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***Piping Systems, Inc*.**

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**Part 1 – General**

**1.01 Insul-8® Below Ground – FRP x Foam x HDPE**

**1.02 This system** shall be **Below Ground** **FRP x HDPE with Polyisocyanurate Foam Piping System** for Underground Condensate, Chilled Water, Process Piping and Hot Water Applications (300 max)as manufactured by **Rovanco Piping Systems** of Joliet, Illinois.

**Part 2 - Products**

**2.01 Carrier Pipe:** Shall be Green Thread HP 16 bar filament wound fiberglass reinforced epoxy, bell and spigot, designed to withstand 230˚F. ID of pipe shall contain a resin-rich liner. All 1” through 42” pipe to be in 20’-0” random lengths. Pipe to be in conformance with ASTM D-2996.

Red Thread HP 16 pipe filament wound fiberglass reinforced epoxy, bell and spigot, designed   
to withstand 210ºF. ID of pipe to be 20' random lengths. Pipe to be in conformance with ASTM   
D-2996.

\*Bondstrand 3000A also available.

**2.02 Carrier Pipe Insulation:** Carrier pipe insulation shall be a polyisocyanurate high temp foam injected with one shot into the annular space between carrier pipe and jacket. Insulation shall be rigid, >90% closed cell polyisocyanurate with a minimum 2.0 lbs per foot3 density, compressive strength of 30 psi @ 75˚F, a thermal conductivity K factor no higher than 0.14 @ 75˚F per ASTM C-518 and an E84 25/50 passive fire resistance rating. Maximum continuous operating temperature of polyisocyanurate foam shall not exceed 300˚F, except for intermittent spikes of 350˚F. Minimum insulation thickness shall be in accordance with Table 1.

Table 1:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nominal Pipe Size in Inches | Carrier Wall Thickness in Inches | Jacket Size  in Inches | Minimum Insulation Thickness in Inches | Jacket Thickness in Mills |
| 2 | .140 | 6.63 | 1.81 | 200 |
| 3 | .140 | 6.63 | 1.25 | 200 |
| 4 | .180 | 8.00 | 1.75 | 200 |
| 6 | .180 | 10.00 | 1.68 | 200 |
| 8 | .200 | 12.43 | 1.68 | 175 |
| 10 | .200 | 14.06 | 1.64 | 175 |
| 12 | .200 | 15.87 | 1.46 | 175 |
| 14 | .200 | 17.83 | 2.00 | 200 |
| 16 | .206 | 19.80 | 2.00 | 200 |

\*Larger sizes are available upon request.

**2.03 Jacketing Material:** High impact, seamless Polyvinylchloride (PVC) Class 12454-B compound conforming to ASTM 1784, Type 1, Grade 1 through 16” diameter. No FRP jacketing will be allowed. Minimum jacket thickness shall be in accordance with Table 1.

**2.04 End Seals:** Each length of pre-insulated pipe will be fitted with a watertight mastic end seal at jacket and pipe surfaces. All field cuts will be sealed with a field applied end seal. For non-insulated joints, the end seals shall have a letter of certification from an independent Testing Laboratory that they have been tested and proved watertight under the following test criteria:

Casing and End Seal Testing Certification: Test and certification procedures shall demonstrate that casing, factory and field applied end seal are capable of resisting penetration of water into the casing and insulation at 20 feet of head pressure, measured above the highest point of the test sample, subjected over the entire surface of an 8-foot casing test sample for not less than 48 hours.

**2.05 Anchors:** FRP pipe should be joined to steel systems with flanges. All steel systems should be anchored within five feet of connection point to eliminate any thrust, stress or torque from the steel pipe being transferred to the FRP. Steel flanges should be 150# flat faced.

**2.06 Thrust Blocks:** All changes of direction will be poured in concrete thrust blocks to provide anchor points and to direct expansion and contraction.

**2.07 Manufacturer’s Assistance:** Rovanco will provide a field service man on-site to properly train the installing personnel in all phases of installation (if required).

**2.08 Approved Vendors:** With certified tested end seals by Rovanco, Joliet, Illinois. Any alternate supplier must be ISO Certified and submit their technical data to the engineer ten days prior to bid date to be approved in writing as an equal.