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***Piping Systems, Inc*.**

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**Part 1 – General**

**1.01** **Insul-800 Elite Stainless High Temp Conduit**

**1.02** **This system** shall be **Insul-800 Elite Stainless High Temp Conduit** for **High Temp Steam, High Temp Hot Water, Condensate**, etc... as manufactured by **Rovanco Piping Systems** of Joliet, Illinois.

**Part 2 - Products**

* 1. **Carrier Pipe:** All carrier pipe shall be Sch 10 or Sch 40 316L Welded Stainless Steel. Other

carrier pipe materials available.

* 1. **Carrier Pipe Insulation:** Shall be Pyrogel® XT-e as manufactured by Aspen Aerogel.

Pyrogel® XT-e is a high temp insulation blanket of silica Aerogel and reinforced with a non-woven, glass-fiber batting. Sectional insulation shall be banded on pipe with aluminum banding on 18” center. Insulation thickness shall be as specified.

* 1. **Inner Pipe Supports:** All pipe shall be aligned and supported within the inner conduit

casing with galvanized steel supports spaced on 10’ centers. The carrier pipe shall bear directly on the steel support. The support shall be designed as to permit drainage and free air passage. All pipe passing through supports shall be insulated. Concrete type pipe supports will not be allowed.

* 1. **Inner Conduit Casing:** Casing shall be Sch 10 stainless 304 welded steel, or as specified.

The interior surface shall be smooth to permit free moisture drainage and removability of the inner assembly. The outer casing shall be sized to provide adequate annular space between the outer surface of the insulation material and the interior surface of the casing. Inner conduit casing field joint closures shall consist of stainless steel and shall be field welded over adjacent units. Factory applied inner conduit coating is optional and is based on specifications. No asphalt, coal tar coating, FRP casing or any other type is allowed.

* 1. **Inner Conduit Casing Insulation:** Insulation thickness shall be 1.75” nominal.

Shall be Hi-Temp polyisocyanurate foam insulation has a K factor of .145, density of 2.5, closed cell content of 87%, compressive strength of 30 psi, and continuous service temperature of 400°F. Insulation must be capable of handling intermittent temperature spikes to 450°F. Conformance with ASTM Standard D1621, 1622, 1623, 2126, 2842, 2856, and C518-91. Completely filling the annular space between the carrier pipe and jacketing. Provide written performance certification with submittals.

**2.06 Outer Jacket:** The exterior protective jacket shall be heavyweight, seamless, high impact, polyethylene conforming to ASTM D3350. Spray and wrapped polyethylene jackets are not considered to be seamless and not allowed. Field joints shall be insulated with specified insulation type on carrier and half shells of high temp polyisocyanurate foam for outer insulation. No FRP jacket allowed.

**2.07 RhinoJoints:** After welding and testing, all joints on outer polyethylene joint shall be certified EN 489, RhinoJoint by Rovanco or equal. Certification required during submittal. Joints must be air tested in a way that the polyethylene is not drilled into. Air test from the side of joint is recommended. Contractor to log each joint and present to owner at time of final test.

**2.08** **Expansion Loops & Els:** Expansion loops, expansion elbows and other fittings shall be pre-fabricated and furnished in the same types and thickness of insulation and casing as those for the straight section of the piping system. They will be of a size to permit the inner pipe or pipes to expand and contract without damage to the insulation material.

**2.09 Fittings:** All changes in direction of the carrier pipe shall be made with fittings. Mitering of pipe will not be permitted. When tee branches are smaller to the main they join, weld-o-lets may be used. All weld fittings shall be the same wall thickness as adjacent piping.

**2.10 Anchors:** Anchors shall be pre-fabricated onto the piping units and shall be equipped
with drain and vent openings at the top and bottom of the anchor plate. Anchor plates shall be made of minimum ½” stainless steel plate and coated with Amerlock® epoxy.

**2.11 End Seal and Gland Seals:** Terminal ends of conduit inside manholes, pits or buildings shall be equipped with end seals consisting of a stainless-steel bulkhead plate welded to the conduit and carrier pipe if there is an anchor within five feet of the end seal. Where there is no anchor within five feet of a terminal end, conduits shall be equipped with gland seals consisting of a high temp gasket and follower plate. End seals or gland seals shall be made of ½” stainless steel plate and factory coated with Amerlock® epoxy with drain and vent openings on the vertical center line of the mounting plate.

**2.12 Corrosion Protection Overlay:** All anchors, end seals, and gland seals will be protected by Amerlock® epoxy coating. All other coatings and paint not allowed.

**2.13 Field Tests:** The carrier pipe shall be field tested hydrostatically to 1-1/2 times the working pressure of the line or as specified. The stainless-steel inner conduit casing shall be tested with air at 15 psig. All leaks shall be repaired and the test repeated. After test, all field joints shall be air testable RhinoJoints that are sealed water tight.

**2.14 Back Fill:** Clean, granular backfill should be tamped in place so as to assure a stable surface. No rock should be used within 24” of the pipe. Top of pipe grade shall not be less than 24” to meet H-20 Highway loading.

**2.15 Installation:** The installation shall be made in accordance with plans, specifications, and manufacturer’s installation instructions. Pipe system supplier will provide an installation instructor on site to train the contractor on all phases of installation, if required.

**2.16 Leak Detection (optional):** Leak detection wires will be utilized in the foam. Leak detection box must have built-in TDR and can detect leaks in <3.

**2.17 Approved Vendors:** Insul-800 Elite Stainless High Temp Conduit manufactured by Rovanco, Joliet, Illinois, 815-741-6700, or approved, ISO Certified, equal. Any alternative supplier wishing to be approved as an equal must submit their technical data, including HDPE outer jacket and polyisocyanurate insulation material test reports, and must have a 10-year warranty.

These reports must be certified by an independent Testing Agency that the high temperature polyisocyanurate insulation and the polyethylene jacketing material have been tested to and meet all ASTM standards listed in the “inner conduit insulation” and “outer jacket” section of the specifications. These reports must be submitted to the engineer ten days prior to bid date for an alternate supplier’s product to be approved in writing as an equal to the specified products.