforming to ASTM C478-78a, as detailed on the plans. Reinforcing steel and miscellaneous castings shall be stainless steel. Provide integral sleeves as required for larger piping penetrations. Small openings may be core-drilled in the field.
- B. Access covers and frames shall be Fiberlite 36" diameter F95 watertight sealed composite construction, with composite frame, designed for steam applications. Provide SK300 FRP skirts as required, aligned with openings in the structure.
- C. Piping penetrations at structures (existing & new) shall be sealed with Link-Seal modular seal assemblies. Assemblies shall be made with EPDM seals and stainless steel hardware. 6" piping (with factory conduit 18-1/2" od assemblies) will require approx. 22" diameter sleeves (Contractor to field verify Link-Seal Model required once fabricated pipe fittings are on site). 1" condensate discharge shall have a 3" (sleeved) opening, with a LS-300 seal assembly.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify City of Duluth Engineering and coordinate all traffic control procedures prior to beginning excavation work.

3.02 TRENCHING

- A. Notify A/E of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.

- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter which could damage piping or impede consistent backfilling or compaction.
- G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
- H. Remove excavated material that is unsuitable for re-use from site.
- I. Stockpile excavated material to be re-used in area designated on site.
- J. Remove excess excavated material from site.
- K. Saw-cut existing pavement along existing joints, or as indicated on the drawing.
- L. Where excavations expose existing concrete encased steam piping, Contractor may encounter asbestos containing material used for insulation of original steam lines. Carefully cut the top of the original concrete duct enclosing the existing steam line. Employ "best practice methods" to prohibit any visible emissions of asbestos containing material if encountered, and advise the A/E or Duluth Steam if asbestos material is encountered – removal of any ACM will be handled by separate contract by Duluth Steam.
- M. Remove all existing concrete pipe enclosure, non-asbestos pipe covering, and original steam piping to make room for installation of new piping. All material to be disposed of in accordance with standard trade best practices.

3.03 PREPARATION FOR UTILITY PLACEMENT

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with suitable materials.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.04 STRUCTURE INSTALLATION

- A. Coordinate installation of structures with piping alignment, and pavement elevations, as detailed.
- B. After structures have been poured and piping penetrations have been made, the exterior of the structure shall be waterproofed with a cementitious slurry-coat material equal to XYPEX Concentrate, or approved equal. Surface preparation shall be as recommended by the manufacturer. Product shall be mixed, applied and cured according to manufacturer's recommendations.

3.05 BACKFILLING

- A. Backfill to contours and elevations to match existing grades using suitable fill materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.

- F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.
- H. Slope grade away from structures minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- I. Correct areas that are over-excavated.
 - 1. Thrust bearing surfaces: Fill with concrete.
 - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum dry density required for finished surface indicated.
- J. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.
- K. Reshape and re-compact fills subjected to vehicular traffic.
- L. Provide cast-in-place reinforced grade beams where lines are subject to traffic as indicated on the drawings.
- M. At planted area where existing trees are removed (between manholes #43 & #44), provide surface restoration consisting of 4" topsoil covered with 2" wood-chip mulch. Undisturbed weeded areas may remain as is.

3.06 TOLERANCES

- A. Top Surface of Backfilling: Plus or minus 1 inch from required elevations.
- B. Reset monument according to details included on the drawing. Coordinate setting of monument with SEH Inc. survey crew as required.

3.07 SURFACE RESTORATION

- A. Match all existing surfaces where new utilities are installed. Bituminous driving surfaces, sidewalk, and curb & gutter shall match current City of Duluth and MnDOT standards.

3.08 CLEAN-UP

- A. Remove unused stockpiled materials, leave area in a clean and neat condition.

END OF SECTION

SECTION 15122

PIPING EXPANSION COMPENSATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion joints and compensators.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- B. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- C. Maintenance Data: Include adjustment instructions.

PART 2 PRODUCTS

2.01 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

- A. Pressure-equalized **expansion joints shall be supplied by Duluth Steam**, with weld-ends, having 300#/500F design rating. Outside diameter and drilling per ASME/ANSI B16.5. (300 lb. drilling for all 300 psig designs).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Anchor pipe where indicated. Anchors shall be fabricated from standard steel shapes as noted. Erect piping such that strain and weight is not on cast connections or apparatus.
- D. Provide support and equipment required to control expansion and contraction of piping. Install pipe offsets, and swing joints, or expansion joints where indicated.
- E. **Joints furnished by Duluth Steam** shall be field-installed, in accordance with factory recommendations of the joint supplier.

END OF SECTION



SECTION 15184

STEAM PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and pipe fittings.
- B. Valves.
- C. Steam piping system.

1.02 SYSTEM DESCRIPTION

- A. Use unions and flanges downstream of valves and at equipment or apparatus connections.
- B. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.
- C. Use gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

1.03 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- B. Welders Certificate: Include welder's certification of compliance with ASME (BPV IX).
- C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.04 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 and ASME B31.1 code for installation of piping system.
- B. Work shall include a State High Pressure Steam permit.
- C. Provide certificates from authority having jurisdiction indicating approval of welders.
- D. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HIGH PRESSURE STEAM PIPING (150 PSIG MAXIMUM)

- A. Steel Pipe: ASTM A 53/A 53M, seamless, Schedule 40, black.
 - 1. Fittings: ASTM A 234/A 234M wrought Class 250 carbon steel welding type.
 - 2. Joints: AWS D1.1 welded.
- B. Buried piping: Pre-fabricated pipe sections and fittings purchased by Duluth Steam, installed by this Contractor.

2.02 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
- C. Hangers for Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
- D. Multiple or Trapeze Hangers for Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods; cast iron roll and stand.

2.03 FLANGES, AND COUPLINGS

- A. Flanges for Pipe Over 2 Inches:
 - 1. Ferrous Piping: 250 psig forged steel
 - 2. Gaskets: 1/16 inch thick preformed non-asbestos graphite fiber.

2.04 VALVES

- A. 2 Inches and smaller:
 - 1. Class 800 forged steel, bolted bonnet, outside screw & yoke, solid wedge, screwed ends, with wheel handle.
 - 2. Valves shall be equal to Vogt Model 12111, Bonney Forge Model HL-10, or approved equal.
- B. Over 2 Inches:
 - 1. Class 300 carbon steel, triple-offset butterfly type, lug style, trimmed for high-pressure steam service (500F), with wheel handle.
 - 2. Valves shall be equal to Adams, Vanessa, Zwick, Velan, or approved equal.
 - 3. Provide flanged spool-piece adjacent to the valve – such that the installed assembly will dimensionally match the flange-to-flange dimensions for a Class 300 gate valve.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Whenever work is suspended during construction protect open ends with temporary plugs or caps.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Install piping to allow for movement without stressing pipe, joints, or connected equipment.
- E. Pipe Hangers and Supports:
 - 1. Support horizontal piping as required.
 - 2. Place hangers within 12 inches of each horizontal elbow.
 - 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 4. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Slope steam piping one inch in 40 feet in direction of flow. Use eccentric reducers to maintain bottom of pipe level.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- I. Install valves with stems upright or horizontal, not inverted.
- J. Contractor will be required to shuttle pre-fabricated underground conduit assemblies from the Duluth Steam plant, to the job-site.
- K. See following pages for reference information on the pre-purchased pre-fabricated underground steam conduit system – including accessories. Install pipe & fittings in accordance with manufacturer's recommendations.

END OF SECTION



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P.O. BOX 79670 • 1670 HICKS FIELD RD. E. • FORT WORTH, TX 76179 • (817) 847-7300 • FAX (817) 847-7222

SUBMITTAL DATA FOR:

PROJECT: CITY OF DULUTH STEAM
DULUTH, MINNESOTA

CONTRACTOR: DULUTH STEAM CO-OP ASSOCIATION
1 Lake Place Dr.
Duluth, MN 55802
Phone: (218) 730-5003
Attn: Jim Johnson

EQUIPMENT: DUO THERM "505"
Thermacor Process Job #33990-06

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: FLUID TECHNOLOGY CORPORATION
1631 N.E. 55th Avenue
Des Moines, IA 50313
Phone: (515) 263-9210
Attn: Rex Glantz

SHOP DRAWING REVIEW	
<input type="checkbox"/>	NO EXCEPTIONS NOTED
<input checked="" type="checkbox"/>	REJECTED - RESUBMIT
<input checked="" type="checkbox"/>	MAKE CORRECTIONS NOTED
<input type="checkbox"/>	REVISE AND RESUBMIT CORREC:
<input type="checkbox"/>	TIONS AS NOTED
THIS REVIEW IS FOR DESIGN ONLY AND DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITIES FOR DIMENSIONS, QUANTITIES, ETC.	
BY <u>Jim Johnson</u>	DATE <u>8/12/13</u>
FOSTER, JACOBS, AND JOHNSON INC.	
PROFESSIONAL DULUTH,	ENGINEERS MINNESOTA

REFER TO DWG # 33990-01 FOR CHANGES

SIGNED Jim Johnson DATE 8/12/13

TITLE P.E.

COMPANY Foster Jacobs & Johnson

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

Rhonda Slates
July 24, 2013



THERMACOR[®] PROCESS INC.

P.O. BOX 79670 • 1670 HICKS FIELD RD. E. • FORT WORTH, TX 76179 • (817) 847-7300 • FAX (817) 847-7222
WWW.THERMACOR.COM

Monday, 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 Riggins
Engineering
Thermacor Process Inc.
817.847.7300 x 609



DUO THERM "505"

Service: Steam piping materials.

Pipe: A53B, ERW, standard weight, same as Schedule 40 up to 10", steel.

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, hot-dipped galvanized, steel, 10 gauge per ASTM A-139, A-134, 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" 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: Extruded, black high-density polyethylene (HDPE) in accordance with ASTM D3350, minimum 135 mils thickness.

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: Carrier pipe shall be tested as specified or per B31.1 guidelines.

Field Assistance: By local Field Service Technician.

CONTINUED

Note: Pipe to be shipped with wrapped ends.

Factory Testing:

Spray applied polyurethane foam is visually inspected for voids during the foam application process by the spray foam operator prior to the application of the extruded HDPE jacket.

Polyurethane foam shall be tested once per shift for compliance to ASTM standards as per specification for density, compressive strength, closed cell content, and thermal conductivity.

Pre-Formed Mineral Wool Pipe Insulation

Description:

MPT-PF is a nominal 8-pound density pipe insulation manufactured from mineral fiber produced from basalt rock and slag. It is produced to fit iron pipe and tubing sizes for industrial applications ranging from below ambient up to 1200° F. Meets ASTM C547 requirements.

Features and Benefits:

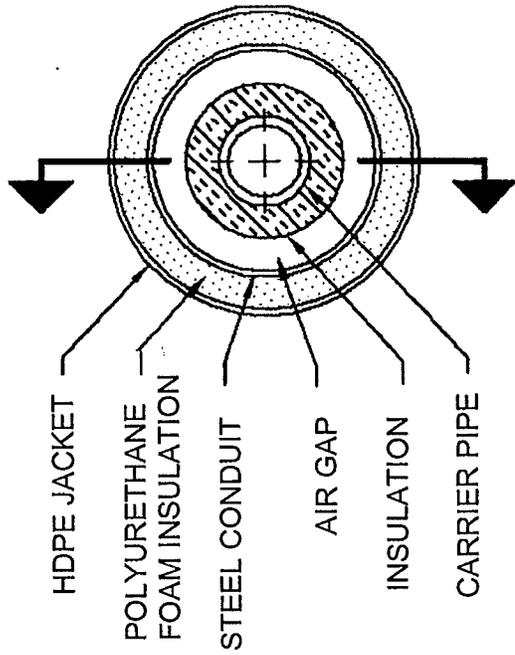
- MPT-PF provides excellent thermal and acoustical performance
- Packaged in corrugated Kraft boxes for warehousing
- Highly efficient insulation
- Ease of application
- Low installed cost
- Also available with ASJ & FSK facing
- Available hinged up to 19" insulation o.d.*
- Passes Federal Agencies 96-Hr Conduit Boiling Test for Class-A materials
- Non-wicking, water repellant
- Does not promote growth of fungi or mildew.
*special order



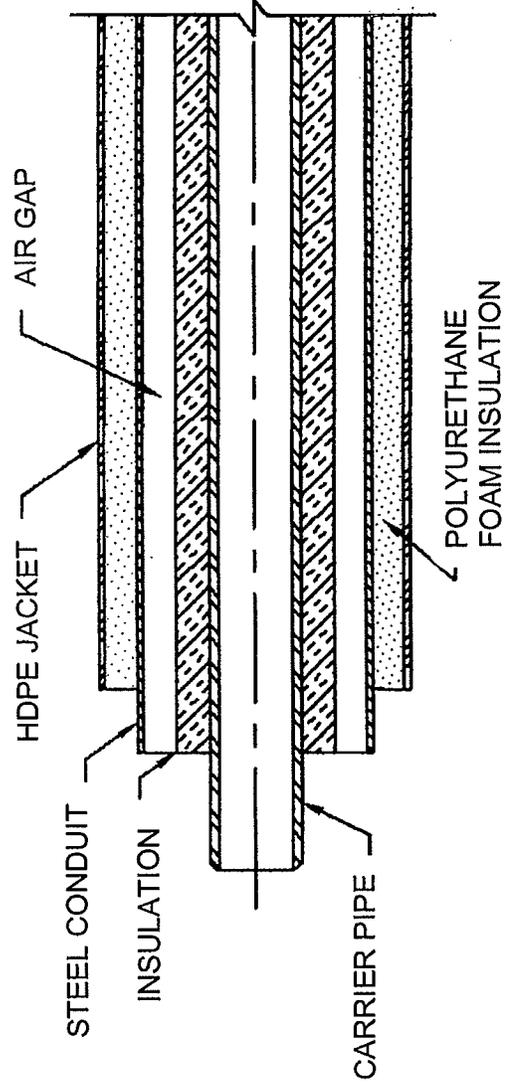
Recommended Applications:

Perfect for nearly any hot pipe application. Specific applications include Steam, Condensate, HTHW (High-Temperature Hot Water in Federal Spec.) Piping, Hot Process Piping, Fuel Oil Lines, Electric-traced Piping, Steam-traced Piping, Generator Exhaust Piping, Concrete Trench and Buried Insulated Conduit Systems. Installs easily with filament tape, tie-wire, or metal bands with normal insulator's tools.

Technical Data/Properties		
Physical Property:	Value/Unit	Specification
Insulation density:	8.0 Lbs/Cu.Ft. (nominal)	ASTM C547
Outer Diameters:	Standard	ASTM C586
Thermal Conductivity	K factor:	
Mean Temp:	75°F .23 Btu.in/h, ft ² °F	ASTM C335, using ASTM C1045 calculation
	200°F .29 Btu.in/h, ft ² °F	
	300°F .35 Btu.in/h, ft ² °F	
	500°F .48 Btu.in/h, ft ² °F	
	600°F .55 Btu.in/h, ft ² °F	
Maximum Service Temperature	1200°F	ASTM C411
Non-fiber content (shot)	Less than 17%	ASTM C1335
* Meets requirements of UFGS-02562A for Class-A Systems; Federal Agencies 96-Hour Conduit Boiling Test		
Combustibility	Non-Combustible	ASTM E136
Surface Burning Characteristics	Smoke <25, Flame Spread <50	ASTM E84
Standard Facing	Integral Fiberglass Mat >2.5" ips	ASTM C1136
Water Absorption	<2% after 24 hr exposure	Proprietary
Stainless Steel stress corrosion	None. (special order provision)	ASTM C795, using C871 & C692 Chemical Analysis
Corrosion: Steel, Aluminum, Copper	None	ASTM C865
Compressive Strength	630 PSF @ 10% deformation	ASTM C165
Standard Product Dimensions		
Pipe/Tube Size	Length	Available Thickness
		Single Layer
½" – 10" ips. /tube	36"	1" – 4"
12" – 36" ips	36"	1.5" – 4"



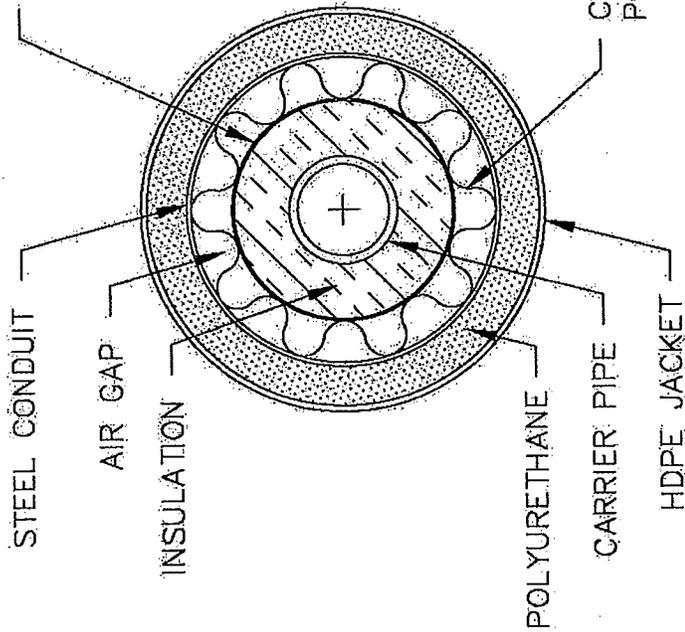
END VIEW
SCALE: NONE



SECTION VIEW
SCALE: NONE

RECOMMENDED INSULATION THICKNESS				
NOMINAL PIPE SIZE (In)	MINERAL WOOL THICKNESS (In)	CONDUIT O.D. (In)	POLYURETHANE FOAM THICKNESS (In)	HDPE JACKET O.D. (In)
6"	3"	16"	1"	18.5"

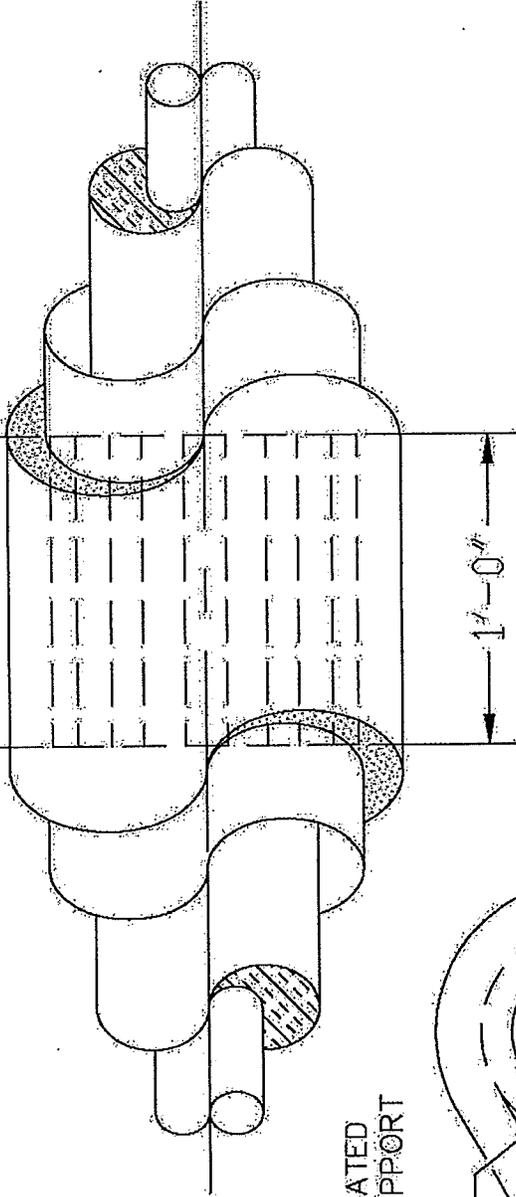
24 GA. SHEET METAL, 12" LONG, AFFIXED W/METAL SCREWS TO IT- SELF AND INSULATION (TYP.)



SEE NOTE 1

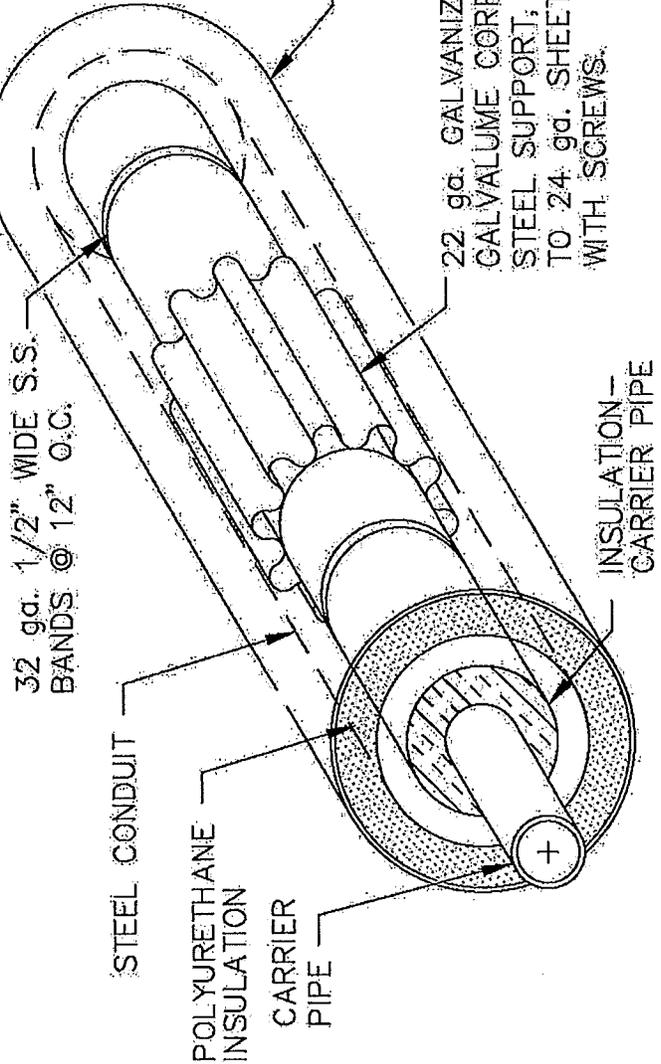
CALCIUM SILICATE

SEE NOTE 1



NOTE:

INSULATION SHALL BE MINERAL WOOL



TYPICAL INSTALLED PIPE SUPPORT / GUIDE

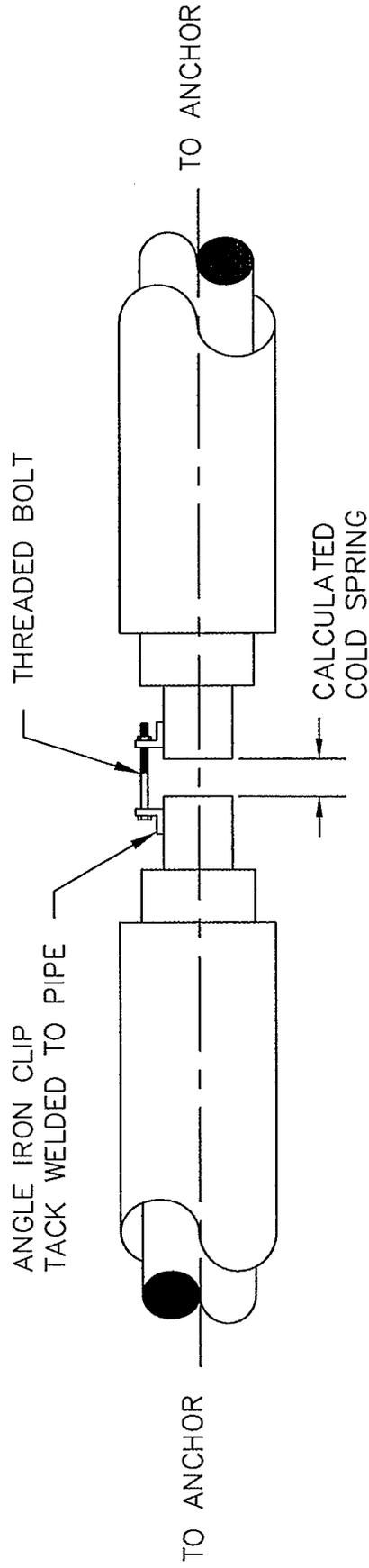
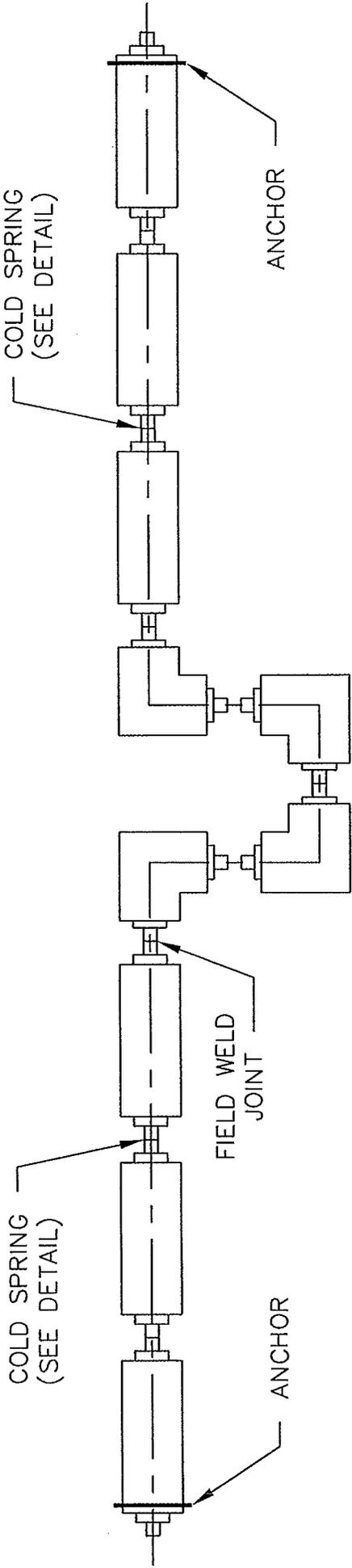
THERMACOR PROCESS
 1676 HICKS FIELD RD. FT. WORTH, TEXAS

INC.

STANDARD CORRUGATED PIPE SUPPORT / GUIDE

DWG. NO.

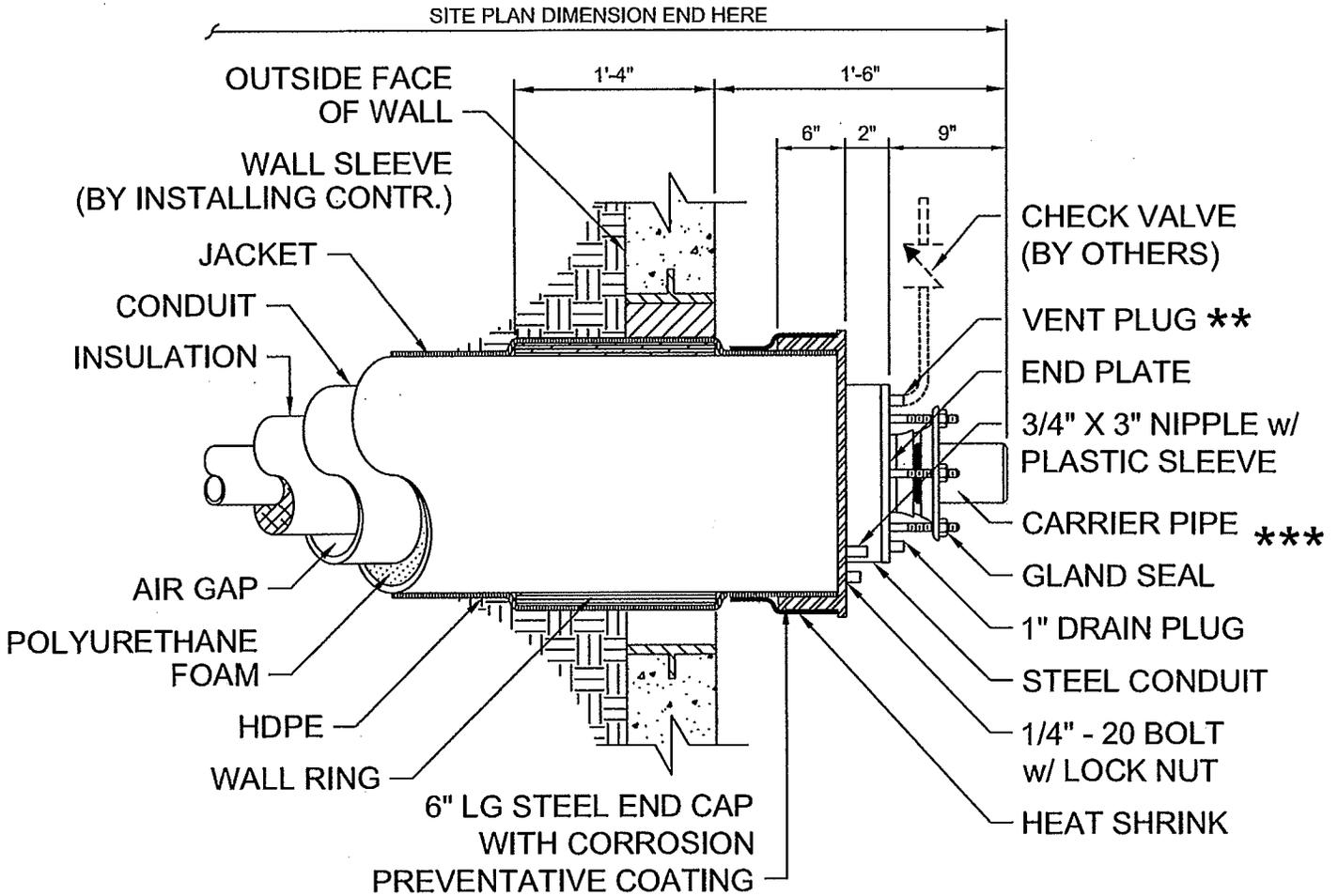
SK-2D



COLD SPRING DETAIL

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

DWG. NO. SK-9D
 TYPICAL COLD SPRING (C.S.)



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.

SCALE: NTS

THERMACOR PROCESS INC.

1670 HICKS FIELD RD. FT. WORTH, TEXAS

TYPICAL MANHOLE/BLDG.

WALL PENETRATION

W/ GLAND SEAL

DWG. NO.

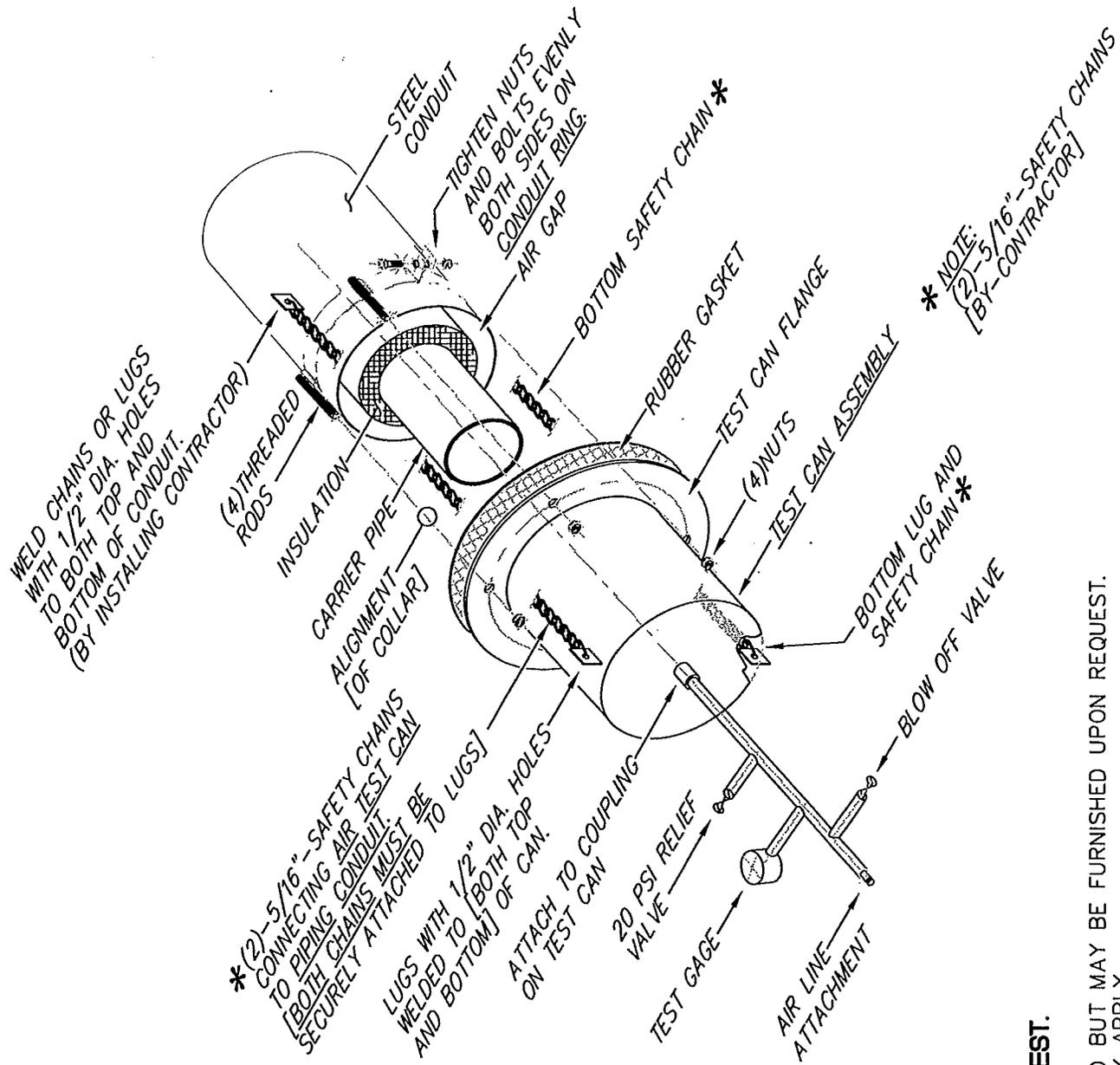
SK-19AB

CONDUIT AIR TEST INSTALLATION INSTRUCTIONS:

1. CHECK CONDUIT ENDS FOR BURRS CAUSED BY REMOVAL OF SHIPPING BARS. REMOVE BURRS ON SHARP EDGES BY GRINDING OR FILING SO THAT A PROPER SEAL MAY BE ACHIEVED.
 2. SLIDE TEST CAP OVER OPEN END OF CONDUIT, BUTTING UP TO RUBBER GASKET PLACED BETWEEN CONDUIT END AND TEST CAP.
 3. TIGHTEN TEST CAN NUT AND BOLT ASSEMBLY ON RING PLACED OVER CONDUIT END UNTIL THE NUTS AND BOLT ASSEMBLY CANNOT BE TIGHTENED ANY FURTHER.
 4. SNUG UP TEST CAN TO END OF CONDUIT, SO THAT RUBBER GASKET SEALS TIGHTLY BETWEEN TEST CAN, AND OPEN END OF CONDUIT.
 5. **ATTACH SAFETY CHAIN TO THE TEST CAN IN LUGS PROVIDED, AND WELD CHAIN TO CONDUIT.**
- CAUTION: 'DO NOT' WALK IN FRONT OF THE TEST CAN DURING PRESSURIZATION !!**
6. AFTER TESTING IS COMPLETE REMOVE TEST CAN AND GASKET.

TEST CANS FOR MAXIMUM 15psi AIR TEST.

TEST CANS NOT INCLUDED BUT MAY BE FURNISHED UPON REQUEST.
ADDITIONAL CHARGES MAY APPLY.



* **NOTE:**
(2) - 5/16" - SAFETY CHAINS
[BY - CONTRACTOR]



DUO-THERM "505" JOINT CLOSURE INSTRUCTIONS

FKII
14.801

DUO-THERM "505" JOINT CLOSURE

4.08.09

INSTALLATION PROCEDURE FOR JOINT CLOSURES FOR DUO-THERM PIPING SYSTEM

Materials & Equipment

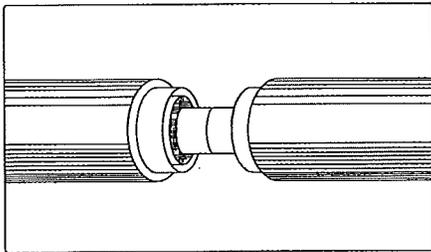
MATERIALS:

1. Sectional Insulation
2. (2) 1/2" Stainless Steel Bands (for insulation)
3. Split Conduit Sleeve
4. HDPE Split Sleeve
5. Pour Foam, Components "A" & "B"
6. ERM Jumper Cable (Per Kit)
7. Heat Shrink Sleeve

EQUIPMENT PROVIDED BY CONTRACTOR:

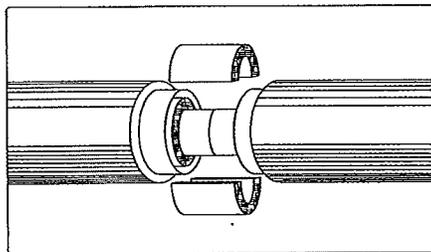
1. Clean Rags
2. Duct Tape
3. Hole Saw, 1" Hole Cutter
4. Safety Equipment as Prescribed by Local Regulations
5. Tape Measure
6. Propane Torch
7. Analog OHM Meter
8. Crimpers

Step 1.



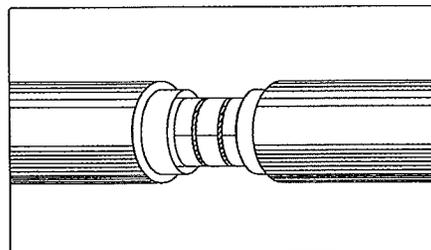
Carefully cut and remove shipping straps from carrier pipe and conduit. Factory recommends use of a grinder to remove straps. **DO NOT CUT OR GOUGE PIPE WHEN REMOVING STRAPS.** Weld carrier pipes together at joint. After weld has cooled, hydro-test as per specifications.

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!!



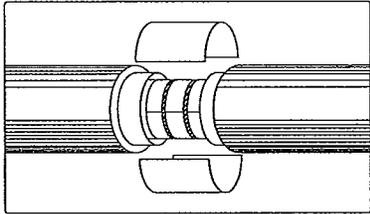
DUO-THERM "505" JOINT CLOSURE INSTRUCTIONS

FKII
14.802

DUO-THERM "505" JOINT CLOSURE

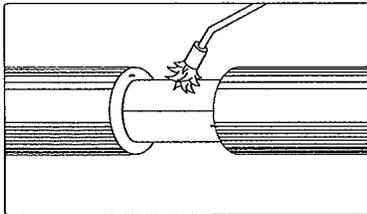
12.30.10

Step 4.



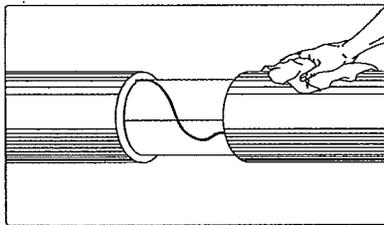
Place split conduit sleeve over joint and weld in place. After weld has cooled, pressure test as per specifications.

Step 5.



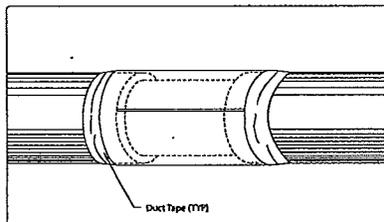
Use a propane torch with a light, billowy flame to dry the area out.

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!!



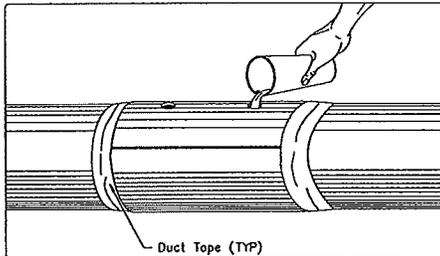
DUO-THERM "505" JOINT CLOSURE INSTRUCTIONS

FKII
14.803

DUO-THERM "505" JOINT CLOSURE

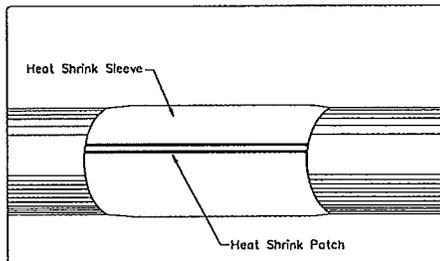
4.08.09

Step 8.



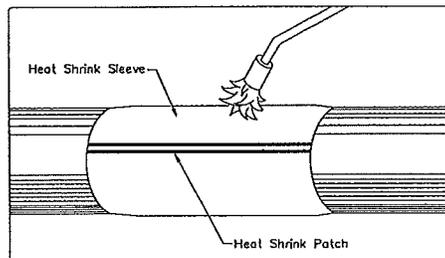
Drill two 1" holes in the top of the sleeve. Mix required foam per Foam Kit Instructions and pour into 1" hole. Allow foam and gas (Air) to escape through holes and cover the holes with duct tape when the foam comes out of the holes. See Foam Kit Instructions for quantities, etc. (Foam Quantities over 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.



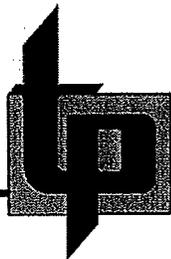
Allow 4 to 5 minutes reaction time for foam to completely fill the void. If the total foam quantity is over 64 oz., perform multiple pours until the total volume is delivered. Trim excess foam from the joint with a knife. Remove duct tape used temporarily seal seams.

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!!



THERMACOR PROCESS INC.®

(www.thermacor.com)

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Tuesday, April 16, 2013

THERMACOR HEAT SHRINK SLEEVE APPLICATION PROCESS

The current Heat Shrink Sleeve provided with most of our joint kits has a thicker adhesive backing. This provides added bond strength which results in an improved joint kit. In addition, the heat shrink sleeve does not degrade with extended exposure in direct sunlight. These benefits improve the overall quality of each joint kit.

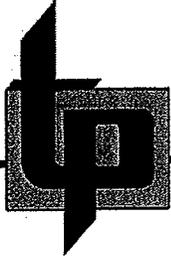
With the increase in the adhesive backing, additional heating is required to ensure that the heat shrink sleeve seals to the HDPE jacket. If sufficient heat is not applied, the adhesive will not soften and the sleeve will not properly seal the joint. Please use the procedure below to ensure proper adhesion:

1. Insulate the joint per the normal installation instructions up to the point of applying the heat shrink sleeve.
2. Prior to applying the heat shrink sleeve to the joint, use a light, billowy flame to soften the **adhesive** side of the sleeve. Do not over heat this section which would cause the backing to shrink. See attached picture of a properly prepared heat shrink sleeve.
3. Install the heat shrink sleeve and finish per the factory installation instructions.

Please feel free to contact Thermacor if you have any additional questions.

Thank You,

Clint Riggan
VP Engineering
Thermacor Process, Inc.
criggan@thermacor.com
817.847.7300 x609



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Proper Pre-Heat of Heat Shrink Sleeve



Figure 1. When properly pre-heated on the adhesive side, the heat shrink sleeve will appear "wet" but will not activate the shrinking of the sleeve



DUO-THERM "505" JOINT CLOSURE INSTRUCTIONS

FKII
14.804

DUO-THERM "505" JOINT CLOSURE

4.08.09

STANDARD POUR FOAM MIXING QUANTITIES

Conduit Size (in)	HDPE Jacket (in)	Foam Thickness	HDPE Sleeve	"A" Component (fl. oz)	"B" Component (fl. oz)
6 5/8	9.0	1"	30"W x 14"	10	10
8 5/8	11.0	1"	30"W x 14"	13	13
10 3/4	13.2	1"	30"W x 14"	16	16
12 3/4	15.2	1"	30"W x 20"	19	19
14	16.4	1"	30"W x 20"	20	20
16	18.5	1"	30"W x 20"	23	23
18	20.5	1"	30"W x 24"	26	26
20	22.5	1"	30"W x 24"	29	29
22	24.5	1"	30"W x 30"	31	31
24	26.5	1"	30"W x 30"	34	34
26	28.5	1"	30"W x 30"	37	37
28	30.5	1"	(2) 30"W x 20"	39	39
30	32.5	1"	(2) 30"W x 20"	42	42
32	34.5	1"	(2) 30"W x 20"	44	44
34	36.5	1"	(2) 30"W x 20"	47	47
36	38.5	1"	(2) 30"W x 24"	50	50

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

IMPORTANT: THE JOINT AND JOINT MATERIALS MUST BE KEPT DRY!!



DUO-THERM "505" Installation Manual

DTIM
3.201

GENERAL INSTALLATION INSTRUCTIONS

3.14.07

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 TAMPING!



DUO-THERM "505" Installation Manual

DTIM
3.202

SHIPPING & HANDLING

3.14.07

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.

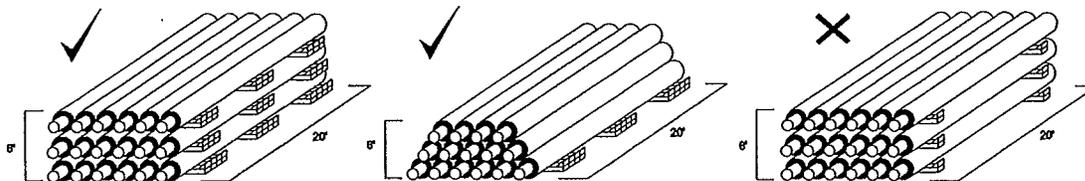
UNLOADING PIPE

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.

SECTION 15185

STEAM AND STEAM CONDENSATE SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steam traps.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Provide for manufactured products and assemblies required for this project.
 - 2. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
- B. Manufacturer's Installation Instructions: Indicate application, selection, and hookup configuration. Include pipe and accessory elevations.
- C. Operation and Maintenance Data: Include installation instructions, servicing requirements, and recommended spare parts lists.

PART 2 PRODUCTS

2.01 STEAM TRAPS

- A. Trap:
 - 1. Inverted Bucket Traps: Cast iron body with bolted cover, stainless steel bucket, stainless steel seats and plungers, and stainless steel lever mechanism with knife edge operating surfaces, equal to ARMSTRONG 1" size, Model 813.
 - 2. Features: Access to internal parts without disturbing piping, top test plug, bottom drain plugs.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install steam and steam condensate piping and specialties in accordance with ASME B31.9.
- B. Install specialties in accordance with manufacturer's instructions.
- C. Steam Traps:
 - 1. Provide minimum 1 inch size on steam mains and branches.
 - 2. Install with union or flanged connections at both ends.
 - 3. Provide gate valve and strainer at inlet.
 - 4. Provide minimum 10 inch long dirt pocket between apparatus and trap.
- D. In high pressure mains, provide 4" nipple in bottom of main, extending 3/4 inch into and above bottom of pipe. Provide dirt pocket with 1" high pressure bucket trap.

END OF SECTION