

Date: April 5, 2013

RFQ # 7461399

TITLE: Emergency Steam Line Replacement – Rhode Island College

CLOSING DATE AND TIME: Monday April 29, 2013 @ 11:00 AM (Local Prevailing Time) (LPT)

PRE-BID PROPOSAL CONFERENCE: YES, April 12, 2013 @ 9:00 am (LPT)

MANDATORY: YES

LOCATION: RIC Physical Plant Conference RM., 600 Mount Pleasant Ave., Providence

Questions concerning this solicitation may be e-mailed, in Microsoft Word format, to the Division of Purchases at questions@purchasing.ri.gov no later than **4/17/2013 @ 12:00 noon** LPT. Please reference the RFQ # on all correspondence. Answers to questions received, if any, will be posted on the Internet as an addendum to this solicitation. It is the responsibility of all interested parties to download this information.

SURETY REQUIRED: Yes

BOND REQUIRED: Yes

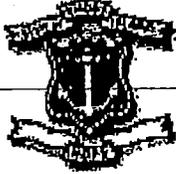
**Thomas Bovis
Interdepartmental Project Manager**

Vendors must register on-line at the State Purchasing Website at www.purchasing.ri.gov

NOTE TO VENDORS:

Offers received without the entire completed four-page RIVIP Generated Bidder Certification Form attached may result in disqualification.

THIS PAGE IS NOT A BIDDER CERTIFICATION FORM



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Administration
DIVISION OF PURCHASES
One Capitol Hill
Providence, RI 02908-5855

NOTICE TO VENDORS

Effective **January 1, 2013** all *public works project* related bids or proposals exceeding **Five Hundred Thousand (\$500,000) dollars** are required to include a "public copy." All agency contract solicitations and invitations for bids, etc. shall state that any bid or proposal that exceeds Five Hundred Thousand (\$500,000) dollars must include a copy to be available for public inspection upon the opening of the bids. Any bid or proposal in excess of Five Hundred Thousand (\$500,000) dollars which does not include a copy for public inspection shall be deemed to be non-responsive. For further information, please see R. I. Gen. Laws §37-2-18(j).

Dated: December 11, 2012



State of Rhode Island Department of Administration
Division of Purchases

REVISED
December 11, 2012

NOTICE TO CONTRACTORS
AND VENDORS BIDDING
ON PUBLIC WORKS PROJECTS

Effective January 1, 2013 all Public Works related project proposals exceeding Five Hundred Thousand (\$500,000) dollars are required to include a "public copy." All agency contract solicitations, requests for proposals, invitations for bids, etc. shall state that any bid or proposal that exceeds Five Hundred Thousand (\$500,000) dollars must include a copy to be available for public inspection upon the opening of the bids. Any bid or proposal in excess of Five Hundred Thousand (\$500,000) dollars which does not include a copy for public inspection shall be deemed to be non-responsive. Additionally, proposals submitted for a Master Price Agreement, when the total amount potentially may exceed Five Hundred Thousand (\$500,000) and the solicitation expressly requires any or all vendors to submit a public copy, must include a copy to be available for public inspection.

For further information, see R.I. Gen. Laws Section 37-2-18(j) and State Procurement Regulations at www.purchasing.ri.gov. This requirement applies to all public works projects (vertical and horizontal) exceeding Five Hundred Thousand (\$500,000) dollars and any combination of base bid plus all alternates.

In accordance to the State Procurement Regulations the following conditions are required:

1. All bid proposals shall be opened publicly and read aloud.
2. Each bid, together with the name of the bidder, shall be recorded and an abstract made available "immediately" for public inspection.
3. Copy of the redacted bid proposal shall be available for public inspection by the close of the business day the subject bid(s) and/or contract(s) is opened by the Division of Purchases.

4. The burden to identify and withhold from the public copy that is released at the bid opening any trade secrets, commercial or financial information, or other information the bidder deems not subject to public disclosure pursuant to Chapter 38-2, the Access to Public Records Act, shall rest solely and exclusively with the bidder submitting the bid proposal.
5. At the time that a proposal is submitted, a bidder must submit a redacted copy of the bid proposal in a PDF (Portable Document File) file format on a read only CD-R Media Disk (hereinafter referred to as a "CD"). Vendors are required to provide all documents submitted in response to the bid solicitation on the CD.
 - a. The acceptable media is a CD-R. Media that is read/writable (CD RW) will not be accepted.
 - b. Only readable, not writeable media is acceptable.
 - c. Vendor is responsible for supplying their own CD-R media.
 - d. Vendor is responsible for the integrity of the CD.
6. Failure of the bidder to submit a public copy on a readable CD, as required by RIGL 37-2-18 as amended, shall result in the disqualification of said bid.
7. CD must be enclosed in a protective cover and the protective cover clearly labeled with the following:
 - a. Marked "Public Copy"
 - b. Title of Solicitation as it appears on the RIVIP cover letter.
 - c. Name of Company and Vendor ID as it appears on the RIVIP cover letter.
 - d. Bid Response Number as it appears on the RIVIP cover letter.
 - e. Date of Bid as it appears on the RIVIP cover letter.
8. Bid response on CD-R to be in a PDF (Portable Document Format).
 - a. One PDF file will be on the CD-R. File to meet the following requirements:
 - i. Only one file will contain all documents in response to the bid. If you have more than one document for the response, the documents must be concatenated or merged into one PDF document. Failure to submit only one PDF file may result in disqualification of bid.
 - ii. File should be named in the following manner:
 1. BidNumber_DateofBid_VendorName_VendorID.pdf. Where:
 1. Bid Number is the bid number for which the response is for as it appears on the RIVIP cover sheet.
 2. Dateofbid is date of bid using the format (mm-dd-yyyy).
 3. VendorName is the name of the vendor as one word -- no spaces or punctuation.
 4. Vendor ID as it appears on the RIVIP vendor cover sheet.

Note: you must use underscores in separating the fields. Do not use underscores anywhere else in the filename other than to separate the fields.

Example: 1234567_06-01-2011_Vendor1_9876.pdf

9. Purchasing staff will officially conclude the bid opening and all loaded proposals will be posted to the Purchasing web site. All proposals will be available immediately after bid opening www.purchasing.ri.gov.

For technical assistance, contact the Division of Purchases office at 574-8100.

Invitation to Bid Number: 7461399

Date: April 5, 2013

**Purchaser: The Department of Administration, Office of Purchases
One Capitol Hill 2nd Floor
Providence, RI 02908**

Owner/Agent: State of Rhode Island Board of Governors for Higher Education, Rhode Island College, and State of Rhode Island

Project: Emergency Steam Line Replacement Project
Rhode Island College
600 Mount Pleasant Ave
Providence, RI 02908

Completion Time: Completion of the project on or before August 10, 2013

The **Owner** is soliciting bids for the Emergency Steam Line Replacement Project at Rhode Island College, in accordance with the specifications and drawings attached.

Sealed proposals addressed to the above **Purchaser** shall be received on or before the date and time specified below. At the time they will be opened and read aloud in public.

General Contractors are invited to submit an offer under sealed to the **Purchaser** at the appropriate address, for construction of the above project, on or before: bids on the above Project, to the Purchaser at the above address, on or before:

Time: 11:00 am (LPT), Date: Monday April 29, 2013

NOTE: Plans and specifications are available to download from the RI Division of Purchases website at www.purchasing.ri.gov (labeled with the issue date of this Solicitation Information document) at no cost.

Bidder is required to provide a **Bid Security** in the form of a Bid Bond, or a certified check payable to the State of Rhode Island, in the amount of a sum equal to 5 percent (5%) of the Proposal shall be submitted with the bid.

A **Performance and Payment Bond** equal to one hundred percent (100%) of the contract price with a surety company registered and licensed in the State of Rhode Island shall be required of the successful bidder.

This project is subject to terms, conditions and provisions of the Rhode Island General Laws Chapter 37-14.1 et. Seq, and regulations promulgated thereunder, which requires that ten percent (10%) of the dollar value of work performed on the project be performed by minority business enterprises, and that wage rates to be paid under the Contract for this project must be in accordance with those prevailing wages of file in the Rhode Island Department of Labor, Office of the Director.

Bidders are subject to terms, conditions and provisions of State's General Conditions of Purchase, and to the provisions of Chapters 2, 12, 13 and 14.1 of Title 37, General Laws of the State of Rhode Island 1956, as amended, including apprentice requirements of 13-3.1.

Supplemental Instructions to Bidders for specific Bidding requirements including additional State and Federal mandates.

The Office of Purchases reserves the right to waive any technicalities in the bids, award in the best interest of the College, and accept or reject any or all offers...

The **Owner** will hold a **Mandatory Pre-Bid Conference at:**

RIC, Physical Plant – Conference Room 600 Mount Pleasant Ave., Providence, Rhode Island.

Time: 9:00 am (LPT) Date: Friday April 12, 2013

The Owner will not be obligated to schedule site visits after the Pre-Bid.

END

RHODE ISLAND COLLEGE
QUAD STEAM AND CONDENSATE REPLACEMENT
SPECIFICATIONS

1. GENERAL.

- 1.1 CONTRACT PURPOSE. The existing main steam pit, condensate lines and steam lines has deteriorated and needs to be replicated per specification. Accordingly, the purpose of this Contract is to completely replace with new steam/ condensate lines and structures per specification.
- 1.2 Pre-Bid- Submittal Site inspection. Mandatory Pre-Bid Meeting is scheduled on April XX, 2013 @ XX:XX AM – Location: Facilities & Operations – Conference Room
- 1.3 Pre-Construction Planning and Schedule. Contractor shall not start or layout actual replacement work without first reporting to F&O and submitting and receiving approval for materials. The installation of the new steam/ condensate lines and structures shall begin the Monday after RIC commencement and shall be completed by August 10, 2013. All restorations of grounds shall be completed by August 14, 2013. Overtime hours are the responsibility of the contractors' base bid to meet this schedule. Contractors shall submit a schedule for approval of the College.
- 1.4 Contractor Qualifications. Each contractor submitting a bid shall provide the following licenses; pipe fitter 1, RI excavating license. Contractor shall provide a copy of their certificate for installation of ROVANCO Pipe.
- 1.5 Laws, Permits. Contractor shall comply with all applicable federal and state laws, regulations and codes. Contractor shall be licensed with the RI Contractors Registration Board. All bonds and insurances shall be required and included in the bid package.
- 1.6 Materials and Workmanship. Materials shall be supplied by ROVANCO Piping Systems, Inc., no substitutions shall be approved by RIC. Materials shall be approved in writing by a ROVANCO Piping Systems representative. Workmanship shall be the best of their respective kind; work will be accomplished in a neat and workmanlike manner in full accord with modern construction methods and shall comply with all RI State Codes.

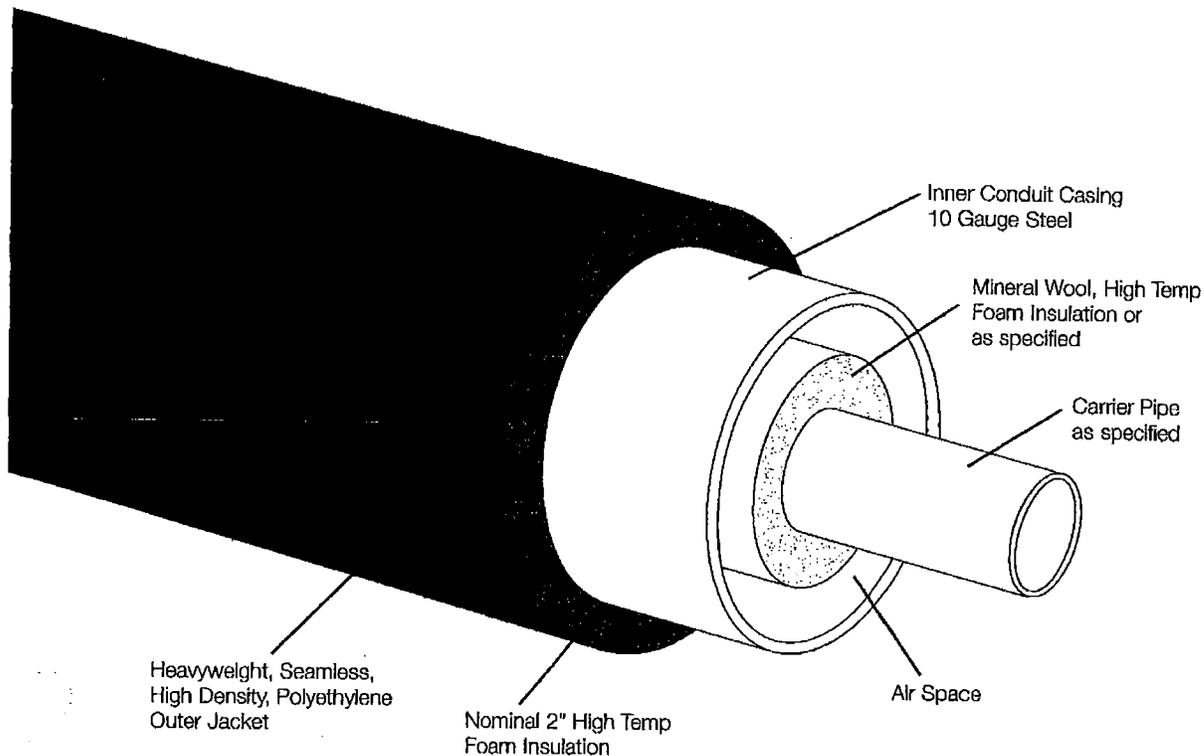
Rhode Island College Steam Emergency Repair Project

1. **Scope:** The scope of proposed work is to furnish a turn-key installation of new Rovanco Insul800 steam and condensate pipes beginning at a connection point inside of the existing steam pit commonly known as "The Alger Pit" and terminating at tie in points inside the existing steam pit commonly known as "The Mall Pit". New tie in's for Craig Lee Hall, Fogarty Life Science, and Clarke Science shall be connected to the new main through and above ground valve station. Tie in's for Donovan Dining, Student Union/Dorm Feeds and Mall Feed shall be tied in through a second above ground valve station to be built into the existing grass area on the mall side of Adams Library. Existing steam and condensate systems shall be maintained during construction and shut downs of any utilities shall be done so to minimize interruptions during operational hours. Scope shall include all labor and materials as well as equipment, signage, safety equipment and supervision required to complete installation, commissioning and turn-over of the new system. It is the sole responsibility of each bidder to review all available site and utility drawings located at physical plant as well as become familiar with the site and existing conditions. Any drawings provided showing either pipe location or elevation are for example only and do not designate a predetermined or preferred utility location. It shall be each bidder's sole responsibility to layout and locate new piping locations and path. Additionally, drip trap stations required for elevation or pitch changes shall be considered to be part of the bidders design. No additional compensation shall be provided for after bid changes or added drip stations.
2. **Piping System:** New underground piping system shall be Rovanco Insul800. No substitutes will be accepted. Rovanco Insul800 is currently installed on campus and will be connected at some tie points. For reasons of standardization, submittal of alternate systems shall be reason for bidder disqualification.
3. **Bidder Qualifications:** Bidder shall at a minimum possess a valid State of Rhode Island Master pipefitter I and applicable Hydraulic license and shall submit copies of each as part of their bid. Additionally, each bidder shall provide certification from Rovanco as to the bidder being certified to install the Insul800 piping system and proof of prior satisfactory installation of Insul800 shall be required for bid consideration.
4. **Site Safety:** Each bidder shall prior to commencement of any on site work submit a project safety plan covering and all work to be performed on site. Hot work permits in accordance with Rhode Island College established fire safety procedures shall be incorporated into any safety plan.
5. **Site Security:** All designated work area shall provide protection to the Rhode Island College community by a minimum means of 6' rigid construction fencing (Snow fence and caution tape barriers will not be accepted) with protective welding shield screens as applicable. Vendor shall be responsible to prove adequate signage to direct vehicular and pedestrian traffic as well as provide warnings to potential dangers within the work area.

6. Physical Site Protection: In all cases existing site improvements including existing utilities and landscaping shall be protected from damage.
7. Demolition: All concrete and asphalt shall be saw cut full depth prior to removal. Concrete panels shall be replaced as full panels. Any panel damaged, cracked, chipped, or partially cut into shall be removed in its entirety and replaced. Asphalt removal that exceeds 33% of any walk or parking area width shall be removed full width and replaced. Existing manholes and pits scheduled for removal shall be demolished to a point no less than three (3) feet below finished grade. Any piping system to be abandoned below grade shall have welded caps installed at all abandoned points.
8. Disposal: Rhode Island College shall have the right to retain ownership of any removed or demolished materials. Any materials not retained by Rhode Island College shall be disposed of lawfully off site by the bidder.
9. Deliveries: Deliveries, loading and off-loading shall only be performed in designated areas. Traffic control plans and laydown/storage area plans shall be included as part of the pre-construction submission package. In all cases, interference with College operations shall be in all cases kept to a minimum.
10. Below Grade piping Installation: Rovanco pipe offloading shall be done so not to interfere with normal traffic patterns. Pipe handling and offloading shall be done only with nylon slings having adequate certified rating. No pipe shall be offloaded with chains or cables. Pipe handling shall be performed by properly licensed personnel and in a safe manner. All carrier pipes shall be tested by a Rovanco approved method, witnessed by Rhode Island College personnel prior to conduit installation. All conduit pipes shall also be tested to a Rovanco approved method prior to exterior jacket installation. Any blocking or mounts shall be removed prior to bedding pipes. All piping shall be bedded with a minimum of 12 inches ASTM 33 bedding sand in every direction. No cover shall be placed over bedding sand until a site inspection had been conducted by Rhode Island college personnel.
11. Below Grade Pipe Anchors: All below grade anchors required as part of the system designs shall be form poured using concrete with a minimum of rating of 4,000Psi/28 days. All anchor forms shall be inspected by Rhode Island College personnel prior to pouring of concrete. After concrete set up time, all forms shall be removed in their entirety.
12. Backfilling of trenches: All backfill material shall be free of debris or objects greater than 6 inches in diameters. Concrete and asphalt areas shall have 12 inches of compacted crusher run processed gravel placed in top of trench areas. Landscaped areas shall have 6 inches of screened loam placed in top of trench areas.
13. Asphalt Restoration: Asphalt restoration shall consists of one 2" base or binder course and one 1 ½" top or finish course. Any previously striped marked areas shall have all marking restored.

14. Concrete Restoration: All concrete restoration shall be full panel replacement. Concrete shall be drilled and doweled with coated #4 rebar placed every 12 inches. Dowels shall be 12" long and drilled 6 inches into existing concrete. Expansion joints and caulking shall be installed to match original installation where applicable. Finish and edges shall match existing,
15. Landscaping: All landscaping shall be restored to original or better condition. Any existing law sprinkler systems that are encountered during this project shall be activated and inspected as part of project close out. Any system that is no longer working as it was prior to the start of this project shall be restored to the satisfaction of Rhode Island College as part of this project. Any tree removal shall require the prior approval of Rhode Island College. In no case shall removal of any trees be performed if an alternate piping direction or location is available. Trees damaged by this project, shall be replaced or removed at the direction of Rhode Island College. Mulch beds shall be restored with 6 inches of mulch similar to types currently installed. Grass areas shall be restored with 6 inches of screened loam and wither seed or hydro seed with a mix to be preapproved by Rhode Island College. Unless hydro-seeded with wood based mulch, all seeded slopes exceeding 8% grade shall require an approved stabilization material.
16. Rain Caps: In all cases, rain caps shall extend no less than 15 inches above finished grade.
17. Above grade valve Stations: All piping and materials shall be per attached standardized approved materials. Substitutions or alternates will not be accepted as these will be standardized parts. Concrete base pads shall be a minimum 6 inches thick poured concrete with a broom finish. Edge stone border shall be ¾" blue stone 18" in depth. All fencing shall be 6 foot high black vinyl coated chain link. Landscaping shall be provided as to shield fencing view. A landscape plan shall be submitted as part of the pre-construction submittal package.

Insul-800 High Temp Conduit by Rovanco



Rovanco's Insul-800 High Temp Conduit is designed for below ground high temperature systems (210°F and above). It is Drainable, Dryable and Air Testable. The product is composed of a steel, copper or stainless steel carrier pipe, mineral wool or high temp foam insulation. The insulated pipe is enclosed in an inner conduit casing of a 10 gauge steel which is insulated with a high temperature foam insulation, rated for 400°F continuous service. The outer layer of foam insulation is protected by a heavy-weight, seamless, high density polyethylene outer jacket. This combination results in an economical, high quality, high temp system, and the most energy efficient available. Since the system has a polyethylene outer jacket that is non-corrosive, the system does not require cathodic protection.

Rovanco's systems are engineered to the latest edition of ANSI B31.1.

Rovanco's Insul-800 High Temp Conduit is provided with part numbered cut-to-length pieces manufactured to verified field dimensions. All piping systems are spooled out with elbows, tees, anchors and end seals added to lengths of pipe at Rovanco's Joliet, Illinois factory.

The piping system comes complete with all accessories of steel sleeves, joint insulation, and polyethylene shrink sleeve to make the installation completely watertight.

To find out more about Rovanco's Insul-800 High Temp Conduit system, you can call your local representative, phone us at (815) 741-6700, fax us at (815) 741-4229, visit our web site at www.rovanco.com or e-mail us at marketing@rovanco.com.

STANDARD SPECIFICATIONS

INSUL-800 HIGH TEMP, PRE-INSULATED CONDUIT SYSTEM FOR STEAM, HIGH TEMP HOT WATER, CONDENSATE, ETC.

Carrier Pipe

All carrier pipe shall be carbon steel A-53-B ERW. Pipe 10" and smaller shall be Schedule 40. Pipe 12" and larger shall be .375 wall. Schedule 80 shall be used for condensate lines 10" and smaller, X-1 for 12" and larger.

Other pipe types also available. (copper, stainless steel, etc.)

Carrier Pipe Insulation

Shall be sectional mineral wool with K factor of .29 at 200°F. Sectional insulation shall be banded on pipe with stainless steel banding on 18" centers. Insulation thickness shall be as specified or recommended by system supplier.

Optional Carrier Pipe Insulation—High Temp polysocyanurate. Same as specified below for Inner Conduit Casing Insulation.

Inner Pipe Supports

All pipe shall be aligned and supported within the inner conduit casing with galvanized steel supports spaced on 10' centers. The carrier pipe shall not bear directly on the steel support. The support shall be designed to permit drainage and free air passage. All pipe passing through supports shall be insulated.

Inner Conduit Casing

Casing shall be 10 gauge black steel. The interior surface shall be smooth to permit free moisture drainage and removability of the inner assembly. The outer casing shall be sized to provide an adequate annular space between the outer surface of the insulation material and the interior surface of the casing. Inner conduit casing field joint closures shall consist of 10 gauge steel and shall be field welded over adjacent units.

Inner Conduit Insulation

Insulation thickness shall be 1 3/4" minimum.

High-temp polysocyanurate insulation applied to the inner conduit casing shall have the following properties:

Minimum Density:	2.0 pcf per ASTM D 1622
Closed Cell Content:	90% per ASTM D 2856
Compressive Strength:	30 PSI per ASTM D 1621

K factor

• Initial @ 75°F Mean Temperature	0.130
• @ 200°F Mean Temperature	0.235
• Aged @ 400°F for 28 days	0.220
• @ 400°F Service Temperature and 75° Amb	0.240

Dimensional Stability—% change per ASTM 2126

400°F Exposure of 2" cube foam sample

• 1 Day + 1.3% length	+0.1% Volume
• 7 Day + 2.3% length	-2.3% Volume

450°F Exposure of 2" cube foam sample

• 1 Day + 10.31% length	+14.6% Volume
• 7 Day + 7.1% length	+1.5% Volume

Insulation must be capable of handling intermittent temperature spikes to 450°F for 8-12 hours. Insulation must completely fill the annular space between the inner conduit casing and HDPE jacket. System supplier shall provide written temperature performance certification from foam insulation manufacturer and an Independent Testing Agency Report and Certification that the insulation to be provided meets the above referenced performance standards.

Outer Jacket

The exterior protective jacket shall be heavyweight, seamless, minimum .175 mil thickness, high impact, polyethylene conforming to ASTM D1248 & D3350. Field joints shall be insulated and covered with a polyethylene sleeve the same thickness as the outer jacket. The joint will then be sealed water tight with polyethylene heat shrink material.

Expansion Loops and Elbs

Expansion loops, expansion elbows and other fittings shall be pre-fabricated and furnished in the same types and thickness of insulation and casing as those for the straight section of the piping system. They will be of a size to permit the inner pipe or pipes to expand and contract without damage to the insulation material.

Fittings

All changes in direction of the carrier pipe shall be made with fittings. Mitering of pipe will not be permitted. When tee branches are smaller than the main they join, weld-o-lots may be used. All weld fittings shall be the same wall thickness as adjacent piping.

Anchors

Anchors shall be pre-fabricated onto the piping units and shall be equipped with drain and vent openings at the top and bottom of the anchor plate. Anchor plates shall be made of minimum 1/2" steel plate.

End Seals and Gland Seals

Terminal ends of conduits inside manholes, pits or buildings shall be equipped with end seals consisting of a steel bulkhead plate welded to the conduit and carrier pipe if there is an anchor within five feet of the end seal. Where there is no anchor within five feet of a terminal end, conduits shall be equipped with gland seals consisting of a high temp gasket and follower plate. End seals or gland seals shall be made of 1/2" steel plate with drain and vent openings on the vertical center line of the mounting plate.

Field Tests

The carrier pipe shall be field tested hydrostatically to 1 1/2 times the working pressure of the line or as specified. The 10 gauge steel inner conduit casing shall be tested with air at 15 psig. All leaks shall be repaired and the test repeated. After test, all field joints shall be insulated and sealed water tight.

Back Fill

Clean, granular backfill should be tamped in place so as to assure a stable surface. No rock should be used within 24" of the pipe. Top of pipe to grade shall not be less than 24" to meet H-20 Highway loading.

Installation

The installation shall be made in accordance with plans, specifications, and manufacturers' installation instructions. Pipe system supplier will provide an installation instructor on site to train the contractor in all phases of installation if required.

Approved Vendors

Insul-800 manufactured by Rovanco, Joliet, Illinois, 815-741-6700, or approved equal. Any alternative supplier wishing to be approved as an equal must submit their technical data, including HDPE outer jacket and insulation material test reports.

These reports must be certified by an Independent Testing Agency that the high temperature polysocyanurate insulation and the polyethylene jacketing material have been tested to and meet all ASTM standards listed in the "inner conduit insulation" and "outer jacket" section of the specifications. These reports must be submitted to the engineer ten days prior to bid date for an alternate supplier's product to be approved in writing as an equal to the specified products.

Copyright 2005 - Rovanco's products are covered by various U.S. patents, including but not limited to U.S. Patent #5,996,643 (Insul-800). Rovanco & Insul-8 are federally registered trademarks. Rovanco manufactures a complete line of Insul-8 engineered, pre-insulated piping systems for temperatures from -320°F to 700°F. For information on Rovanco and its Insul-8 piping systems, please contact us.

Contact Your Rovanco® Representative

Rovanco

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ROVANCO

Piping Systems, Inc.

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Email: marketing@rovanco.com
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February 26, 2013

Mr. Frank Montanaro
Facilities and Operations
Rhode Island College
600 Mount Pleasant Avenue
Providence, RI 02909

RE: R. I. College – Mall Steam

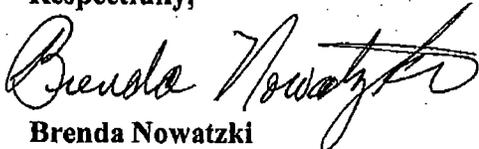
As per our conversation, Rovanco drawings 8106, provided to you for the underground steam and condensate piping on R.I. College – Mall Steam System, will not require hiring an outside Engineer.

The piping system expansion and contraction provisions on the layout have already been analyzed for stress and expansion and will be confirmed with a stress analysis report.

Any modifications to the system will be analyzed for stress and expansion by Rovanco and reconfirmed by means of another stress analysis.

Rovanco and its employees look forward to having another opportunity to work with you on this project.

Respectfully,

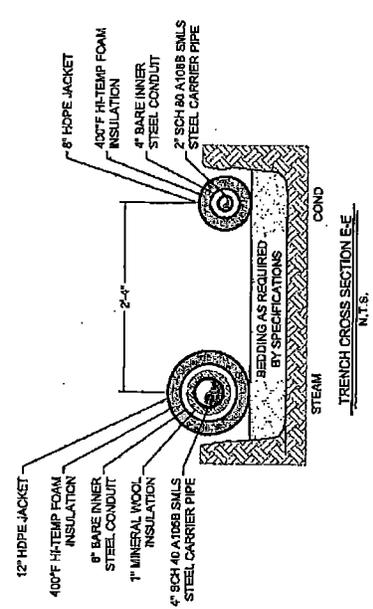
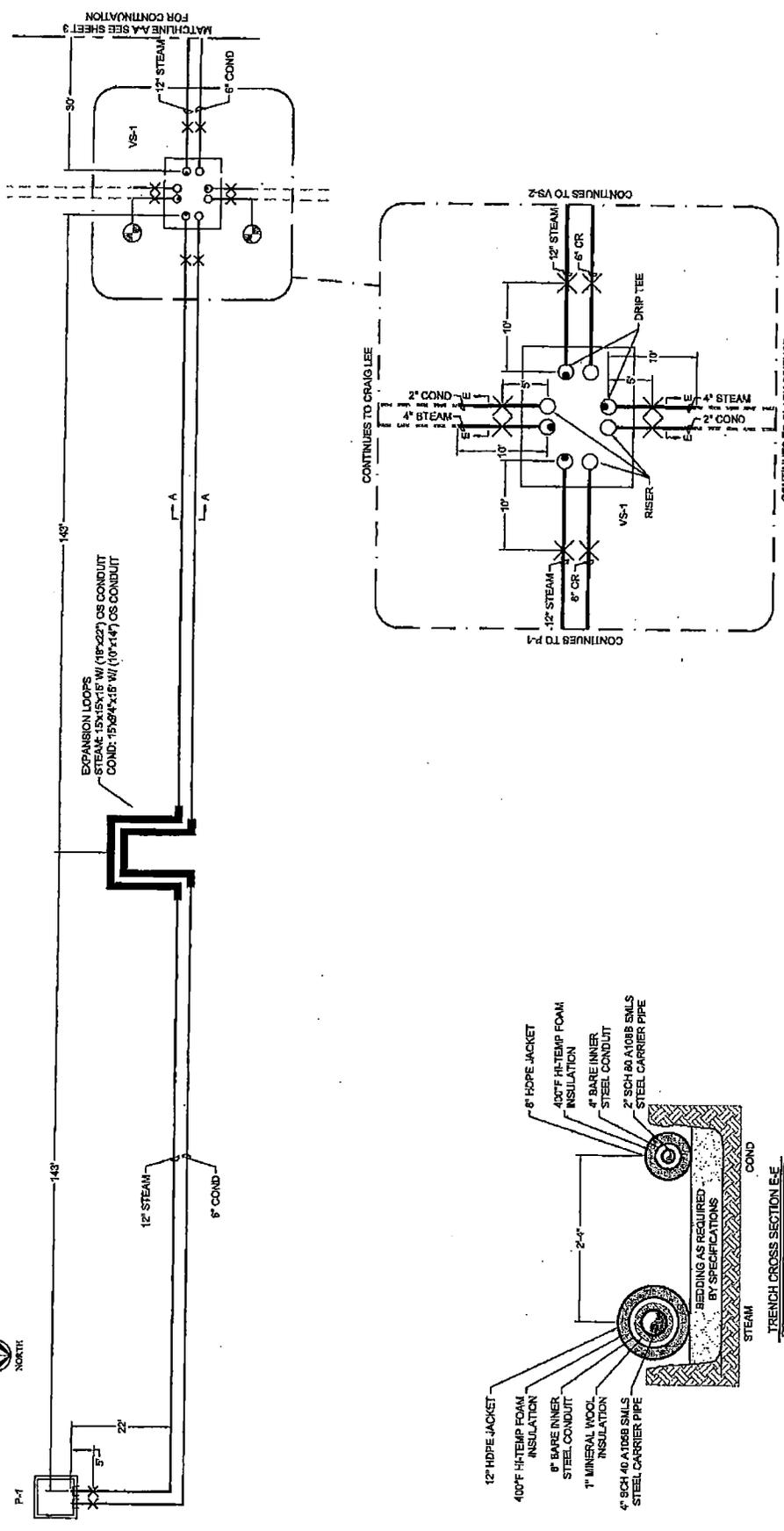


Brenda Nowatzki
National Sales Manager

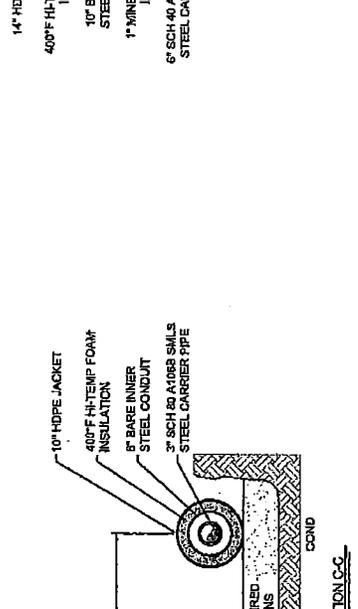
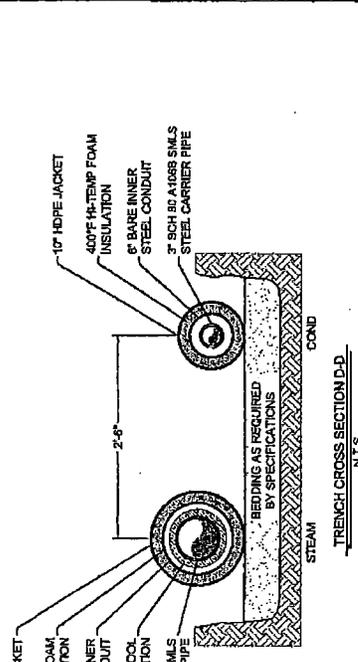
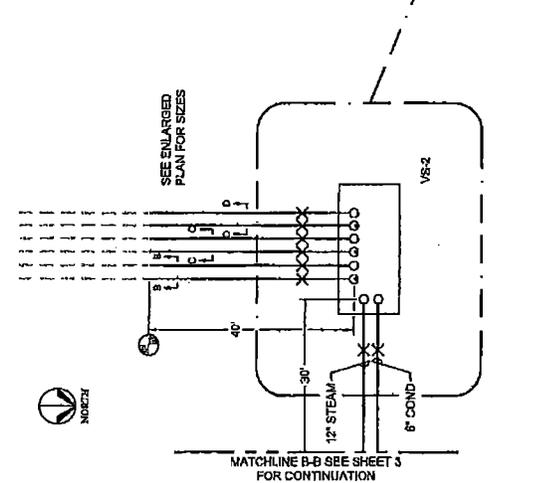
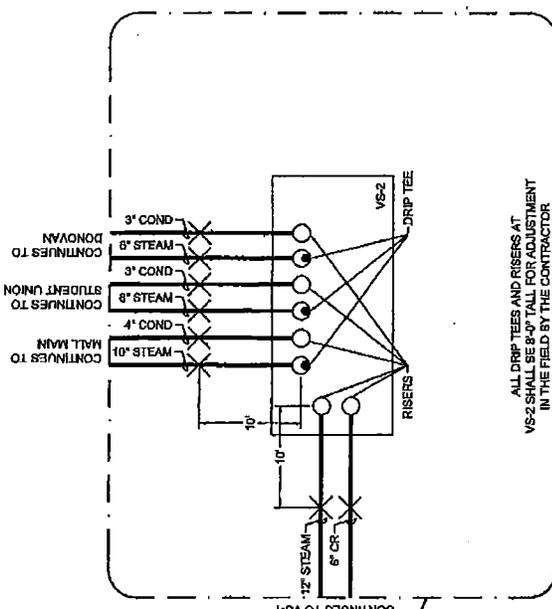
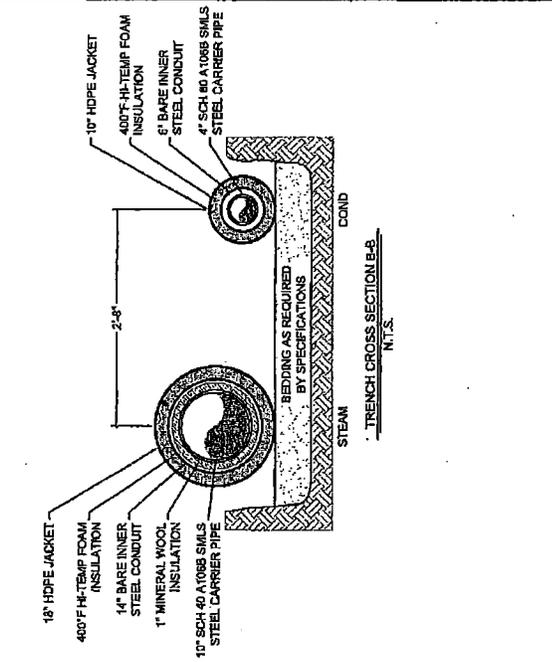
Cc: Larry Stonitsch, Rovanco
Bob Fasano, Fasano Technical Products



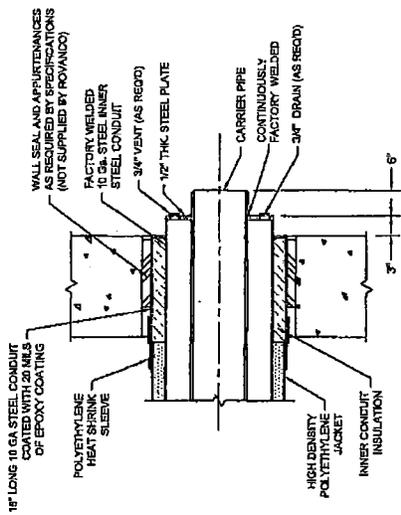
Serving the industry with quality products since 1969



ENGINEERED TRENCH SYSTEM BY: ROVANCO PIPING SYSTEMS 2008 BE FRONTRAGE RD., JOLIET, ILLINOIS 60431 PH: 815.724.4444 FAX: 815.724.4428 WWW.ROVANCO.COM		DESIGN CRITERIA TRENCH TEMP: 200°F TRENCH DEPTH: 30" TRENCH WIDTH: 30" TRENCH LENGTH: 100' TRENCH COVER: 12" TRENCH SLOPE: 0% TRENCH MATERIAL: 12" HDPE		OPERATING SERVICE CRITERIA OPERATING TEMP: 200°F OPERATING DEPTH: 30" OPERATING WIDTH: 30" OPERATING LENGTH: 100' OPERATING COVER: 12" OPERATING SLOPE: 0%		CLIENT: ATLANTIC CONTROL SYSTEMS PROJECT: OWNER: RHODE ISLAND COLLEGE		PROJECT: RHODE ISLAND COLLEGE - MALL STEAM TITLE: STEAM & COND PIPING PLAN		REVISIONS: NO. DATE DESCRIPTION BY/CHK 1 02/22/13 2 02/22/13		SCALE: SHEET NO. 40-002 SHEET TOTAL 40-002 DATE 02/22/13 DRAWN BY LEV CHECKED BY LEV PROJECT NO. 222213 SHEET NO. 01 OF 6	
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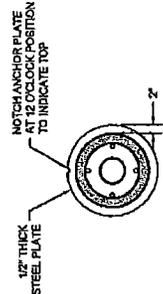


ENGINEERED PIPING SYSTEM BY ROVANCO, INC. PIPING SYSTEMS 2800 S. FRONTAGE RD., SUITE 200, LANSING, MI 48201 PH: (313) 741-8700 - FAX: (313) 741-4228 WEB: WWW.ROVANCO.COM		OPERATING SERVICE CRITERIA OPERATING PRESSURE: 150 PSIG OPERATING TEMPERATURE: 300°F SERVICE: STEAM		DESIGN CRITERIA DESIGN PRESSURE: 150 PSIG DESIGN TEMPERATURE: 300°F SERVICE: STEAM		CUSTOMER ATLANTIC CONTROL SYSTEMS WINNER OWNER: RHODE ISLAND COLLEGE		RHODE ISLAND COLLEGE - MALL STEAM STEAM & COND PIPING PLAN		REV. NO. 4 OF 6 DATE 02/22/15 BY LST DESCRIPTION		PROJECT NO. 8108
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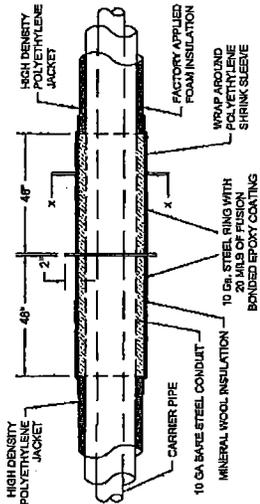


1 ALL OF OUR DIMENSIONS ARE TAKEN FROM END OF CARRIER PIPE AT WALL PENETRATIONS.

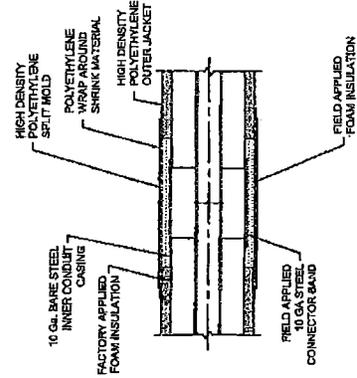
1 INSUL-800 CONDUIT END SEAL DETAIL
N.T.S.



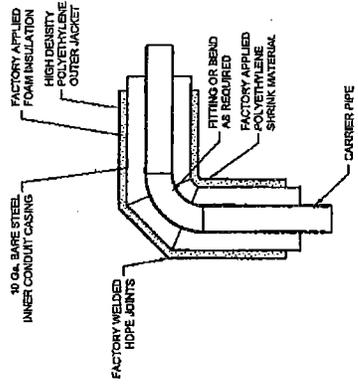
2 CROSS SECTION X X
ROUND ANCHOR 1/2\"/>



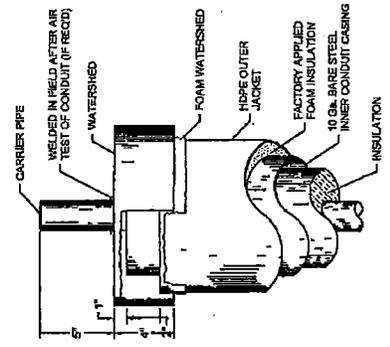
2 INSUL-800 ANCHOR DETAIL
N.T.S.



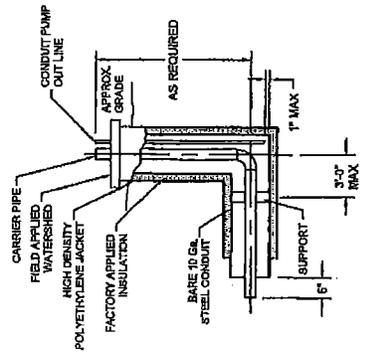
3 INSUL-800 FIELD JOINT DETAIL
N.T.S.



4 INSUL-800 GORED ELBOW DETAIL
N.T.S.

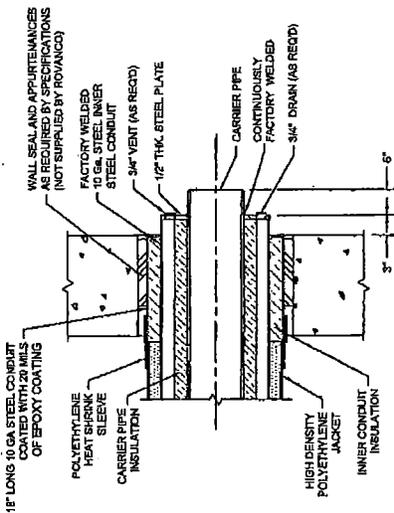


5 INSUL-800 CONDUIT WATERSHED DETAIL
N.T.S.



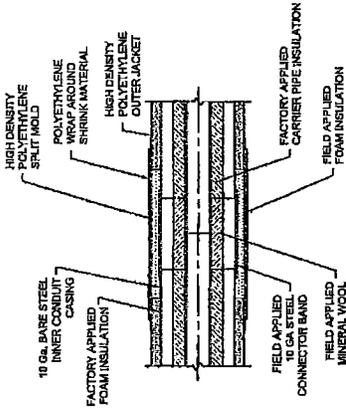
6 INSUL-800 CONDENSATE RISER DETAIL
N.T.S.

ROVANCO PIPING SYSTEMS BY ROVANCO PIPING SYSTEMS 2008 DE PROFFAGE RD., JOLIET, ILLINOIS 60431 PH. 815.724.1125 FAX 815.724.1126 WWW.ROVANCO.COM		DESIGN CRITERIA DESIGN TEMP. 120°F DESIGN PRESS. 150 PSI DESIGN WIND SPEED 120 MPH DESIGN SEISMIC ACC. 0.25 G	OPERATING SERVICE CRITERIA SERVICE TEMP. 120°F SERVICE PRESS. 150 PSI SERVICE WIND SPEED 120 MPH SERVICE SEISMIC ACC. 0.25 G	CUSTOMER ATLANTIC CONTROL SYSTEMS BUILDING	TITLE RHODE ISLAND COLLEGE - MALL STEAM CONDENSATE PIPING DETAILS	SHEET NO. 9 OF 9 DATE NONE DRAWN JEN CHECKED JEN APPROVED JEN
REVISIONS NO. DATE DESCRIPTION BY/CC		OWNER RHODE ISLAND COLLEGE		REV. DATE 02/23/10	DESCRIPTION CONDENSATE PIPING DETAILS	8103

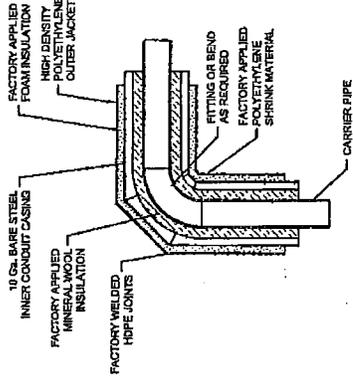


ALL OF OUR DIMENSIONS ARE TAKEN FROM END OF CARRIER PIPE AT WALL PENETRATIONS.

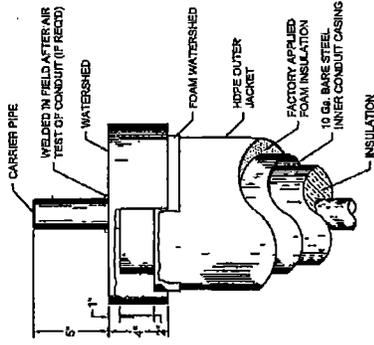
1 INSUL-800 CONDUIT END SEAL DETAIL N.T.S.



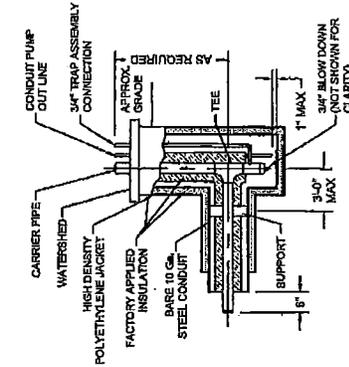
2 INSUL-300 FIELD JOINT DETAIL N.T.S.



3 INSUL-800 GORBED ELBOW DETAIL N.T.S.



4 INSUL-500 ANCHOR DETAIL N.T.S.



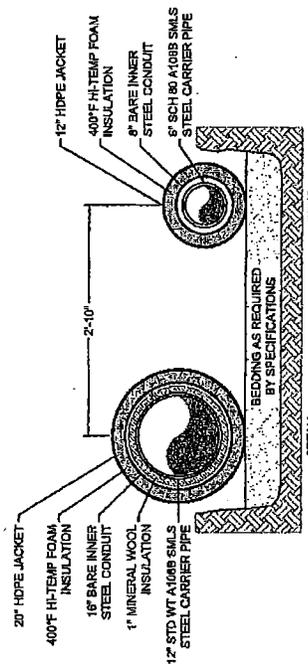
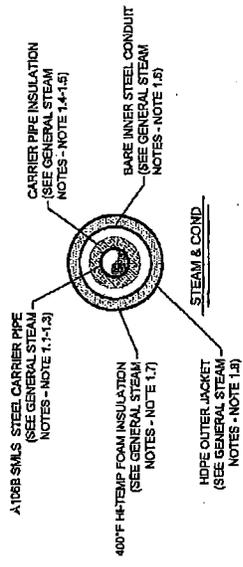
5 INSUL-500 CONDUIT WATERBUSH DETAIL N.T.S.

6 INSUL-800 CONDUIT DRIP TEE DETAIL N.T.S.

ROVANCO ENGINEERED PIPING SYSTEMS BY PIPING SYSTEMS 2605 W. 14TH ST. SUITE 100 PH. 813.714.4833 FAX. 813.714.4228 WEB: WWW.ROVANCO.COM		DESIGN CRITERIA AISC ASME B31.1 B31.3 B31.9 B31.12 B31.13 B31.14 B31.15 B31.16 B31.17 B31.18 B31.19 B31.20 B31.21 B31.22 B31.23 B31.24 B31.25 B31.26 B31.27 B31.28 B31.29 B31.30 B31.31 B31.32 B31.33 B31.34 B31.35 B31.36 B31.37 B31.38 B31.39 B31.40 B31.41 B31.42 B31.43 B31.44 B31.45 B31.46 B31.47 B31.48 B31.49 B31.50 B31.51 B31.52 B31.53 B31.54 B31.55 B31.56 B31.57 B31.58 B31.59 B31.60 B31.61 B31.62 B31.63 B31.64 B31.65 B31.66 B31.67 B31.68 B31.69 B31.70 B31.71 B31.72 B31.73 B31.74 B31.75 B31.76 B31.77 B31.78 B31.79 B31.80 B31.81 B31.82 B31.83 B31.84 B31.85 B31.86 B31.87 B31.88 B31.89 B31.90 B31.91 B31.92 B31.93 B31.94 B31.95 B31.96 B31.97 B31.98 B31.99 B31.100		OPERATING SERVICE CRITERIA A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA AB AC AD AE AF AG AH AI AJ AK AL AM AN AO AP AQ AR AS AT AU AV AW AX AY AZ BA BB BC BD BE BF BG BH BI BJ BK BL BM BN BO BP BQ BR BS BT BU BV BW BX BY BZ CA CB CC CD CE CF CG CH CI CJ CK CL CM CN CO CP CQ CR CS CT CU CV CW CX CY CZ DA DB DC DD DE DF DG DH DI DJ DK DL DM DN DO DP DQ DR DS DT DU DV DW DX DY DZ EA EB EC ED EE EF EG EH EI EJ EK EL EM EN EO EP EQ ER ES ET EU EV EW EX EY EZ FA FB FC FD FE FF FG FH FI FJ FK FL FM FN FO FP FQ FR FS FT FU FV FW FX FY FZ GA GB GC GD GE GF GG GH GI GJ GK GL GM GN GO GP GQ GR GS GT GU GV GW GX GY GZ HA HB HC HD HE HF HG HH HI HJ HK HL HM HN HO HP HQ HR HS HT HU HV HW HX HY HZ IA IB IC ID IE IF IG IH II IJ IK IL IM IN IO IP IQ IR IS IT IU IV IW IX IY IZ JA JB JC JD JE JF JG JH JI JJ JK JL JM JN JO JP JQ JR JS JT JU JV JW JX JY JZ KA KB KC KD KE KF KG KH KI KJ KL KM KN KO KP KQ KR KS KT KU KV KW KX KY KZ LA LB LC LD LE LF LG LH LI LJ LK LL LM LN LO LP LQ LR LS LT LU LV LW LX LY LZ MA MB MC MD ME MF MG MH MI MJ MK ML MN MO MP MQ MR MS MT MU MV MW MX MY MZ NA NB NC ND NE NF NG NH NI NJ NK NL NM NO NP NQ NR NS NT NU NV NW NX NY NZ OA OB OC OD OE OF OG OH OI OJ OK OL OM ON OO OP OQ OR OS OT OU OV OW OX OY OZ PA PB PC PD PE PF PG PH PI PJ PK PL PM PN PO PP PQ PR PS PT PU PV PW PX PY PZ QA QB QC QD QE QF QG QH QI QJ QK QL QM QN QO QP QQ QR QS QT QU QV QW QX QY QZ RA RB RC RD RE RF RG RH RI RJ RK RL RM RN RO RP RQ RR RS RT RU RV RW RX RY RZ SA SB SC SD SE SF SG SH SI SJ SK SL SM SN SO SP SQ SR SS ST SU SV SW SX SY SZ TA TB TC TD TE TF TG TH TI TJ TK TL TM TN TO TP TQ TR TS TT TU TV TW TX TY TZ UA UB UC UD UE UF UG UH UI UJ UK UL UM UN UO UP UQ UR US UT UY UZ VA VB VC VD VE VF VG VH VI VJ VK VL VM VN VO VP VQ VR VS VT VU VV VW VX VY VZ WA WB WC WD WE WF WG WH WI WJ WK WL WM WN WO WP WQ WR WS WT WU WV WW WX WY WZ XA XB XC XD XE XF XG XH XI XJ XK XL XM XN XO XP XQ XR XS XT XU XV XW XX XY XZ YA YB YC YD YE YF YG YH YI YJ YK YL YM YN YO YP YQ YR YS YT YU YV YW YX YZ ZA ZB ZC ZD ZE ZF ZG ZH ZI ZJ ZK ZL ZM ZN ZO ZP ZQ ZR ZS ZT ZU ZV ZW ZX ZY ZZ		SHEET NO. 8 OF 8 DATE: 02/27/13 BY: CK CHECKED: LEV APPROVED: LEV PROJECT: RHODE ISLAND COLLEGE - MALL STEAM PIPING DETAILS TITLE: STEAM PIPING DETAILS DESCRIPTION: RHODE ISLAND COLLEGE REV. DATE: 02/27/13 REV. BY: CK REV. DESCRIPTION:
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LEGEND

- END SEAL
- RISER
- ANCHOR (POUR IN CONCRETE)
- OVERSIZED CONDUIT
- PIPE BY OTHERS
- DRIP TEE
- POINT OF CONNECTION TO EXISTING



GENERAL STEAM NOTES

1. ALL UNDERGROUND STEAM AND CONDENSATE LINES ARE AN INSUL-PRO CONDUIT SYSTEM AS MANUFACTURED BY ROVANCO PIPING SYSTEMS INC., JOULET, ILLINOIS.
 - 1.1. STEAM CARRIER PIPE 12" AND LARGER IS STD WT A1068 SMLS STEEL PIPE.
 - 1.2. STEAM CARRIER PIPE 10" AND SMALLER IS SCH 40 A1068 SMLS STEEL PIPE.
 - 1.3. COND CARRIER PIPE IS SCH 40 A1068 SMLS STEEL PIPE.
 - 1.4. STEAM CARRIER PIPE INSULATION IS MINERAL WOOL CONFORMING TO ASTM C-547 WITH A K-VALUE OF NO GREATER THAN .28 AT 200°F. SECTIONAL INSULATION IS Banded ON PIPE WITH STAINLESS STEEL BANDING ON 18" CENTERS.
 - 1.5. COND CARRIER PIPE IS UNINSULATED.
 - 1.6. THE INNER CONDUIT SHALL BE 10 GA. WELDED STEEL CONFORMING TO ASTM A-138.
 - 1.7. THE INNER CONDUIT INSULATION IS H-TEMP POLYISOCYANURATE FOAM INSULATION K FACTOR OF .145, DENSITY OF 2 POF, CLOSED CELL CONTENT OF 60%, COMPRESSIVE STRENGTH OF 35 PSI, RATED FOR 400°F. CONFORMING TO ASTM STANDARD D1621, 1622, 1623, 2123, 2842, 2846, AND C61641.
 - 1.8. THE OUTER JACKET IS A HIGH DENSITY POLYETHYLENE CONFORMING TO ASTM D1248, TYPE 3, CLASS C.
 - 1.9. ALL CONDUIT UNITS WILL BE SHIPPED WITH SHIPPING BARS IN PLACE. ATTACHING THE CARRIER PIPES TO THE CONDUIT, THESE SHIPPING BARS MUST BE REMOVED IN THE FIELD PRIOR TO CLOSING OF THE FIELD JOINT. DETAILED INSTALLATION INSTRUCTIONS WILL BE PROVIDED WITH SHIPMENT.
 - 1.10. WHERE REQUIRED AND SHOWN ON FINAL DESIGN DRAWING, THE CARRIER PIPE MUST BE COLD SPRUNG IN THE FIELD.
2. ALL DIMENSIONS AND DESIGN PARAMETERS SHOWN ON THIS DRAWING MUST BE VERIFIED BY THE INSTALLING CONTRACTOR. CORRECTED FIELD DIMENSIONS AND/OR DESIGN PARAMETERS MUST BE SHOWN ON THIS DRAWING. WE REQUIRE 1 COPY OF THIS DRAWING TO BE SHOWN AND RELEASED FOR FABRICATION PRIOR TO BEING USED FOR THIS PROJECT FOR FABRICATION. PLEASE SIGN APPROVAL BLOCK PROVIDED.
3. ALL DIMENSIONS ARE TO THE STEAM LINE UNLESS NOTED OTHERWISE AND ARE FROM CENTER LINE OF CARRIER PIPE TO CENTER LINE OF CARRIER PIPE OR FROM CENTER LINE OF CARRIER PIPE TO END OF CARRIER PIPE.

ENGINEER APPROVAL

THIS DRAWING HAS BEEN REVIEWED FOR DESIGN ACCURACY AND CONFORMANCE TO APPLICABLE STANDARDS AND SPECIFICATIONS AND DETAILS REVIEWED FOR ACCURACY.

ENGINEER / OWNER DESIGN APPROVAL

BY: _____ DATE: _____

CONTRACTOR APPROVAL

CERTIFICATION OF FIELD DIMENSIONS

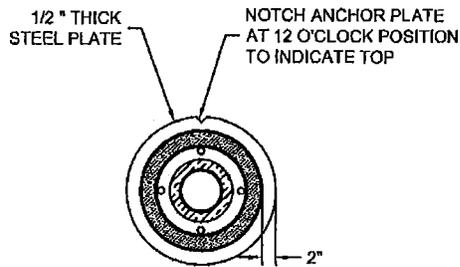
THIS DRAWING HAS BEEN REVIEWED FOR CONFORMANCE WITH SITE CONDITIONS. THE DIMENSIONS AND DETAILS SHOWN HAVE BEEN VERIFIED AND CERTIFIED FOR FABRICATION.

CONTRACTOR FIELD DIMENSION APPROVAL

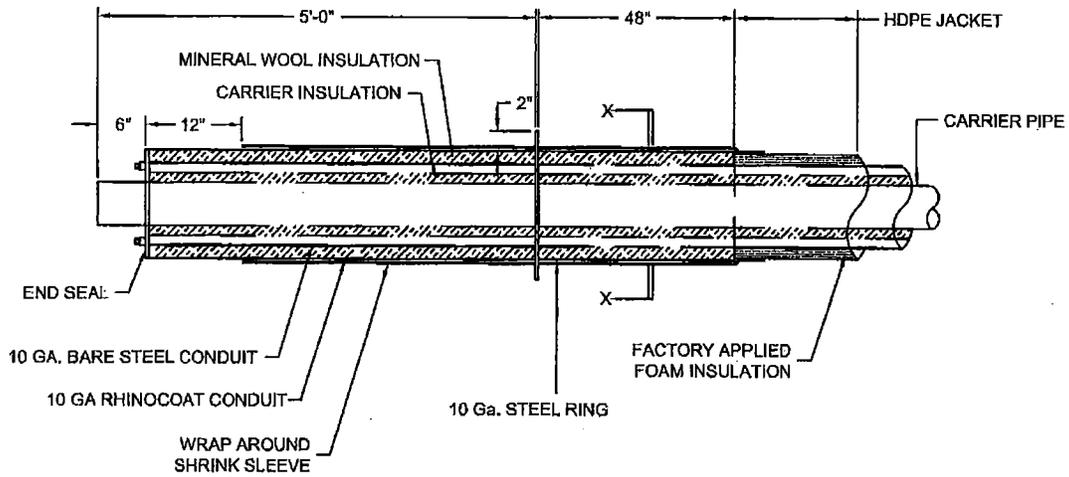
BY: _____ DATE: _____

WRITTEN APPROVAL MUST BE RECEIVED BY ROVANCO BEFORE PROJECT IS RELEASED FOR FABRICATION AFTER APPROVAL. THIS APPROVAL WILL BE DATED AND PROJECT SCHEDULED FOR PRODUCTION.

<p>ENGINEERED PIPING SYSTEM BY ROVANCO PIPING SYSTEMS 208 SAGE BROOKDALE RD. - JOULET, ILLINOIS 60451 PH: (815) 741-4100 - FAX: (815) 741-4028 WEB: WWW.ROVANCO.COM</p>		<p>DESIGN CRITERIA</p> <table border="1"> <tr> <th>DESIGN CRITERIA</th> <th>200°F</th> <th>250°F</th> <th>300°F</th> <th>350°F</th> <th>400°F</th> </tr> <tr> <td>DESIGN TEMPERATURE</td> <td>200°F</td> <td>250°F</td> <td>300°F</td> <td>350°F</td> <td>400°F</td> </tr> <tr> <td>DESIGN PRESSURE</td> <td>150 PSI</td> <td>150 PSI</td> <td>150 PSI</td> <td>150 PSI</td> <td>150 PSI</td> </tr> <tr> <td>DESIGN WIND SPEED</td> <td>117 MPH</td> <td>117 MPH</td> <td>117 MPH</td> <td>117 MPH</td> <td>117 MPH</td> </tr> <tr> <td>DESIGN SEISMIC</td> <td>0.15</td> <td>0.15</td> <td>0.15</td> <td>0.15</td> <td>0.15</td> </tr> </table>	DESIGN CRITERIA	200°F	250°F	300°F	350°F	400°F	DESIGN TEMPERATURE	200°F	250°F	300°F	350°F	400°F	DESIGN PRESSURE	150 PSI	DESIGN WIND SPEED	117 MPH	DESIGN SEISMIC	0.15	0.15	0.15	0.15	0.15	<p>OPERATING SERVICE CRITERIA</p> <table border="1"> <tr> <th>OPERATING SERVICE CRITERIA</th> <th>200°F</th> <th>250°F</th> <th>300°F</th> <th>350°F</th> <th>400°F</th> </tr> <tr> <td>DESIGN TEMPERATURE</td> <td>200°F</td> <td>250°F</td> <td>300°F</td> <td>350°F</td> <td>400°F</td> </tr> <tr> <td>DESIGN PRESSURE</td> <td>150 PSI</td> <td>150 PSI</td> <td>150 PSI</td> <td>150 PSI</td> <td>150 PSI</td> </tr> <tr> <td>DESIGN WIND SPEED</td> <td>117 MPH</td> <td>117 MPH</td> <td>117 MPH</td> <td>117 MPH</td> <td>117 MPH</td> </tr> <tr> <td>DESIGN SEISMIC</td> <td>0.15</td> <td>0.15</td> <td>0.15</td> <td>0.15</td> <td>0.15</td> </tr> </table>	OPERATING SERVICE CRITERIA	200°F	250°F	300°F	350°F	400°F	DESIGN TEMPERATURE	200°F	250°F	300°F	350°F	400°F	DESIGN PRESSURE	150 PSI	DESIGN WIND SPEED	117 MPH	DESIGN SEISMIC	0.15	0.15	0.15	0.15	0.15	<p>CUSTOMER</p> <p>ATLANTIC CONTROL SYSTEMS</p> <p>BRINER</p> <p>OWNER</p> <p>RHODE ISLAND COLLEGE</p>	<p>FOR</p> <p>RHODE ISLAND COLLEGE - MALL STEAM</p> <p>STEAM & COND</p> <p>PIPING PLAN</p>	<p>DATE</p> <p>4/26/23</p> <p>SCALE</p> <p>AS SHOWN</p> <p>PROJECT NO.</p> <p>2322715</p> <p>REV. DATE</p> <p>BY / CHK</p> <p>LEVY</p>	<p>SHEET NO.</p> <p>1 OF 6</p> <p>TITLE</p> <p>NOISE</p> <p>8100</p>																
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DESIGN SEISMIC	0.15	0.15	0.15	0.15	0.15																																																														



CROSS SECTION X-X
ROUND ANCHOR 1/2" THICK



INSUL-800 ANCHOR DETAIL WITH END SEAL

N.T.S.

DESCRIPTION: INSUL-800 ANCHOR DETAIL WITH END SEAL

DRAWN BY:
AMK

APPR. BY:

DATE/REV:
07/14/05

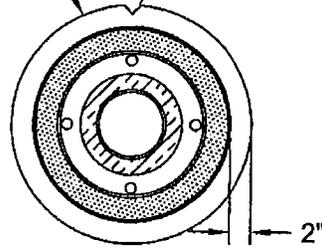
DWG. NO:
18A-01

Rovanco®

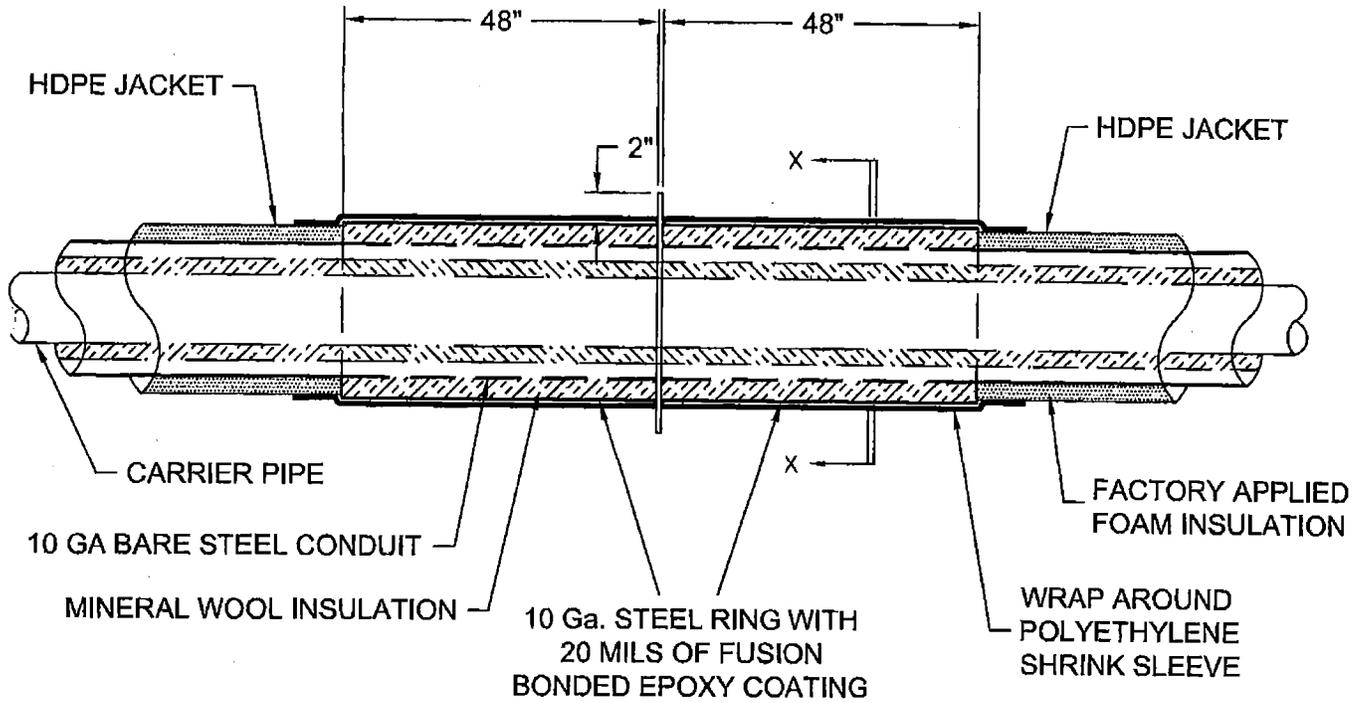
20535 S.E. FRONTAGE RD. JOLIET, IL. 60431 (815) 741-6700

1/2" THICK
STEEL PLATE

NOTCH ANCHOR PLATE
AT 12 O'CLOCK POSITION
TO INDICATE TOP



CROSS SECTION X-X
ROUND ANCHOR 1/2" THICK



INSUL-800 ANCHOR DETAIL

N.T.S.

DESCRIPTION: INSUL-800 ANCHOR DETAIL

DRAWN BY:
AMK

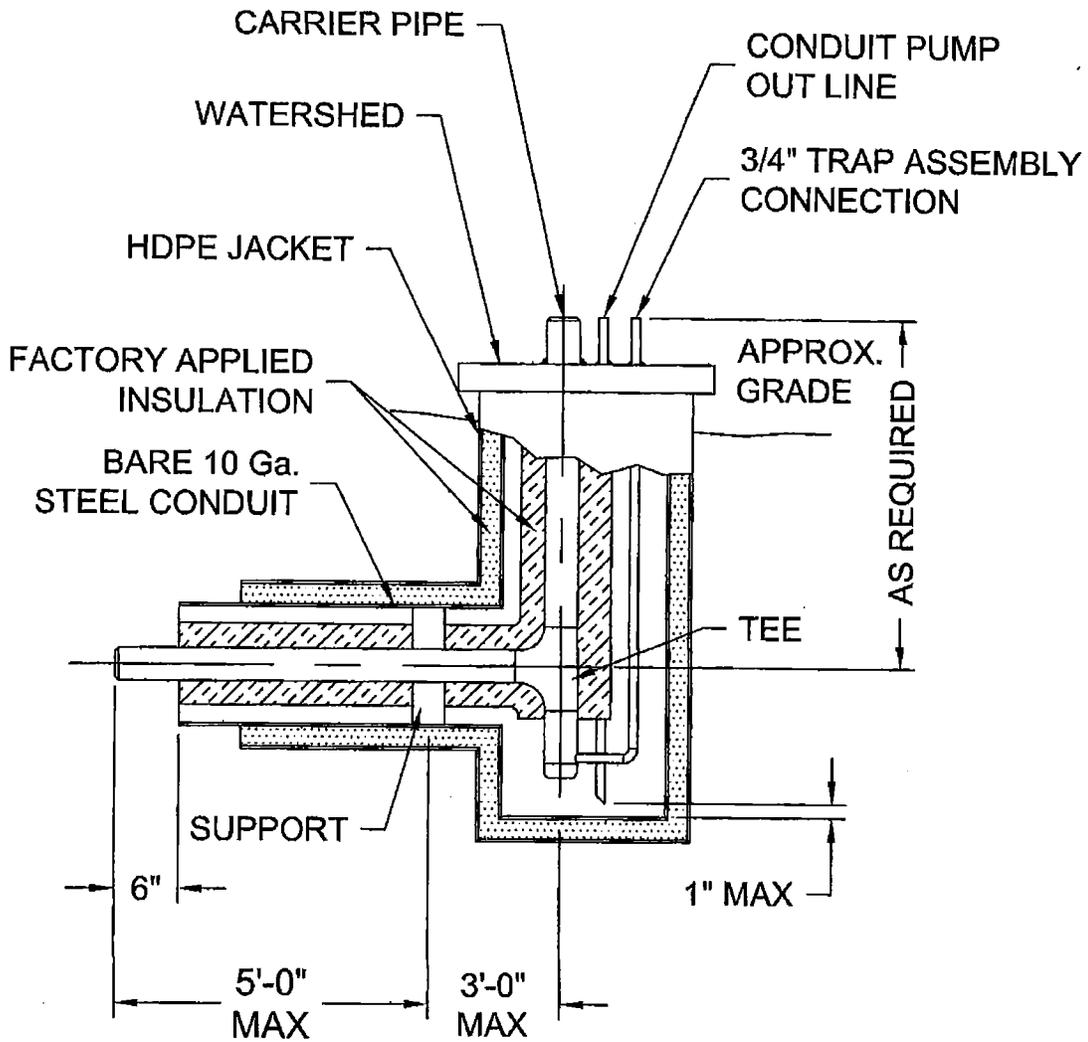
APPR. BY:

DATE/REV:
07/13/09

DWG. NO:
18A-02

Rovanco®

20535 S.E. FRONTAGE RD. JOLIET, IL. 60431 (815) 741-6700



INSUL-800 CONDUIT DRIP TEE DETAIL

N.T.S.

DESCRIPTION: INSUL-800 CONDUIT DRIP TEE DETAIL

DRAWN BY:
AMK

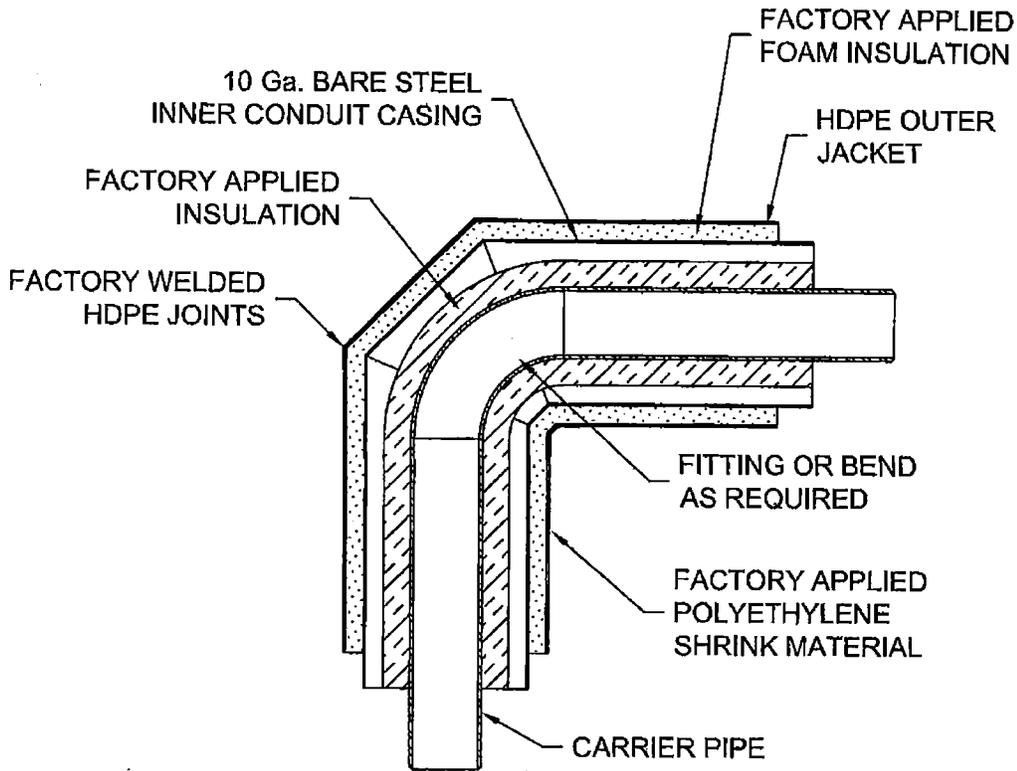
APPR. BY:

DATE/REV:
02/23/05

DWG. NO:
18DT-01

Rovanco®

20535 S.E. FRONTAGE RD. JOLIET, IL. 60431 (815) 741-6700



INSUL-800 CONDUIT GORED ELBOW DETAIL

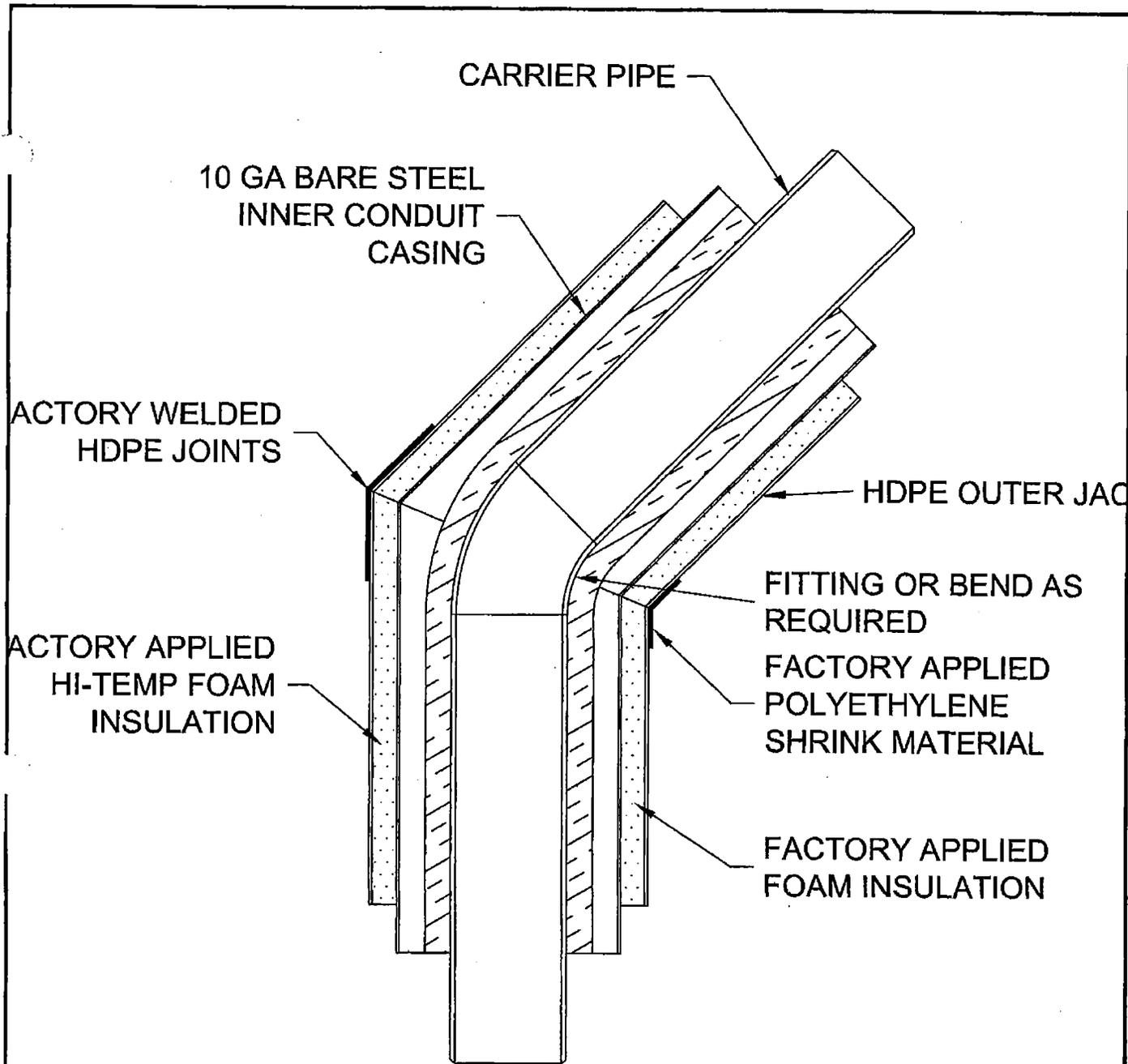
N.T.S.

DESCRIPTION: INSUL-800 CONDUIT GORED ELBOW DETAIL

DRAWN BY: AMK	APPR. BY:
DATE/REV: 07/20/04	DWG. NO: 18E-01

Rovanco®

20535 S.E. FRONTAGE RD. JOLIET, IL. 60431 (815) 741-6700



INSUL-800 CONDUIT ODD° ELBOW DETAIL

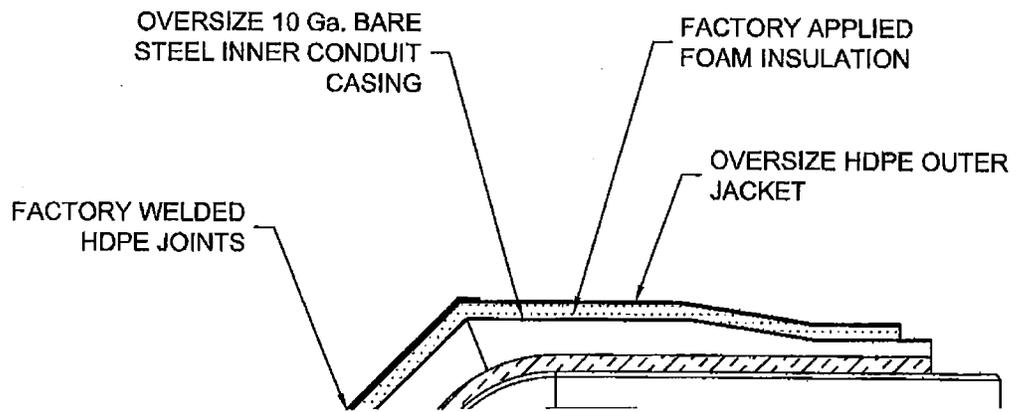
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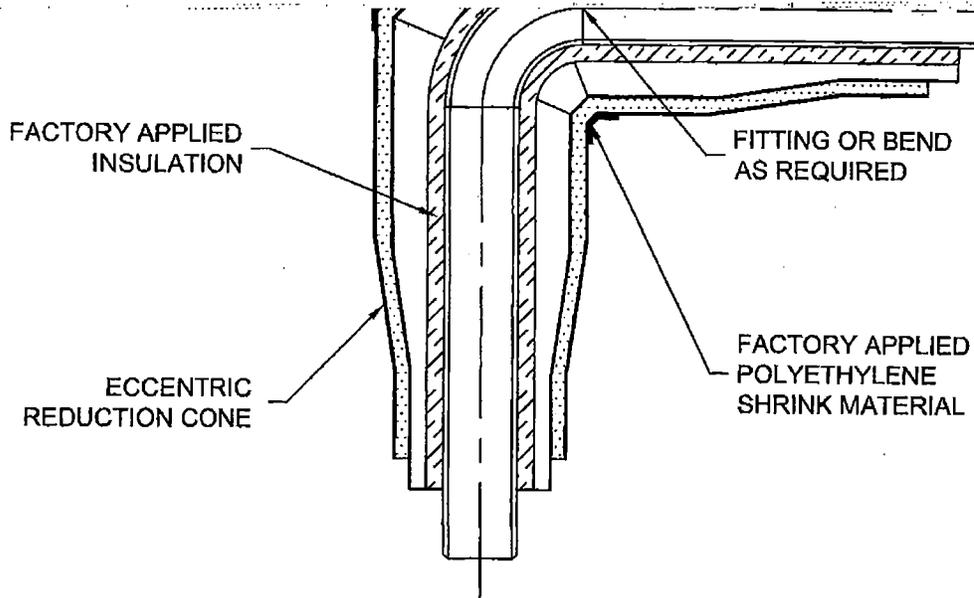
DESCRIPTION: INSUL-800 CONDUIT ODD ° ELBOW DETAIL

DRAWN BY: AMK	APPR. BY:
DATE/REV: 07/20/04	DWG. NO: 18E-02

Rovanco®

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INSUL-800 OVERSIZE CONDUIT ELBOW DETAIL

N.T.S.

DESCRIPTION: INSUL-800 OVERSIZE CONDUIT ELBOW DETAIL

DRAWN BY:
AD

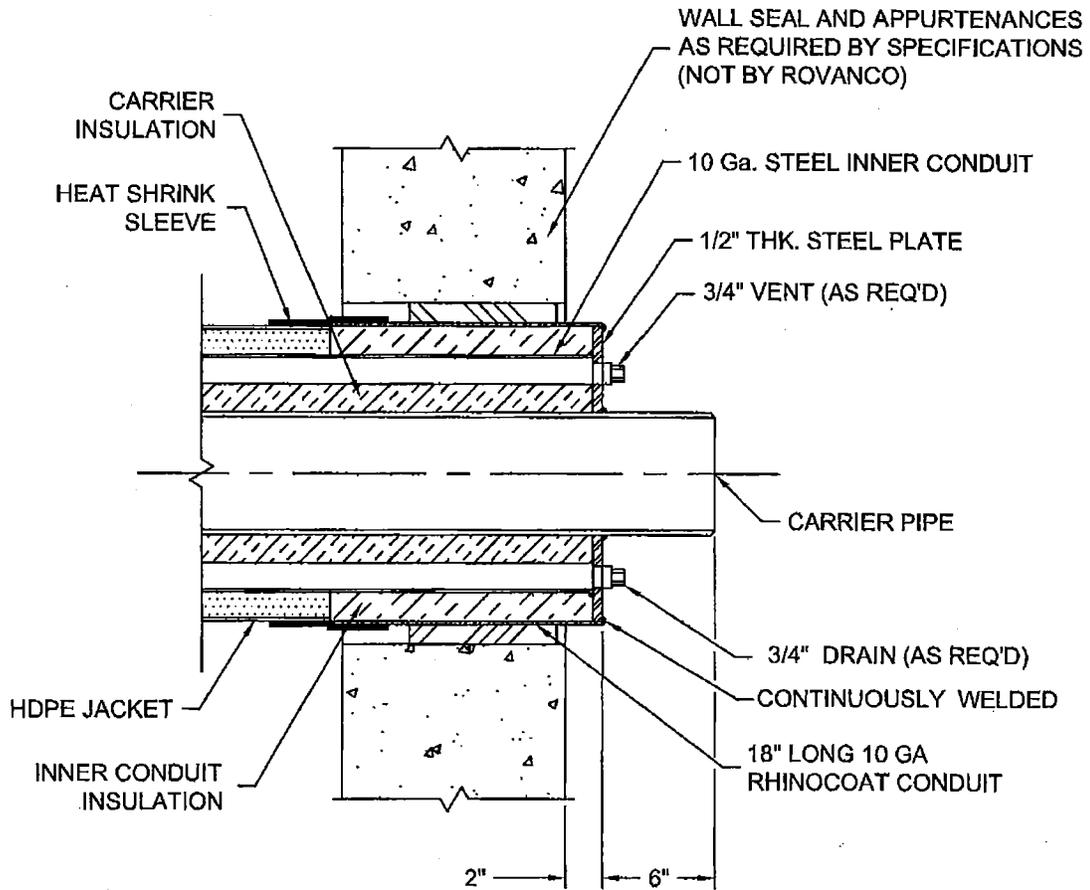
APPR. BY:

DATE/REV:
07/20/04

DWG. NO:
18E-03

Rovanco®

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ALL OF OUR DIMENSIONS ARE TAKEN FROM
END OF CARRIER PIPE AT WALL PENETRATIONS.

INSUL-800 CONDUIT END SEAL DETAIL

N.T.S.

DESCRIPTION: INSUL 800 CONDUIT END SEAL DETAIL

END SEAL WITHOUT ANCHOR LOCATIONS

DRAWN BY:
AMK

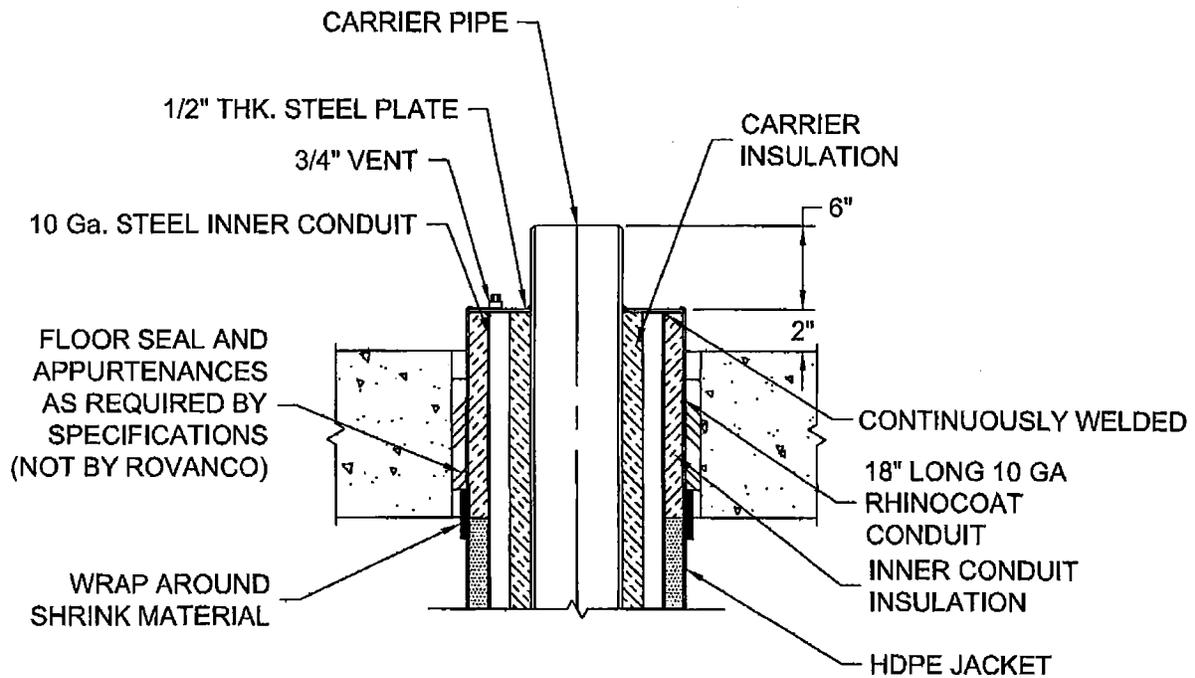
APPR. BY:

DATE/REV:
07/14/05

DWG. NO:
18FS-01

Rovanco®

20535 S.E. FRONTAGE RD. JOLIET, IL 60431 (815) 741-6700



ALL OF OUR DIMENSIONS ARE TAKEN FROM
END OF CARRIER PIPE AT WALL PENETRATIONS.

INSUL-800 CONDUIT END SEAL DETAIL

VERTICAL FLOW PENETRATION

DESCRIPTION: INSUL -800 CONDUIT END SEAL DETAIL

DRAWN BY:
AD

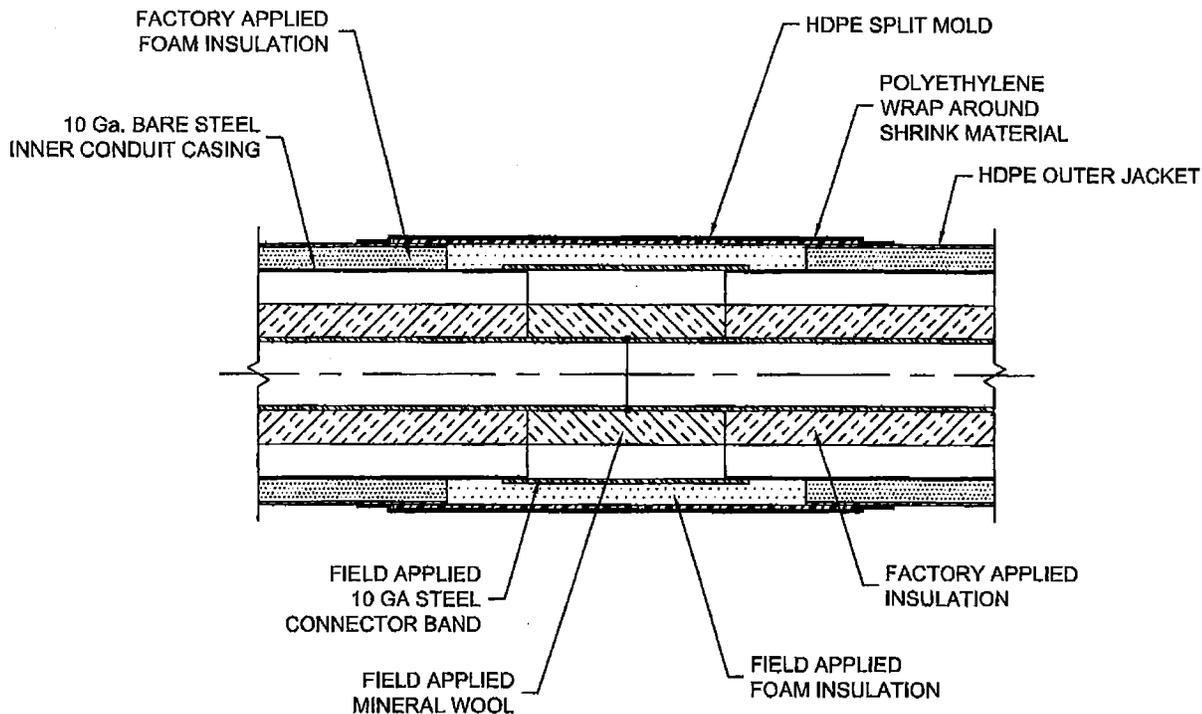
APPR. BY:

DATE/REV:
07/14/05

DWG. NO:
18ES-02

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NOTE: FOR 2" AND LARGER STEEL CARRIER PIPE

INSUL-800 CONDUIT FIELD JOINT DETAIL

N.T.S

DESCRIPTION: INSUL-800 CONDUIT FIELD JOINT DETAIL

DRAWN BY:
AMK

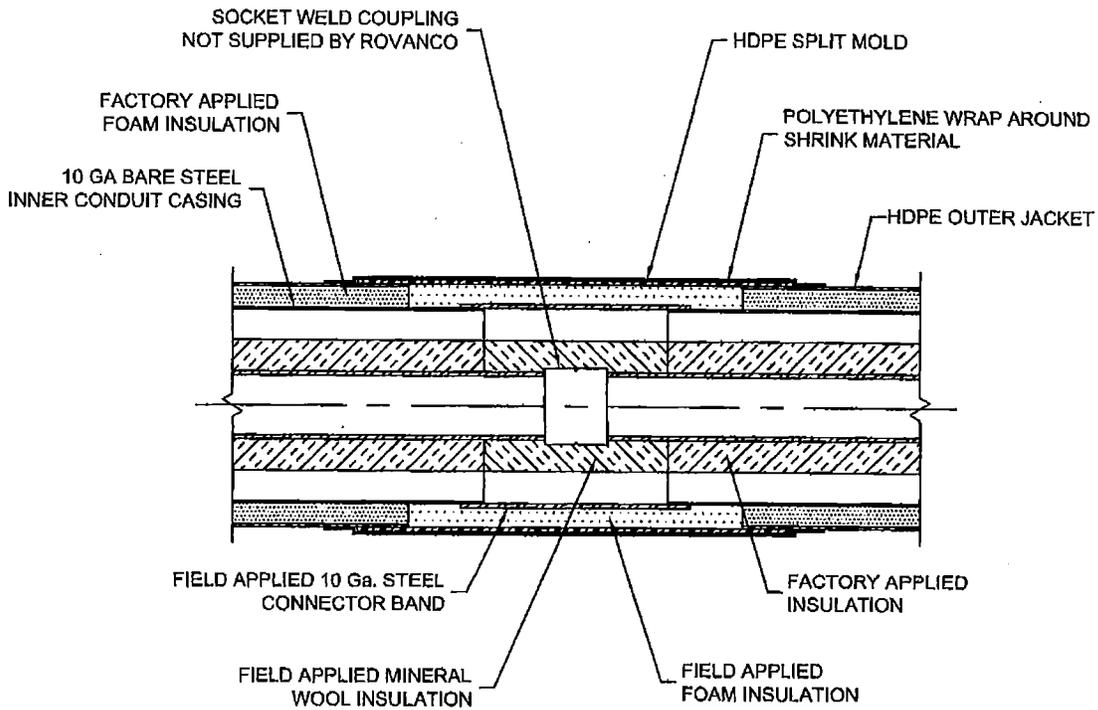
APPR. BY:

DATE/REV:
05/01/05

DWG. NO:
18F-01

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NOTE: FOR 1½" AND SMALLER
STEEL CARRIER PIPE.

INSUL-800 CONDUIT FIELD JOINT DETAIL

N.T.S.

DESCRIPTION: INSUL-800 CONDUIT FIELD JOINT DETAIL

DRAWN BY:
AMK

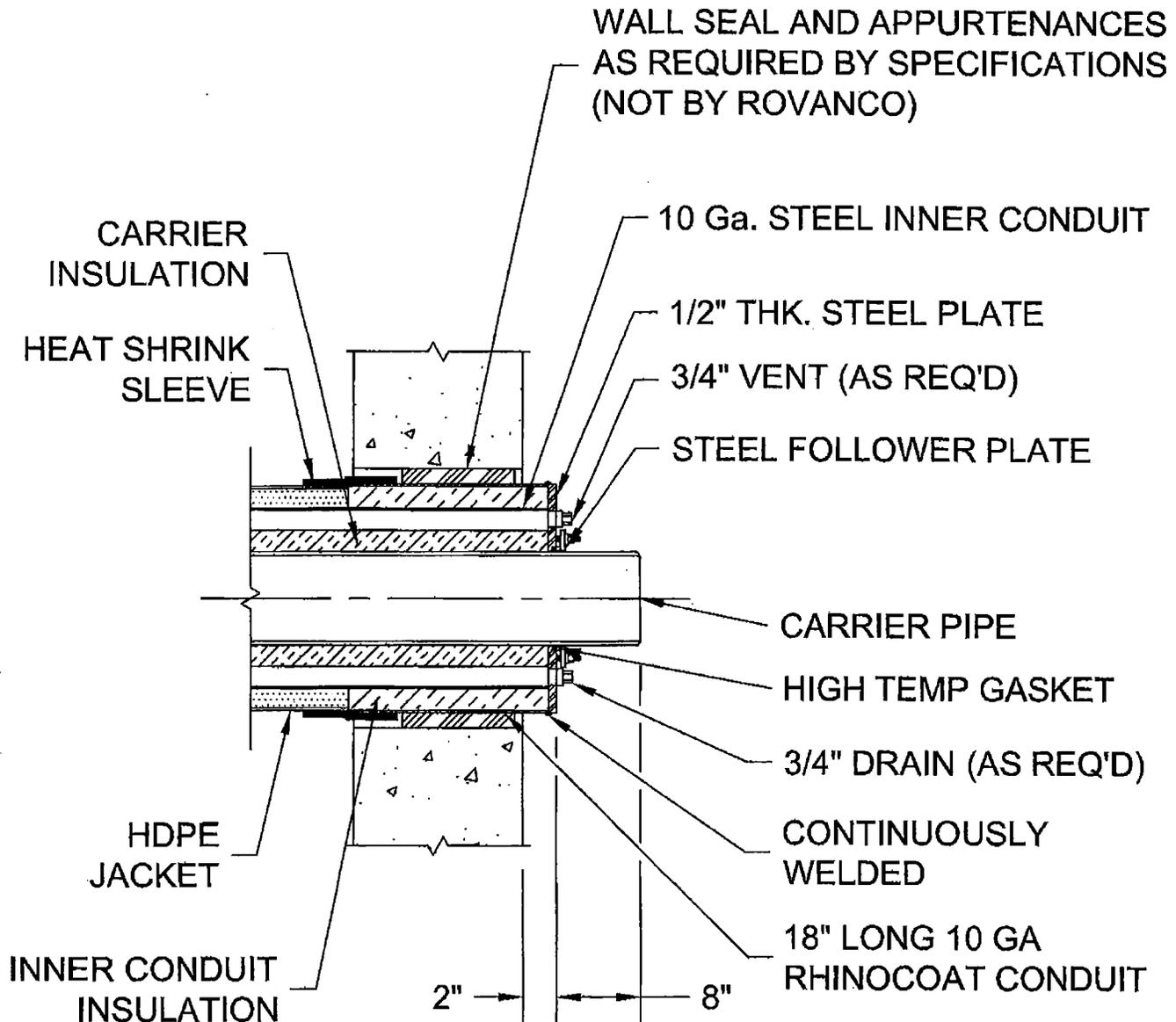
APPR. BY:

DATE/REV:
05/01/05

DWG. NO:
18F-02

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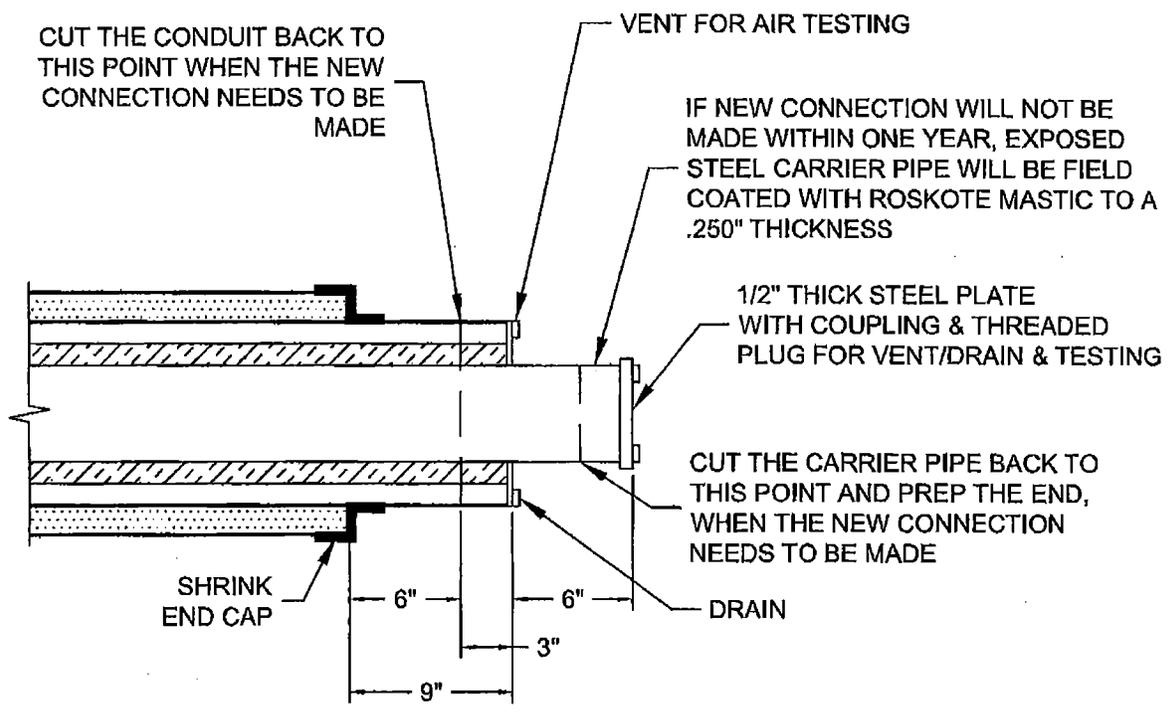


ALL OF OUR DIMENSIONS ARE TAKEN FROM
END OF CARRIER PIPE AT WALL PENETRATIONS.

INSUL-800 CONDUIT GLAND SEAL DETAIL
N.T.S.

Rovanco[®]
20535 S.E. FRONTAGE RD. JOLIET, IL. 60431 (815) 741-6700

NAME: INSUL-800 CONDUIT GLAND SEAL DETAIL			
APPR BY: DK	DRAWN BY: AD	DATE/REV: 01/27/2009	DWG NO: 18G-01



INSUL 800 CAP FOR FUTURE DETAIL

N.T.S.

DESCRIPTION: INSUL-800 CAP FOR FUTURE DETAIL

DRAWN BY:
AMK

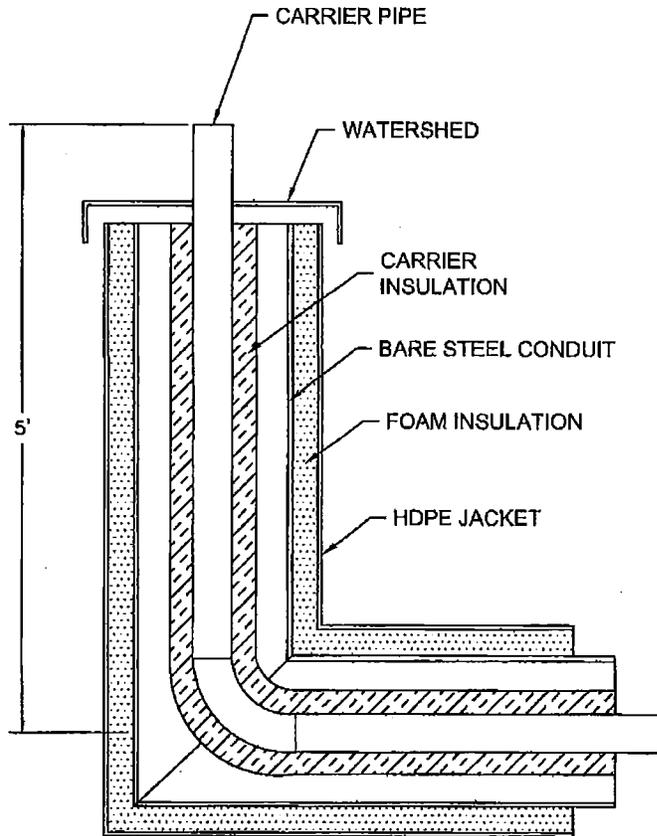
APPR. BY:

DATE/REV:
07/20/04

DWG. NO:
18M-01

Rovanco®

20535 S.E. FRONTAGE RD, JOLIET, IL. 60431 (815) 741-6700



TYPICAL INSUL-800 RISER WITH WATERSHED DETAIL

N.T.S.

DESCRIPTION: TYPICAL INSUL-800 RISER WITH WATERSHED DETAIL

DRAWN BY:
AD

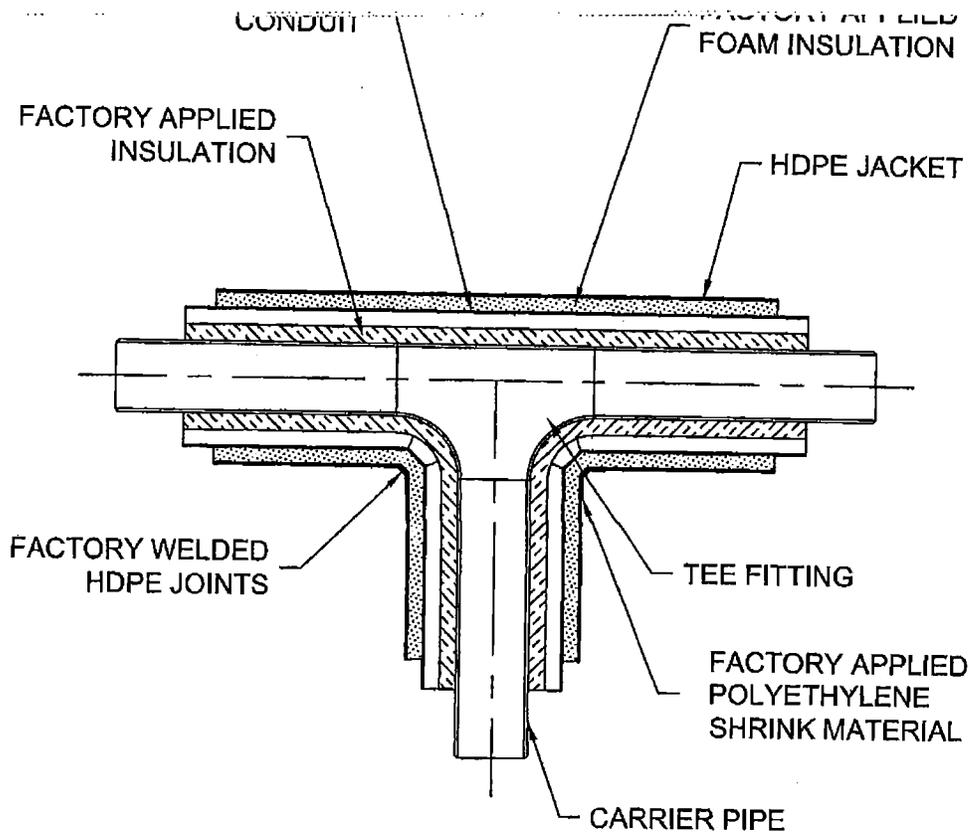
APPR. BY:

DATE/REV:
07/20/04

DWG. NO:
10M 02

Rovanco®

20275 S.E. FRONTAGE RD. SUITE # 20474 (915) 744-8200



INSUL-800 CONDUIT TEE DETAIL

N.T.S.

DESCRIPTION: INSUL-800 CONDUIT TEE DETAIL

DRAWN BY:
AMK

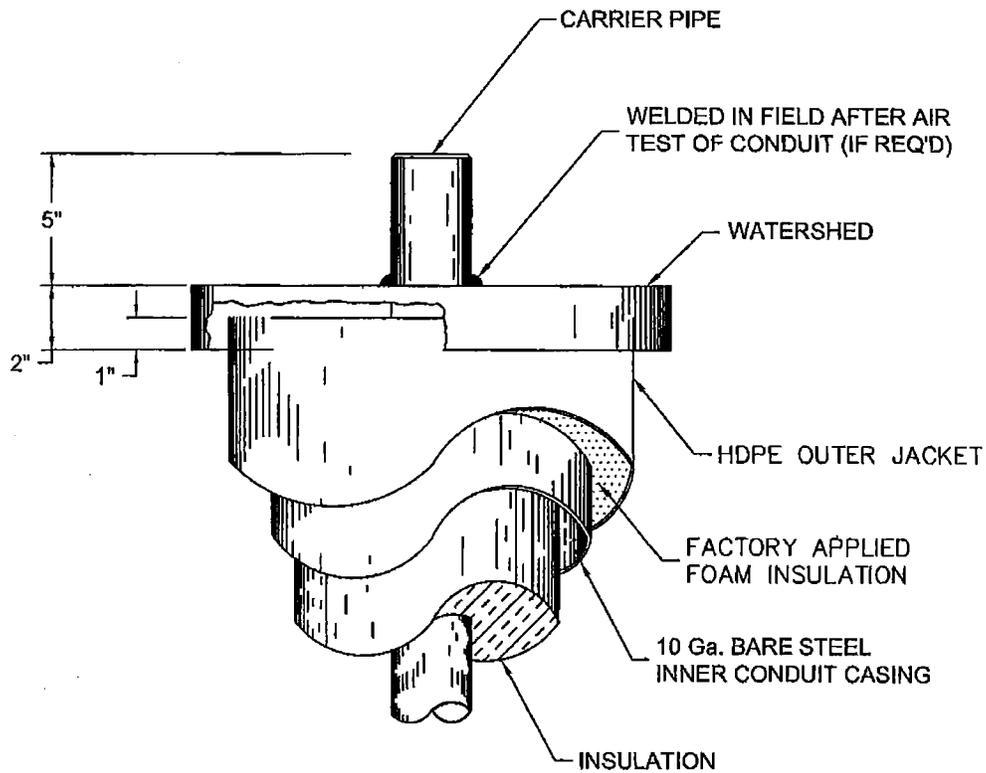
APPR. BY:

DATE/REV:
07/20/04

DWG. NO:
18T-01

Rovanco®

20535 S.E. FRONTAGE RD. JOLIET, IL. 60431 (815) 741-6700



INSUL-800 CONDUIT WATERSHED DETAIL

N.T.S.

DESCRIPTION: INSUL-800 CONDUIT WATERSHED DETAIL

DRAWN BY:
AMK

APPR. BY:

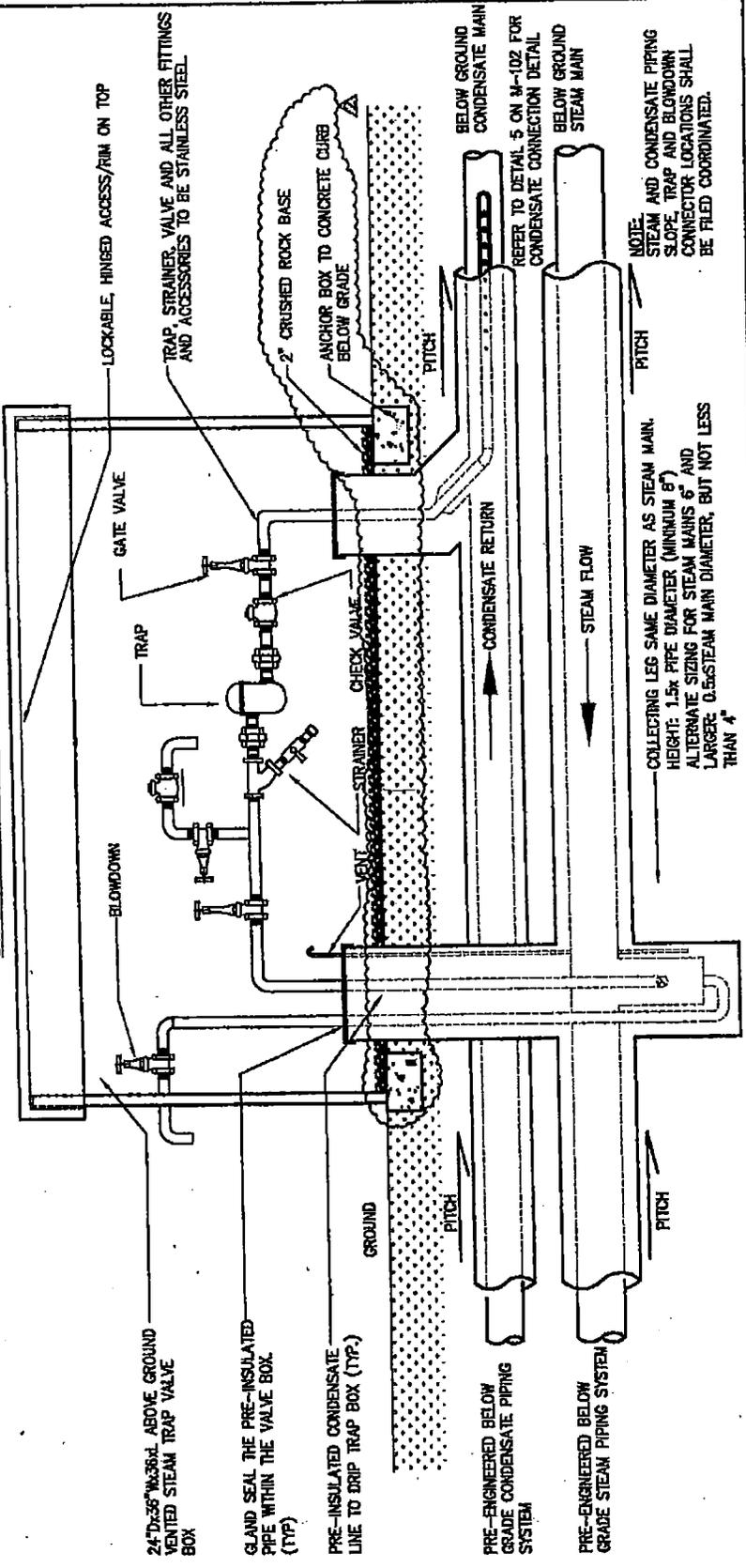
DATE/REV:
07/20/04

DWG. NO:
18WS-01

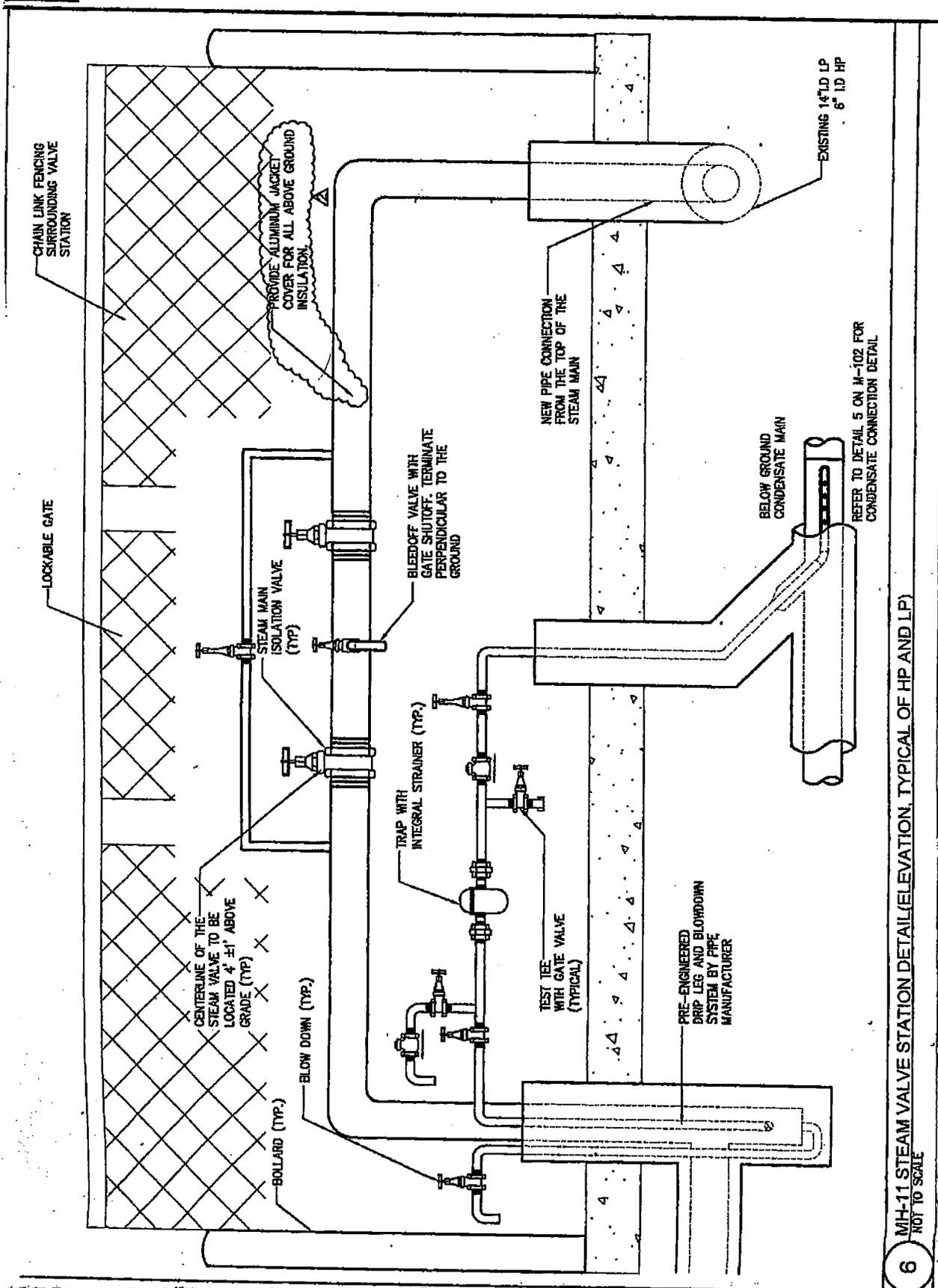
Rovanco®

20535 S.E. FRONTAGE RD. JOLIET, IL, 60431 (815) 741-6700

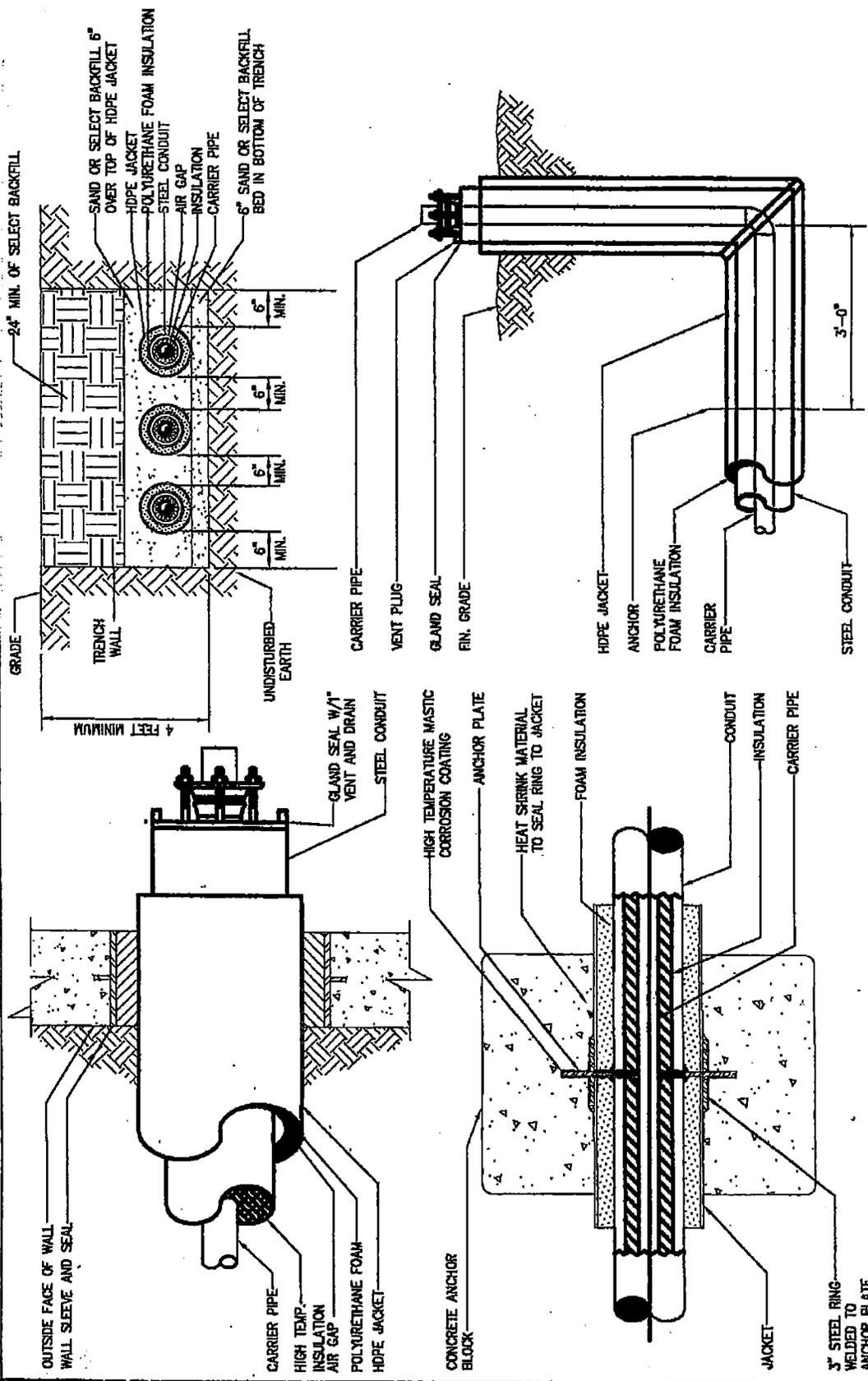
STEAM TRAP & BLOWDOWN VALVE BOX



1 MIDDLE OF THE MAIN DRIP TRAP & BLOWDOWN
NOT TO SCALE

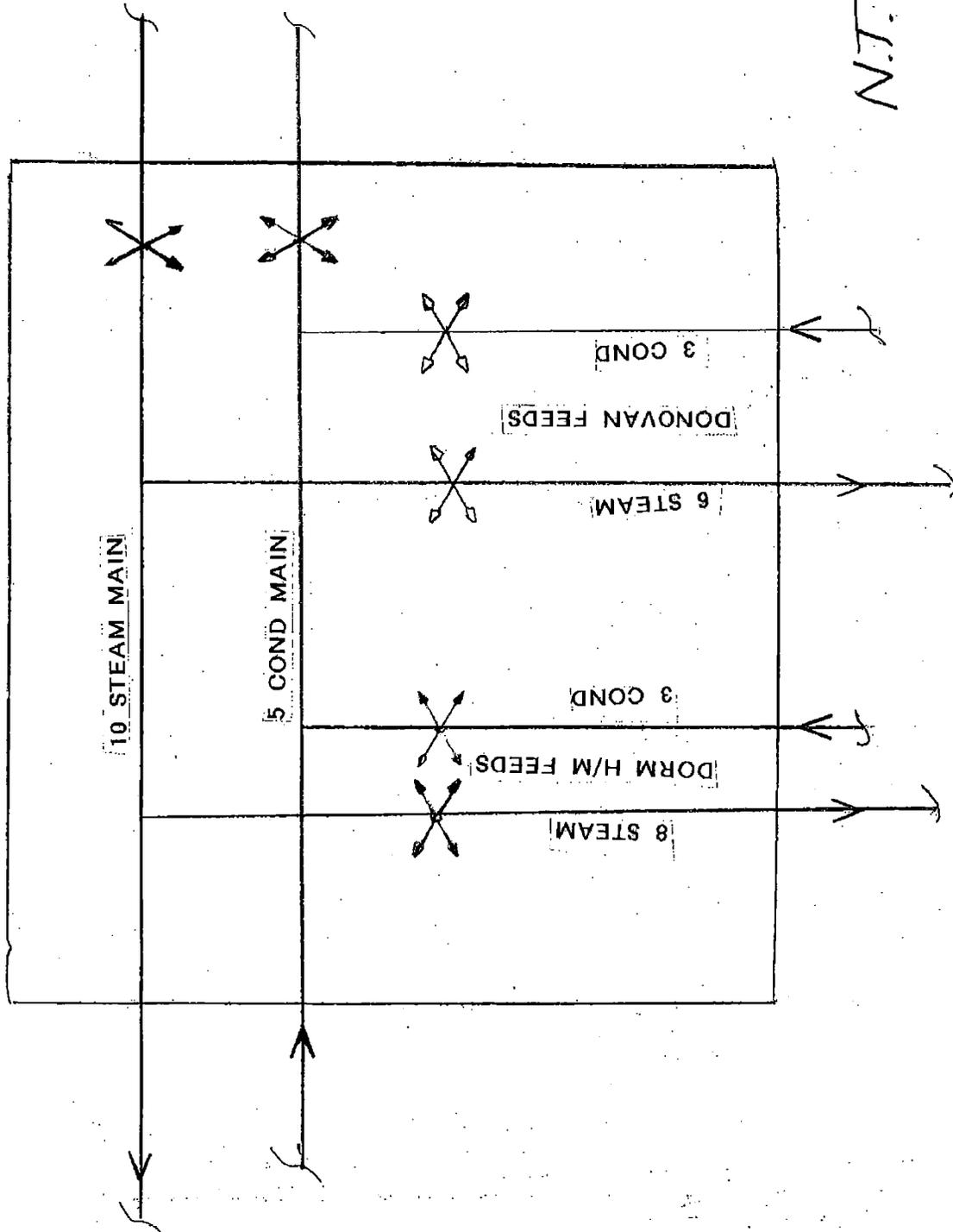


6 MH-11 STEAM VALVE STATION DETAIL (ELEVATION, TYPICAL OF HP AND LP)
NOT TO SCALE



7 UNDERGROUND STEAM/CONDENSATE PIPING DETAIL
NOT TO SCALE

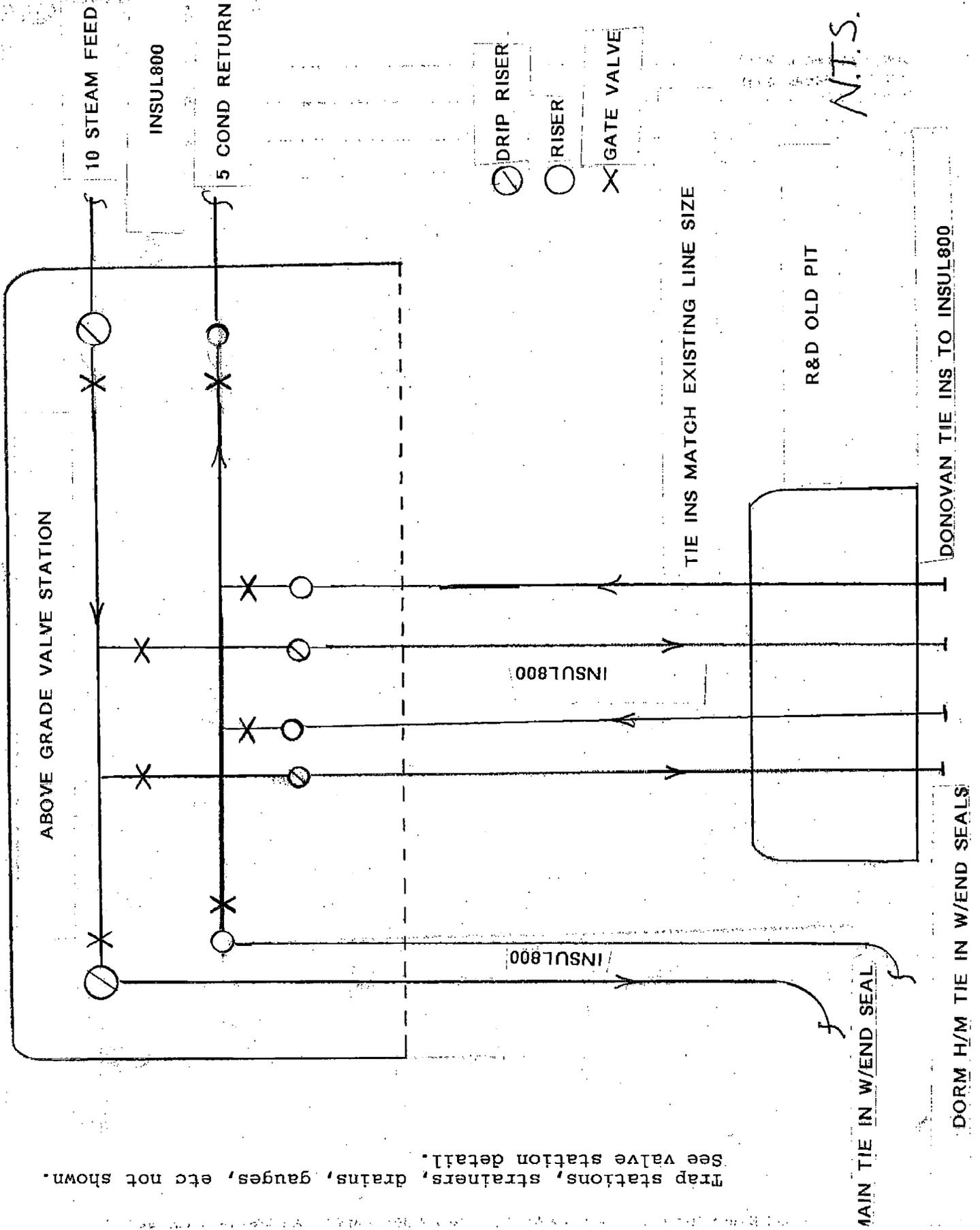
All piping is conventional steel except for the Donovan Feeds which are Rovanco Insul800 with end seals inside pit. Pit trap assembly from mud leg runs at floor level



N.T.S.

RIC MALL PIT EXISTING CONDITIONS

Trap stations, strainers, drains, gauges, etc not shown.
See valve station detail.





FOR APPROVAL
 SPEC SECTION _____
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 PRODUCT LPT HP STEAM PIPE
 Pipe Specification A106 (S40)

Specification	A106 NPS 1/8 -- 48 ANSI Schedules to 160		
Scope	Covers SEAMLESS carbon steel nominal wall pipe for high-temperature service, suitable for bending, flanging and similar forming operations. NPS 1 1/2 and under may be either hot finished or cold drawn. NPS 2 and larger shall be hot finished unless otherwise specified.		
Kinds of Steel Permitted For Pipe Material	Killed Steel Open-hearth Electro-furnace Basic-oxygen		
Hot-Dipped Galvanizing	Not covered in specification.		
Permissible Variations in Wall Thickness	The minimum wall thickness at any point shall not be more than 12.5% under the nominal wall thickness specified.		
Chemical Requirements	<u>Grade A</u>	<u>Grade B</u>	<u>Grade C</u>
Carbon max. %.....	0.25	0.30	0.35
Manganese %.....	0.27 to 0.93	0.29 to 1.06	0.29 to 1.06
Phosphorous, max. %.....	0.025	0.025	0.025
Sulfur, max. %.....	0.025	0.025	0.025
Silicon, min. %.....	0.10	0.10	0.10
Tensile Requirements	Seamless		
	<u>Grade A</u>	<u>Grade B</u>	<u>Grade C</u>
Tensile Strength, min., psi.....	48,000	60,000	70,000
Yield Strength, min., psi.....	30,000	35,000	40,000
Hydrostatic Testing	Inspection test pressures produce a stress in the pipe wall equal to 60% or specified minimum yield strength (SMYS) at room temperature. Maximum Pressures are not to exceed 2500 psi for NPS 3 and under and 2800 psi for the larger sizes. Pressure is maintained for not less than 5 seconds.		
Permissible Variations in Weights per Foot	Weight of any length shall not vary more than 10% over and 3.5% under that specified. NOTE -- NPS 4 and smaller -- weighed in lots. Larger sizes -- by length		
Permissible Variations in Outside Diameter	Outside Diameter at any point shall not vary from standard specified more than--		
	<u>NPS</u>	<u>Over</u>	<u>Under</u>
	1 1/2 and smaller	1/64"	1/32"
	2 - 4	1/32"	1/32"
	6 - 8	1/16"	1/32"
	10 - 18	3/32"	1/32"
	20 - 26	1/8"	1/32"
Mechanical Tests Specified	Tensile Test -- NPS 8 and larger -- either transverse or longitudinal acceptable Smaller than NPS 8 -- weighed in lots. Larger sizes -- by length. Flattening Test -- NPS 2 and larger. Bending Test (Cold) -- NPS 2 and under.		
		<u>Degree of Bend</u>	<u>Diameter of Mandrel</u>
		For Normal A106 uses	90
		For Close Colling	180
			12 x nom. dia. of pipe
			8 x nom. dia. of pipe
Number of Tests Required	<u>NPS</u>	<u>On One Length From Each Lot of</u>	
	Tensile	5 and smaller	400 or less
		6 and larger	200 or less
	Bonding	2 and smaller	400 or less
	Flattening	2 through 5	400 or less
		6 and over	200 or less
Lengths	Lengths required shall be specified on order. No "Joiners" permitted unless otherwise specified. If no definite lengths required, following practice applies: Single Random -- 16' - 22'. 5% may be 12' - 16' Double Random -- Minimum length 22', Minimum average 35'. 5% may be 16' - 22'.		
Required Markings on Each Length (On Tags attached to each Bundle in case of Bundled Pipe)	Rolled Stamped or Stenciled (Mfrs. option) Manufacturer's name or brand. Length of pipe. A106 A, A106 B, A106 C. ANSI schedule number. Hydrostatic test pressure and/or NDE. Weight per foot (NPS 4 and larger) or NH if neither is specified. Additional "S" if tested supplementary requirements.		
General Information	* Unless otherwise specified, pipe furnished with plain ends. * Purchaser may specify NDE * Surface finish standards are outlined in specification. In lieu of hydrostatic test or neither		



FOR APPROVAL
 SPEC SECTION _____
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 PRODUCT STEAM COND. PIPE
 (580)

Pipe Specification A106

Specification	A106 NPS 1/8 -- 48 ANSI Schedules to 160		
Scope	Covers SEAMLESS carbon steel nominal wall pipe for high-temperature service, suitable for bending, flanging and similar forming operations. NPS 1 1/2 and under may be either hot finished or cold drawn. NPS 2 and larger shall be hot finished unless otherwise specified.		
Kinds of Steel Permitted For For Pipe Material	Killed Steel Open-hearth Electric-furnace Basic-oxygen		
Hot-Dipped Galvanizing	Not covered in specification.		
Permissible Variations in Wall Thickness	The minimum wall thickness at any point shall not be more than 12.5% under the nominal wall thickness specified.		
Chemical Requirements		<u>Grade A</u>	<u>Grade B</u>
		<u>Grade C</u>	
	Carbon max. %.....	0.25	0.30
	Manganese %.....	0.27 to 0.63	0.29 to 1.06
	Phosphorous, max. %.....	0.025	0.025
	Sulfur, max. %.....	0.025	0.025
	Silicon, min. %.....	0.10	0.10
Tensile Requirements		<u>Grade A</u>	<u>Grade B</u>
		<u>Grade C</u>	
	Seamless		
	Tensile Strength, min., psi.....	48,000	60,000
	Yield Strength, min., psi.....	30,000	46,000
Hydrostatic Testing	Inspection test pressures produce a stress in the pipe wall equal to 60% or specified minimum yield strength (SMYS) at room temperature. Maximum Pressures are not to exceed 2500 psi for NPS 3 and under and 2800 psi for the larger sizes. Pressure is maintained for not less than 5 seconds.		
Permissible Variations in Weights per Foot	Weight of any length shall not vary more than 10% over and 3.5% under that specified. NOTE -- NPS 4 and smaller -- weighed in lots. Larger sizes -- by length		
Permissible Variations in Outside Diameter	Outside Diameter at any point shall not vary from standard specified more than--		
	NPS	Over	Under
	1 1/2 and smaller	1/64"	1/32"
	2 - 4	1/32"	1/32"
	5 - 8	1/16"	1/32"
	10 - 18	3/32"	1/32"
	20 - 26	1/8"	1/32"
Mechanical Tests Specified	Tensile Test -- NPS 8 and larger -- either transverse or longitudinal acceptable Smaller than NPS 8 -- weighed in lots. Larger sizes -- by length.		
	Flattening Test -- NPS 2 and larger--		
	Bending Test (Cold) -- NPS 2 and under.		
		<u>Degree of Bend</u>	<u>Diameter of Mandrel</u>
		For Normal A106 uses	90
		For Close Colling	180
			12 x nom. dia. of pipe
			8 x nom. dia. of pipe
Number of Tests Required		NPS	On One Length From Each Lot of
	Tensile	5 and smaller	400 or less
		6 and larger	200 or less
	Bonding	2 and smaller	400 or less
	Flattening	2 through 5	400 or less
		6 and over	200 or less
Lengths	Lengths required shall be specified on order. No "joints" permitted unless otherwise specified. If no definite lengths required, following practice applies: Single Random -- 16' - 22'. 5% may be 12' - 16' Double Random -- Minimum length 22', Minimum average 35'. 5% may be 16' - 22'.		
Required Markings on Each Length (On Tags attached to each Bundle in case of Bundled Pipe)	Rolled Stamped or Stenciled (Mfrs. option) Manufacturer's name or brand. Length of pipe. A106 A, A106 B, A106 C. ANSI schedule number. Hydrostatic test pressure and/or NDE. Weight per foot (NPS 4 and larger) or NH if neither is specified. Additional "S" if tested supplementary requirements.		
General Information	* Unless otherwise specified, pipe furnished with plain ends. * Purchaser may specify NDE * Surface finish standards are outlined in specification. In lieu of hydrostatic test or neither		



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 PRODUCT SMW PIPE
NIPPLES

Malleable, Cast Iron, Forged Steel, and
 Nipple standards & specifications.

Standards and Specifications

	DIMENSIONS	MATERIAL	GALVANIZING	THREAD	PRESSURE RATING	FEDERAL/ OTHER
M.I. Fittings						
Class 150	ANSI B16.3	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.3	WW-P-521
Class 300	ANSI B16.3	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.3	
M.I. Unions						
Class 150	ANSI B16.39	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.39	WW-U-531
Class 250	ANSI B16.39	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.39	WW-U-531
Class 300	ANSI B16.39	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.39	WW-U-531
Cast-Iron Threaded Fittings						
Class 125	ANSI B16.4	ASTM A-126(A)	ASTM A-153	ANSI B.1.20.1+	ANSI B16.4	WW-P-501
Class 250	ANSI B16.4	ASTM A-126(A)	ASTM A-153	ANSI B.1.20.1+	ANSI B16.4	WW-P-501
C.I. Plugs and Bushings						
	ANSI B16.14	ASTM A-126(A)	ASTM A-153	ANSI B.1.20.1+	*	WW-P-471
C.I. Drainage Threaded Fittings						
	ANSI B16.12	ASTM A-126(A)	ASTM A-153	ANSI B.1.20.1+	*	WW-P-491
C.I. Flanges and Flanged Fittings						
Class 125 (1"-12")	ANSI B16.1	ASTM A-126 (A) or (B)	ASTM -A 153	ANSI B.1.20.1+	ANSI B16.1	WW-F-406
Class 125 (14"-up)	ANSI B16.1	ASTM A-126 (B)	ASTM -A 153	ANSI B.1.20.1+	ANSI B16.1	WW-F-406
Class 250 (1"-12")	ANSI B16.1	ASTM A-126 (A) or (B)	ASTM -A 153	ANSI B.1.20.1+	ANSI B16.1	WW-F-406
Class 250 (14"-up)	ANSI B16.1	ASTM A-126 (B)	ASTM -A 153	ANSI B.1.20.1+	ANSI B16.1	WW-F-406
Forged Steel Threaded Fittings						
Class 2000,3000,6000	ANSI B16.11	ASTM A105		ANSI B.1.20.1+	ANSI B16.11	

		A182 A350				
Pipe Nipples	ASTM A 733			ANSI B.1.20.1+	*	WW-N-351**
Steel Pipe						
Welded		ASTM A 53 Type F				
Welded		ASTM A 120				
Seamless		ASTM A 53 Gr. B, Type S				
Seamless(High Temp.)		ASTM A 106 Gr. B				
Brass		ASTM B 43				

*The Standard
 **Compliance with Dimensions and Material Only
 *+ ANSI B.1.20.1 was ANSI B2.1



FOR APPROVAL
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 PRODUCT STEAM PIPING
FITTINGS + FLANGES
2 1/2" + LARGER

ASTM specifications for weld fittings and flanges.
 Grade & composition symbols for carbon weld fittings.

Material Specifications for Carbon Steel BUTT WELDING FITTINGS

ASTM SPECIFICATION A234		
GRADE SYMBOL	WPA (Grade A)	WPB (Grade B)
TYPE OF STEEL	Carbon	Carbon
CHEMICAL COMPOSITION	C-0.25 max.	C-0.30 max.
MINIMUM PHYSICAL REQUIREMENTS	TS-48,000 YP-30,000	TS-60,000 YP-35,000
HEAT TREATMENT	Cooled in Still Air	Cooled in Still Air

Material Specifications for Carbon Steel FLANGES

ASTM SPECIFICATION*				
GRADE SYMBOL	A181		A105	
	I	II	I	II
TYPE OF STEEL	Carbon		Carbon	
CHEMICAL COMPOSITION	C-0.35 max.		C-0.35 max.	
MINIMUM PHYSICAL REQUIREMENTS	TS-60,000 YP-30,000	TS-70,000 YP-36,000	TS-60,000 YP-30,000	TS-70,000 YP-36,000
HEAT TREATMENT	Hot forged with finishing temp. above upper critical Cooled in still air		Normalized	

GRADE AND COMPOSITION SYMBOLS FOR CARBON STEEL BUTT-WELDING FITTINGS

WPA	Seamless Pipe.....	ASTM A106 Grade A
	Plate.....	ASTM A285 Grade C
	Forgings.....	ASTM A105 Grade 1
	Bars*.....	ASTM A107 GR. 1008-1022

*Material specifications for the ASME Boiler Code are the same ASTM except the letter S is prefixed thereto.
 A 35% Carbon maximum for flanges which are to be welded has been established by ASTM A181 and A105.

WPB	Seamless Pipe.....	ASTM A106 Grade B
	Plate.....	ASTM A515 Grade 6S
	Forgings.....	ASTM A105 Grade 11
	Bars*.....	ASTM A107 Gr. 1025-1030

WPC	Seamless Pipe.....	ASTM A106 Grade C
	Plate.....	
	Forgings.....	ASTM A104 Grade 11 ¹

* For fittings 2" nominal size and smaller

Low Temperature Carbon Steel

WPLO	Seamless and Welded Pipe.....	ASTM A332 Grade O
	Plate.....	ASTM A300 Class 1
	Forgings.....	ASTM A350 Grade LF1



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PRODUCT STEAM PIPING
FITTINGS 2" + SMALLER

Malleable Specifications

MALLEABLE THREADED FITTINGS

Standard Class 150 Specifications:

ANSI B1.20.1, Threads, B16.3, Dimensions, Pressure Rating.
A.S.T.M. A197, Material, A153, Galvanizing.
Federal Spec. WWP 521
Pressure Ratings: 150 p.s.i. – Saturated Steam
300 p.s.i. – At 150 degrees W.O.G.
U.L. Listed Where Applicable

Extra Heavy Class 300 Specifications:

ANSI B1.20.1, Threads, B16.3, Dimensions, Pressure Rating.
A.S.T.M. A197, Material, A153, Galvanizing
Pressure Ratings: 300 p.s.i. – Saturated Steam
1/4" – 1" – 2000 p.s.i. – At 150 Degrees W.O.G.
1 1/4" – 2" – 1500 p.s.i. – At 150 Degrees W.O.G.
2 1/2" – 3" – 1000 p.s.i. – At 150 Degrees W.O.G.
U.L. Listed Where Applicable

Union Specifications: (Brass to Brass, Brass to Iron, Iron to Iron, Gasket Type, Dielectric Iron to Brass)

ANSI B1.20.1, Threads, B16.39, Dimensions, Pressure Rating.
A.S.T.M. A197, Material, A153, Galvanizing.
Federal Spec. WW-U-531
Pressure Ratings: Class 150 – 150 p.s.i. – Saturated Steam
300 p.s.i. – At 150 Degrees W.O.G.
Class 250 – 250 p.s.i. – Saturated Steam
500 p.s.i. – At 150 Degrees W.O.G.
Class 300 – 300 p.s.i. – Saturated Steam
600 p.s.i. – At 150 Degrees W.O.G.
U.L. Listed Where Applicable



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PRODUCT STEAM PIPING
UNIONS

Malleable Specifications

MALLEABLE THREADED FITTINGS

Standard Class 150 Specifications:

ANSI B1.20.1, Threads, B16.3, Dimensions, Pressure Rating.
A.S.T.M. A197, Material, A153, Galvanizing.
Federal Spec. WWP 521
Pressure Ratings: 150 p.s.i. - Saturated Steam
300 p.s.i. - At 150 Degrees W.O.G.
U.L. Listed Where Applicable

Extra Heavy Class 300 Specifications:

ANSI B1.20.1, Threads, B16.3, Dimensions, Pressure Rating.
A.S.T.M. A197, Material, A153, Galvanizing
Pressure Ratings: 300 p.s.i. - Saturated Steam
1/2" - 1" - 2000 p.s.i. - At 150 Degrees W.O.G.
1 1/4" - 2" - 1500 p.s.i. - At 150 Degrees W.O.G.
2 1/2" - 3" - 1000 p.s.i. - At 150 Degrees W.O.G.
U.L. Listed Where Applicable

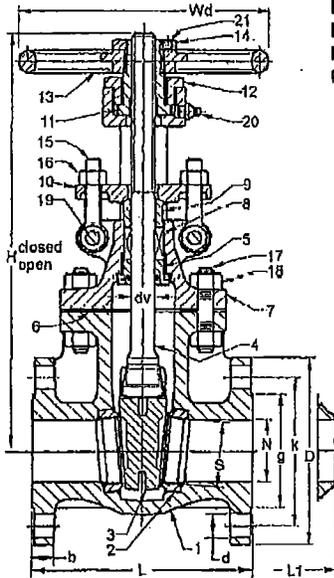
**Union Specifications: (Brass to Brass, Brass to Iron, Iron to Iron,
Gasket Type, Dielectric Iron to Brass)**

ANSI B1.20.1, Threads, B16.39, Dimensions, Pressure Rating.
A.S.T.M. A197, Material, A153, Galvanizing.
Federal Spec. WW-U-531
Pressure Ratings: ~~Class 150 - 150 p.s.i. - Saturated Steam~~
~~300 p.s.i. - At 150 Degrees W.O.G.~~
~~Class 250 - 250 p.s.i. - Saturated Steam~~
~~500 p.s.i. - At 150 Degrees W.O.G.~~
→ Class 300 - 300 p.s.i. - Saturated Steam
600 p.s.i. - At 150 Degrees W.O.G.

U.L. Listed Where Applicable

1550CB2 FLANGED ENDS 1552CB2 BUTT-WELD ENDS GATE CLASS 150 2"-12"

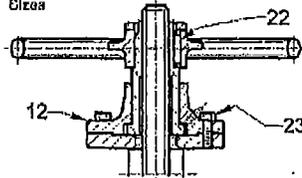
2"-8" Sizes



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PRODUCT GATE VALVE
2 1/2" WABOR

10"-12" Sizes



SPECIFICATIONS		
Design	API 600, ASME B 16.34	
P-T Rating	ASME B 16.34	
Connections	ASME B 16.5, 16.25	
Face to Face	ASME B 16.10	
Test & Inspection	API 598, RP 501	
MATERIAL LIST		
ITEM	PARTS NAME	MATERIALS
		Unless otherwise specified
1	Body	A216 Gr WCB
2	Seat Ring/Facing	A105 / Co-Cr-W Face or A216 Gr WCB / Co-Cr-W Face
3	Wedge	2"-8" A182 Gr F6a or A216 Gr WCB/13% Cr Face 10"-12" A216 Gr WCB / 13% Cr Face
4	Stem	A182 Gr F6a
5	Ducktail Bushing	A870 Type 410
6	Gasket	Flex Graphite w/ ss core
7	Bonnet	A216 Gr WCB
8	Packings	Graphoil w/ Braided Rings
9	Gland	A182 Gr F6a
10	Gland Flange	A105
11	Yoke Nut	A439 Type D2
12	Yoke Bushing 2"-8"	A536 Gr 65-45-12
	Yoke Cap 10"-12"	A216 Gr WCB
13	Handwheel	A470 Gr 32510
14	Handwheel Nut	A47 Gr 32510
15	Gland Eyebolt	Carbon Steel
16	Gland Eyebolt Nut	A307 Gr B
17	Body Bonnet Stud	A193 Gr B7
18	Body Bonnet Stud Nut	A194 Gr 2H
19	Gland Eyebolt Pin	Carbon Steel
20	Grease Filling	Carbon Steel
21	Set Screw	Carbon Steel
22	Key	Carbon Steel
23	Bolt	Carbon Steel

DIMENSIONS

Size	Port		Line Flange					Face to Face L INCHES (mm)	BW L1 INCHES (mm)	Height		Stem dv INCHES (mm)	Line Flange Bolts		Turns to Open	Hand-wheel Wt INCHES (mm)	Weight Approx. lbs (kg)
	N Dia. INCHES (mm)	S Dia. INCHES (mm)	D Dia. INCHES (mm)	Thickness (min.) a INCHES (mm)	Bolt Circle Dia. k INCHES (mm)	Hole Dia. d INCHES (mm)	Raised Face Dia. g INCHES (mm)			Open H INCHES (mm)	Closed H INCHES (mm)		Quantity	Size INCHES (metric)			
2	2.00	2.11	8.00	0.82	4.78	0.78	3.82	7.00	8.50	16.29	13.58	0.75	4	5/8	11.0	8.00	48
	50.8	53.6	152.4	15.7	120.7	19.1	81.9	177.8	215.9	413.8	344.9	19.1	4	M16	203.2	21	
2-1/2	2.50	2.58	7.00	0.89	5.50	0.75	4.12	7.50	9.50	17.32	14.17	0.75	4	5/8	12.6	8.00	62
	63.5	65.5	177.8	17.5	139.7	19.1	104.8	190.5	241.3	439.9	359.9	19.1	4	M16	203.2	28	
3	3.00	3.07	7.50	0.75	6.00	0.75	5.00	8.00	11.13	19.68	16.14	0.88	4	5/8	12.4	9.00	77
	76.2	78.0	190.5	19.1	152.4	19.1	127.0	203.2	282.7	499.9	410.0	22.2	4	M16	228.6	35	
4	4.00	4.09	9.00	0.94	7.50	0.75	6.19	9.00	12.00	24.78	19.84	1.00	8	5/8	14.8	10.00	117
	101.6	103.9	228.6	23.9	190.5	19.1	157.2	228.6	304.8	628.9	503.9	25.4	8	M16	254.0	53	
5	5.00	5.10	10.00	0.94	8.46	0.87	7.31	10.00	15.00	28.38	22.64	1.13	8	3/4	20.0	14.00	143
	127.0	129.5	254.0	23.9	215.0	22.0	185.7	254.0	381.0	720.8	575.0	28.6	8	M20	355.6	65	
6	6.00	6.15	11.00	1.0	9.50	0.88	8.50	10.50	15.88	32.80	25.90	1.25	8	3/4	13.6	10.50	207
	152.4	156.2	279.4	25.4	241.3	22.4	215.9	266.7	403.4	833.1	657.9	31.8	8	M20	286.7	94	
8	8.00	8.15	13.50	1.12	11.75	0.88	10.62	11.50	16.50	40.74	32.44	1.38	8	3/4	16.5	18.00	348
	203.2	207.0	342.9	28.4	298.5	22.4	269.7	292.1	419.1	1034.8	824.0	34.9	8	M20	406.4	158	
10	10.00	10.20	16.00	1.19	14.25	1.00	12.75	13.00	18.00	50.11	38.78	1.50	12	7/8	22.8	18.00	524
	254.0	259.1	406.4	30.2	362.0	25.4	323.9	330.2	457.2	1272.8	985.0	38.1	12	M22	457.2	238	
12	12.00	12.24	19.00	1.25	17.00	1.00	15.00	14.00	19.75	58.66	45.31	1.63	12	7/8	26.8	20.00	761
	304.8	310.9	482.6	31.8	431.8	25.4	381.0	355.6	501.7	1490.0	1150.9	41.3	12	M22	508.0	346	

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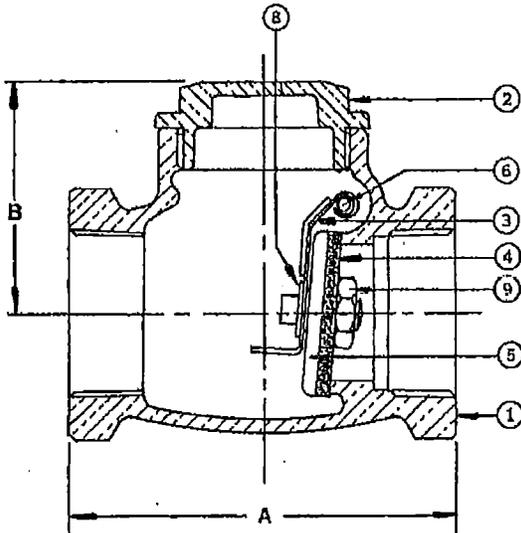
CHECK 509/509T

HORIZONTAL SWING – BRONZE

125 lb. SWP-200 lb. WOG† • General Service
• Threaded Ends

FOR APPROVAL

SPEC SECTION _____
PAGE # _____
PAGE SECTION _____
PARAGRAPH _____
PRODUCT _____



DIMENSIONS - INCHES / MILLIMETERS				
UNITS	SIZE	A	B	C _v
Inches	1/4	2.13	1.44	3.3
mm	6.35	53.98	36.53	
Inches	3/8	2.13	1.44	6.0
mm	9.53	53.98	36.53	
Inches	1/2	2.31	1.44	10.0
mm	12.70	58.75	36.53	
Inches	3/4	2.63	1.69	18.0
mm	19.05	66.68	42.88	
Inches	1	3.25	2.00	31.0
mm	25.40	82.55	50.80	
Inches	1 1/4	3.56	2.13	54.0
mm	31.75	90.50	53.98	
Inches	1 1/2	4.00	2.38	76.0
mm	38.10	101.60	60.33	
Inches	2	4.75	2.81	131.0
mm	50.80	130.18	207.98	
Inches	*2 1/2	6.00	3.63	192.0
mm	63.50	152.40	92.08	
Inches	*3	6.88	4.19	297.0
mm	76.20	174.63	106.38	

† Non-Shock
* 509 Only

Rev. 7

SPECIFICATIONS

509	Conforms to: MSS SP-80, Type 3, Class 125, Threaded Ends.
-----	--

MATERIAL LIST

NO.	PART	MATERIAL	SPECIFICATION
1	Body	Bronze	ASTM B 62
2	Cap	Bronze	ASTM B 62
3	Lever	St. Steel - 509	Commercial 1/4" to 2" Incl.
		Bronze - 509	ASTM B 684 2 1/2" and 3"
		Brass - 509T	ASTM B 16 1/4" to 2" Incl.
4	Disc	Brass - 509	ASTM B 16 1/4" to 3/4" ASTM B 453 1" to 1 1/2"
		Bronze - 509	ASTM B 62 2" to 3"
		PTFE - 509T	Commercial
5	Disc Holder	Brass	ASTM B 16 1/4" to 3/4"
		Bronze	ASTM B 62 1" to 3"
6	Pin	St. Steel	Commercial
7 ¹	Disc Nut	Brass	ASTM B 16
8	Retaining Ring	St. Steel	Commercial
9	Plug (not shown)	Brass - 509	ASTM B 16
10 ¹	Washer (not shown)	Brass - 509	ASTM B 16

¹ Used on 2 1/2" and 3" sizes only

INNOVATION IN EVERY VALVE



MILWAUKEE VALVE

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CHECK 507

HORIZONTAL SWING - BRONZE

300 lb. SWP-425°F-600 lb. WOG†-150°F
 Bronze Regrinding Disc • Y-Pattern • Threaded Ends

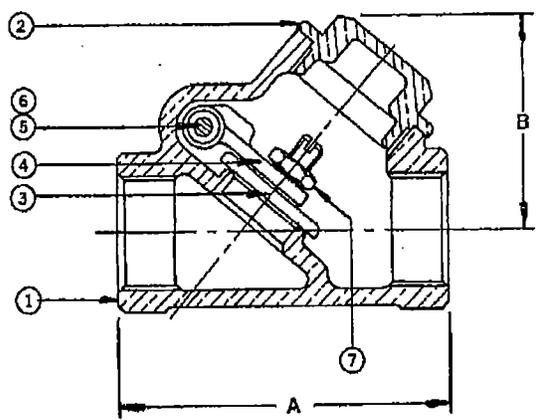
FOR APPROVAL
 RFPD SECTION _____
 PAGE # _____
 PAGE SECTION _____
 PARAGRAPH _____
 PRODUCT _____

SPECIFICATIONS

507	Conforms to: MSS SP-80, Type 3, Class 300, Threaded Ends.
-----	--

MATERIAL LIST

NO.	PART	MATERIAL	SPECIFICATION
1	Body	Cast Bronze	ASTM B 61
2	Cap	Cast Bronze	ASTM B 61
3	Disc	Cast Bronze	ASTM B 61
4	Lever	Cast Bronze	ASTM B 61
5	Pin	St. Steel	Commercial
6	Plug	Rod Brass	ASTM B 16
7	Disc Nut	Rod Brass	ASTM B 16



DIMENSIONS - INCHES / MILLIMETERS				
Units	Size	A	B	C _v
Inches	1/4	2.25	1.63	2.3
mm	6.35	57.15	41.28	
Inches	3/8	2.25	1.63	4.3
mm	9.53	57.15	41.28	
Inches	1/2	2.63	1.75	7.2
mm	12.70	66.68	44.45	
Inches	3/4	3.00	1.94	13.0
mm	19.05	76.20	49.23	
Inches	1	3.69	2.50	22.0
mm	25.40	93.68	63.50	
Inches	1 1/4	4.38	3.00	39.0
mm	31.75	111.13	76.20	
Inches	1 1/2	4.63	3.31	56.0
mm	38.10	130.18	84.14	
Inches	2	5.88	4.00	92.0
mm	50.80	149.22	207.98	
Inches	2 1/2	7.00	4.75	150.0
mm	63.50	177.80	120.65	
Inches	3	7.88	5.50	240.0
mm	76.20	200.00	127.00	

† Non-Shock

Rev. 4

INNOVATION IN EVERY VALVE



MILWAUKEE VALVE

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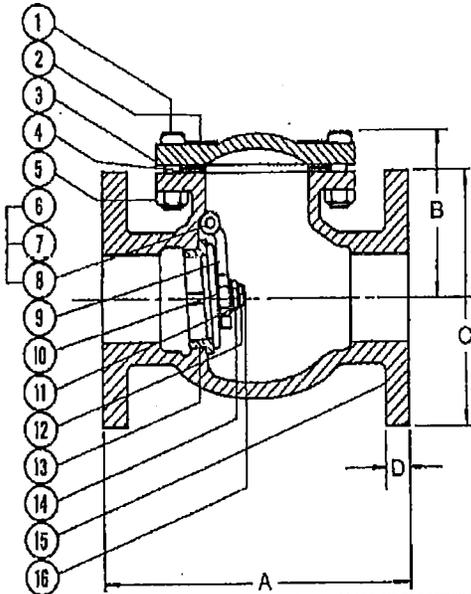
CHECK F-2974-M, F-2974-M26

HORIZONTAL SWING - IRON

FOR APPROVAL

SPEC SECTION _____
 PAGE # _____ 125 lb. SWP-200 lb. WOG† • Bolted Cap • Flanged Ends
 PAGE SECTION _____
 PARAGRAPH _____
 PRODUCT _____

125 PSI/8.6 Bar Fluid Pressure to 353° F/178° C
 200 PSI/13.8 Bar Non-Shock Cold Working Pressure to
 -20° F to 150° F/-29° C to 66° C.
 14"-24"-100 LB. SWP-150 LB WOG



NOTE: On Pump discharge, the preferred check valve is an in-line spring loaded, swing design with lever and weight or lever and spring. Install these valves as far as possible from the pump and elbows and at a minimum length of 5 times the pipe diameter. See 1400 & 1800 series

These iron body check valves may be installed in horizontal and vertical lines with upward flow or in intermediate position. Flange shape and drilling to specification ASME/ANSI B16.1 (125 lb).

F-2974-M26			
Same as F-2974-M except all in iron			
SPECIFICATIONS			
F-2974-M Conforms to MSS SP-71, Type 1.			
MATERIAL LIST			
NO.	PART	MATERIAL	SPECIFICATION
1	Bolt	Steel	
2	Identification Plate	Aluminum	
3	Bonnet	Cast Iron	ASTM A126, Class B
4	Body Gasket	Non-Asbestos	
5	Nut	Steel	
6	Slide Plug	Brass	ASTM B16
7	Gasket	Non-Asbestos	
8	Hanger Pin 2" - 12"	Brass	ASTM B16
	Hanger Pin 14" - 24"	SS 304	
9	Hanger	Ductile Iron	ASTM A536
10 ¹	Disc	Cast Iron	ASTM A126, Class B
11	Washer	Steel	
12	Coiler Pin	Zinc Plated Steel	
13	Seal Ring	Bronze	ASTM B62
14	Disc Nut	Steel	ASTM A307
15	Body	Cast Iron	ASTM A126, Class B
16	Stud Bolt	Brass	ASTM B16

¹ Valve Disc - Cast Iron with bronze disc face rings

DIMENSIONS - INCHES / MILLIMETERS						
UNITS	SIZE	A	B	C	D	C _v
Inches	2	8.00	4.56	6.00	0.63	137
mm	50.80	203.20	115.90	152.40	15.88	
Inches	2 1/2	8.50	6.38	7.00	0.69	221
mm	63.50	215.80	136.53	177.80	17.48	
Inches	3	9.50	6.56	7.50	0.75	327
mm	76.20	241.30	141.30	190.50	19.05	
Inches	4	11.50	6.88	9.00	0.84	605
mm	101.60	292.10	169.88	228.60	23.83	
Inches	5	13.00	7.75	10.00	0.84	975
mm	127.00	330.20	196.85	254.00	23.83	
Inches	6	14.00	9.50	11.00	1.00	1440
mm	152.40	355.80	241.30	279.40	25.40	
Inches	8	19.50	10.38	13.50	1.13	2670
mm	203.20	495.30	263.53	342.90	28.58	
Inches	10	24.60	12.00	16.00	1.19	4300
mm	254.00	622.30	304.80	406.40	30.18	
Inches	12	27.50	13.50	19.00	1.25	6350
mm	304.80	699.50	342.90	482.80	31.75	
Inches	14	31.00	15.75	21.00	1.38	
mm	355.60	787.40	400.05	533.40	34.93	
Inches	18	36.00	17.25	23.50	1.44	
mm	406.40	914.40	438.15	596.80	36.53	
Inches	18	36.00	19.00	25.00	1.56	
mm	457.20	914.40	482.60	635.00	39.70	
Inches	20	40.00	21.88	27.50	1.69	
mm	508.00	1016.00	555.63	698.50	42.88	
Inches	24	48.00	24.44	32.00	1.88	
mm	609.60	1219.20	620.73	812.80	47.83	

† Non-Shock Rev. 4
 Suffix M - Signifies "MILVACO" Series International Valves.

INNOVATION IN EVERY VALVE

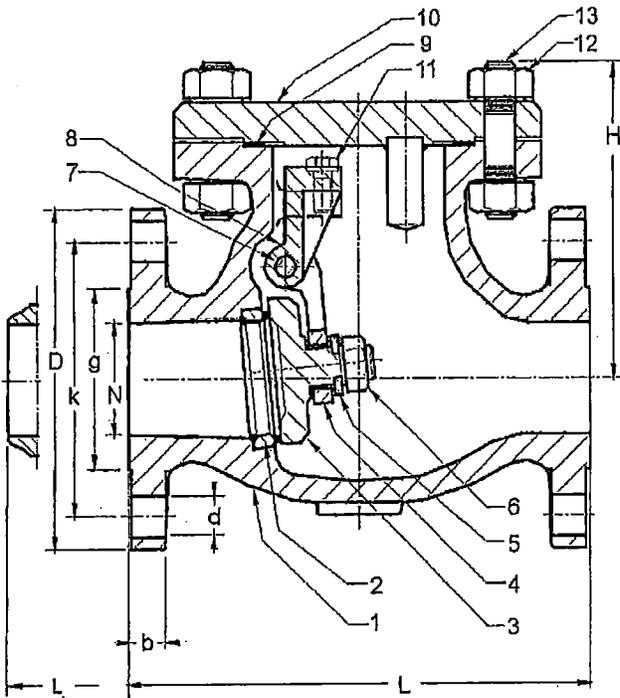


MILWAUKEE VALVE

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1570CB2 FLANGED ENDS 1572CB2 BUTT-WELD ENDS SWING CHECK CLASS 150 2"-12"



SPECIFICATIONS		
Design	API 600, ASME B 16.34	
P-T Rating	ASME B 16.34	
Connections	ASME B 16.5, 16.25	
Face to Face	ASME B 16.10	
Test & Inspection	API 598, RP 591	
MATERIAL LIST		
ITEM	PARTS NAME	MATERIALS
Unless otherwise specified		
1	Body	A216 Gr WCB
2	Seat Ring/Facing	A105 / Co-Cr-W Face or A216 Gr WCB / Co-Cr-W Face
3	Disc	2"-6" A182Gr F6a 8"-12" A216 Gr WCB / 13% Cr Face
4	Disc Hinge	2"-6" A105 8"-12" A216 Gr WCB
5	Disc Washer	A276 Type 410
6	Disc Nut	A194 Gr 6
7	Hinge Pin	A276 Type 410
8	Disc Support	A216 Gr WCB
9	Gasket	Spiral Wound S/S w/ Graphite
10	Cover	A105 A216 Gr WCB
11	Bolt	A276 Type 410
12	Cover Stud Bolt Nut	A194 Gr 2H
13	Cover Stud Bolt	A193 Gr B7

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 SPEC SECTION _____
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 PRODUCT _____

DIMENSIONS

Size NPS	Line Flange							Face to Face BW L=L1 INCHES	Height H INCHES	Line Flange Bolts	
	Nominal Size Dia. N INCHES	Dia. D INCHES	Thickness (min) b INCHES	Bolt Circle Dia. k INCHES	Hole Dia. d INCHES	Raised Face Dia. g INCHES	Quantity			Size INCHES	Weight Approx. lbs
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)			(metric)	(kg)
2	2.00	5.98	0.75	4.76	0.79	3.62	8.00	6.14	4	5/8	42
	50.8	152.0	19.1	120.6	20.0	92.0	203.2	158.0		M16	19
2 1/2	2.50	7.01	0.88	5.49	0.79	4.13	8.50	6.73	4	3/4	52
	63.5	178.0	22.4	139.5	20.0	105.0	215.9	171.0		M20	24
3	3.00	7.52	0.94	6.00	0.79	5.00	9.50	7.09	4	3/4	62.7
	76.2	191.0	23.9	152.4	20.0	127.0	241.3	180.0		M20	40
4	4.00	9.02	0.88	7.50	0.79	6.19	11.80	8.54	8	3/4	100
	101.6	229.0	22.4	190.5	20.0	157.2	292.1	217.0		M16	45
6	6.00	10.98	0.94	9.51	0.79	8.54	14.00	12.44	8	3/4	145
	152.4	279.0	23.9	241.5	20.0	218.9	355.8	316.0		M20	58
8	8.00	13.50	1.08	11.76	0.91	10.62	19.50	14.37	8	7/8	300
	203.2	343.0	27.4	298.4	23.0	269.7	495.3	365.0		M22	136
10	10.00	1.81	1.14	14.26	1.02	12.75	24.60	17.52	12	1	464
	254.0	46.0	29.0	362.0	26.0	323.9	622.3	445.0		M24	211
12	12.00	19.02	1.20	17.00	1.02	15.00	27.15	20.28	12	1 1/8	778
	304.8	483.0	30.4	431.8	26.0	381.0	689.5	515.0		M24	352

Rev. 1

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GATE 1150 BRONZE

150 lb. SWP-300 lb. WOG† • General Service
Solid Wedge Disc • Rising Stem
Threaded Bonnet • Gland Packed • Threaded Ends

FOR APPROVAL

SPEC SECTION _____
PAGE # _____
PAGE SECTION _____
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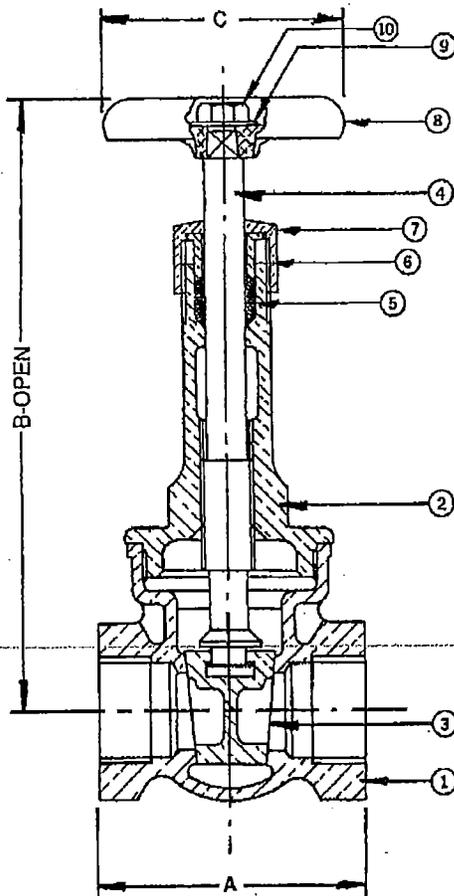
4" size has split wedge and bolted bonnet. It is not covered in MSS SP-80.

SPECIFICATIONS

1150	Conforms to: MSS SP-80, Type 2, Class 150, Threaded Ends.
------	--

MATERIAL LIST

NO.	PART	MATERIAL	SPECIFICATION
1	Body	Bronze	ASTM B 62
2	Bonnet	Bronze	ASTM B 62
3	Wedge Disc	Bronze	ASTM B 62
4	Stem	Bronze	ASTM B 62
5	Packing	Graphite	Commercial
6	Gland	Brass	ASTM B124 C37700
7	Packing Nut	Brass	ASTM B283 C37700
8	Handwheel	Mall. Iron	Commercial
9	Identification Plate	Aluminum	Commercial
10	Handwheel Nut	Brass	Commercial



DIMENSIONS - INCHES / MILLIMETERS

Units	Size	A	B	C	C _v
Inches	1/4	1.75	4.38	2.00	5.6
mm	6.35	44.45	111.13	50.80	
Inches	3/8	1.81	4.38	2.00	10.7
mm	9.53	46.05	111.13	50.80	
Inches	1/2	2.00	4.38	2.00	17.6
mm	12.70	50.80	111.13	50.80	
Inches	3/4	2.13	5.84	2.50	32.0
mm	19.05	53.98	148.44	63.50	
Inches	1	2.56	7.06	2.75	54.0
mm	25.40	65.10	179.40	69.85	
Inches	1 1/4	2.78	8.78	3.13	97.0
mm	31.75	70.84	223.04	79.38	
Inches	1 1/2	2.81	9.50	3.50	135.0
mm	38.10	71.45	241.30	88.90	
Inches	2	3.31	11.50	3.75	230.0
mm	50.80	84.15	292.10	95.25	
Inches	2 1/2	4.19	14.31	4.75	337.0
mm	63.50	106.38	363.65	120.65	
Inches	3	4.63	16.83	5.25	536.0
mm	76.20	117.48	422.28	133.35	
Inches	4	5.50	15.50	5.25	960.0
mm	101.60	139.70	393.70	133.35	

† Non-Shock

Rev 4

INNOVATION IN EVERY VALVE



MILWAUKEE VALVE

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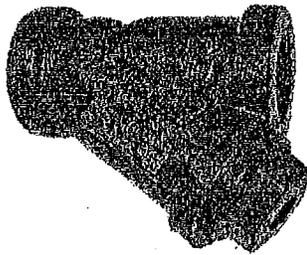
Model: 11M

Cast Iron Screwed End Y Strainers
Sizes: 1/4" - 4" (6-100mm)

Pressure/Temperature - Non-Shock		
Model	Material	Rating
11M	Cast Iron	400psi @ 20°F to 150°F 27.68 bar @ 6.9°C to 60°C 250psi @ 406°F 17.24 bar @ 207.78°C

11M

Class 250



Model 11M

FOR APPROVAL
 SPEC SECTION _____
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Typical Service

- Used extensively to strain foreign matter from pipe lines and provide economical protection for costly pumps, motors, valves and other similar mechanical equipment.

Features

- Machined seats in both body and cap align and lock the screen in place to stop sediment bypass.

Construction

- Gasketed cap is used for easy disassembly and assembly. Many others use Loctite, rendering disassembly virtually impossible.

Self-Cleaning

- Self cleaning is accomplished by opening the plug or valve connected to the blowoff outlet.

Blowoff Outlets

- Outlets are NPT Tapped
- Sizes of tapping specified on the next page.
- Not normally furnished with plug. Plug available, specify with order.

Capacity

- Generously proportioned bodies
- Open Area Ratio much greater than pipe size, ensure low pressure loss.

Screens

MODEL	SIZES	STANDARD (WATER)		STEAM RECOMMENDATION	
		MATERIAL	OPENING	MATERIAL	OPENING
11M	1/4" - 2"	304SS	20 mesh	304SS	30 mesh
11M	2 1/2" - 4"	304SS	.062 perf	304SS	.045 perf

Pressure Drop

Pressure Drop Charts in Technical Data section of Mueller Steam Specialty Engineering binder.

Material

11M	
Body	Cast Iron ASTM A128-B
Gasket	Metal filled Graphite

Job Name _____
 Job Location _____
 Engineer _____
 Approval _____

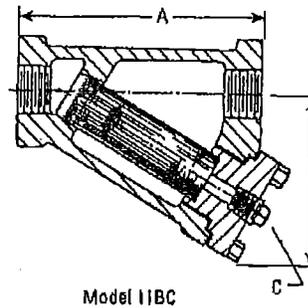
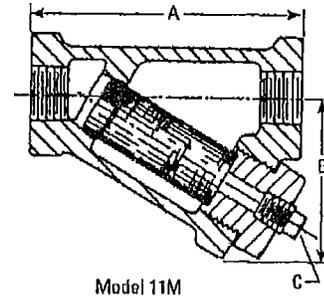
Contractor _____
 Approval _____
 Contractor's P.O. No. _____
 Representative _____



Dimensions and Weights

SIZE		DIMENSIONS						WEIGHTS	
in.	mm	A		B		C		lbs.	kgs.
		in.	mm	in.	mm	in.	mm		
1/4	6	3 3/16	81	2 1/16	52	1/4	6	1.6	0.7
3/8	10	3 3/16	81	2 1/16	52	1/4	6	1.6	0.7
1/2	15	3 3/16	81	2 1/16	52	1/4	6	1.6	0.7
3/4	20	3 3/4	95	2 7/16	61	3/8	10	2.4	1.1
1	25	4	102	2 3/4	66	3/8	10	3.0	1.4
1 1/4	32	5	127	3 1/4	85	3/4	20	5.2	2.3
1 1/2	40	5 3/4	146	3 3/4	98	3/4	20	8.0	3.6
2	50	7	177	4 3/4	121	1	25	12.5	5.7
2 1/2	65	9 1/4	234	5 3/4	149	1 1/2	40	22.0	10.0
3	80	10	254	6	152	1 1/2	40	30.0	13.6
4	100	15 1/16	386	11 1/4	286	1 1/2	40	70.0	32.0

Apply For Certified Drawings.



Mueller Steam Specialty product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Mueller Steam Specialty Technical Service. Mueller Steam Specialty reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Mueller Steam Specialty products previously or subsequently sold.



A Watts Water Technologies Company

ES-MS-11-M 1020

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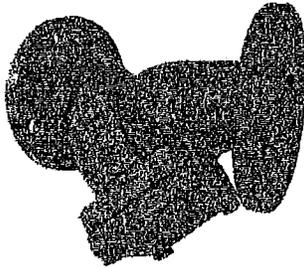
Model: 758

Cast Iron Flanged Ends Y Strainers Sizes: 3/4" - 24" (20 - 600mm)

Pressure/Temperature - Non-Shock		
Size	Material	Rating
1/2" - 12"	Cast Iron	200psi @ -20 to 150°F 13.79 bar @ -65 to 66°C
		125psi @ 150°F 8.62 bar @ 232.22°C
		150psi @ -20 to 150°F 10.34 bar @ -65 to 66°C
14" - 24"	Cast Iron	100psi @ 393°F 6.89 bar @ 176.33°C
		100psi @ 393°F 6.89 bar @ 176.33°C

758

Class 125



Model 758

FOR APPROVAL
 SPEC SECTION _____
 PAGE # _____
 PAGE SECTION _____
 PARAGRAPH _____
 PRODUCT _____

Typical Service

- Used extensively to strain foreign matter from pipe lines and provide economical protection for costly pumps, meters, valves, and other similar mechanical equipment

Features

- Mueller "BREECH-LOK STRAINERS" furnished as standard in sizes 8" and larger.
 - A one-quarter turn securely locks the screen in its seat.
 - Allows for easy bolting of the cover flange.
 - Tapered seats in both the body and cover flange retain screen and prevent particle bypass

Construction

- All covers have NPT blowoff outlet at location C. See next page.
- Recessed seat in the cover assures accurate screen alignment.
- Bosses at the inlet and outlet flanges are provided for the gauge taps.

Self-cleaning

- Self-cleaning is accomplished by opening the plug or valve connected to the blowoff outlet
- Advise when strainers are to be mounted in vertical piping so we can rotate the cover to position the blowoff at the lowest point.

Blowoff Outlets

- Outlets are NPT tapped
- Sizes of tapping specified on next page.
- Not normally furnished with plug. Plug available, specify with order

Capacity

- Generously proportioned bodies
- Open Area Ratio much greater than pipe size, ensuring low pressure drop

Screens

MODEL	SIZES	STANDARD (WATER)		STEAM RECOMMENDATION	
		MATERIAL	OPENING	MATERIAL	OPENING
758	3/4" - 4"	304SS	.062 perf	304SS	.045 perf
758	6" - 10"	304SS	.125 perf	304SS	.045 perf
758	12" and Up	304SS	.125 perf	304SS	.062 perf

Job Name _____
 Job Location _____
 Engineer _____
 Approval _____

Contractor _____
 Approval _____
 Contractor's P.O. No. _____
 Representative _____



Material

758	
Body	Cast Iron ASTM A126-B
Cover	Carbon Steel ASTM A126-B
Gasket	Compressed Fiber

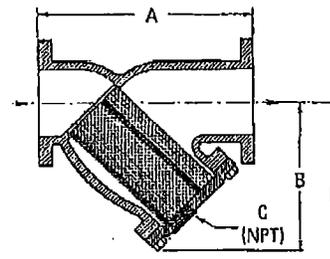
Consult factory for other materials.

Pressure Drop

- See Pressure Drop Charts in Technical Data section of the Mueller Steam Specialty Engineering binder.

Dimensions and Weights

SIZE		DIMENSIONS								WEIGHT	
		A		B		C (NPT)		D Screen Removal		lbs.	kg.
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
¾	20	7¼	187	3¼	95	½	15	5	127	10	4.5
1	25	7¾	187	3¾	98	½	15	5	127	10	4.5
1¼	32	7½	190	4¼	120	½	15	6½	165	13	5.9
1½	40	7½	190	4¼	120	½	15	6½	165	13	5.9
2	50	7¾	200	5¼	133	½	15	7	178	18	8
2½	65	10	254	6½	165	1	25	9¼	248	28	12
3	80	10¼	257	7	178	1	25	10	254	34	15
4	100	12¼	308	8¼	210	1½	40	12	305	60	27
5	125	15¾	397	11¼	286	2	50	17	432	95	43
6	150	18¼	470	13½	343	2	50	20	508	133	60
8	200	21¼	549	15½	394	2	50	22¾	578	247	112
10	250	25¾	654	18½	470	2	50	28	711	370	168
12	300	29¾	759	21¾	553	2	50	30	762	579	263
14	350	33¾	846	25	635	2	50	36¼	927	863	392
16	400	38¾	984	26½	673	2	50	42	1067	1380	627
18	450	43¾	1105	31	788	2	50	45¼	1156	2272	1032
20	500	49½	1257	38¼	970	2	50	55¾	1407	2875	1213
24	600	58½	1486	44¼	1119	2	50	67¼	1708	4880	2213



Model 758

Apply For Certified Drawings.

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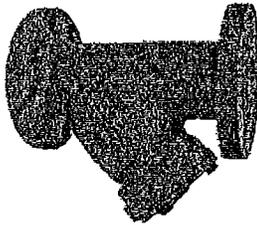
Model: 752

**Cast Iron Flanged End Y Type Strainers
Size: 1½" - 24" (40 - 600mm)**

Working Pressure - Non-Shock ANSI B16.1	
	CWP
1½" - 12"	600psi @ 150°F
14" - 24"	200psi @ 150°F
	Steam
1½" - 12"	200psi @ 450°F
14" - 24"	200psi @ 408°F

752

Class 250



Model 752

FOR APPROVAL
 SPEC SECTION _____
 PAGE # _____
 PAGE SECTION _____
 PARAGRAPH _____
 PRODUCT _____

Typical Service

- Used extensively to strain foreign matter from pipe lines and provide economical protection for costly pumps, meters, valves, and other similar mechanical equipment

Features

- Mueller "Breach-Lok Strainers"
 - Furnished as standard in sizes 8" and larger.
 - A one quarter-turn securely locks the screen in its seat.
 - Allows for easy bolting of the cover flange.
 - Tapered seats in both the body and cover flange retain screen and prevent particle bypass

Construction

- Gasketed cover, O-ring seats available.

Self-Cleaning

- Self-cleaning is accomplished by opening the plug or valve connected to the blowoff outlet

Blowoff Outlets

- Outlets are NPT tapped
- Sizes of tapping specified on next page.
- Not normally furnished with plug. Plug available, specify with order

Capacity

- Generously proportioned bodies
- Open Area Ratio much greater than pipe size, ensuring low pressure drop.

Screens

MODEL	SIZES	STANDARD (WATER)		STEAM RECOMMENDATION	
		MATERIAL	OPENING	MATERIAL	OPENING
752	1½" - 4"	304SS	.062" perf	304SS	.048" perf
	5" - 10"	304SS	.125" perf	304SS	.045" perf
	10" & Up	304SS	.125" perf	304SS	.062" perf

Job Name _____ Contractor _____
 Job Location _____ Approval _____
 Engineer _____ Contractor's P.O. No. _____
 Approval _____ Representative _____



Materials

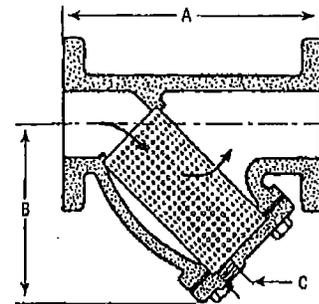
	752
Body	Cast Iron ASTM A126-B
Cover	A126-B 1½" - 5", A516-70 Plate 6" & Up
Gasket	Compressed Fiber

Pressure Drop

See Pressure Drop Charts in Technical Data section of the Mueller Steam Engineering binder.

Dimensions and Weights

SIZE		DIMENSIONS						WEIGHT	
		A		B		C		lbs.	kgs.
in.	mm	in.	mm	in.	mm	in.	mm		
1½	40	8½ ₁₆	204	4¾	121	½	15	24	10.9
2	50	9¾ ₁₆	237	6	152	½	15	28	12
2½	65	11¼ ₁₆	281	7¼	181	1	25	40	18
3	80	12¾	321	9¾	232	1¼	32	59	26.8
3½	90	14¾	365	9	229	1¼	32	76	34
4	100	15¾	397	10¾	276	1½	40	93	42
5	125	18¼	464	12¾ ₁₆	329	2	50	146	66
6	150	20¾ ₁₆	512	14½	368	2	50	194	88
8	200	25¾	638	16¾ ₁₆	418	2	50	316	143
10	250	29¾	739	21	533	2	50	475	215
12	300	33¾	857	25	635	2	50	750	3740
14	350	38¾	984	28¾	730	2	50	908	412
16	400	44¾	1128	29¾	762	2	50	1135	515
18	450	47¾	1213	34¼ ₁₆	881	2	50	2400	1090
20	500	56	1422	39	991	2	50	3350	1522
24	600	57½	1461	45	1143	2	50	4705	2138



Model 752

Apply for Certified Drawings.

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ES-MS-752 1020



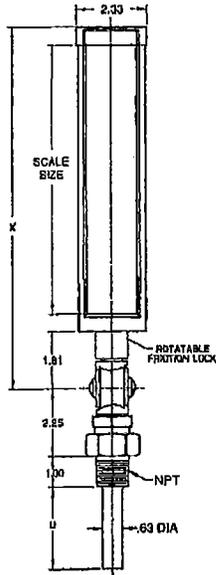
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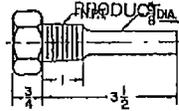
SPEC SECTION _____
 PAGE # _____
 PAGE SECTION _____
 PARAGRAPH _____



CASE: Modern V-shape design with parts molded of GE Valox® polyester, in black textured finish. Heavy glass protected front firmly secured against rattles by spring action. **STEM:** For 3 1/2" stems only and ranges up to and including 300°F, the stem material is a precision die cast Zamac alloy. For ranges above 300°F, bulb chamber is a precision machined aluminum alloy with copper plated steel stem extension. **For Separable Socket connections only.** **LOCKING DEVICE:** A hand rotatable friction lock with the angle adjusting screw work independently to provide a full 360° positioning of thermometer case and stem. **ADJUSTABLE JOINT:** GE Valox finished to match case. **ACCURACY:** Within 1% of scale range. Silicone shock mounted for lasting durability. **SCALE:** White coated aluminum with permanently baked bold black markings. **FILL:** Blue liquid.

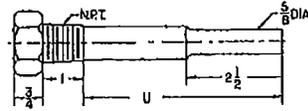
® Valox is a registered trademark of the General Electric Co.
 ® Vot-angle is a registered trademark of Weiss Instruments, Inc.

Scale Size	X
7"	9 3/4"
9"	11 3/4"



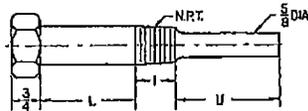
Standard Stem - E Series

CAT. NO.	NPT
E35-75BS	3/4"



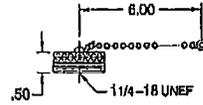
Long Stem - ER Series

CAT. NO.	U	NPT
ER6-75BS	5	3/4"
ER9-75BS	8	3/4"
ER12-75BS	11	3/4"



Extension Neck - ESS, EN, ENS Series

CAT. NO.	L	U	NPT
ESS35-75BS	1	1 1/2	3/4"
EN6-75BS	2 1/2	2 1/2	3/4"
ENS9-75BS	2 1/2	5 1/2	3/4"
ENS12-75BS	2 1/2	8 1/2	3/4"



Cat. No. ECC - Brass Cap & Chain

VARI-ANGLE INDUSTRIAL THERMOMETERS

QTY.	CAT. NO.	SCALE LGTH.	STEM LGTH	RANGE	TAG
→	9VU35	9"	3 1/2"		
	9VU6	9"	6"		

THERMOWELLS

QTY.	CAT. NO.	STEM LGTH.	INSERTION	NPT	MATERIAL	TAG
→	E35-75BS	3 1/2"	2 1/2"	3/4"	BRASS	
	ER6-75BS	6"	5"	3/4"	BRASS	
	EN6-75BS	6"	2 1/2"	3/4"	BRASS	

°F. RANGES	SCALE DIVISION
40-0-110°F	2°
0-120°F	1°
0-160°F	2°
30-180°F	2°
30-240°F	2°
30-300°F	2°

NOTE: Dual and Centigrade Scales available.

STEM	CAT. NO.	CAT. NO.
3 1/2"	7VU35	9VU35
6"	7VU6	9VU6
9"	7VU9	9VU9
12"	7VU12	9VU12

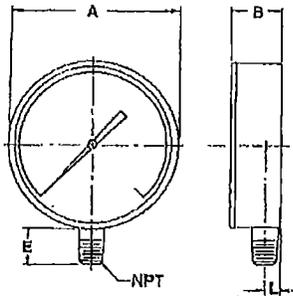
CUSTOMER _____
 PROJECT _____
 ENGINEER _____
 PRO or P.O. NO. _____



WEISS INSTRUMENTS, INC.
 HOLTSTVILLE, NEW YORK 11742

DESCRIPTION:
Vari-angle® Industrial Glass Thermometer

DRAWN BY: _____ DATE: _____ DRAWING: _____



CASE - Drawn stainless steel, with push-in Lexan window.
TUBE & SOCKET - Phosphor bronze. Brass socket and 1/4" male NPT lower connection. Soft soldered connection.
DIAL - White coated metal lithographed with black graduations lines and numerals.
MOVEMENT - All brass construction, precision gear and pinion.
POINTER - Slotted adjustable.
ACCURACY - 1% ANSI-ASME B40.1 Grade 1A.

SERIES		A	B	E	L	NPT
4CTS	INCH	4.62	1.12	1.062	.437	1/4"
	MM	117.3	28.4	26.9	11.09	

QTY.	CAT. NO.	DIAL DIA.	RANGE	TAG
	4CTS	4 1/2"		
	4CTS	4 1/2"		
	4CTS	4 1/2"		
	4CTS	4 1/2"		
	4CTS	4 1/2"		

PRESSURE (psi) - Series 4CTS

Range ¹	Figure interval	Minor graduation
0-15	1	0.2
0-30	5	0.5
0-60	5	1.0
0-100	10	1.0
0-160	20	2.0
0-200	20	2.0
0-300	50	5.0
0-400	50	5.0
0-600	50	10.0

Range	Figure interval		Minor graduation	
	in Hg	psi	in Hg	psi
30"Hg-15psi	10	5	1	0.5
30"Hg-30psi	10	5	1	1
30"Hg-60psi	10	10	2	2
30"Hg-100psi	15	10	5	2
30"Hg-150psi	30	20	2	2

VACUUM

Range	Figure interval	Minor graduation
0-30"Hg	5"Hg	0.5"Hg

¹ All dial ranges available in dual scale - psi & Kpa, psi & Kg/cm². Ranges 15psi thru 200psi available dual scale - psi & Ft H₂O.

FOR APPROVAL
 SPEC SECTION _____
 PAGE # _____
 PAGE SECTION _____
 PARAGRAPH _____
 PRODUCT PRESSURE _____
BRVJS

CUSTOMER _____
 PROJECT _____
 ENGINEER _____
 PRO or P.O. NO. _____



WEISS INSTRUMENTS, INC.
 HOLTSVILLE, NEW YORK 11742

DESCRIPTION:
4 1/2" HVAC Pressure Gauge
 Series 4CTS

DRAWN BY: _____ DATE: _____ DRAWING: _____

FOR APPROVAL

SPEC SECTION _____
 PAGE # _____
 PAGE SECTION _____
 PARAGRAPH _____
 PRODUCT LP STEAM TRAP

spirax / sarco®

Cast Iron Float & Thermostatic Steam Traps FT-15, FT-30, FT-75, FT-125

Steam Traps

Float & Thermostatic

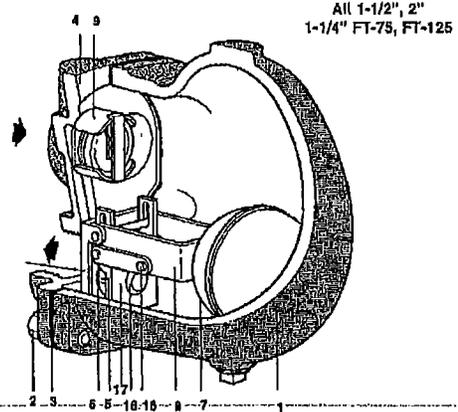
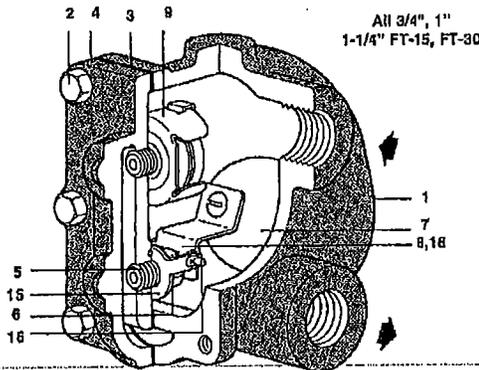
The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature, while non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

Model →	FT-15	FT-30	FT-75	FT-125
PMO	15 psig	30 psig	75 psig	125 psig
Sizes	3/4", 1", 1-1/4", 1-1/2", 2"			
Connections	NPT			
Construction	Cast Iron Body & Cover Stainless Steel Internals			
Options	Gauge Glass, Vacuum Breaker			

Typical Applications

All process equipment, particularly when controlled by modulating temperature control valves; unit heaters, air heating coils, heat exchangers and steam main drip stations.

For Capacities,
See TIS 2.317



Limiting Operating Conditions

Max. Operating Pressure (PMO) → FT-15: 15 psig (1.0 barg)
 FT-30: 30 psig (2.1 barg)
 FT-75: 75 psig (5.2 barg)
 FT-125: 125 psig (8.8 barg)

Max. Operating Temperature 45°F (25°C) of superheat at all operating pressures

Pressure Shell Design Conditions

PMA 125 psig/up to 450°F 9 barg/up to 232°C
 Max. allowable pressure

TMA 450°F/0-125 psig 232°C/0-9 barg
 Max. allowable temperature

Construction Materials

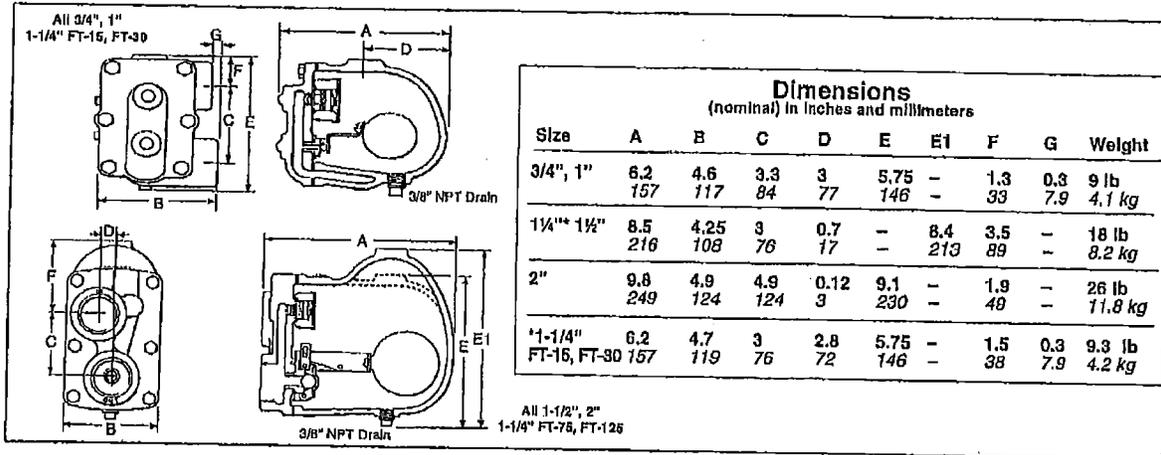
No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Carbon Steel	ASTM A449
3	Cover Gasket	Graphite	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seat	Stainless Steel	Type 420F
6	Valve Seat Gasket	Stainless Steel	Type 302
7	Ball Float	Stainless Steel	Type 304
8	Float Arm	Stainless Steel	AISI 301/302/304
9	Air Vent Assembly	Stainless Steel	
	Air Vent Head	Stainless Steel	Type 440 GR B
	Air Vent Seal	Stainless Steel	Type 303
15	Seat Bracket	Stainless Steel	AISI 301/302/304
16	Pivot Pins	Stainless Steel	Type 302 or 303
17	Head Bracket, Stop, Link	Stainless Steel	Type 301
18	Valve Head	Stainless Steel	Type 440 Gr.C

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-313-US 3.09

Cast Iron Float & Thermostatic Steam Traps

FT-15, FT-30, FT-75, FT-125



Sample Specification

Steam traps shall be of the mechanical ball float type having cast iron bodies, NPT connections, and all stainless steel internals. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 45°F (25°C) of superheat and resisting waterhammer without sustaining damage. Internals of the trap shall be completely serviceable without disturbing the piping.

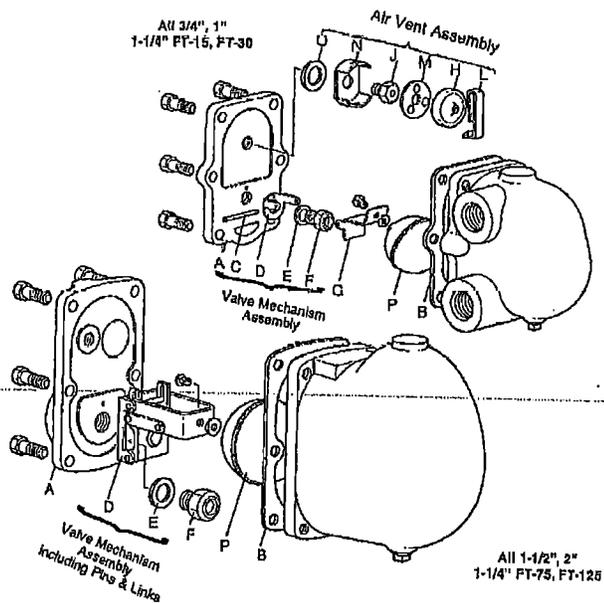
Installation

A pipeline strainer should be installed ahead of any steam trap. Full port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position so that the float arm is in a horizontal plane so that the float rises and falls vertically, and with the direction of flow as indicated on the body. Refer to IM-2-300 for complete instructions.

Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent. Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly. Complete installation and maintenance instructions are given in IM-2-300, which accompanies the product.

Spare Parts



Gasket Kit (3 of each)	B, E
Air Vent Kit	H, J, L, M, N, O
Valve Mechanism Kit (less float)	C, D, E, F, (G)
Float Kit	P
Replacement Module	A, C, B, D, E, F, G, H, J, L, M, N, P (Assembled)
3/4", 1", 1-1/4" FT-15	
3/4", 1", 1-1/4" FT-30	
3/4", 1", FT-15, FT-125	

spirax/sarco

FOR APPROVAL
 SPEC SECTION _____
 PAGE # _____
 PAGE SECTION _____
 PARAGRAPH _____
 PRODUCT FT STEAM TRAP

Cast Iron Float & Thermostatic Steam Traps FT-15, FT-30, FT-75, FT-125

Steam Traps

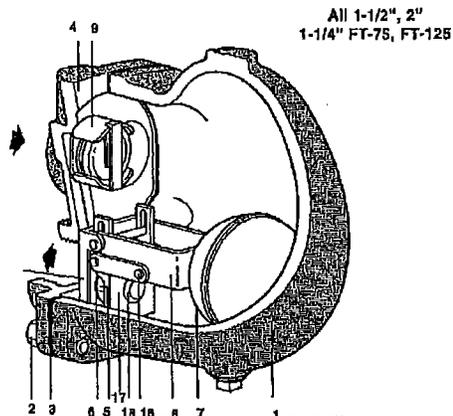
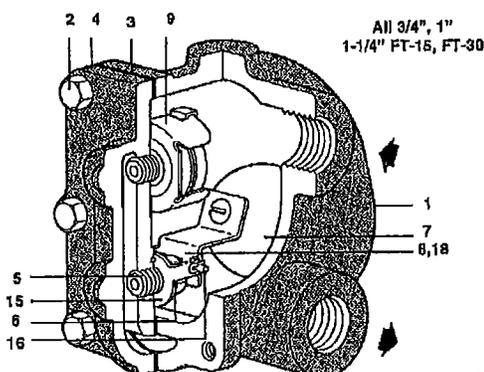
The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature, while non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

Model →	FT-15	FT-30	FT-75	FT-125
PMO	15 psig	30 psig	75 psig	125 psig
Sizes	3/4", 1", 1-1/4", 1-1/2", 2"			
Connections	NPT			
Construction	Cast Iron Body & Cover Stainless Steel Internals			
Options	Gauge Glass, Vacuum Breaker			

Typical Applications

All process equipment, particularly when controlled by modulating temperature control valves; unit heaters, air heating coils, heat exchangers and steam main drip stations.

For Capacities,
See TIS 2.317



Limiting Operating Conditions

Max. Operating Pressure (PMO) FT-15: 15 psig (1.0 barg)
 FT-30: 30 psig (2.1 barg)
 → FT-75: 75 psig (5.2 barg)
 FT-125: 125 psig (8.6 barg)

Max. Operating Temperature 45°F (25°C) of superheat at all operating pressures

Pressure Shell Design Conditions

PMA 125 psig/up to 450°F 9 barg/up to 232°C
 Max. allowable pressure

TMA 450°F/0-125 psig 232°C/0-9 barg
 Max. allowable temperature

Construction Materials

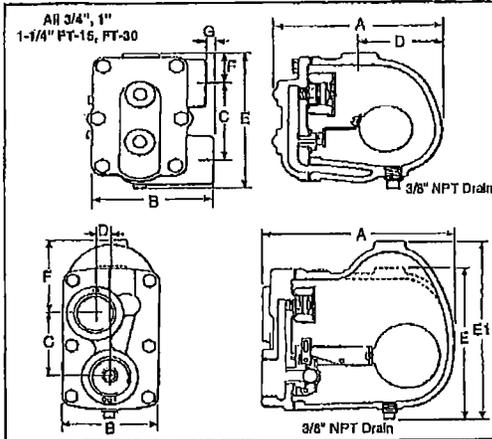
No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Carbon Steel	ASTM A449
3	Cover Gasket	Graphite	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seal	Stainless Steel	Type 420F
6	Valve Seal Gasket	Stainless Steel	Type 302
7	Ball Float	Stainless Steel	Type 304
8	Float Arm	Stainless Steel	AISI 301/302/304
9	Air Vent Assembly	Stainless Steel	
	Air Vent Head	Stainless Steel	Type 440 GR B
	Air Vent Seat	Stainless Steel	Type 303
15	Seal Bracket	Stainless Steel	AISI 301/302/304
18	Pivot Pins	Stainless Steel	Type 302 or 303
17	Head Bracket, Stop, Link	Stainless Steel	Type 301
18	Valve Head	Stainless Steel	Type 440 Gr.C

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-313-US 3.09

Cast Iron Float & Thermostatic Steam Traps

FT-15, FT-30, FT-75, FT-125



Size	Dimensions (nominal) in inches and millimeters								Weight
	A	B	C	D	E	E1	F	G	
3/4", 1"	6.2 157	4.6 117	3.3 84	3 77	5.75 146	-	1.3 33	0.3 7.9	9 lb 4.1 kg
1 1/4" * 1 1/2"	8.5 216	4.25 108	3 76	0.7 17	-	8.4 213	3.5 89	-	18 lb 8.2 kg
2"	9.8 249	4.9 124	4.9 124	0.12 3	9.1 230	-	1.9 49	-	28 lb 11.8 kg
1-1/4"	6.2 157	4.7 119	3 76	2.8 72	5.75 146	-	1.5 38	0.3 7.9	9.3 lb 4.2 kg

All 1-1/2", 2"
1-1/4" FT-75, FT-125

Sample Specification

Steam traps shall be of the mechanical ball float type having cast iron bodies, NPT connections, and all stainless steel internals. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 45°F (25°C) of superheat and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping.

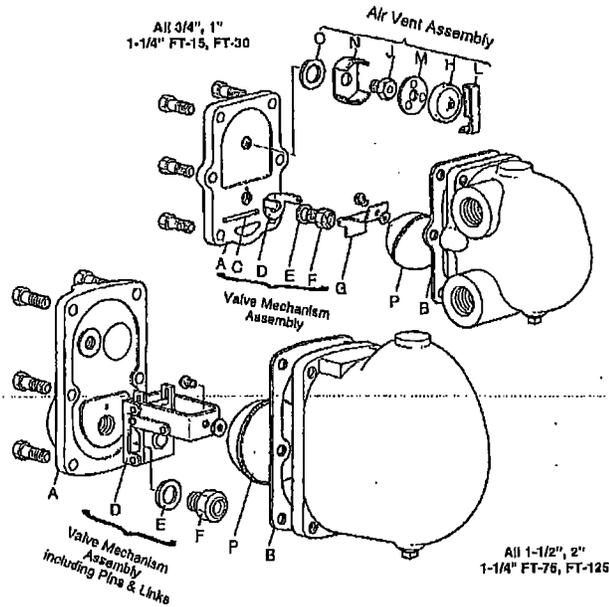
Installation

A pipeline strainer should be installed ahead of any steam trap. Full port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position so that the float arm is in a horizontal plane so that the float rises and falls vertically, and with the direction of flow as indicated on the body. Refer to IM-2-300 for complete instructions.

Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent.
Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly. Complete installation and maintenance instructions are given in IM-2-300, which accompanies the product.

Spare Parts



Gasket Kit (3 of each)	B, E
Air Vent Kit	H, J, L, M, N, O
Valve Mechanism Kit (less float)	C, D, E, F, (G)
Float Kit	P
Replacement Module	A, C, B, D, E, F, G, H, J, L, M, N, P
3/4", 1", 1-1/4" FT-15	(Assembled)
3/4", 1", 1-1/4" FT-30	
3/4", 1", FT-15, FT-125	

TI-2-313-US 3.09

Sprax Sarco, Inc., 1150 Northpoint Blvd, Blythewood, SC 29016

Telephone: (803) 714-2000 FAX (803) 714-2222

2:173

Steam Traps

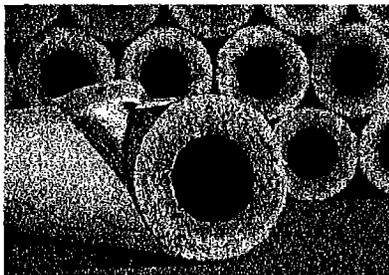
Float & Thermostatic

We submit the following materials, as outlined in this schedule and enclosed brochures, to be applied at the above-named project in accordance with the plans and specifications.

<u>SERVICE OR SYSTEM</u>	<u>MATERIAL AND THICKNESS</u>	<u>JACKET/FINISH</u>
HVAC SYSTEMS – MECHANICAL INSULATION		
Exterior, Above Ground piping Located at Valve Stations#1 & #2		
High Pressure and Low Pressure Steam piping and valves All Sizes	Molded Glass Fiber 2" thick	ASJ/SSL Weatherproofed with .016 Aluminum Jacketing
Condensate Return Piping And Valves All Sizes	Molded Glass Fiber 2" thick	ASJ/SSL Weatherproofed with .016 Aluminum Jacketing
Steam and Condensate Return Pipe Fittings	High-Temperature Thermal Insulating Wool Blanket	Pre-molded Aluminum Ell-Jac Fitting Covers



Fiberglas® Pipe Insulation



- SSL II® All-Service Jacket (ASJ), Self-Sealing Lap**
- SSL® I ASJ**
- No-Wrap**

Description

Owens Corning Fiberglas® pipe insulations are molded of heavy density resin bonded inorganic glass fibers. These one-piece, 36" (914mm) long, hinged sections are opened, placed over the pipe, closed and secured by means specific to the type as described below.

Fiberglas SSL II® Pipe Insulation is jacketed with a smooth, reinforced, wrinkle-resistant all-service (ASJ) vapor retarder jacket. Factory applied **DOUBLESURE**† double pressure sensitive adhesive closure provides positive mechanical and vapor sealing of the longitudinal jacket seam. Pressure sensitive butt strip seals complete the positive closure. Available in the most popular sizes.

In larger sizes *Fiberglas* Pipe Insulation is furnished with SSL® I, a single adhesive lap seal.

Fiberglas "No-Wrap" Pipe Insulation is also available without a jacket. It is intended for field installation of jacketing appropriate to the vapor control, damage or corrosion resistance requirements of the application.

Uses

Insulation of hot, cold, concealed and exposed piping operating at temperatures from 0°F (-18°C) to 850°F (454°C) in commercial buildings, industrial facilities and process or power plants.

†DOUBLESURE is a registered trademark of Morgan Adhesives Company.

Features/Benefits

SSL II Positive Closure System

Effective long-term vapor sealing of both longitudinal and butt joints. With double-adhesive lap seal, plus two-part butt strip seal, positive closure is fast, neat and foolproof. No need for staples and mastic, promoting unexcelled jobsite productivity.

Jacket and Lap Shipped Adhered

Short pieces of insulation can be cut without jacket loss; it won't come apart in handling. No "dog-ears" in or out of the carton. Dust and

moisture can't reach the seal. Butt strips come in sealed bags inside the carton, staying clean until the moment of use.

Excellent Thermal Performance

Fiberglas Pipe Insulation's low thermal conductivity contributes to lower operating costs of heating and cooling equipment.

Meets Model Code Fire Ratings

Flame spread rating of 25 or less, and smoke developed rating of 50 or less, usually means that *Fiberglas* Pipe Insulation will be granted immediate building code approval.

Availability

Fiberglas Pipe Insulations are available in thicknesses and for pipe sizes as follows:

Thickness	Weight (lb)	Thickness	Weight (lb)	Thickness	Weight (lb)	Thickness	Weight (lb)
1/4	(19)	1/4-6	(15-150)	1/4-6	(15-150)	1/4-6	(15-150)
1	(25)	1/4-15	(15-375)	1/4-33	(400-825)	1/4-33	(15-825)
1 1/4	(38)	1/4-14	(15-350)	1/4-33	(375-825)	1/4-33	(15-825)
2	(61)	1/4-12	(15-300)	1/4-33	(350-825)	1/4-33	(15-825)
2 1/4	(64)	2-11	(50-275)	1/4-32	(300-650)	1/4-32	(15-800)
3	(76)	3-10	(75-250)	1/4-31	(275-650, 750)	1/4-31	(15-900)
3 1/4	(89)	4 1/4-9	(115-225)	1/4-30	(250-450, 500-550, 600)	1/4-30	(15-750)
4	(102)	4 1/4-8	(115-200)	1/4-29	(225-525, 600, 625)	1/4-29	(15-725)
4 1/4	(114)	6-7	(150-175)	1/4-28	(200-250, 300, 350, 400, 450, 500, 600)	1/4-28	(15-700)
5	(127)	6	(150)	1/4-27	(175-350, 400-600)	1/4-27	(15-675)
5 1/4	(140)			6-26	(150-650)		
6	(152)			6-25	(150-625)		

* SSL I all made-to-order except 14" x 2" (350mm x 51mm) and 16" x 1", 1 1/2" and 2" (400mm x 25mm, 380mm and 51mm).

** Consult Packaging Data Supplement (PPLP6) available upon request for standard and made-to-order sizes.

Specification Compliance

- ASTM C 547, Mineral Fiber Pre-Formed Pipe Insulation, Type I to 850°F (454°C)
- ASTM C 1136, Flexible Low Permeance Vapor Retarders for Thermal Insulation: All Types
- ASTM C 795, Thermal Insulation for Use Over Austenitic Stainless Steel*
- Mil. Spec. MIL-I-22944D, Insulation, Pipe, Thermal, Fibrous Glass
- Nuclear Regulatory Commission Guide 1.36, Non-Metallic Thermal Insulation*
- U.S. Coast Guard Approval No. 164.009, Noncombustible Materials (no-wrap)
- New York City MEA No. 344-83
- CAN/CGSB-51.9 - Type 1, Class 2
- NFPA 90A

* Preproduction qualification testing complete and on file. Chemical analysis of each production lot required for total conformance.

Fiberglas® Pipe Insulation

Physical Property Data

Operating temperature range	ASTM C 411	0 to 850°F* (-18°C to 454°C)*
Jacket temperature limitation	ASTM C 1196	-20°F to 150°F (-29°C to 66°C)
Jacket permeance	ASTM E 96, Proc. A	0.02 perm
Puncture resistance	ASTM D 781	50 units
Composite surface burning characteristics	UL 723,** ASTM E 84** or CAN/ULC-S102-M**	Flame spread 25** Stroke developed 50

* Limited to single layer applications above 650°F (343°C), but not greater than 6" (152mm) thickness.
 ** The surface burning characteristics of these products have been determined in accordance with UL 723, ASTM E 84 or CAN/ULC-S102-M. These standards should be used to measure and describe the properties of materials, products or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use. Values are reported to the nearest 5 rating.

Thermal Performance, ASTM C 680

2 x 1/4 (50 x 13)	77 (74)	128 (53)		
4 x 1 (100 x 25)	78 (75)	109 (43)		
8 x 1 (200 x 25)	140 (135)	112 (44)		
12 x 1 (300 x 25)	199 (191)	113 (45)		
2 x 1 1/4 (50 x 38)			88 (85)	116 (47)
4 x 1 1/4 (100 x 38)			142 (137)	123 (51)
8 x 1 1/4 (200 x 38)			242 (233)	128 (53)
12 x 1 1/4 (300 x 38)			330 (317)	129 (54)
2 x 2 (50 x 51)			189 (134)	127 (53)
4 x 2 1/4 (100 x 64)			188 (181)	125 (52)
8 x 2 1/4 (200 x 64)			295 (284)	129 (54)
12 x 3 (300 x 76)			369 (345)	125 (52)

Heat Loss (HL), Btu/hr·ft (W/m); Surface Temperature (ST), °F (°C).
 Design Conditions: Horizontal piping, 80°F (27°C) average ambient temperature, 0 mph wind speed, ASJ jacket.

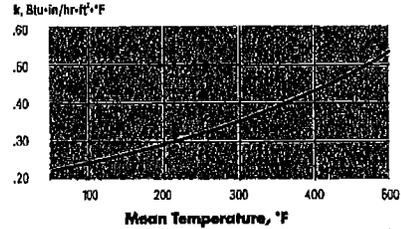
Thickness to Prevent Surface Condensation

Owens Corning ASJ Jacket for up to 16" NPS (400mm DN)⁽¹⁾, in. (mm)

110 (43)	50%-70%	1 (25)	1 (25)	1 (25)
		1 1/2 (38)	1 1/2 (38)	1 (25)
		3 (76)	3 (76)	2 1/2 (64)
100 (38)	50%-70%	1 (25)	1 (25)	1 (25)
		1 1/2 (38)	1 1/2 (38)	1 (25)
		3 (76)	3 (76)	2 1/2 (64)
90 (32)	50%-70%	1 (25)	1 (25)	1 (25)
		1 1/2 (38)	1 (25)	1 (25)
		3 (76)	2 1/2 (64)	2 (51)
80 (27)	50%-80%	1 (25)	1 (25)	1 (25)
		2 1/2 (64)	2 (51)	1 1/2 (38)
		3 (76)	3 (76)	1 (25)
70 (21)	50%-80%	1 (25)	1 (25)	1 (25)
		1 1/2 (38)	1 1/2 (38)	1 (25)
		3 (76)	3 (76)	1 (25)

- (1) For NPS (DN) greater than 16" (400mm), please contact your local Owens Corning Representative.
 (2) If humidity exceeds 90%, some condensation is to be expected; therefore, a coating of a mastic or PVC jacket overwrap is recommended as repeated or continual wetting of the ASJ jacket will degrade its vapor retarder performance.

Thermal Conductivity



Apparent thermal conductivity curve determined in accordance with ASTM Practice C 1045 with data obtained by ASTM Test Method C 335. Values are nominal, subject to normal testing and manufacturing tolerances.

50	0.22	10	0.032
75	0.23	25	0.034
100	0.24	50	0.037
150	0.27	100	0.043
200	0.29	125	0.047
250	0.32	150	0.051
300	0.35	175	0.056
350	0.39	200	0.062
400	0.43	225	0.068
450	0.48	250	0.075
500	0.54	275	0.082

Application Recommendations

The hinged sections of *Fiberglas Pipe Insulation* are opened, placed over the pipe, carefully aligned, and sealed or jacketed as required by the form of the insulation and the application.

Fiberglas SSL II Pipe Insulation is shipped with the jacket and longitudinal lap closed, the two adhesives separated by a release strip. The insulation is opened by pulling the release strip from between the two adhesive strips. The insulation is placed on the pipe, carefully aligned, and the two adhesives rubbed firmly together to close and seal. The two part butt strip seal completes the positive closure. Application may be at ambient temperatures from 25°F (-4°C) to 110°F (43°C).

Fiberglas "No-Wrap" Pipe Insulation is designed for field-jacketing with pipe covering secured by wires or bands, vapor sealed where required.

Outdoor applications must be protected from weather. If painting is required, use only water base latex paint.



OWENS CORNING INSULATING SYSTEMS, LLC
 ONE OWENS CORNING PARKWAY
 TOLEDO, OHIO 43659
1-800-GET-PINK

INNOVATIONS FOR LIVING™ www.owenscorning.com

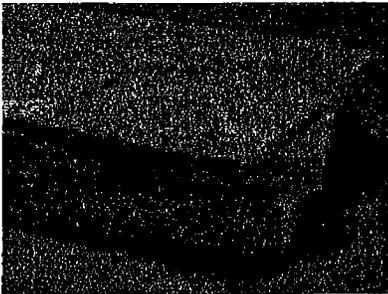


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Fiberglas® TIW Types I & II Insulations

Thermal Insulating Wool



- Type I
- Type II

Description

Fiberglas® TIW Types I and II Insulations are off-white to light tan, noncombustible wool with resilient, inorganic glass fibers bonded with a thermosetting resin. TIW Type I is available in rolls; TIW Type II comes in batts.

Uses

Fiberglas TIW Type I Insulation is used in applications up to 1000°F (538°C) at maximum recommended thickness requiring a lightweight insulation, such as that used in panel systems, flexible wrap, industrial ovens or surfaces having irregularities. Its low compressive strength does not make it suitable for use as a base wool for metal mesh blankets.

Fiberglas TIW Type II Insulation is especially suitable for use in metal mesh blankets and for use on boilers, vessels and many other types of industrial equipment operating at temperatures up to 1000°F (538°C) at maximum recommended thickness. It may also be used in panel systems for precipitators, ducts and breechings where more compressive resistance than Fiberglas TIW Type I Insulation is needed.

Features/Benefits

Excellent Thermal Performance

TIW's thermal efficiency contributes to lower fuel costs due to reduced heat loss.

Lightweight

Being lightweight makes Fiberglas TIW Types I and II Insulation easy to handle and install, even when large size panels are used. There is no tendency for pin-hole elongation under vibration situations, a frequent source of heat leaks in heavier products.

Quick, Easy Installation

Large batts or blankets cover greater areas quickly, eliminating tedious block-by-block hand lay-up and drilling for studs in hard insulations. The insulation is easily impaled over welded studs or pins, or may be held in place with wire ties, metal lath or lagging.

Specification Compliance

- ASTM C 553, Mineral Fiber Blanket Thermal Insulation, Types I, II, V - TIW Type I; all types - TIW Type II when specification Type VII is limited to 1000°F maximum use temperature.
- ASTM C 612, Mineral Fiber Block & Board Thermal Insulation, Types IA, II, III - TIW Type II
- ASTM C 795, Thermal Insulation for Use Over Austenitic Stainless Steel*
- ASTM C 1199, Fibrous Glass Thermal Insulation and Sound Absorbing Blanket and Board for Military Applications, Type 1, Grade 2 - TIW Type I; Type 2, Grade 2 - TIW Type II
- Mil. Spec. MIL-I-22023D (Ships), Insulation Felt, Thermal and Sound Absorbing Felt, Fibrous Glass, Flexible, Types 1 & 2, Class 3 - TIW Type I
- Nuclear Regulatory Commission Guide 1.36, Non-Metallic Thermal Insulation*
- U.S. Coast Guard Approval No. 164.009, Noncombustible Materials
- CAN/CGSB-51.11 - Type 1, Class 4 - Fiberglas TIW Types I & II Insulation

* Preproduction qualification testing complete and on file. Chemical analysis of each production lot testing required for total conformance.

Physical Property Data

Property	Test Method	Value
Equipment operating temperature range*	ASTM C 411	Up to 1000°F (538°C)
Nominal density	ASTM C 167	Type I: 1.0 pcf (16 kg/m ³) Type II: 2.4 pcf (38 kg/m ³)
Shot content	ASTM C 1335	Negligible
Water vapor sorption	ASTM C 1104	< 2.0% by weight at 120°F (49°C), 95% R.H.
Composite surface burning characteristics	UL 723,** ASTM E 84** or CAN/ULC-S102-M**	Flame spread 25** Smoke developed 50

* Maximum allowable thickness at 1000°F (538°C): Type I - 8.5" (216mm); Type II - 6" (152mm).

** The surface burning characteristics of these products have been determined in accordance with UL 723, ASTM E 84 or CAN/ULC-S102-M. This standard should be used to measure and describe the properties of materials, products or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use. Values are reported to the nearest 5 rating.

Noncorroding

Fiberglas TIW Types I and II Insulation can be used in direct contact with steel, copper and aluminum without corrosive effects.

Availability

TIW, Type I

STANDARD ROLL SIZES

Widths,	24 (0.6)	
	36 (0.9)	
	48 (1.2)	
Lengths,	33 (10.1)	
	44 (13.4)	
	66 (20.1)	
Thicknesses,	1 (25)	2 (51)
	3 (76)	4 (102)

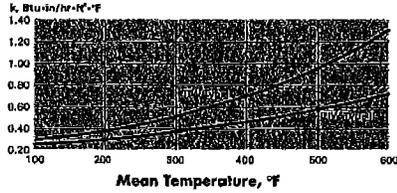
TIW, Type II

STANDARD BATTS

in. (m)	24 x 48	(0.6 x 1.2)
	36 x 48	(0.9 x 1.2)
	48 x 48	(1.2 x 1.2)
Thicknesses,	1 (25) to 4 (102)	
	in. (mm)	in 1/2 (13) increments

Thermal Insulating Wool Fiberglas® TIW Types I & II Insulations

Thermal Conductivity



Apparent thermal conductivity curve determined in accordance with ASTM Practice C 1045 with data obtained by ASTM Test Method C 177. Values are nominal, subject to normal testing and manufacturing tolerances.

TIW Type I		TIW Type II	
Mean Temp. (°F)	k (Btu-in/hr-ft²-F)	Mean Temp. (°F)	k (Btu-in/hr-ft²-F)
75	0.27	25	0.039
100	0.29	50	0.044
200	0.39	100	0.058
300	0.52	150	0.075
400	0.70	200	0.099
500	0.96	250	0.131
600	1.31	300	0.173

TIW Type I		TIW Type II	
Mean Temp. (°F)	k (Btu-in/hr-ft²-F)	Mean Temp. (°F)	k (Btu-in/hr-ft²-F)
75	0.23	25	0.033
100	0.24	50	0.036
200	0.30	100	0.044
300	0.37	150	0.054
400	0.46	200	0.066
500	0.58	250	0.080
600	0.73	300	0.098

Thermal Performance, ASTM C 680

TIW Type	400°F (204°C)		600°F (321°C)		800°F (427°C)		1000°F (538°C)	
	HL (Btu/hr-ft²)	ST (°F)						

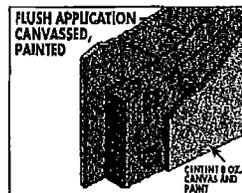
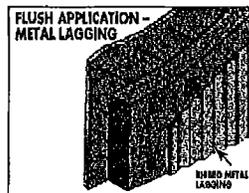
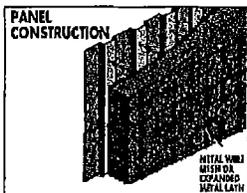
TIW Type I

1 (25)	110	182	265	282	525	415	912	568
2 (51)	62	144	148	209	298	301	529	417
3 (76)	43	128	103	177	207	247	370	340
4 (102)	33	118	79	158	159	216	283	293
5 (127)	27	112	64	146	128	195	230	261
6 (152)	22	108	54	137	108	180	193	239
7 (178)	19	105	46	131	93	169	167	221
8 (203)	17	102	41	126	82	160	146	208

TIW Type II

1 (25)	85	163	182	232	329	318	538	421
2 (51)	47	131	100	174	180	230	295	299
3 (76)	32	118	69	150	124	192	203	245
4 (102)	25	110	62	136	94	170	155	213
5 (127)	20	105	42	127	76	156	125	193
6 (152)	17	102	36	121	64	146	105	178

The above table provides approximate heat loss values (HL), Btu/hr-ft², and Surface Temperatures (ST), °F, for flat surfaces. Values are based on horizontal heat flow, vertical flat surface, 80°F ambient temperature, still air, weathered aluminum jacket. To convert heat loss values to W/m², multiply values by 3.15. To convert surface temperatures, use the formula: °C = (°F-32)/1.8.



Application Recommendations

Fiberglas TIW Types I and II Insulations can be installed directly on heated flat and curved surfaces by attaching with welded metal pins or studs and finishing with sheet metal or metal mesh and insulating cement, then canvased and painted. Pins with speed washers or studs and nuts should be installed on 16" (400mm) (maximum) spacing and not more than 4" (100mm) from the edge of the insulation. The insulation is normally impaled over the pins or studs and the enclosing sheet metal or metal mesh secured to the same fasteners. Joints of the sheet metal finish are offset from joints of the insulation.

For temperatures over 400°F (204°C), good insulation practice suggests double layer application, regardless of insulation type. Single layer installation of any type of insulation material requires good workmanship to minimize heat loss and hot spots at insulation joints. Fiberglas TIW Types I and II Insulations may be installed in either single or multiple layers at all temperatures up to 1000°F (538°C). Maximum allowable thicknesses at that temperature: TIW Type I, 8 1/2" (216mm); TIW Type II, 6" (152mm).



OWENS CORNING WORLD HEADQUARTERS
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TOLEDO, OHIO, USA 43669

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www.owenscorning.com

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ITW Insulation Systems

PABCO - CHILDERS METALS

Aluminum Roll Jacketing

DESCRIPTION

ITW Pabco/Childers Aluminum Roll Jacketing is manufactured from alloys 3105 and 3003, conforming to ASTM B-209 designation, half-hard temper (H-14) and heavier gauges quarter-hard (H-12 lock-forming quality).

Commercially pure aluminum is relatively soft as structural material. Its strength can be greatly improved by alloying aluminum with small percentages of one or more other elements such as manganese, silicon, copper, magnesium or zinc. Additional strength can be achieved by cold working, such as cold rolling.

Standard alloys and nominal chemical composition

Alloy	Copper	Manganese	Magnesium
3105		.6	.50
3003	.12	1.2	~

ITW reserves the right to ship whichever alloy is in stock at time of order placement, unless advised a specific alloy is requested (may affect lead-time and/or price). Other alloys are special order and minimum quantities and extended lead-time required.

ITW's aluminum roll jacketing is available in smooth, stucco embossed or 3/16 corrugations (cross-crimped) finishes.

POLYSURLYN MOISTURE RETARDER

Polysurlyn consists of a 3 mil thickness of a co-extrusion of polyethylene and DuPont's Surlyn[®] which is heat laminated to the metal jacketing. Due to its superior performance characteristics, it replaces the old standard 1 mil and 3 mil polykraft moisture retarders. **For cold rooftop and hot work cyclical applications, refer to Technical Information for recommendations.**

THICKNESS & Suggested Applications

.016" (4mm) The standard for industrial use. Recommended over insulated lines up to 36" O.D. including insulation.

&
.020" (5mm)

.024" (6mm) A heavier weight jacketing used on larger diameter lines and large equipment up to 8 feet in diameter.

.032" (8mm) Used in special applications where extra thickness and protection is required, such as fabricated tank head covers and other special fabrications.

.040" (1.0mm) Available in rolls, where extra heavy gauges are required because of severe mechanical abuse or special fabricating requirements, such as flat ducts or precipitators. Also recommended for areas subject to high wind conditions.

RECOMMENDED USES

Jacketing is recommended for insulated piping, tanks and vessels less than 8 feet in diameter. Deep corrugated sheets are recommended for diameters greater than 8 feet.

ITW Insulation Systems

PABCO - CHILDERS METALS

(SURE-FIT)

(ELL-JACS)

ALUMINUM ELBOW COVERS

DESCRIPTION

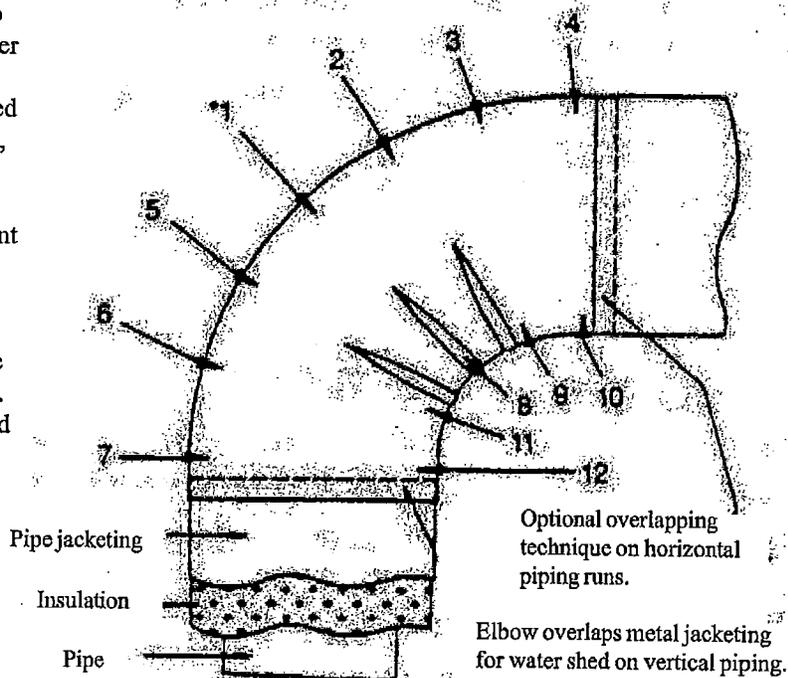
ITW Insulation Systems Aluminum Sure-Fit (Pabco) or Ell-Jacs® (Childers) Insulation Fitting Covers are made in two precision formed matching halves and are sized to cover and weatherproof insulated 90° and 45° elbows along pipelines. They are manufactured from 1100 Aluminum alloy in .024" thickness. A moisture retarder coating is applied to the interior for resistance to electrolytic degradation, and a clear coating is applied to the exterior for corrosion protection.

They can be used on long and short radius, butt weld, socket weld, and screwed pipe elbows from 1/2" to 12" Iron Pipe Size, inclusive. These insulation covers are also available in colors to harmonize with painted aluminum jacketing.

When ordering, long radius, short radius, 90° or 45° must be specified.

ITW Elbow covers are made in two matching halves, and are applied over or under pipeline jacketing to shed water. The product should be applied using screws or rivets for hot piping, or strapping in conjunction with a vapor barrier for cold piping. Overlaps should be caulked with joint sealants.

The number of stainless steel screws (or rivets) are determined by the size of the elbow. Space screws 3" apart. The first screw on the elbow heel and throat must be started in the middle. Then, work from the center to the ends. Additional strapping at the ends is optional.



Note: See the O.D. chart on reverse side providing information on the maximum O.D. ITW's elbows will fit after allowing for a 7/16" overlap. There is an allowance for insulation that is oversized when measured against Table 3-A, ASTM C-585 designation.

ALUMINUM ELBOW COVERS

Insulation Size O.D. Chart

IPS	1/2"	1"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"
1/2"	2.375	3.0625	4.25	5.3125	7	8	8.9375	10.125
3/4"	2.375	3.0625	4.25	5.3125	7	8	8.9375	10.125
1"		3.6875	4.75	5.9375	7	8	8.9375	10.125
1-1/4"		3.6875	5.25	5.9375	7	8	8.9375	10.125
1-1/2"		4.1875	5.25	7	8	8.9375	10.125	11.0625
2"		4.8125	5.875	7	7.875	8.9375	10.125	11.0625
2-1/2"		5.3125	6.75	7.875	8.9375	10.125	11.0625	12.125
3"		5.9375	7	7.875	8.9375	10.125	11.0625	12.125
3-1/2"		6.8125	8	9	10.125	11.0625	12.125	13
4"		6.8125	8	9	10.125	11.0625	12.125	13
4-1/2"		8	9	10.125	11	12.125	13	14.50
5"		8	9	10.125	11	12.25	13	14.50
6"		9	10	11.125	12.25	13.125	14.50	15.50
7"		10	11.125	12.25	13.125	14.50	15.50	16.50
8"		11.125	12.25	13.25	14.375	15.25	16.50	17.50
9"		12.25	13.25	14.375	15.25	16.50	17.50	
10"		13.25	14.50	15.50	16.50	17.375	18.50	
11"		14.50	15.50	16.50	17.3125	18.50	19.50	
12"		15.3125	16.50	17.3125	18.50	19.50	20.375	
14"				18.50	19.50	20.375	21.50	
15"					20.375	21.50	22.50	
16"				20.375	21.50	22.50		
17"					22.50			
18"				22.50				

The O.D. chart provides information on the maximum O.D. ITW's elbows will fit after allowing for a 7/16" overlap. There is an allowance for insulation that is oversized when measured against Table 3-A, ASTM C-585 designation.