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***Piping Systems, Inc*.**

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**Part 1 – General**

**1.01 Rhinocoat Double Wall Containment Piping System with Leak Detection**

**1.02 Basis of design** shall be **RhinocoatTM Below Ground Double Wall Containment Piping** as manufactured by **Rovanco Piping Systems** of Joliet, Illinois.

**Part 2 - Products**

**2.01 Carrier Pipe:** A53B Black Steel pipe, Seamless or ERW, in pre-cut lengths. Pipe 10” and smaller shall be Schedule 40. Pipe 12” and larger shall be .375” wall (Schedule 80).

Other piping materials also available.

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

centering supports spaced on approximately 10’0”. The inner pipe shall bear directly on the support. The support shall be designed as to permit drainage and free air passage. Concrete type pipe supports will not be allowed. Supports will be manufactured in such a way that 1” EMT tube will be able to go through for leak detection pull rope capabilities.

**2.03 Outer Containment:** Outer casing shall be black steel. Casing up through 24” shall be 10 gauge. Casing 26” and larger shall be 6 gauge.

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 an adequate annular space between the outer surface of the insulation material and the interior surface of the casing.

The exterior surface will be coated with a two coat Fusion Bonded Epoxy system. The first coat will be green finish coat with a melting point of 500˚F. No glasswrap or filler materials shall be used in the epoxy. All exterior conduit surfaces shall be shot-blasted prior to the coating being applied. The Fusion Bonded Epoxy shall conform to these ASTM Standards:

ASTM D1763 Disclosure of properties of the epoxy

Sub-components

 ASTM G17 Penetration test

 ASTM D1044 Abrasion resistance

 ASTM D2370 Tensile strength

 ASTM G14 Impact tests

 ASTM G8 Salt crock

 ASTM D968 Abrasion tests

 ASTM D1002 Sheer strength and adhesion

ASTM D659 Compressive strength

 ASTM D257 Volume resistivity

 ASTM D1000 Electric strength

 ASTM G53 Weathering

 ASTM B117 Salt fog

No asphalt, coal tar coating, FRP casing or any other type will be allowed.

The second layer will be compatible Fusion Bonded Epoxy coating that will provide mechanical protection to the first layer. It should be a darker color than the first layer and be a color other than green. The second layer of Fusion Bonded Epoxy will be applied no later than 5 seconds after the first layer has been applied so that it securely bonds to the first layer as both layers cure. The second layer must have an impact resistance of at least 160 lbs. per square inch as per ASTM G14-72. The Fusion Bonded Epoxy coating will be applied in a total thickness of no less than 20 mils. 2 layers required. The coating system will be equal to Rovanco Piping Systems’ Rhinocoat™.

Outer conduit casing closures shall consist of 10 gauge steel suitably rustproofed and in cylindrical form with a single horizontal split and shall be field welded over adjacent units.

After tests all exposed closures shall be covered in the field with a two part epoxy and left to dry and then polyethylene heat shrink material with minimum thickness of 60 mils.

**For above ground outside applications**, the steel casing, fitting covers and closure joints can be hot dipped galvanized or Red Mil coated.

**2.04 Weld Fittings:** All changes in direction shall be made with bent or weld fittings. Where tee branches are smaller that the mains they join, weld-o-lets may be used. All weld fittings shall be long radius and shall be the same wall thickness as adjacent piping.

**2.05 Leak Detection:** Double wall piping manufacture to supply and design all leak detection components. 10XTV 208V non-regulating cable with capability of 400’ per circuit and D1 controls approved NEMA 79. Continuous leak detection cable. Electrical Schematic required at submittal. Pull Ports will be factored in the design if needed.

**2.06 End Seal:** Terminal ends inside manholes, pits, or building walls shall be equipped with end seals consisting of a steel bulkhead plate welded to the pipe conduit.

End seals shall be made of ½” steel plate with drain or vent openings located diametrically opposite on the vertical center line of the mounting plate and shall be shipped to the job site with plugs in place. Terminate all conduits 2 inches beyond the inside face of building walls to protect any exposed piping insulation from damp wall condensation.

**2.07 Field Tests:** The inner pipes of this system shall be tested hydrostatically to 1-1/2 times the working pressure of the line. If a leak is found, it shall be repaired and the test repeated. The outer casing shall be tested with air at 15psig and a soap solution shall be applied to the field joints to locate leaks. If leaks occur, they shall be repaired and the test repeated. After approved by test, all field joints shall be coated by the contractor. Before backfilling, the contractor shall test the conduit coating with an electric holiday detector. Any breaks in the coating system will be repaired and the test repeated by the contractor.

**2.08 Back Fill:** Should be tamped compactly in place so as to assure a stable surface. No rock should be used in first foot of backfill. 24 inches, from top of pipe to grade, of compacted fill shall meet H-20 Highway Loading.

**2.09 Installation:** The installation shall be made in accordance with plans and specifications, and manufacturer’s installation instructions. Piping system manufacturer will provide a field service instructor on site to train the contractor on all phases of installation, if required.

**2.10 Approved Vendors:** Rhinocoat Containment System with leak detection by Rovanco, Joliet, Illinois, or approved equal. Engineering Submittals will be required as well as design assist of project. Any alternate supplier must submit their technical data to the engineer 10 days prior to bid date to be approved in writing as equal.