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Typical Commercial Specification for Terre-Pex Pre-insulated PEX Carrier Piping For Radiant, Snowmelt, or Domestic Water Systems

A. Pre-insulated Transmission Mains

1. **Provide a complete hydronic system for transmission of the *(Designers note: select one of the following)* radiant/snowmelt/domestic water as shown on the plans and as specified. System shall be complete with all materials and controls from one single manufacturer source. Submittals must include manufacturer complete specification sheets for all components and accessories being supplied as part of the system for engineer's approval.**
2. **The installation shall be in strict accordance with all manufacturer's instructions in accordance with their warranty policy. All materials shall come complete with a manufacturer's standard 10-year warranty.**

B. PEX Carrier Tubing

1. **Carrier piping shall be Terre-Pex polyethylene (PEX-A) cross-linked piping with Oxygen Diffusion Barrier or engineer approved equal. All tubing shall be protected with a manufacturer applied oxygen diffusion barrier. Oxygen barrier shall perform in accordance with DIN Standard 4726 or better.**
2. **Tubing shall be DIN and ASTM approved and stamped with the appropriate code references. The PEX pipe shall have an operating temperature of 203F at an operating pressure of 87 psig.**
3. **Tubing shall be sized as indicated and scheduled on the plans, without restriction or reduction of cross-section within the insulated jacket.**

C. Internal Pipe Insulation

1. **Insulation of all carrier piping shall consist of a microcellular, cross-linked polyethylene foam in multi-layer arrangements. The insulation closed cell structure shall insure minimal water absorption at all times to preserve insulating effect against thermal loss.**
2. **Insulation shall have a thermal conductivity performance equal to DIN Standard 56212 or higher for underground thermal loss.**
3. **All material shall be CFC free and completely flexible to the radius required to meet the layout of the piping as shown on the plans.**

D. Corrugated HDPE Outer Jacket

1. **The exterior jacket shall be made of high-density polyethylene (HDPE) to protect the carrier pipe and insulating materials from external influences.**
2. **The jacket shall be cast with a corrugated pattern along its entire length. The corrugation pattern shall provide flexibility in the longitudinal direction and rigidity against radial forces.**

3. **The corrugation outer edges shall employ a closed cell construction to provide a double layer of protection from piercing of the outer jacket. Single wall exterior jackets shall be deemed not equal for the long-term protection of the Owner.**

E. <u>Installation – Handling, Trenching, and Backfill</u>

1. **Pipe should be stored and transported in such a way to avoid sharp objects, stones, or other damaging external influences. Pipe coils should not be dragged along the ground, but rolled or lifted into place.**
2. **All PEX carrier piping ends shall be protected with tape over the ends during the installation process. Tape shall not be removed until carrier tubing is connected to system piping.**
3. **Only nylon or textile straps should be used for fastening or hoisting. Chains should not be used under any circumstances.**
4. **All trenches up to 4 feet deep shall be vertical trenches with straight sidewalls. Excavation should be carried out in an approved manner, within the rules and regulations of all local and OSHA requirements.**
5. **A minimum laying temperature of 23F outdoors is recommended.**
6. **A minimum layer of 4" sand shall be placed and compacted along the entire bottom of the trench, or as specified in the site trench details.**
7. **Tubing can be laid out directly from coil by pulling on the carrier pipe. Pulling connections should never be made onto the outer jacket, but on the carrier pipe end.**
8. **An adequate excess of material for connection should be left and secured at the beginning of the trench as the remaining coil is rolled out into place.**
9. **As the tubing is uncoiled, sand shall be placed on to the outer jacket every 10 feet or as required to keep the tubing in place.**
10. **Once the tubing has been installed and pressure tested in the trench as needed, backfill can be made over the entire tubing length. Backfill in direct contact with the tubing outer jacket shall be layered sand in 8" depth without rocks or sharp objects. Sand shall be compacted by hand only. Care should be taken to remove any stone or sharp objects from backfill to avoid damaging the outer jacket layer. When backfill has been brought to a minimum of 20" above tubing outer jacket, a vibrating tamper may be used to compact the remainder of the soil.**

F. <u>Connections and Underground Protection</u>

1. **All connections from the carrier pipe as sized to equipment and internal connections shall be a cast bronze clamp-on style connection to convert to a male NPT threaded end similar to a Jentro connector. The connectors shall have a clap on type closure around the entire perimeter of the carrier tubing. Compression ring type connectors will not be considered equal.**
2. **All underground joints will be composed of the appropriate number for PEX x NPT adapters and the required fitting (tee, coupling, etc.). Manufacturer shall provide preformed plastic insulation casings to be clamped over the pipe connections after assembly and pressure testing. Casing shall completely encased connections and all edges of connecting outer jacket HDPE corrugations for a watertight fit. Casings shall be supplied complete with internal dry insulation and watertight sealant for edges of casing.**
3. **Where a set of supply and return or hot and cold water lines are being taken off a set of parallel mains, an inspection chamber with removable top cover shall be provided with re-enterable top inspection port. All outer jackets of entering pipe shall be secured to inspection chamber with water tight fit.**

4. **Manufacturer shall supply the appropriate number of dry or shrink-wrap end sleeves as required by the project. Contractor shall install end caps after installation of the tubing but before installation of end connectors.**
5. **If the exterior HDPE jacket is damaged in any way during the installation process, contractor shall install heat-shrinkable heat tape from the system manufacturer to seal outer jacket. Tape shall be wrapped completely around the exterior jacket with an overlap of at least 3" from each side of the damaged portion. Tape shall be heated with a heat gun or low heat torch to conform to the corrugations of the exterior jacket.**

G. <u>Hydrostatic Pressure Testing</u>

1. **Pressure testing shall be required for any run of piping that has underground piping connections.**
2. **Any runs that do not contain any connections can be back filled directly after laying the pipe in the trench without further testing.**
3. **After installation of pre-insulated tubing and before backfilling of the trench, all Terre-Pex piping required shall be pressure tested to a minimum of 60 psig for a 24-hour period. Contractor shall notify factory and general contractor representatives for verification both before and after testing period.**
4. **All piping shall be bled of air pockets and minimum 4 inch test gauges shall be installed temporarily for testing. If test pressure drops more than 2 psig over the 24 hour period, system shall be re-checked and re-tested. Any tubing showing signs of damage at the jobsite before pour shall be replaced without any concealed joints whatsoever.**

H. <u>Building Penetrations, Attachments, Sleeves</u>

1. **All penetrations below grade into and out of building sections shall be installed in a manner that protects the exterior jacket of piping and provides a watertight seal to prevent any water entering building.**
2. **For all sub-grade penetrations, an appropriate size plastic or metal sleeve shall be set into the wall or core drilled to guide and protect the piping entry.**
3. **Wall sleeves shall be sized and planned to allow the installation of a mechanical link seal type filler between sleeve interior and exterior HDPE casing of Terre-Pex piping. Link type seal device shall be field supplied.**
4. **Where piping system penetrates building walls, a fixed-point bracket shall be installed to secure piping and allow minor expansion and contraction of the PEX carrier tube. A bracket shall be used to secure the line attaching to the carrier tubing after the point of conversion to hard piping. Do not clamp onto the PEX carrier tubing at any point.**
5. **Where exterior jacket and insulation end inside, a heat shrinkable cap shall be provided by the manufacturer to prevent water or other liquids from entering the insulation space. Installers shall use a heat gun or low heat torch to completely surround exterior jacket and interior PEX carrier piping after all connections are made and pressure tested.**
6. **For entry above grade, a non-watertight entry may be made. A heat-shrinkable sleeve shall be installed over exterior of HDPE exterior jacket for protection. Sleeve shall be placed on jacket so that sleeve is inside wall penetration when in the final installed position. Any air gaps or spaces shall be filled with foam type insulation to complete penetration.**