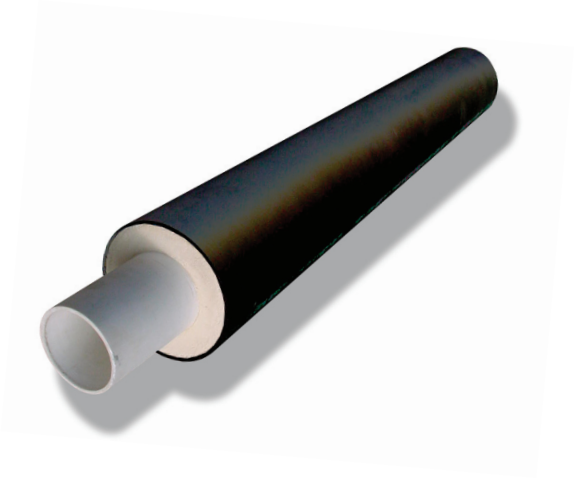
CHILL-THERM

PVC PIPING SYSTEM

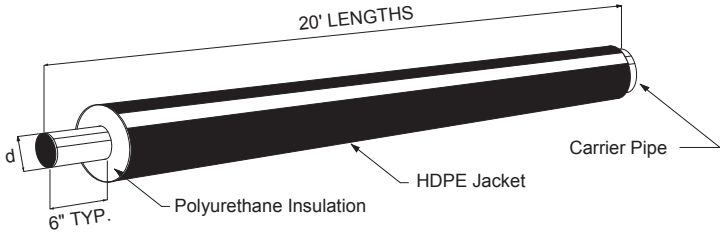


CHILL-THERM

THERMACOR'S CHILL-THERM is a factory-fabricated, pre-insulated piping system for below ground distribution of chilled water. The system is designed with Polyvinyl Chloride (PVC) plastic pressure carrier pipe (type to be specified), closed cell polyurethane foam insulation, and a High Density Polyethylene (HDPE) or PVC jacket.

Carrier Pipe

- Class 160 (SDR 26) (Gasket)
- Class 200 (SDR 21) (Gasket)
- C900/C905 (DR 14 - DR 25) (Gasket)
- PVC (Schedule 40 or 80) (Solvent Weld)
- CPVC (Schedule 40 or 80) (Solvent Weld)



Polyurethane Insulation

• Density	> 2.0 lbs/ft³
• "K" Factor	≤ 0.16 @ 75°F
• Compressive Strength	> 30 psi
• Closed Cell Content	≥ 90% @ 75°F

Jacket

- High Density Polyethylene (HDPE)
- PVC 60, Type 1, Class 1

P.O. BOX 79670 · 1670 HICKS FIELD ROAD EAST · FORT WORTH, TEXAS 76179 · 817 / 847-7300 · FAX 817 / 847-7222

SPECIFICATION GUIDE *

GENERAL

All underground and above ground piping materials transporting chilled water, potable water, and low temperature process fluids shall be **CHILL-THERM** as manufactured by **THERMACOR PROCESS INC.** All straight pipe, fittings, insulating materials, and technical support shall be provided by the manufacturer.

SERVICE PIPE

The carrier or service pipe shall be PVC, SDR-26, Class 160, bell and spigot, gasket joint pipe conforming to ASTM D-2241 and D-1784. PVC resin compound shall be PVC-1120, Class Designation 12454-B. Pipe is rated for 160 psi at 73°F. *At the Engineer's option*, SDR-21, Class 200 PVC, having a pressure rating of 200 psi at 73°F, or C900 or C905 DR rated pipe, may be specified. Pre-insulated pipe sections shall be supplied in 20 foot lengths and insulated from the bell end to just short of the spigot insertion stop mark.

INSULATION

Insulation of the service pipe shall be rigid polyurethane foam with a minimum 2.0 lbs/ft³ density, 90% minimum closed cell content, and a "K" factor not higher than .16 at 75°F per ASTM C518. The polyurethane foam shall be CFC-free. The polyurethane foam shall completely fill the annular space between the service pipe and jacket, and shall be bonded to both. Insulation shall be provided to the minimum insulation thickness specified, within manufacturing tolerances.

JACKET

The outer protective jacket shall be high density polyethylene (HDPE). HDPE shall have a minimum wall thickness as specified below. No FRP, HDUP, or tape jacket allowed.

FITTINGS

Fittings shall be PVC with a gasket joint similar to that of the PVC pipe. Cast or Ductile iron fittings conforming to the pipe dimensions may be used for sizes greater than 12". Fittings are not insulated and are poured in concrete thrust blocks at all changes of direction. *Thrust block design and sizing is the responsibility of the design engineer.*

FIELD JOINTS

Service pipe shall be hydrostatically tested as per the Engineer's specification with a factory recommendation of 1.5 times the specified pressure of the system.
Joints between pipe sections are not insulated to allow for expansion and contraction of the gasketed joint. *At the Engineer's option*, straight field joints may be covered by a split or oversized sleeve and sealed with a heat shrink sleeve to prevent the ingression of moisture or debris.

INSTALLATION

Installation of the piping system shall be in accordance with the manufacturer's instructions. Factory trained field technicians shall be provided for critical periods of installation, unloading, field joint instruction, and testing.

** For alternate specifications, please contact THERMACOR.*

THERMACOR PROCESS INC.

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Fort Worth, Texas 76179-5248
P.O. Box 79670

Phone (817) 847-7300
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www.thermacor.com

Your Authorized THERMACOR Representative Is:

Pre-insulated PVC Piping Systems *suitable for Chilled Water, Potable Water, and Low Temperature Process Fluids.*

Part 1 – Products

1.1 Pre-insulated Piping - Furnish a complete system of factory pre-insulated PVC piping for the specified service. All pre-insulated pipe, fittings, insulating materials, and technical support shall be provided by the Pre-insulated Piping System manufacturer.

1.2 The system shall be **CHILL-THERM** manufactured by **Thermacor Process Inc.** of Fort Worth, Texas.

Part 2 – Products

2.1 Carrier pipe shall be PVC, SDR-26, Class 160, bell and spigot, gasket joint pipe conforming to ASTM D-2241 and D-1784. PVC resin compound shall be PVC-1120, Class Designation 12454-B. Pipe is rated for 160 psi at 73°F. (*At the Engineer's option*, SDR-21, Class 200 PVC, having a pressure rating of 200 psi at 73°F, C900 or C905 DR rated pipe, or Schedule 40 or Schedule 80 PVC or CPVC, may be specified.) Pre-insulated pipe sections shall be insulated from the bell end to just short of the spigot insertion stop mark.

2.2 Insulation shall be polyurethane foam either spray applied or injected with one shot into the annular space between carrier pipe and jacket, and shall be bonded to both. Insulation shall be rigid, minimum 90% closed cell polyurethane with a minimum 2.0 lbs per cubic foot density, compressive strength of 30 psi @ 75°F, and coefficient of thermal conductivity (K-Factor) of not higher than 0.16 @ 75°F per ASTM C-518. Maximum operating temperature of urethane shall not exceed 250°F. Insulation thickness shall be specified by calling out appropriate carrier pipe and jacket size combinations as listed on drawing CTSG 5.103 and CTSG 5.104.

2.3 Jacketing material shall be extruded, black, high density polyethylene (HDPE), having a minimum wall thickness of 100 mils for jacket sizes less than or equal to 12", 125 mils for jacket sizes 12" to 24", and 150 mils for jacket sizes larger than 20". No tape jacket allowed. The inner surface of the HDPE jacket shall be oxidized by means of corona treatment, flame treatment (patent pending), or other approved methods. This will ensure a secure bond between the jacket and foam insulation preventing any ingression of water at the jacket/ foam interface.

2.4 Straight Run Joints are not insulated to allow for expansion and contraction of the gasketed joint. At the Engineer's option, straight field joints may be covered with an HDPE split sleeve and sealed with heat shrink tape to prevent the ingression of moisture or debris.

2.5 Fittings shall be PVC with a gasket joint similar to that of the PVC pipe. Cast or Ductile iron fittings conforming to the pipe dimensions may be used for sizes greater than 12". Fittings are not insulated and are poured in concrete thrust blocks at all changes of direction. *Thrust block design and sizing is the responsibility of the design engineer.*

Part 3 – Execution

3.1 Underground systems shall be buried in a trench of not less than two feet deeper than the top of the pipe and not less than eighteen inches wider than the combined O.D. of all piping systems. A minimum thickness of 24 inches of compacted backfill over the top of the pipe will meet H-20 highway loading.

3.2 Trench bottom shall have a minimum of 6" of sand, pea gravel, or specified backfill material, as approved by the engineer, as a cushion for the piping. All field cutting of the pipe shall be performed in accordance with the manufacturer's installation instructions. At least the center 75% of each section of pre-insulated pipe shall be covered (approximately one foot of cover per 100 psi of test pressure) with select backfill material and all fittings shall be suitably thrust blocked before attempting any pressure tests of the system.

(Continued)

3.3 A hydrostatic pressure test of the carrier pipe shall be performed per the engineer's specification with a factory recommendation of one and one-half times the normal system operating pressure for not less than two hours. Care shall be taken to insure all trapped air is removed from the system prior to the test. *Appropriate safety precautions shall be taken to guard against possible injury to personnel in the event of a failure.*

3.4 Field service, if required by project specifications, will be provided by a certified manufacturer's representative or company field service technician. The technician will be available at the job to check unloading, storing, and handling of pipe, joint installation, pressure testing, and backfilling techniques. This service will be added into the cost as part of the project technical services required by the pre-insulated pipe manufacturer.

THERMACOR

CHILL-THERM
Specification Guide

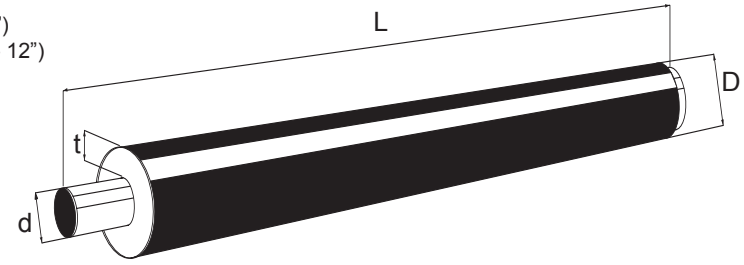
POLYURETHANE FOAM IN HDPE JACKET

CTSG
5.103
8.08.11

Carrier Pipe:
- PVC Class 160 (SDR 26) Bell and Spigot, Gasketed (2" - 12")
- PVC Class 200 (SDR 21) Bell and Spigot, Gasketed (1 1/2" - 12")
- PVC or CPVC, Schedule 40 or 80 (1/2" - 12")

Jacketing Material:
High Density Polyethylene (HDPE)

Insulation:
Polyurethane Foam



Pipe Size	Jacket Size	Standard Length L	Insulation Thickness t	External Diameter D	Weight Per Foot (lbs.)
1/2"	5.4"	20'	2.18"	5.40"	.98
3/4"	5.4"	20'	2.08"	5.40"	1.20
1"	5.4"	20'	1.94"	5.40"	1.45
1-1/4"	5.4"	20'	1.77"	5.40"	1.52
1-1/2"	5.4"	20'	1.65"	5.40"	1.66
2"	5.4"	20'	1.41"	5.40"	2.06
2-1/2"	6.7"	20'	1.80"	6.68"	2.22
3"	6.7"	20'	1.49"	6.68"	2.46
4"	8.7"	20'	1.99"	8.68"	4.01
6"	10.9"	20'	2.01"	10.85"	6.95
8"	12.9"	20'	1.99"	12.85"	10.30
10"	14.1"	20'	1.56"	14.12"	15.31
12"	16.1"	20'	1.57"	16.14"	19.50

* Other pipe and jacket size combinations are available.
** Insulation thickness is calculated using minimum wall thickness. Actual wall thickness may be greater than stated, thereby minimally decreasing actual foam thickness.

THERMACOR

CHILL-THERM
Specification Guide

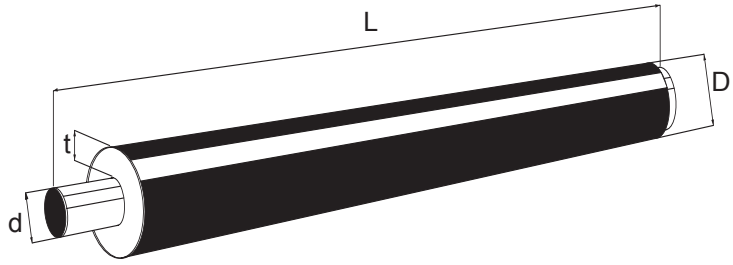
POLYURETHANE FOAM IN HDPE JACKET

CTSG
5.104
3.04.08

Carrier Pipe:
- C900 DR 18 (4”- 12”)
- C905 DR 25 (14” - 24”)

Jacketing Material:
High Density Polyethylene (HDPE)

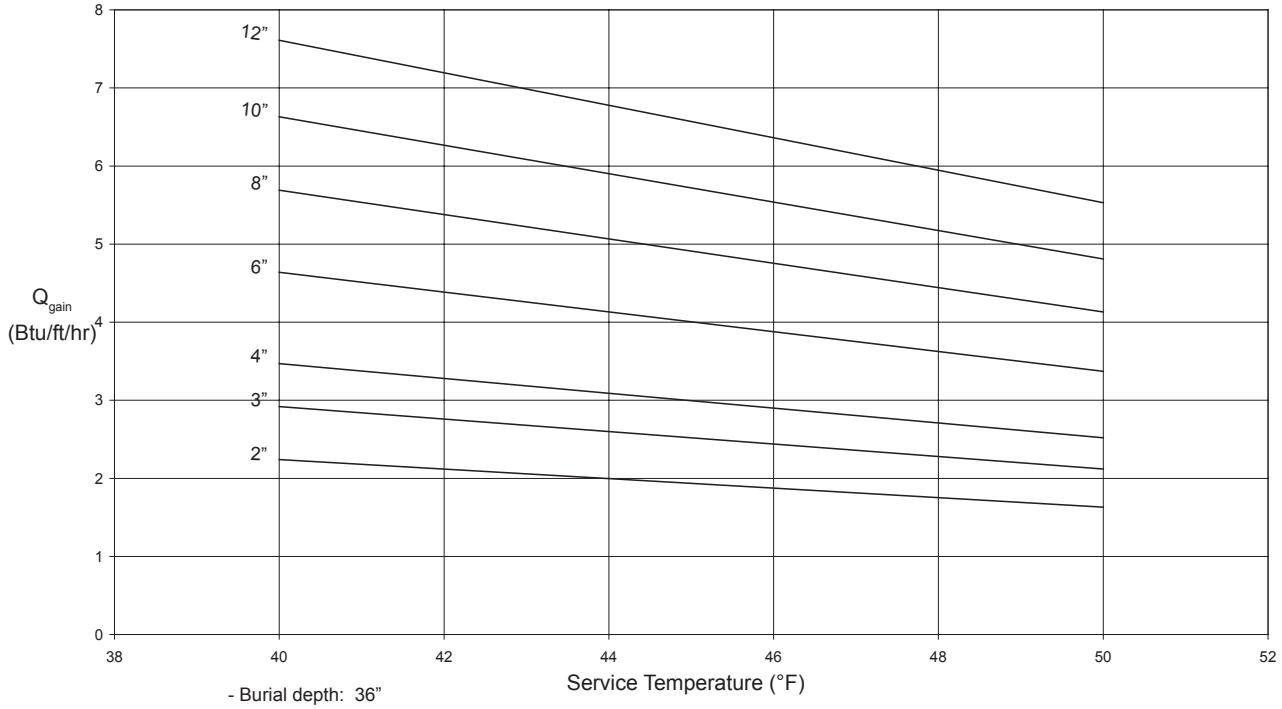
Insulation:
Polyurethane Foam



Pipe Size	Jacket Size	Standard Length L	Insulation Thickness t	External Diameter D	Weight Per Foot (lbs.)
4”	8.7”	20’	1.81”	8.68”	5.21
6”	10.9”	20’	1.84”	10.85”	9.04
8”	12.9”	20’	1.74”	12.85”	13.44
10”	14.1”	20’	1.35”	14.13”	18.82
12”	16.1”	20’	1.31”	16.14”	25.80
14”	18.2”	20’	1.30”	18.23”	26.84
16”	20.3”	20’	1.22”	20.28”	34.73
18”	22.3”	20’	1.15”	22.25”	42.12
20”	24.4”	20’	1.17”	24.38”	50.54
24”	28.3”	20’	1.00”	28.25”	70.28

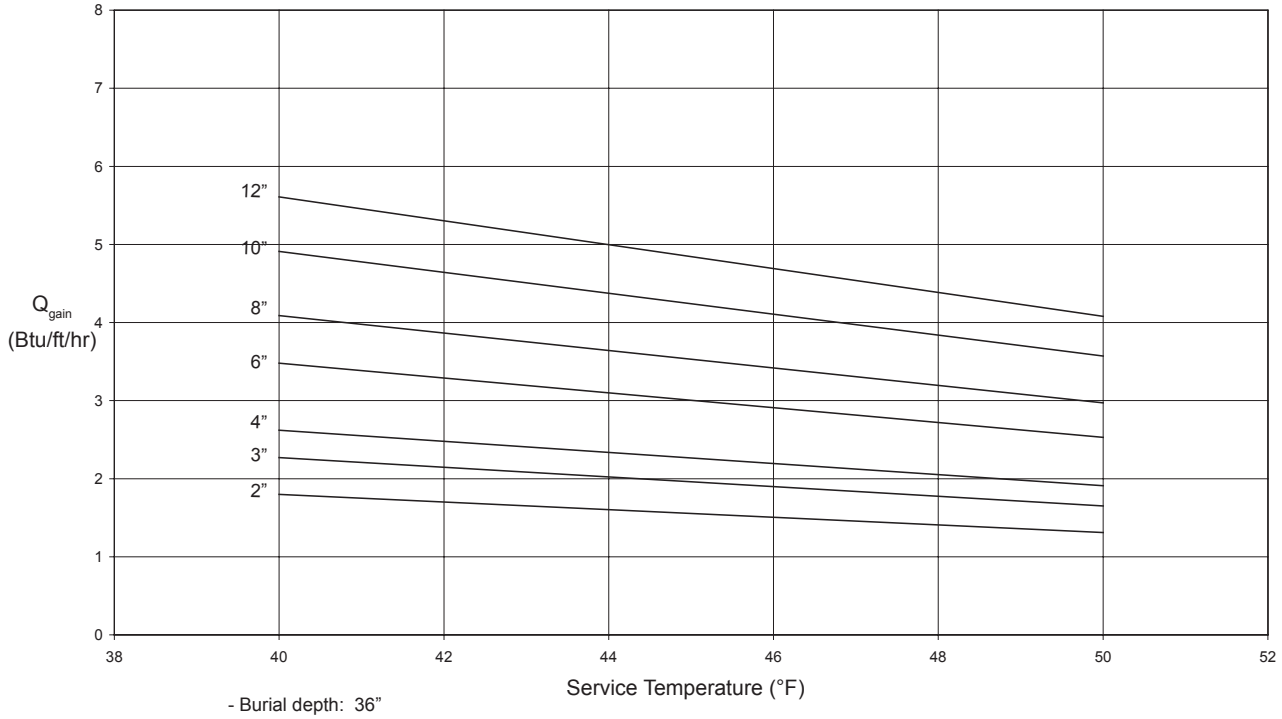
* Other pipe and jacket size combinations are available.
** Insulation thickness is calculated using minimum wall thickness. Actual wall thickness may be greater than stated, thereby minimally decreasing actual foam thickness.

HEAT GAIN FOR 2” OF POLYURETHANE FOAM*



- Burial depth: 36”
- Soil conductivity: 12 (Btu/h.ft^2.°F/ft)
- Soil temperature: 75°F

HEAT GAIN FOR 3” OF POLYURETHANE FOAM*



- Burial depth: 36”
- Soil conductivity: 12 (Btu/h.ft^2.°F/ft)
- Soil temperature: 75°F

* Values are calculated using 3E Plus in accordance with ASTM C680 and are subject to the terms and limitations stated in the software. Actual heat gain may vary.

INSTALLATION INSTRUCTIONS

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

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

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

FIELD JOINING METHODS
Clean pipe ends and coupling grooves to ensure proper gasket fitting. Lubricate smooth pipe spigot with Thermacor provided lubricant. DO NOT LUBRICATE GASKET GROOVE OR GASKET. Insert lubed pipe spigot straight into bell, being careful to prevent cutting or rolling of gasket. Push spigot end to stop mark. DO NOT GO PAST THE STOP MARK which leads to over belling and can cause the pipe to split. DO NOT USE PETROLEUM BASED LUBRICANTS!

FIELD ALTERATIONS
Pipe can be cut in the field when special short pieces are required. Measure distance needed for field alterations (include pipe for bell or socket) and cut through pipe unit with a fine tooth saw or abrasive saw. Using factory insulated pipe as a guide, cut back insulation and bevel pipe (simultaneously removing burrs, cuts, nicks, and scratches) using a PVC pipe beveller, a hand rasp, or file to a 15 degree bevel. DO NOT CUT PIPE! Apply end seals to the clean, dry, exposed insulation surface. Stop marks must be indicated on any cut back pieces. Using a factory finished end as an example, make a stop mark on the spigot using a wax crayon or pen, or use the guidelines provided in the table below. DO NOT OVER BELL THE PIPE.

PIPE SIZE (INCHES)	1½	2	2½	3	4	5	6	8	10	12
STOP MARK (INCHES)	2½	2¾	3	3¼	3½	4¼	4¾	6	7	7½

NOTE: Stop mark dimensions to be used when factory- finished end is not availabe.

BACKFILL INITIAL
After pipe is installed, specified backfill shall be tamped around the conduit in 6" layers to insure proper compaction. One foot on either side of each joint and fitting shall be left bare for visual inspection during testing.

TESTING
Sufficient backfill must be placed on pipe prior to testing. Thermacor recommends temporary thrust blocks be used to proof test the joints and fitting prior to thrust blocks being poured and cured, for final testing. Bleed all air from lines to eliminate possible incorrect readings. The hydrostatic pressure test shall be performed per the engineer's specification with a factory recommendation of one and one-half times the normal operating pressure for not less than two hours. Inspect all fittings, valves, and couplings at this time. NEVER TEST WITH AIR! *Appropriate safety precautions shall be taken to guard against possible injury to personnel in the event of a failure.*

BACKFILL FINAL
Before backfilling is started, the trench should be cleaned of any trench wall cave-ins and general trash. Backfilling should be done with sand or other engineer-approved material 6" below the casing to 1' above. Engineer-approved backfill may be used to fill the rest of the trench. This material should be free of rocks, roots, large clods, or anything that could cause damage to the jacket. Jacket should have a minimum of 2' cover.

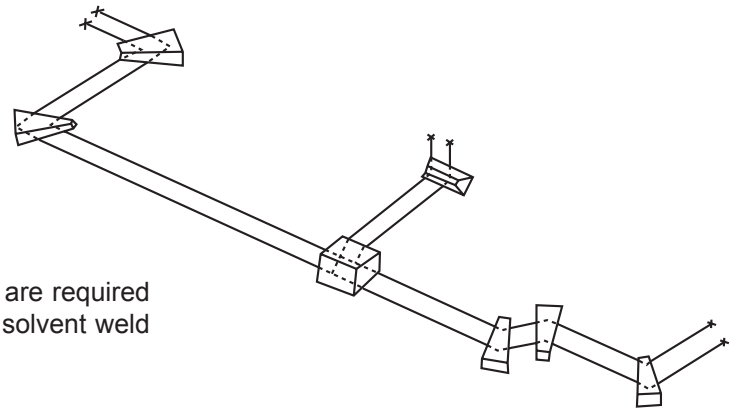
WHEELED OR TRACKED VEHICLES SHALL NOT BE USED FOR TAMPING!

THRUST BLOCK INSTALLATION

The engineer who designs the system has the responsibility for designing and sizing the thrust blocks. Knowledge of site soil conditions is essential for proper design. Thermacor will not accept or assume responsibility for thrust blocks, and intends to provide basic data only.

WHY THRUST BLOCKS?
A Chill-Therm system must include thrust blocks to prevent any gasketed joints from separating under pressure. To prevent separation, thrust blocks must be located at:

1. All major changes in direction; i.e., tees and elbows (both horizontal and vertical).
2. All changes in size.
3. All terminal ends.
4. All Valves, so as to support the body weight and prevent excessive torque on pipe connections.
5. IMPORTANT: Any connecting metallic pipe must be anchored at the point of connection to the PVC pipe to prevent excessive stresses from being transferred to the PVC pipe.

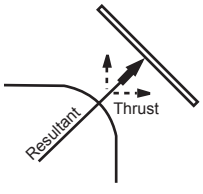


NOTE: Thrust blocks are required with gasket pipe and solvent weld fittings.

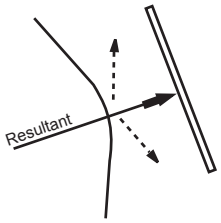
INSTALLATION
As thrust blocks are an essential part of the system, they should be poured before hydrostatic testing. Temporary thrust blocking may be used with extreme caution to proof- test joints in pipe and fittings. The system must be retested after the permanent thrust blocks are poured and cured to verify that the thrust blocks will resist the thrust.

DESIGN
The design of the thrust blocks depends on test pressure, size, number of pipes, soil conditions, and types of fittings involved. Three conditions must be met for the thrust blocks to function properly.

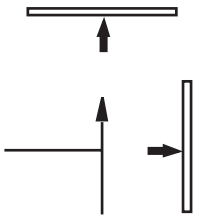
1. The bearing area must be adequate to resist the pressure force.
2. The bearing surface must rest directly against undisturbed soil.
3. The face of the block bearing surface in the soil must be perpendicular to the resultant direction of thrust.



90° ELBOW



45° ELBOW



REDUCING TEE

If the thrust blocks have not been designed by the engineer, they must be sized by the following procedure:
Example: Design a thrust block to resist the horizontal thrust of two 4" chilled water lines (supply and return) at a 90° elbow. The test pressure is 150 psi and the soil is soft clay.

TABLE 1
POUNDS OF THRUST AT FITTING FOR 100 POUNDS/SQ. INCH OPERATING PRESSURE

PIPE SIZE	TEE	90°	45°
1½"	295	415	225
2"	455	645	350
2½"	660	935	510
3"	985	1,395	755
4"	1,620	2,295	1,245
5"	2,500	3,520	1,910
6"	3,500	4,940	2,680
8"	6,050	8,550	4,640
10"	9,951	14,043	7,626
12"	14,229	20,083	10,881
14"	18,380	25,990	14,100
16"	23,780	33,630	18,280
18"	29,860	42,230	22,970
20"	36,640	51,820	28,180

TABLE 2

SAFE BEARING LOADS

SOIL	LB. PER SQ. FT.
Muck, Peat	0
Soft Clay	1,000
Sand	2,000
Sand & Gravel	3,000
Sand & Gravel cemented with clay	4,000
Hard Shale	10,000

STEP 1 **FINDING THRUST:**

From Table 1, the resultant thrust of a 4" x 90° elbow is 2295 lbs. at 100 psi.

At 150 psi, the thrust is:

$$2295 \text{ lbs.} \times \frac{150 \text{ psi}}{100 \text{ psi}} = 3442.5 \text{ lbs. elbow}$$

3442.5 lbs. x 2 = 6885 lbs. thrust for two elbows.

STEP 2 **FINDING BEARING AREA OF BLOCK:**

From Table 2, soft clay has a bearing strength of 1000 lbs./sq. ft. therefore:

$$\frac{6885 \text{ lbs.}}{1000 \text{ lbs./sq. ft.}} = 6.85 \text{ sq. ft. bearing area required}$$

or a block face of 4' x 2' (8 sq. ft.) is adequate.

THRUST BLOCK TYPES

Examples of thrust blocks for normal fittings are illustrated.

For vertical risers the trench bottom must be undercut and the entire trench bottom should be covered with concrete.

The thrust blocks must bear against firm, stable soil.

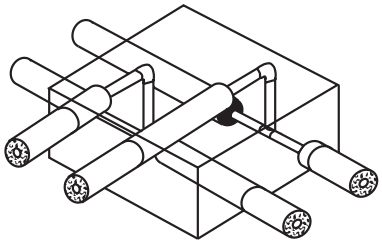


FIGURE I

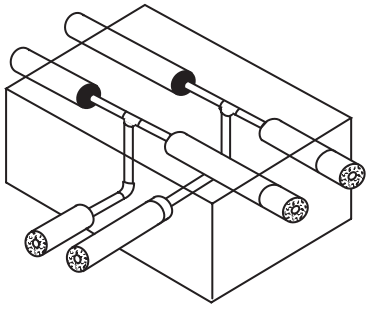


FIGURE II

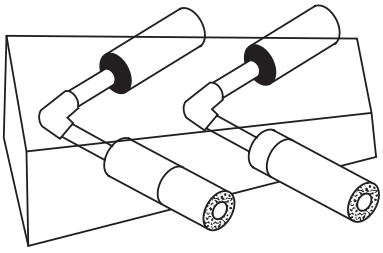


FIGURE III

CONSTRUCTION

Thrust blocks are made of concrete.

An acceptable concrete is 1 part Portland cement, 2 parts washed sand, and 3 parts washed gravel with enough water for a relatively dry mix. The dry mix is easier to shape and offers higher strength.

The concrete should be worked thoroughly around the elbows for maximum surface contact. Make sure the entire area between the fittings and the trench wall is filled with concrete and free of voids.

The blocks should be shaped with the designed bearing area against the trench wall. Smaller blocks should be shaped by hand. Larger blocks require simple forms.

The trench should be undercut under the pipes at least six inches to give added thrust resistance and to provide adequate concrete around the fittings. Six inches of concrete should be over the top of the pipe.

The center of the thrust blocks bearing surface should coincide with the horizontal center line of the pipes. (See figures I and II).

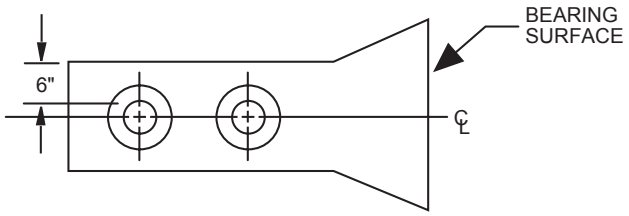


FIGURE I

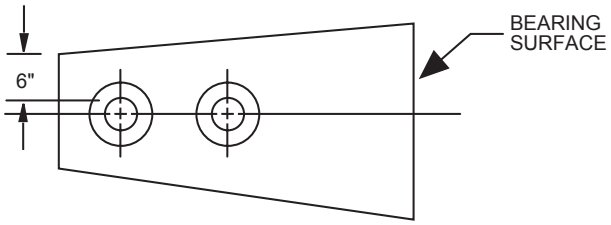


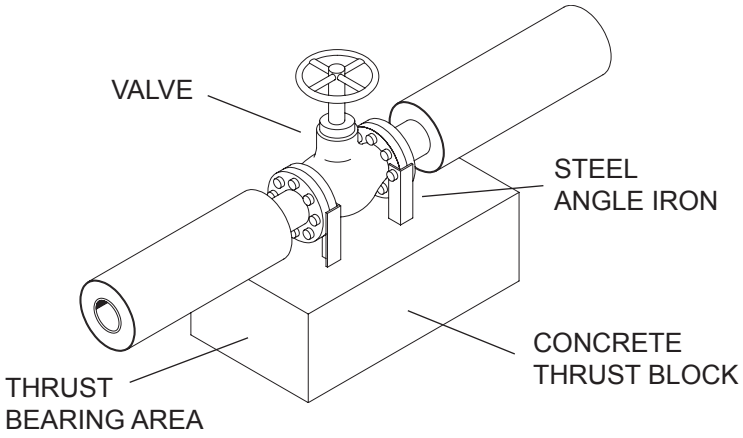
FIGURE II

UNSTABLE SOIL

If the soil is unstable in the area of a thrust block, it will be necessary for the engineer to make special provisions. This is considered a civil engineering matter and a project civil engineer should be consulted for professional advice.

VALVE BLOCKS

Blocks must be poured beneath valves with sufficient steel for valve connections. This supports the valve weight and prevents any torque or twisting action caused by opening and closing the valve.



SHIPPING & HANDLING INSTRUCTIONS

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

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

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

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

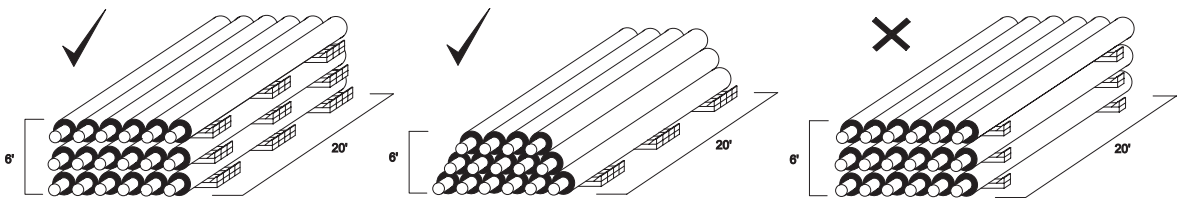
CLAIMS FOR DAMAGES
Claims for damages in transit or lost goods must be made within 30 days. The filing of any claim is the Purchaser's Responsibility. Thermacor will file any claim on Purchaser's behalf upon receipt of the following:

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

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

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

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



BE VERY CAREFUL NOT TO DROP THE PIPE!

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

SOLVENT WELD INSTALLATION INSTRUCTIONS

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

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

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

FIELD JOINING METHODS
PVC solvent weld pipe and fittings are joined in the field using approved methods of solvent welding for appropriate pipe.

FIELD ALTERATIONS
Pipe can be cut in the field when special short pieces are required. Measure distance needed for field alterations (include pipe for bell or socket) and cut through pipe unit with a fine tooth saw or abrasive saw. Using factory insulated pipe as a guide, carefully cut through jacket and insulation. DO NOT CUT PIPE! With a flat bladed chisel, remove jacket and insulation. Scrape clean all pieces of urethane foam from pipe down the entire length of the spigot that is to be inserted into the bell, then use 40 to 120 grit sandpaper (or flapper sander) to remove the urethane film that adheres to the pipe. Apply primer to spigot. If the spigot is properly prepared, primer will "soak" into the pipe and a few thousandths of the primed surface should be able to be scraped off. Repeated applications of the primer may be required. After application of primer to spigot and bell, apply industrial grade solvent cement to bell and spigots, 2 coats.

BACKFILL INITIAL
After pipe is installed, specified backfill shall be tamped around the conduit in 6" layers to insure proper compaction. One foot on either side of each joint and fitting shall be left bare for visual inspection during testing.

TESTING
Sufficient backfill must be placed on pipe and thrust blocks poured and cured, prior to testing. Bleed all air from lines to eliminate possible incorrect readings. The hydrostatic pressure test shall be performed per the engineer's specification with a factory recommendation of one and one-half times the normal operating pressure for not less than two hours. Inspect all fittings, valves, and couplings at this time. NEVER TEST WITH AIR! *Appropriate safety precautions shall be taken to guard against possible injury to personnel in the event of a failure.*

BACKFILL FINAL
Before backfilling is started, the trench should be cleaned of any trench wall cave-ins and general trash. Backfilling should be done with sand or other engineer-approved material 6" below the casing to 1' above. Engineer-approved backfill may be used to fill the rest of the trench. This material should be free of rocks, roots, large clods, or anything that could cause damage to the jacket. Jacket should have a minimum of 2' cover.

WHEELED OR TRACKED VEHICLES SHALL NOT BE USED FOR TAMPING!

SHIPPING & HANDLING INSTRUCTIONS

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

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

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

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

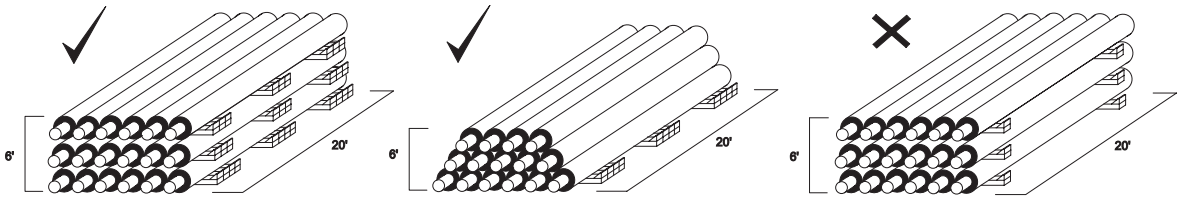
CLAIMS FOR DAMAGES
Claims for damages in transit or lost goods must be made within 30 days. The filing of any claim is the Purchaser's Responsibility. Thermacor will file any claim on Purchaser's behalf upon receipt of the following:

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

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

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

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



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

SOLVENT WELD INSTALLATION INSTRUCTIONS

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FIELD JOINING METHODS
CPVC solvent weld pipe and fittings are joined in the field using approved methods of solvent welding for appropriate pipe. (Thermacor Does Not Provide Solvent Cement or Primer.)

FIELD ALTERATIONS
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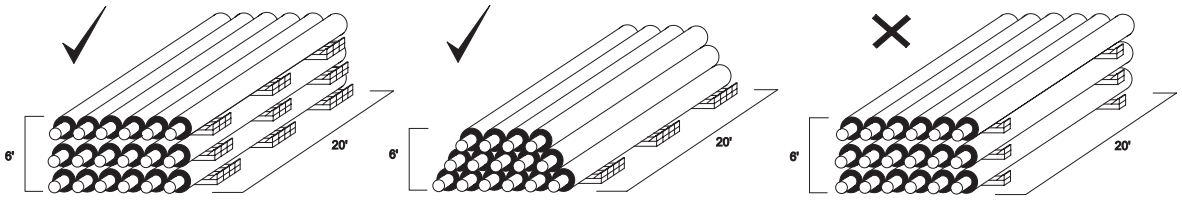

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