



# FERRO-THERM

## Specification Guide

FTSG  
7.101

STANDARD SPECIFICATION

8.10.11

*Pre-insulated HDPE-Jacketed Steel Piping Systems suitable for Chilled Water, 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 HDPE jacketed 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 **FERRO-THERM** as 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 either spray applied or injected with one shot into the annular space between carrier pipe and jacket. Insulation shall be rigid, 90% minimum closed cell polyurethane with a minimum 2.0 lbs per cubic foot density, compressive strength of 30 psi, and coefficient of thermal conductivity (K-Factor) of not higher than 0.16 @ 75°F per ASTM C-518. Maximum operating temperature shall not exceed 250°F. Insulation thickness shall be specified by calling out appropriate carrier pipe and jacket size combinations as listed on drawing FTSG 7.103.

**2.3 Jacketing material** shall be extruded, black, high density polyethylene (HDPE), having a wall thickness not less than 100 mils for jacket sizes less than or equal to 12", 125 mils for jacket sizes larger than 12" to 24", and 150 mils for jacket sizes greater than 24". 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 ingress of water at the jacket/ foam interface.

**2.4 Straight run joints** shall be field-insulated per the manufacturer's instructions, using polyurethane foam poured in an HDPE sleeve and sealed with heat shrink tape. (*At the Engineer's option*, a pressure testable joint closure may be specified.) All joint closures and insulation shall occur at straight sections of pipe. All insulation and jacketing materials shall be furnished by THERMACOR.

**2.5 Fittings** are Thermacor's SC (standard component) factory pre-fabricated and pre-insulated fittings with polyurethane foam to the thickness specified and jacketed with a one-piece seamless molded HDPE fitting cover, a butt fusion welded, or an extrusion welded and mitered HDPE jacket. Carrier pipe fittings shall be butt-welded, except sizes smaller than 2" shall be socket-welded. (*At the Engineer's option*, fittings can be pre-fabricated/ pre-engineered.) Fittings include expansion loops, elbows, tees, reducers, and anchors. Elbows, loops, offsets, or any other direction changes shall conform to the standards set by ASME B31.1, Code for Power Piping.

**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. External expansion compensation utilizing flexible expansion pads (minimum one inch thickness), extending on either side, both inside and outside the radius of the fittings are used with all fittings having expansion in excess of 3/4".

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### 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, system can be pre-fabricated/pre-engineered.*)

**3.2 Underground systems** shall be buried in a trench 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 placed over the top of the **pipe will meet H-20 highway loading.**

**3.3 Trench bottom** shall have a minimum of 6" of sand or specified backfill material as a cushion for the piping. All field cutting of the pipe shall be performed in accordance with the manufacturer's installation instructions.

**3.4 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.*

**3.5 Field Service**, if required, shall be provided by a certified manufacturer's representative or company field service technician. The technician will be available at the job a minimum of one day (or more if required by job size) to check unloading, storing, and handling of pipe, pipe installation, pressure testing, field joint insulation, and backfilling techniques.



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POLYURETHANE FOAM IN HDPE JACKET

7.28.16

**Carrier Pipe:**

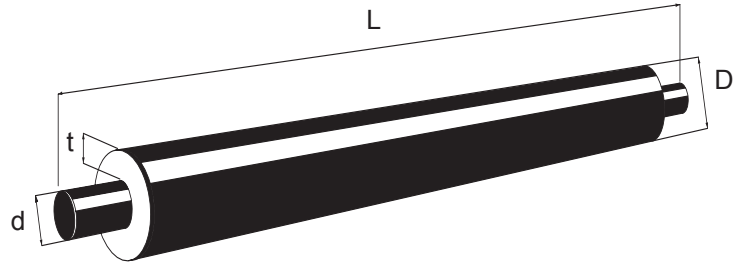
- d ≥ 2" - A53 ERW Grade B, Std. Wt. Black Steel
- d < 2" - A106 SML, Std. Wt. Black Steel
- Seamless and Schedule 80 pipe available for all sizes
- Std. Wt. is the same as Schedule 40 for all sizes thru 10"
- XS is the same as Schedule 80 for all sizes thru 8"

**Jacketing Material:**

High Density Polyethylene (HDPE)

**Insulation:**

Polyurethane Foam



Pipe Size	Jacket Size	Standard Length L	Insulation Thickness t	Weight Per Foot (lbs.)
1/2"	5.4"	20'	2.2"	1.9
3/4"	5.4"	20'	2.1"	2.2
1"	5.4"	20'	1.9"	3.2
1-1/4"	5.4"	20'	1.8"	3.8
1-1/2"	5.4"	20'	1.7"	4.2
2"	5.4"	40'	1.4"	5.1
2-1/2"	6.7"	40'	1.8"	7.7
3"	† 5.7"	40'	1.0"	9.1
	6.7"	40'	1.5"	9.5
	8.7"	40'	2.5"	10.1
4"	6.7"	40'	1.0"	12.5
	† 7.7"	40'	1.5"	13.0
	8.7"	40'	2.0"	13.5
5"	7.7"	40'	1.0"	16.7
	8.7"	40'	1.5"	17.1
6"	† 8.9"	40'	1.0"	21.5
	† 9.9"	40'	1.5"	22.0
	10.9"	40'	2.0"	22.4
8"	† 10.9"	40'	1.0"	31.5
	† 11.9"	40'	1.5"	32.2
	12.9"	40'	2.0"	32.9
10"	† 13.0"	40'	1.0"	44.3
	14.1"	40'	1.6"	46.3
12"	† 15.0"	40'	1.0"	55.4
	16.1"	40'	1.6"	56.2
14"	† 16.2"	40'	1.0"	60.8
	† 17.2"	40'	1.5"	61.9
	18.2"	40'	2.0"	63.0

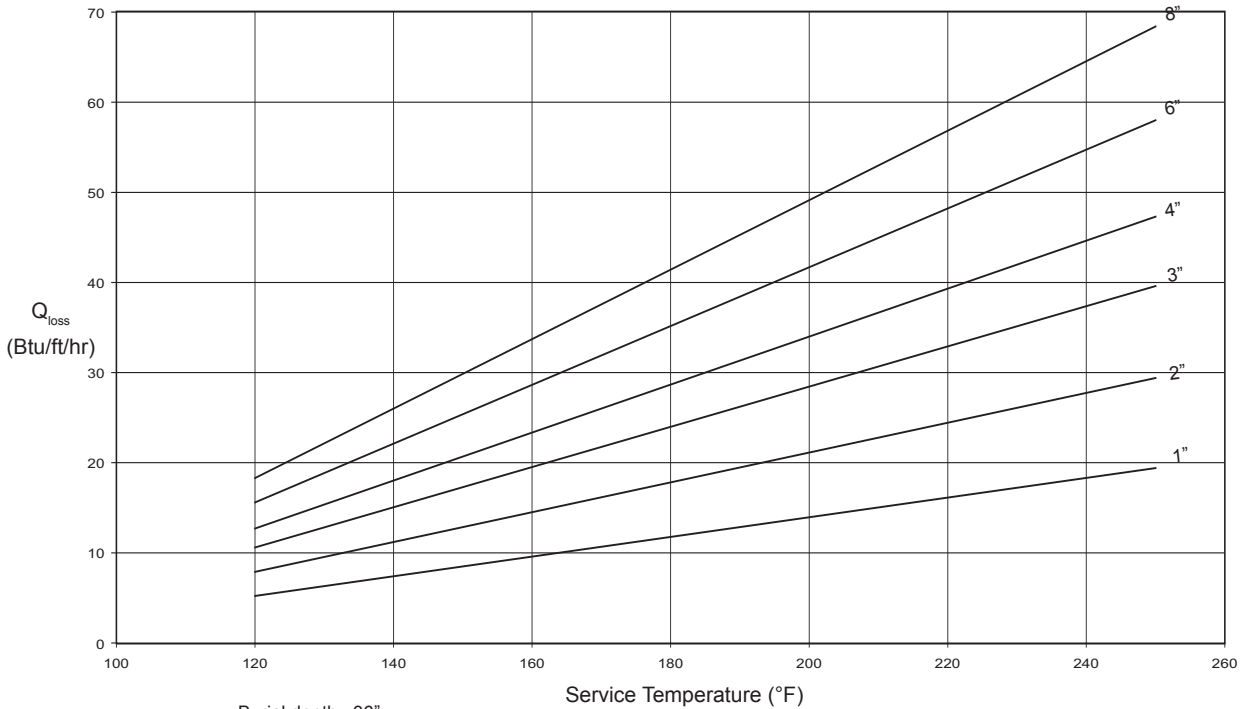
Pipe Size	Jacket Size	Standard Length L	Insulation Thickness t	Weight Per Foot (lbs.)
16"	† 18.3"	40'	1.0"	69.7
	† 19.3"	40'	1.5"	71.2
	20.3"	40'	2.0"	72.7
18"	† 20.3"	40'	1.0"	79.6
	† 21.3"	40'	1.5"	80.7
	22.3"	40'	2.0"	81.8
20"	† 22.4"	40'	1.0"	88.6
	† 23.4"	40'	1.5"	87.8
	24.4"	40'	2.0"	90.9
24"	† 26.3"	40'	1.0"	106.3
	† 27.3"	40'	1.5"	108.1
	28.3"	40'	2.0"	109.9
28"	† 30.3"	40'	1.0"	126.0
	† 31.3"	40'	1.5"	127.5
	32.3"	40'	2.0"	129.0
30"	† 32.3"	40'	1.0"	140.0
	† 33.3"	40'	1.5"	141.5
	36.6"	40'	3.2"	143.0

† Pipe/ Jacket combination available on sticks & kits only.

\* Other pipe sizes and pipe and jacket combinations are available.

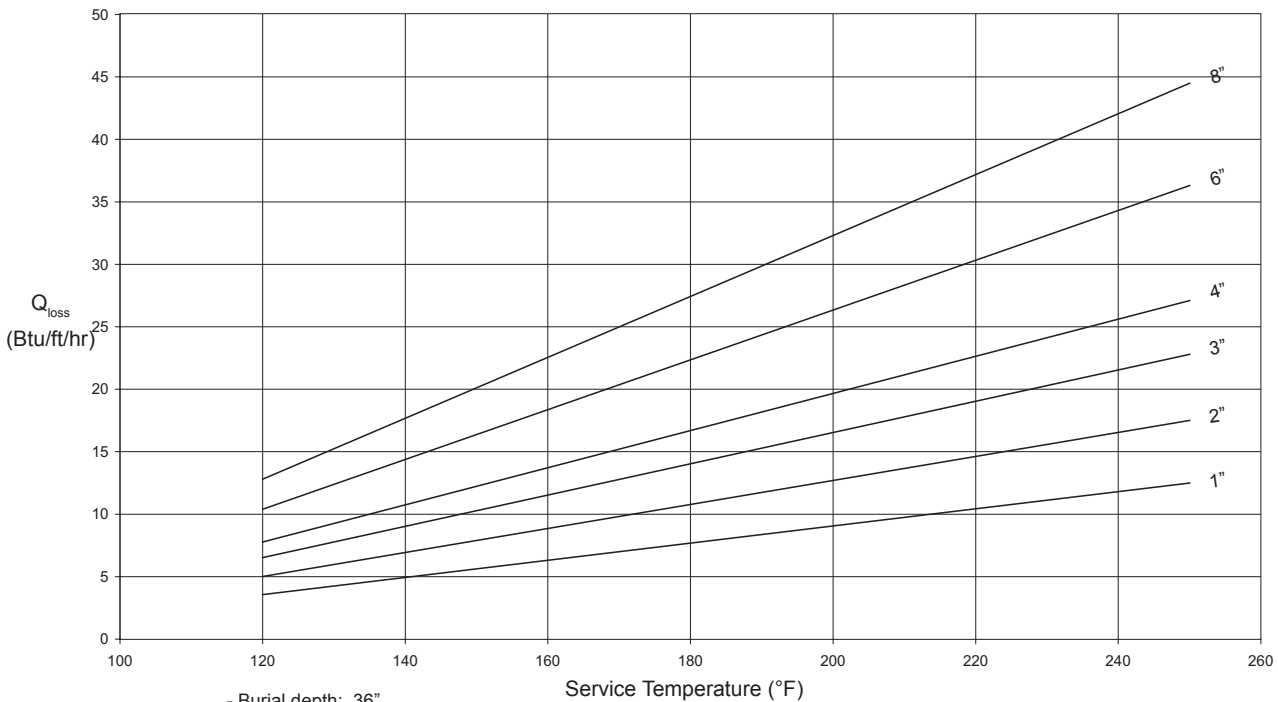
\*\* Insulation thickness is calculated using minimum wall thickness. Actual wall thickness may be greater than stated, thereby minimally decreasing actual foam thickness.

### HEAT LOSS FOR 1" OF POLYURETHANE FOAM\*



- Burial depth: 36"
- Soil conductivity: 12 (Btu/h.ft<sup>2</sup>.°F/ft)
- Soil temperature: 50°F

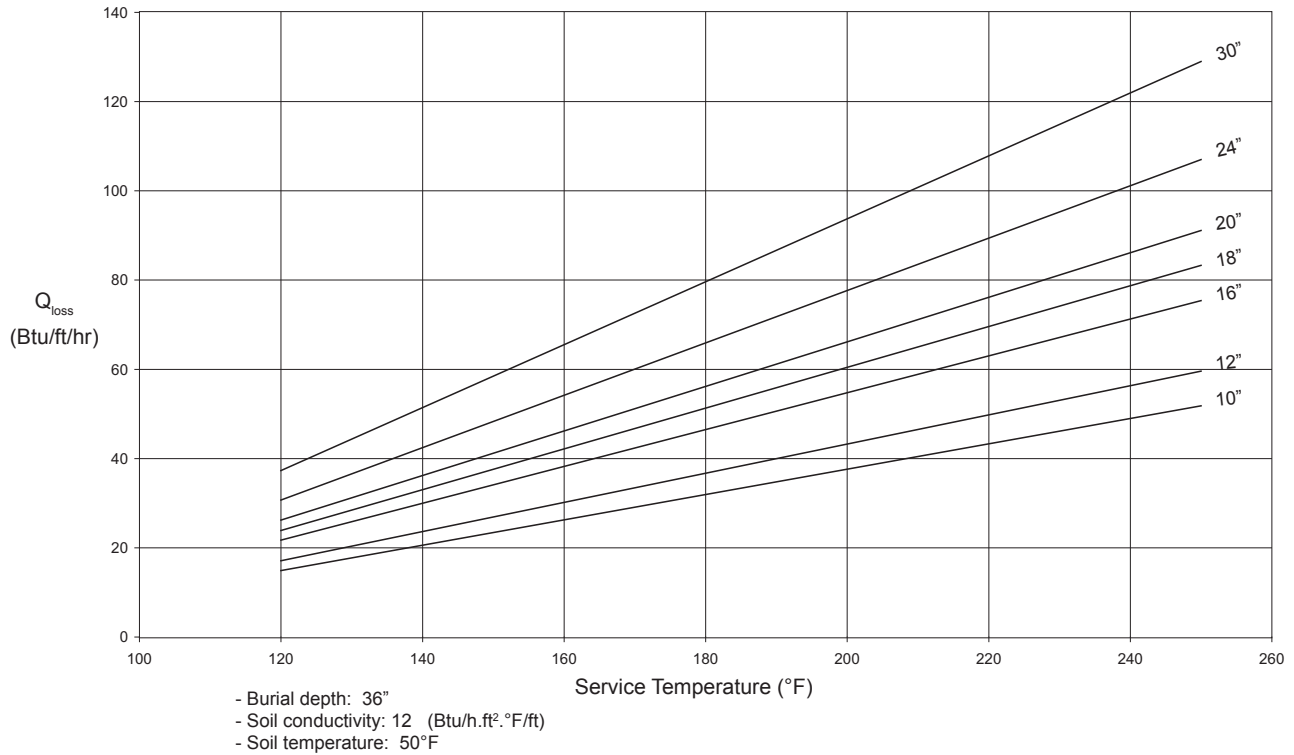
### HEAT LOSS FOR 2" OF POLYURETHANE FOAM\*



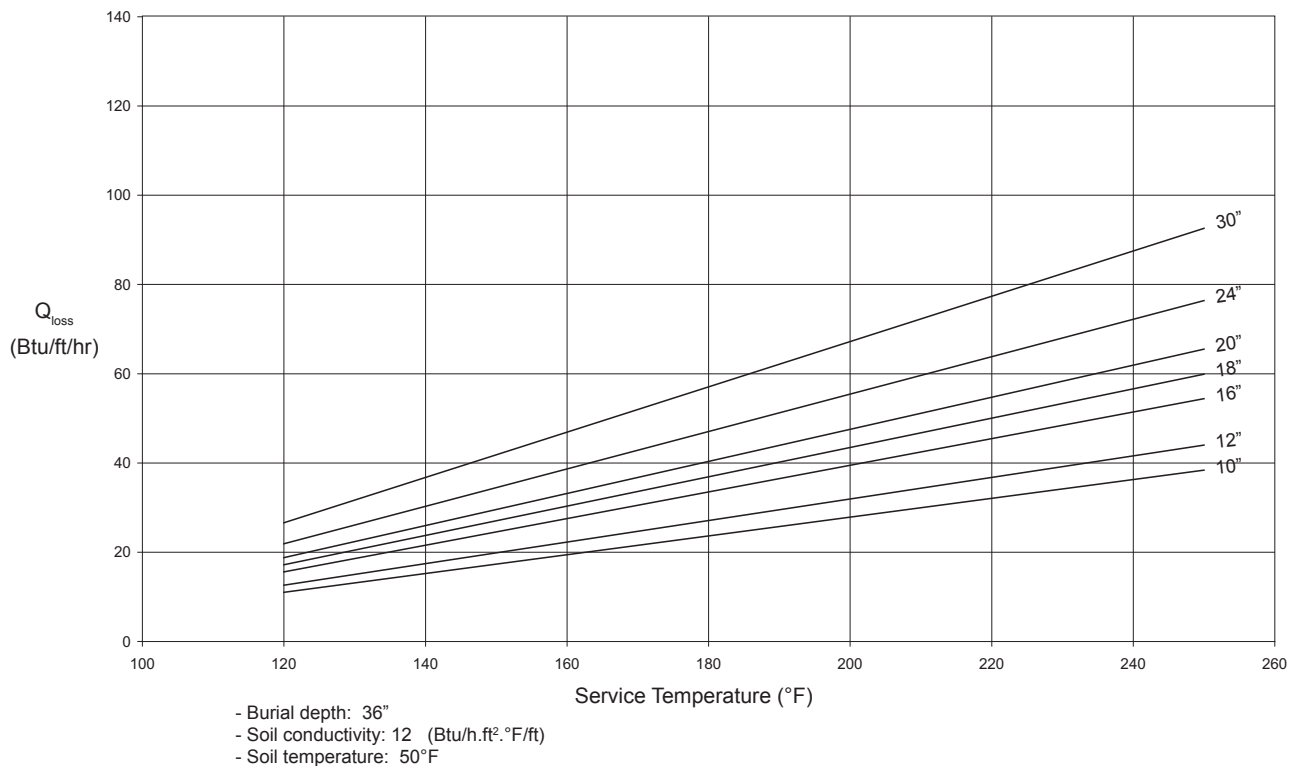
- Burial depth: 36"
- Soil conductivity: 12 (Btu/h.ft<sup>2</sup>.°F/ft)
- Soil temperature: 50°F

\* 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 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.