



HT-406

Specification Guide

HTSG
2.101

STANDARD SPECIFICATION

4.19.05

Preinsulated HDPE-Jacketed Steel Piping Systems suitable for Steam, Condensate Return and High Temperature Heating Water.

Part 1 - General

1.1 Preinsulated Piping - Furnish a complete HDPE jacketed system of factory preinsulated steel piping for the specified service. The jacket throughout the entire system shall incorporate electric fusion, butt fusion, or extrusion welding at all fittings, joint closures, or other points of connection. This shall create a jacket that is seamless throughout the entire system with the exception of anchors, whose water shed rings are sealed with a Raychem Dirax or Canusa GTS-65 wrap prohibiting the ingress of water. All preinsulated pipe, fittings, insulating materials, and technical support shall be provided by the Preinsulated Piping System manufacturer.

1.2 A complete layout of the system, showing anchors, expansion provisions, and building entrance details, shall be provided by the preinsulated pipe manufacturer. Means for expansion must be made in pipe off-sets or loops.

1.3 The system shall be **HT-406** as manufactured by **Thermacor Process, L.P.**, of Fort Worth, Texas, or prior approved equal.

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, Grade B, 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 polyisocyanurate/polyurethane foam insulation bonded to both the jacketing and carrier pipe and either spray applied or high pressure injected with one shot into the annular space between carrier pipe and jacket with a minimum thickness of 2.5" for systems operating below 366°F. Insulation shall be rigid, 85% closed cell foam insulation with not less than 2.4 pounds per cubic foot density, having a compressive strength of not less than 30 psi @ 75°F and a coefficient of thermal conductivity (K-Factor) not higher than 0.17 @ 75°F and 0.30 @ 366°F. Maximum operating temperature of the system shall not exceed 366°F.

2.3 Jacketing material shall be extruded, black, high density polyethylene (HDPE), having a minimum wall thickness of 150 mils for jacket sizes less than or equal to 12" and 200 mils for jacket sizes larger than 12". The jacket throughout the entire system shall incorporate electric fusion, butt fusion, or extrusion welding at all fittings, joint closures, or other points of connection. This shall create a jacket that is seamless throughout the entire system with the exception of anchors, whose water shed rings are sealed with a Raychem Dirax or Canusa GTS-65 wrap prohibiting the ingress of water.

2.4 Straight run joints are insulated using high temperature foam to the thickness specified and jacketed with a pressure testable joint closure, either an electro-fusion welded split sleeve HDPE joint closure, Canusa Supercase, or Raychem Rayjoint. The joint will be pressure tested at 5 psi for 5 minutes while simultaneously soap tested at the joint closure's seams for possible leaks. After passing the pressure test, the field joint is insulated and closure patches are welded (as per specified joint closure instructions) over the foaming holes. All joint closures and insulation shall occur at straight sections of pipe.

2.5 Terminations inside of manholes shall have a corrosion coated steel sleeve protecting the foam. This steel sleeve shall be fillet welded onto the carrier pipe and come up and extend back on the jacket a distance of 6". A high temperature shrink sleeve 4" wide shall be used to seal the steel sleeve to the HDPE jacket. The pipe shall penetrate the manhole a distance of 1' 3", the first 6" is exposed pipe, followed by the 6" steel sleeve, then the 2" overlap of the heat shrink sleeve, and finally 1" of bare jacket just before the inside of the manhole wall. Moisture barrier end seals shall be factory applied to any exposed foam at the end of a pipe length, including the foam that is also protected by the steel sleeve at manhole terminations. End seals shall be high temperature mastic completely sealing the exposed end of the insulation. End seals shall be certified as having passed a 20-foot head pressure test. If any field cutting of the pipe is required, field applied end seals shall be installed to the piping before continuing with the installation.

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2.6 Fittings are factory prefabricated and pre-insulated with polyisocyanurate 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. **NO TAPING OR HOT AIR WELDING SHALL BE ALLOWED.** All fitting jackets/covers shall be connected to the straight lengths of pipe by electro-fusion, butt fusion, or extrusion welding. Carrier pipe fittings shall be butt-welded, except for sizes smaller than 2", which shall be socket-welded. 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.

2.7 Expansion/contraction compensation will be accomplished utilizing factory prefabricated and pre-insulated expansion elbows, Z-bends, expansion loops and anchors specifically designed for the intended application. Flexible expansion pads shall be utilized for external expansion compensation on all fittings having expansion in excess of 1/2". Expansion pads shall be a minimum one inch thick and shall extend to cover both the inside and outside radius of the fittings. Anchors shall be 1/2" thick steel plates welded to the carrier pipe and shall incorporate a steel water shed ring, sized to allow the jacket to slide underneath, that shall be sealed to the HDPE jacket with a Raychem Dirax or Canusa GTS-65 wrap. Anchors are located per manufacturers recommendations.

2.8 The system shall be leak detection ready by means of manufacturing into the system a copper wire through each piece of pre-insulated pipe and fittings. The piping system manufacturer shall install the wire in a manner that has the wire embedded in the foam insulation and not touching the steel carrier pipe. The contractor shall connect the wire together at each field joint with a recommended crimping tool. After crimping the wire at a joint, the contractor shall check the joined pieces for continuity of the wire and electrical isolation from the carrier pipe by use of a standard volt ohmmeter. This check shall be repeated after each crimp, until the entire system is connected. After the piping system is installed, the owner at any time may check the system for a leak by using a standard analog volt ohmmeter. If a leak is detected (a leak is signaled by a drastic drop in the electrical resistance of the circuit) the owner should contact the system manufacturer for a TDR instrument to determine the location of the leak. (At owner's option, an ohmmeter panel may be purchased which will provide continuous leak detection monitoring.)

Part 3 - Execution

3.1 Pre-engineered systems shall be provided with all straight pipe and fittings factory pre-insulated and prefabricated to job dimensions.

3.2 Underground systems shall be buried in a trench not less than two (2) 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, pea gravel, 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 is required and will 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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POLYISOCYANURATE FOAM IN HDPE JACKET

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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:

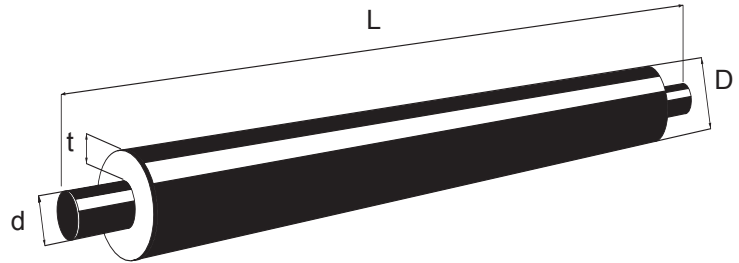
High Density Polyethylene (HDPE)

Insulation:

Polyisocyanurate Foam

Moisture Barrier:

Factory Applied Mastic



Pipe Size	Jacket Size	Standard Length L	Insulation Thickness t	External Diameter D	Minimum Jacket Thickness
1/2" IPS	6.7"	20'	2.77"	6.68"	.150"
	8.7"	20'	3.77"	8.68"	.150"
3/4" IPS	6.7"	20'	2.67"	6.68"	.150"
	8.7"	20'	3.67"	8.68"	.150"
1" IPS	6.7"	20'	2.53"	6.68"	.150"
	8.7"	20'	3.53"	8.68"	.150"
1 1/4" IPS	8.7"	20'	3.36"	8.68"	.150"
1 1/2" IPS	8.7"	20'	3.24"	8.68"	.150"
2" IPS	8.7"	40'	3.00"	8.68"	.150"
2 1/2" IPS	8.7"	40'	2.75"	8.68"	.150"
	10.9"	40'	3.84"	10.85"	.150"
3" IPS	10.9"	40'	3.53"	10.85"	.150"
4" IPS	10.9"	40'	3.03"	10.85"	.150"
5" IPS	10.9"	40'	2.49"	10.85"	.150"
	12.9"	40'	3.49"	12.85"	.150"
6" IPS	12.9"	40'	2.96"	12.85"	.150"
	14.1"	40'	3.55"	14.13"	.200"
8" IPS	14.1"	40'	2.55"	14.13"	.200"
	16.1"	40'	3.56"	16.14"	.200"
10" IPS	16.1"	40'	2.50"	16.14"	.200"
	18.2"	40'	3.54"	18.23"	.200"
12" IPS	18.2"	40'	2.54"	18.23"	.200"
	20.3"	40'	3.57"	20.28"	.200"
14" IPS	20.3"	40'	2.94"	20.28"	.200"
	22.3"	40'	3.93"	22.25"	.200"
16" IPS	22.3"	40'	2.93"	22.25"	.200"
	24.4"	40'	3.99"	24.38"	.200"
18" IPS	24.4"	40'	2.99"	24.38"	.200"
20" IPS	25.7"	40'	2.65"	25.7"	.200"
	28.3"	40'	3.93"	28.25"	.200"
24" IPS	30.6"	40'	3.10"	30.6"	.200"
30" IPS	36.6"	40'	3.10"	36.6"	.200"

* 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.



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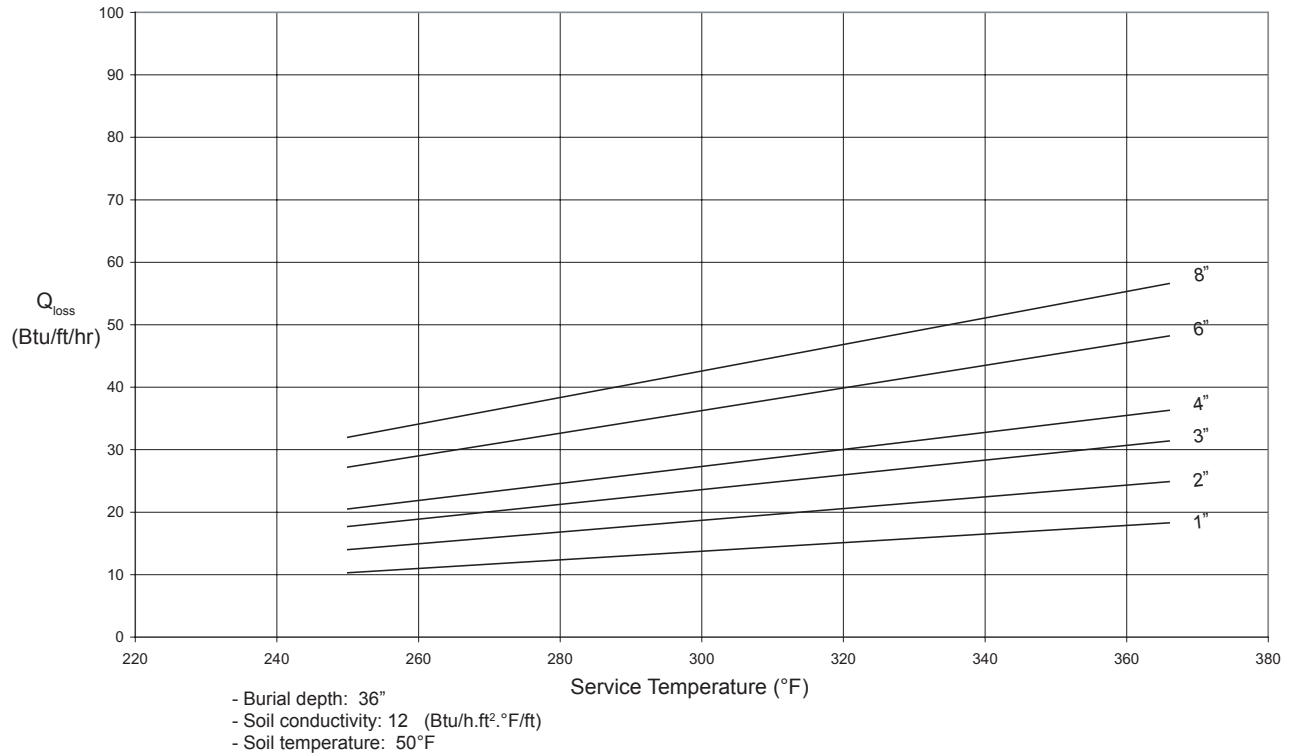
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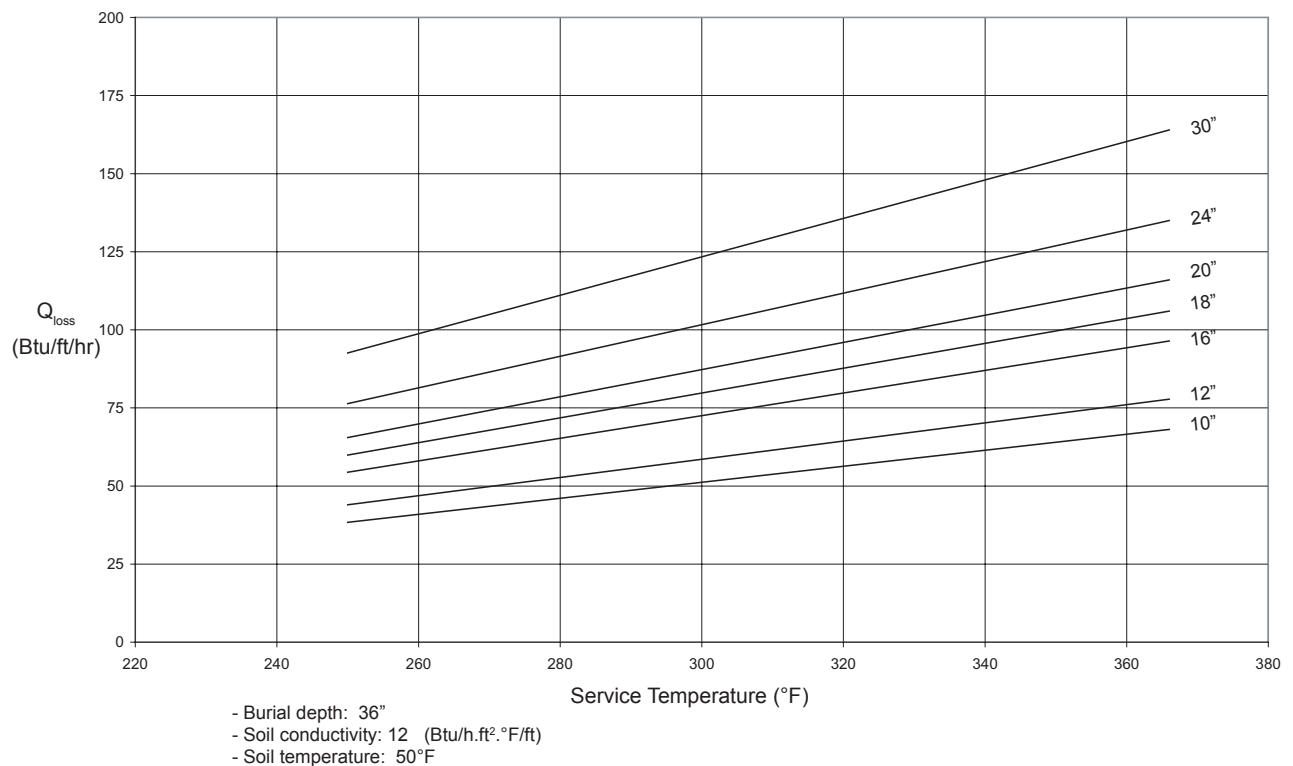
HEAT LOSS DIAGRAM (1" - 30" PIPE)

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HEAT LOSS FOR 3" OF POLYISOCYANURATE FOAM*



HEAT LOSS FOR 3" OF POLYISOCYANURATE 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.