P.O. Box 361
2 Technology Blvd.
Canastota, NY 13032
Ofc. (315) 697-8787
Fax (315) 697-8788

PART 1 – GENERAL

1.01 DESCRIPTION

A. Provide a direct-buried piping system, **Tricon Steel-Con Plus**, (Basis of Design) as manufactured by **Tricon Piping Systems, Inc**. The design shall include a carbon steel carrier pipe with calcium silicate insulation supported inside a carbon steel conduit. The conduit shall be covered with polyurethane foam insulation and a high-density polyethylene (HDPE) outer jacket**.**

B. The system shall be provided as specified below and where shown on the plans.

C. The system shall have the steam and condensate within a single conduit.

D. The system shall be factory fabricated, including all fittings, end seals, anchor plates and expansion loops to the greatest extent possible to minimize field fit up and assembly.

E. Systems fabricated either on site or off site by the installing contractor shall not be acceptable.

F. The design conditions for the Steam system are [pressure] psig and [temperature]°F.

G. The design conditions for the Condensate system are [pressure] psig and [temperature]°F.

H. The system shall be furnished with sufficient flexibility to avoid large stresses from thermal growth in accordance with ASME B31.1 latest addition. Cold springing of the direct-buried pipe will not be allowed for any reason.

1.02 APPLICABLE CODES

A. All work performed and material supplied under this Section shall be in accordance with the latest addenda thereto of the applicable codes, standards, specifications, regulations, procedures, and tests cited herein.

B. All items shall be in accordance with the latest edition and revisions of the following Codes and Standards where applicable.

1. American Society of Mechanical Engineers (ASME).
2. American Society for Testing and Materials (ASTM).
3. American National Standards Institute (ANSI).

C. If there is any overlapping of, or conflict between, the requirements of these codes and this specification, then the requirement which is most stringent shall take precedence.

1.03 SUBMITTALS

A. The prefabricated system manufacturer shall provide a detailed layout showing the size, type and location of each component to be used in the system.

1.04 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code IX.

1. Comply with provisions in ASME B31.1, “Power Piping.”
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

B. ASME Compliance: Comply with ASME B31.1, “Power Piping,” for materials, products, and installation.

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C. ASME Compliance: Safety valves and pressure vessels shall bear appropriate ASME labels.

1.05 **DELIVERY, STORAGE AND HANDLING**

A. The installing contractor shall handle and store the piping system in accordance with the instructions supplied by the prefabricated system manufacturer, and exercise due care to prevent any damage to the piping system.

B. The piping system shall be supplied with temporary stays welded to the service pipe and conduit to prevent damage or misalignment prior to installation.

C. The piping system shall be supplied with end caps covering each pipe end to prevent the ingress of dirt, moisture, rodents and other contaminants.

PART 2 – PRODUCTS

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2.01 **MANUFACTURERS**

A. Tricon Piping Systems, Inc.

2.02 **MATERIALS**

A. **Service Pipe**

1. All pipe and fittings shall be fabricated in accordance with ASTM A53, Grade B, Type E (electric-resistance welded) or ASTM A106, Grade B, Type S (seamless).
2. Steam piping shall be Schedule 40 [or Standard Weight] carbon steel.
3. Condensate piping shall be Schedule 80 [or Extra Heavy] carbon steel. [ASTM A-312, A316L Sch. 10 welded – Sch. 40 when crossing University or City owned streets]
4. [Pipe sizes 2 ½" and larger shall be beveled for butt welding] [Pipe sizes 2" and below shall be square cut for socket welding].
5. The service pipe fittings shall be ASTM [A234 WPB butt weld in accordance with ASME/ANSI B16.9 for sizes 2 ½" and larger] [A105 Class 3000 forged steel socket weld in accordance with ASME/ANSI B16.11 for sizes 2" and smaller]. [All fittings shall be A403 and compatible with the stainless steel carrier pipe. All flanges shall be A316L stainless steel 150 psi.]

B. **Carrier Pipe Insulation**

1. All carrier pipes shall be insulated with [mineral wool] [Pyrogel XT] insulation in accordance with ASTM C-547
2. The minimum insulation thickness shall be provided as listed below.
   a. [High Pressure Steam] [2-1/2" thickness / 1.18" or 30mm]
   b. [Condensate] [1" thickness / 0.59' or 15mm

C. **Conduit**

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1. The carbon steel conduit shall conform to ASTM A-139 or ASTM A-135 and have the wall thickness as listed below.
   a. 6 inch to 26 inch – 10 Gauge
   b. 28 inch to 36 inch – 6 Gauge
   c. 38 inch to 42 inch – 4 Gauge
2. All field joints shall be fabricated with steel sleeves compatible for the conduit.
3. Each terminal point shall be provided with a drain and vent connections for the interstitial space between the conduit and carrier pipe insulation.

D. **Internal Pipe Supports**

1. Pipe supports shall be corrugated galvanized steel and shall be designed and factory installed by the prefabricated system manufacturer.
2. Pipe support spacing shall be determined by the prefabricated system manufacturer based on pipe size and material, and shall be located no more than 10 feet on center.
3. Pipe supports will allow for continuous air flow and drainage of the conduit.

E. **Conduit Insulation**

1. The outer conduit insulation shall be factory applied polyurethane foam with the following properties:
   a. A minimum insulation thickness of 1 inch.
   b. A minimum density of 2.0 lb/ft^3 in accordance with ASTM D-1622.
   c. 90-95% closed cell in accordance with ASTM D-2856.
   d. A “K Factor” of 0.16 $Btu\text{-}in/hr\text{-}ft^2\text{-}°F$ in accordance with ASTM C-591

F. **Outer Jacket**

1. The outer jacket shall be seamless, extruded High Density Polyethylene (HDPE) with a minimum cell classification of PE334360C when classified in accordance with ASTM D3350-21 and with the general requirements as listed below.
   a. Resin Type III, Grade P34 in accordance with ASTM D-3350-12.
   b. Minimum Elongation of 200% in accordance with ASTM D-638.
   c. Tensile Yield Strength of 2500 psi in accordance with ASTM D-638.

2. The outer jacket shall have the minimum wall thickness as listed below
   a. 175 mils for jacket sizes less than or equal to 18 inch.
   b. 200 mils for jacket sizes from 18 to 30 inch.
   c. 300 mils for jacket sizes equal to or larger than 30 inch.

3. PVC or FRP jacketing will not be allowed.

G. **Fittings**

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1. All fittings shall be factory manufactured where shown on the plans and shall follow the same standards as the straight lengths of piping.
2. The service pipe fittings shall be ASTM A234 WPB butt weld in accordance with ASME/ANSI B16.9 for sizes 2 ½" and larger.
3. The HDPE jacket shall be mitered and joints shall be extrusion welded. Tapes, adhesives, and PVC covers will not be allowed.
   Field-fabricated fittings will not be allowed

H. **Expansion Loops and Elbows**

1. Expansion loops and elbows shall be sized and contain specialized supports to permit thermal movement of the service pipe without damage to the insulation.
2. Expansion loops and elbows shall be designed in accordance with stress limits indicated by ASME B31.1, "Power Piping."

I. **Miscellaneous Accessories**

1. General
   a. All miscellaneous accessories shall be designed and factory fabricated to prevent the ingress of moisture into the piping system.

2. **Anchors**
   a. Anchors shall be fabricated with ½ inch thick steel plate. Plates shall extend a minimum of 3 inches in the horizontal direction and 1½ inches in the vertical direction beyond the outer HDPE jacket.
   b. Anchor plates shall have vent and drain holes for free air passage and conduit drainage.
   c. Exposed steel on the anchor plate shall be coated with cold galvanizing compound.

3. **End seals**
   a. End seals shall be provided at every end termination. End seals shall be provided with threaded connections for drains and vents to allow air passage and conduit drainage.
   b. Gland seals may be provided to permit the axial movement of the carrier pipe.
   c. Exposed steel on the end seal shall be coated with cold galvanizing compound.

4. **Wall penetrations**
   a. The annular space between the piping system, and wall sleeve or core-drill opening, shall consist of mechanical-type interlocking rubber links or a non-shrink grout.

J. **Field Joint Assemblies**

1. All field joint assemblies shall be supplied by the system manufacturer and include the materials listed below.

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a. Carrier pipe insulation as specified.
b. Split carbon steel sleeve with a wall thickness no less than the conduit.
c. Urethane foam pipe covering.
d. Heat shrinkable, wraparound sleeve consisting of a cross-linked polyolefin backing, coated with a protective heat activated adhesive.
e. HDPE rockshield to prevent damage to shrink sleeve during backfill.

PART 3 – EXECUTION

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3.01 **INSTALLATION**

A. Prior to installation, the installing contractor shall inspect the piping system for evidence of damage or moisture. In the event of any damages or moisture seepage, the contractor shall notify the prefabricated system manufacturer and shall repair the system in accordance to the prefabricated system manufacturer's recommendations.
B. The installing contractor shall install the system in accordance with the instructions furnished by the prefabricated system manufacturer and as approved by the design engineer.
C. The piping system shall be kept clean and dry at all times during installation.
D. No piping shall be installed in standing water.
E. All temporary stays shall be removed from the piping system after welding the service pipe and prior to welding the conduit field joint closure.
F. The contactor shall test the service pipe in accordance with the specifications prior to welding the conduit closure.
G. The conduit shall be air tested in accordance with the specifications prior to applying the remaining field joint assembly.

3.02 **TESTING**

A. The contractor shall furnish all necessary equipment and labor to perform the testing of the service pipe and conduit. Testing must be completed to the satisfaction of the engineer before backfilling the piping system.
B. The service pipe shall be hydrostatically tested 1.5 times the operating pressure for not less than 1 hour without a loss of pressure or performance. The test pressure shall not exceed the maximum pressure rating of any component under test in the piping system. Examine all service pipe joints for leakage. Any defective joints shall be repaired and re-tested to the satisfaction of the engineer.
C. The conduit shall be air tested at 15 psi for not less than 1 hour without a loss of pressure. Do not exceed 15 psi. In the event of pressure loss, all conduit joints shall be soap tested to identify defective welds. Any defective joints shall be repaired and re-tested to the satisfaction of the engineer.