

SPIRAL-THERM

METAL JACKETED PIPING SYSTEM



SPIRAL-THERM

THERMACOR'S SPIRAL-THERM is a metal jacketed, factory-fabricated, pre-insulated piping system for above ground and tunnel piping applications. The system is designed with a specified carrier pipe, closed cell high temperature polyisocyanurate or standard closed cell polyurethane foam insulation, and a spiral wound metal jacket. The jacket, either aluminum, galvanized steel, or stainless steel, is manufactured with a rubber o-ring into the locking seams to create a watertight jacket.

Carrier Pipe

- As Specified

Spiral Wound Jacket With Watertight Rubber O-Ring Sealed Seam

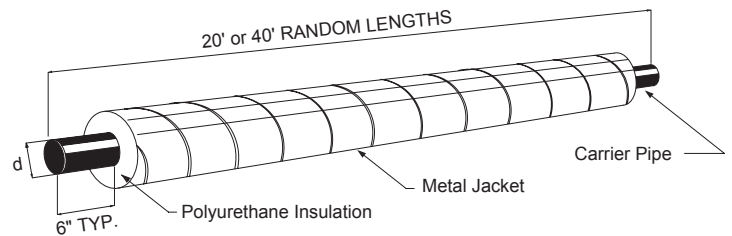
- Aluminum, Galvanized Steel, or Stainless Steel
- Internal or External Seam

Polyurethane Insulation

- Density > 2.0 lbs/ft³
- "K" Factor ≤ 0.15 Btu-in/hr-ft²-°F @ 75°F
- Compressive Strength > 30 psi
- Closed Cell Content $\geq 90\%$ @ 75°F

Polyisocyanurate Insulation

- Density > 2.7 lbs/ft³
- "K" Factor 0.17 Btu-in/hr-ft²-°F @ 75°F, ≤ 0.30 Btu-in/hr-ft²-°F @ 366°F
- Compressive Strength > 30 psi @ 75°F
- Closed Cell Content $\geq 85\%$
- Minimum Thickness $\geq 2.5"$



SPECIFICATION GUIDE *

GENERAL

All above ground piping materials transporting chilled and heating water, domestic hot water, process fluids, low pressure steam (15 PSIG Max.), condensate return, or cryogenic services shall be **SPIRAL-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 A-53, Grade B, ERW, Standard Weight for pipe sizes 2" and larger and A106/ A53, Grade B, seamless, standard weight for pipe sizes 1.5" and smaller. Condensate piping materials shall be extra strong. Pipe shall be butt-welded for sizes 2" and larger and socket-welded for 1.5" and smaller. Straight sections shall be supplied in 20 or 40 foot random lengths with cutbacks to allow for welding at the field joints.

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 .15 (Btu-in/hr-ft²-°F) at 75°F per ASTM C518, and 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.

High temperature systems may use polyisocyanurate foam with a minimum 2.7 lbs/ft³ density, 85% minimum closed cell content, a "K" factor not higher than .17 (Btu-in/hr-ft²-°F) at 75°F and .30 at 366°F per ASTM C518, and meets the requirements of ASTM C591.

JACKET

The outer protective jacket shall be 22 ga., spiral wound,

lock seam galvanized steel formed into steel tubes. (*At the Engineer's option*, spiral wound, lock seamed aluminum jacket .032" thick or stainless steel, 24 ga. may be used.)

FITTINGS

Fittings are factory pre-fabricated and pre-insulated, jacketed with a metal fitting cover and insulated with injected urethane to the specified thickness. Carrier pipe fittings shall be butt-welded, except sizes smaller than 2" shall be socket-welded. If required by project specifications, welds shall be radiographically inspected. Fittings include expansion loops, elbows, tees, reducers, and anchors. (*At the Engineer's option*, fittings may be field insulated with mineral wool, fiberglass or liquid urethane foam insulation, jacketed with a metal fitting cover after being sealed with mastic.) Grooved-end systems may be joined with Victaulic fittings and couplings.

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. Straight run joints are insulated using poured urethane or sectional urethane foam to the thickness specified, covered with a metal sleeve and sealed with mastic and held in place with (2) 1/2" stainless steel bands. Victaulic couplings are insulated with similar materials. All insulation and jacketing materials shall be furnished by THERMACOR.

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.*

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THERMACOR PROCESS INC, sole and exclusive warranty is as stated in the Standard Terms and Conditions of Sale for these products. In no event will THERMACOR PROCESS INC, be liable for any direct, indirect, or consequential damage.



SPIRAL-THERM

Specification Guide

SPSG
12.101

STANDARD SPECIFICATION

3.14.07

Pre-insulated Spiral Metal Jacketed Steel Piping Systems suitable for Above-Ground and Trench applications for Chilled and Heating Water, Domestic Hot Water, Process Fluids, Low Pressure Steam (15 PSIG Max.), Condensate Return, and Cryogenic services.

Part 1 - General

1.1 Pre-insulated Piping - Furnish a complete system of factory pre-insulated steel 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 **SPIRAL-THERM** manufactured by **Thermacor Process Inc.** of Fort Worth, Texas.

Part 2 - Products

2.1 Carrier pipe shall be steel ASTM A-53, Grade B., ERW (Type E) or seamless (Type S), standard weight for sizes 2" and larger, and shall be ASTM A-106/ A-53, seamless, standard weight for sizes 1-1/2" and smaller (Std. Wt. is the same as Sch. 40 through 10"). Condensate return piping shall be Extra Strong (XS is the same as Sch. 80 through 8"). When practical, piping shall be provided in 40-foot double-random lengths. All carbon steel pipe shall have ends cut square and beveled for butt-welding. Straight sections of factory insulated pipe shall have 6" of exposed pipe at each end for field joint fabrication.

2.2 Insulation shall be polyurethane foam high pressure injected with one shot into the annular space between carrier pipe and jacket. Insulation shall be rigid, 90-95% closed cell polyurethane with a 2.0 to 3.0 pounds per cubic foot density and coefficient of thermal conductivity (K- Factor) of 0.14 and shall conform to ASTM C-591. Maximum operating temperature shall not exceed 250 °F. Insulation thickness shall be specified by the Engineer with a minimum of 1-1/2".

2.3 Jacketing material shall be internal lock seal, 22 gauge, spiral wound, galvanized steel with a rubber "o" ring formed in the seam, formed into steel tubes. (*At the Engineer's option*, spiral wound, lock seamed aluminum jacket .032" thick or stainless steel 24 gauge may be used.)

2.4 Straight run joints are insulated using poured urethane or sectional urethane foam to the thickness specified, covered with a metal sleeve, sealed with mastic or silicon, and held in place with two 1/2" stainless steel bands. Victaulic couplings are insulated with similar materials.

2.5 Fittings are factory pre-fabricated and pre-insulated jacketed with a metal fitting cover and insulated with injected urethane to the specified thickness. Carrier pipe fittings shall be butt-welded, except sizes smaller than 2" shall be socket-welded. If required by project specifications, welds shall be radiographically inspected. Fittings include expansion loops, elbows, tees, reducers, and anchors. (*At the Engineer's option*, fittings may be field insulated with liquid urethane foam insulation, jacketed with a metal fitting cover after being sealed with mastic.) Grooved-end systems may be joined with Victaulic fittings and couplings.

2.6 Expansion/ contraction compensation will be accomplished utilizing factory pre-fabricated and pre-insulated expansion elbows, Z-bends, expansion loops, and anchors specifically designed for the intended application.

Part 3 - Execution

3.1 Pre-fabricated systems shall be provided as SC (standard components) fittings and factory insulated straight pipe sections for field engineering per the contract drawings. (*At the Engineer's option*, fittings may be field insulated with liquid urethane foam insulation, jacketed with a metal fitting cover after being sealed with mastic.)

(Continued)



SPIRAL-THERM

Specification Guide

STANDARD SPECIFICATION

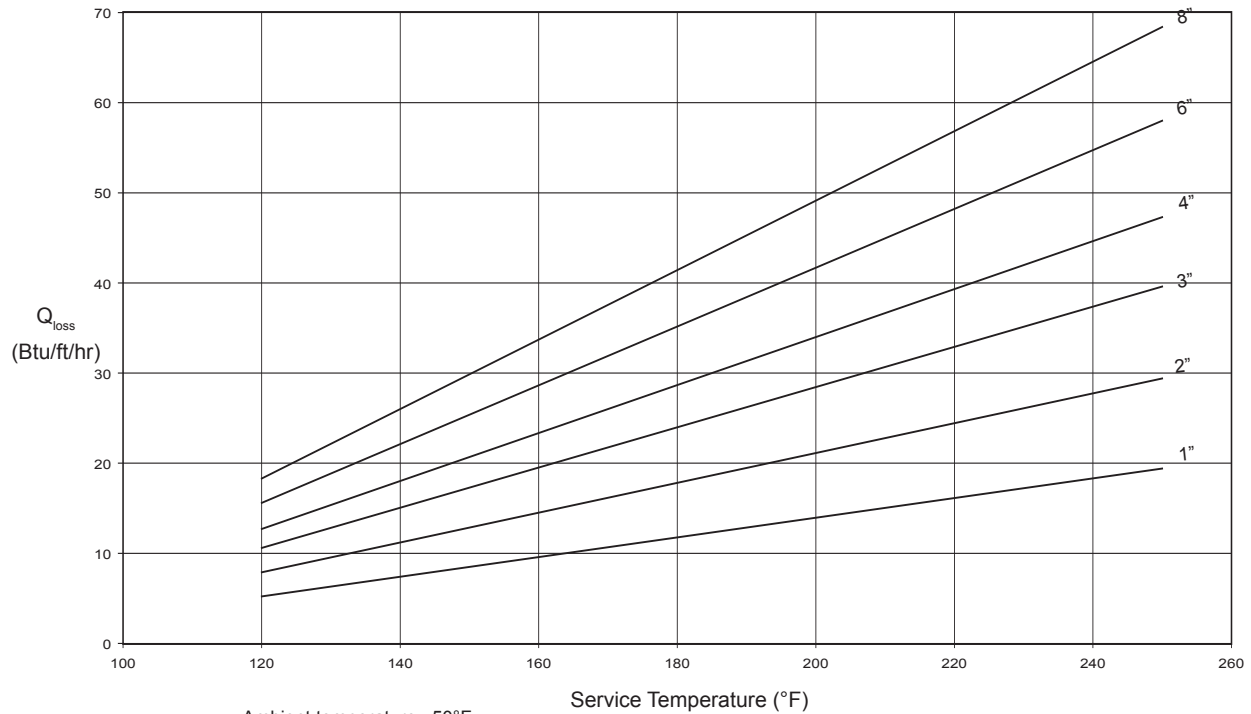
SPSG
12.102

3.14.07

3.2 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.*

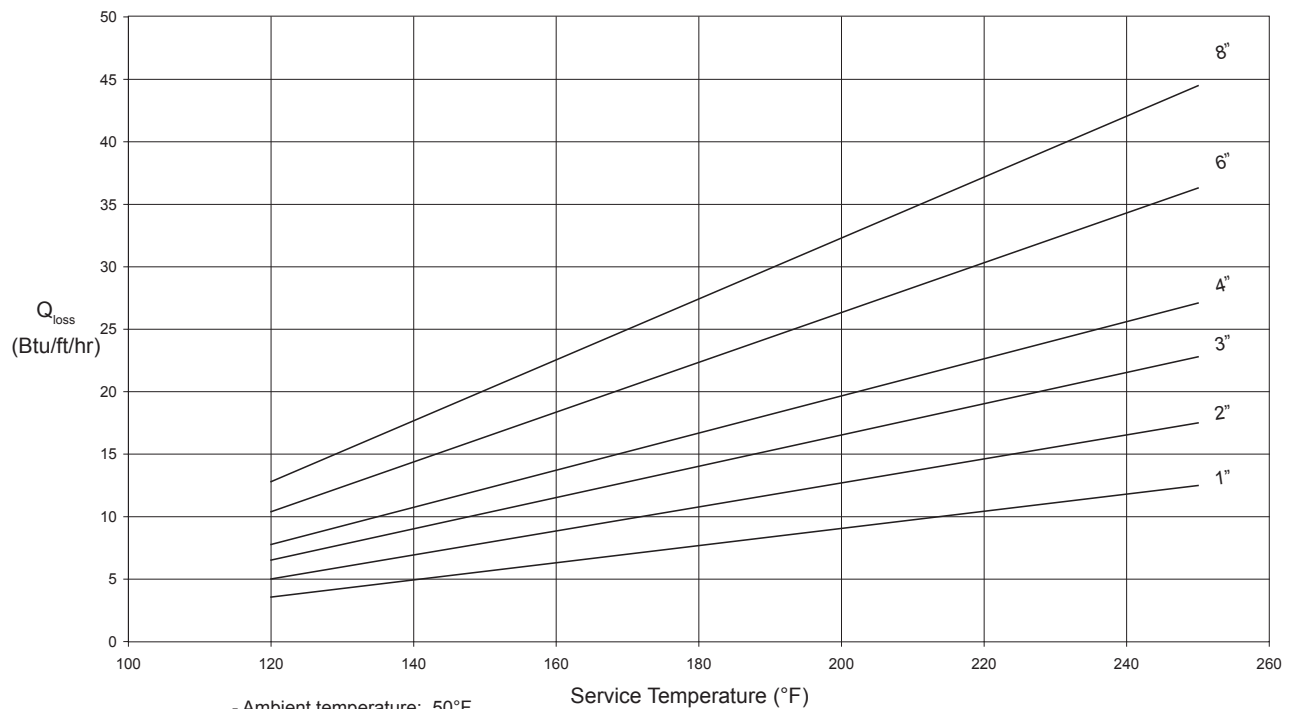
3.3 Field service, if required by project specifications, will be provided by a certified manufacturer's representative or company field service technician. The technician will be available at the job to check unloading, storing, and handling of pipe, joint installation, pressure testing, and backfilling techniques.

HEAT LOSS FOR 1" OF POLYURETHANE FOAM*



- Ambient temperature: 50°F
 - Relative humidity: 50%
 - Wind speed: 0 mph

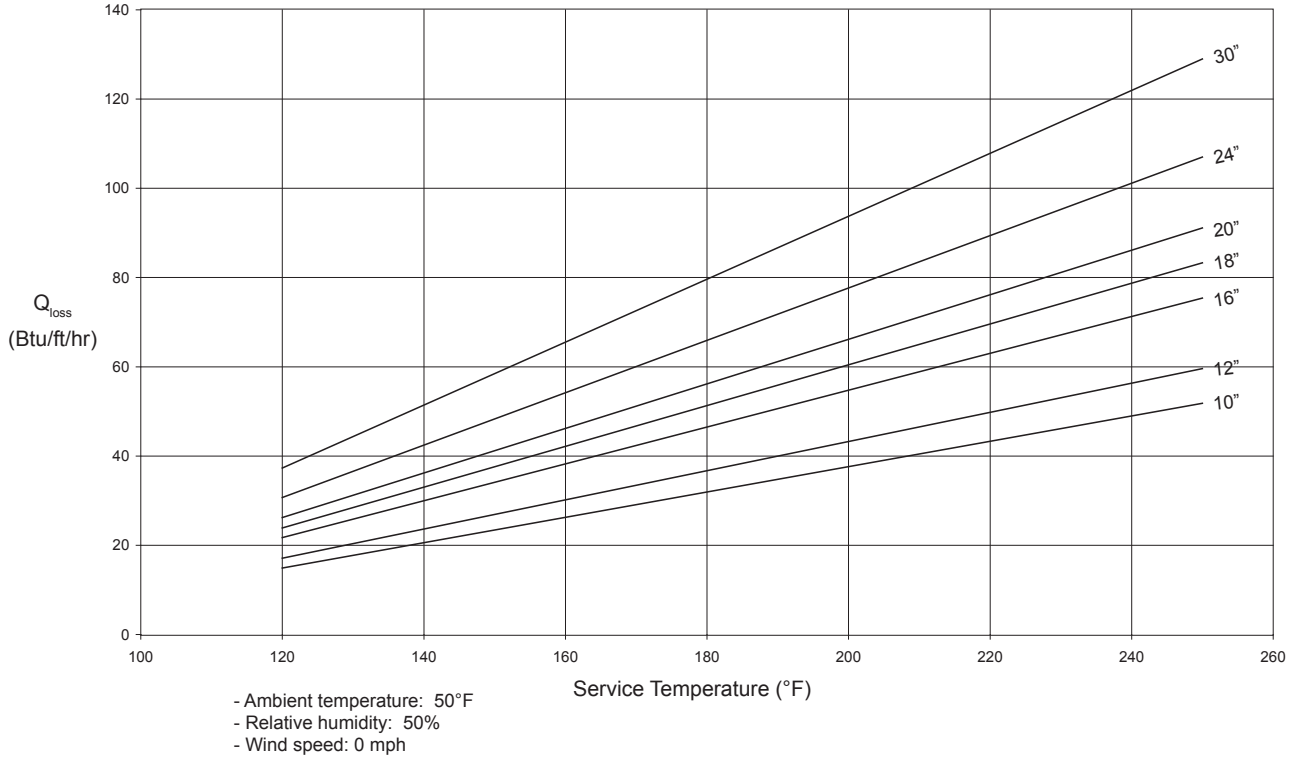
HEAT LOSS FOR 2" OF POLYURETHANE FOAM*



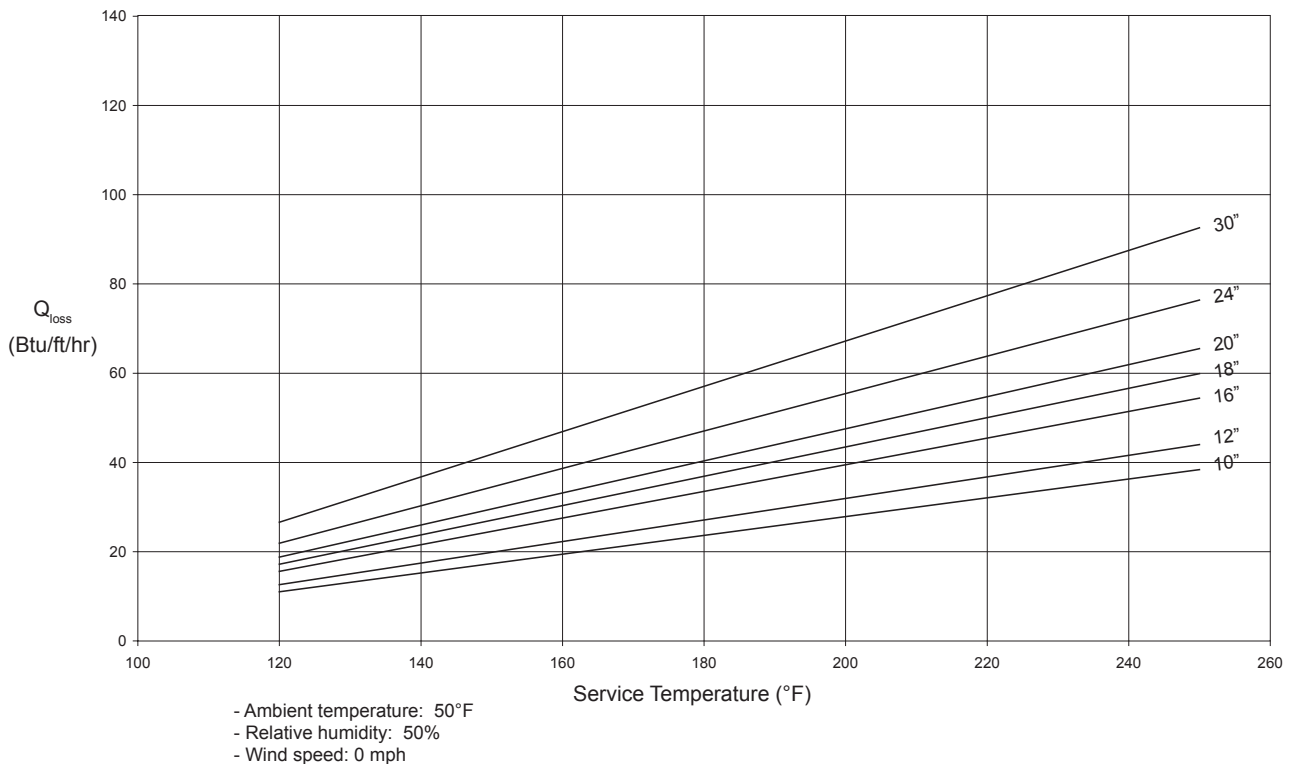
- Ambient temperature: 50°F
 - Relative humidity: 50%
 - Wind speed: 0 mph

* 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 loss may vary.

HEAT LOSS FOR 2" OF POLYURETHANE FOAM*



HEAT LOSS FOR 3" OF POLYURETHANE FOAM*



* 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 loss may vary.



SPIRAL-THERM

Installation Manual

SPIM
12.201

GENERAL INSTALLATION INSTRUCTIONS

3.14.07

INSTALLATION INSTRUCTIONS

UNLOADING & HANDLING

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

STORAGE

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

FIELD JOINING METHODS

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

FIELD ALTERATIONS

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

HYDROSTATIC TESTING

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

FIELD JOINT & FITTING INSULATION

See Drawings furnished with job material.

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.

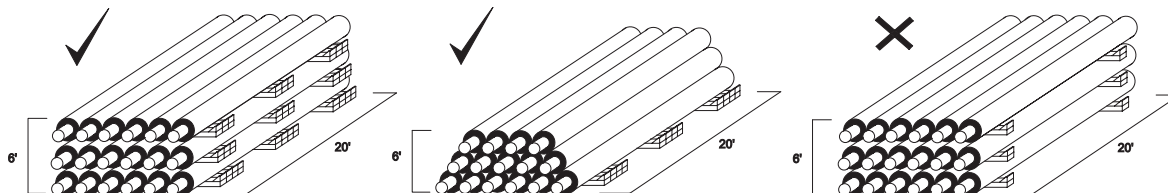
UNLOADING PIPE

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.