

SECTION 15064

SPECIAL PIPING SYSTEMS

PART 1 - DESIGN DIRECTIVES

1.1 SUMMARY

- A. This Standard includes the following special piping systems:
  - 1. Laboratory waste systems
  - 2. RO and DI water distribution systems.
  - 3. Nitrogen & compressed air distribution systems.
  - 4. Refrigerant piping systems.

1.2 DESIGN CRITERIA

- A. The designer shall determine the type of laboratory drainage and waste systems to be installed. Consult with FO&M and FPO to determine the most appropriate system.
- B. Consultants shall review metering systems with departmental users.
- C. Central acid neutralizing system rooms shall have a laundry sink, be ventilated, and have an ANSI eye wash station.
- D. Laboratory compressed air shall be separate of compressed air serving automatic control systems.
- E. Acid monitoring systems may be required on waste lines serving sciences buildings. The designer shall coordinate with the Town of Hanover Public Works to determine requirements.

1.3 QUALITY ASSURANCE

- A. **Manufacturer's Qualifications:** Firms regularly engaged in manufacture of piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. **Installer Qualifications:** Firm with at least 3 years of successful installation experience on projects with piping systems work similar to that required for project.
- C. All products shall be tested by an independent testing laboratory having burning characteristics of a flame spread rating of 25 or less and a smoke developed rating of 50 or less.

PART 2 – PRODUCTS

2.1 LABORATORY DRAINAGE SYSTEMS

- A. Mechanically joined piping systems shall be fabricated of flame retardant polypropylene. Single wall piping system shall be joined together using a factory grooved, schedule 40, pipe with a

systems designed fitting system. Pipe may be field grooved using the tools recommended by the manufacturer. Couplings shall have an outer band of 300 series stainless steel with fasteners conforming to the 100-hour salt spray per ASTM B117. Alternately, the joining system may be a locking nut and threaded fitting system. Systems that require heating of components are not allowed. Acceptable manufacturers are Mechanical Joint, Blue Line; Orion Fittings, Inc. or Mechanical Joining System; Zurn Industries, Inc.

- B. Electrically fuse joined piping systems shall be fabricated of flame retardant polypropylene. Single wall piping system shall be joined together using a factory grooved, schedule 40, pipe with a systems designed fitting system. Pipe may be field grooved using the tools recommended by the manufacturer. Fittings shall be hubbed allowing the pipe to be inserted. Alternately, the joining system may be a locking nut and threaded fitting system. Both systems shall have wires factory installed in the fitting that are heated with an electronic device designed for the system, which fuses the material to insure a leak-proof bond. Acceptable manufacturers are Enfusion; Enfield Industrial Corp., or Fusion Lock Joining System; Zurn Industries, Inc.

## 2.2 HIGH PURITY DISTRIBUTION SYSTEMS

- A. High purity water systems shall be utilized for the distribution of RO and DI water systems. Single wall pipe and fittings shall be fabricated from natural polypropylene conforming with ASTM D-4101. All joints shall be butt fusion welded using a non-contact IR welder. All materials shall be shipped to the jobsite in sealed containers.
- B. Valves shall be diaphragm style with a position indicator and locking handle.
- C. Pipe hanger supports shall be spaced as recommended by the manufacturer and shall be continuously supported by a 'V' shaped sheet metal reinforcement. Hangers shall be designed to accept the 'V' shape of the reinforcement.
- D. Acceptable manufacturers are:
  - 1. Polypure; Asahi/America

## 2.3 NITROGEN PIPING SYSTEMS

- A. Pipe materials shall be copper tube, cleaned and capped, type 'L' hard drawn seamless (ASTM B819), bearing the one or more of the following markings: OXY, MED, OXY/MED, ACR/OXY, or ACR/MED. Fittings shall be cleaned wrought copper. All pipe sizes shall be designated by the internal diameter.
- B. Brazing filler materials shall be copper-phosphorus alloy metal, BcuP-5 (Staysilv), containing 15% silver, 5% phosphorus, remaining elements are copper.
- C. Valves shall be three piece construction full port ball valves with bronze body, factory cleaned for oxygen, and suitable for brazing. Manufacturer shall be Apollo series #82-20x-57 or equal

## 2.4 VACUUM PIPING SYSTEMS

- A. Pipe materials shall be type 'L' hard drawn B88 copper tube. Fittings shall be wrought copper, ANSI B16.22 & B16.18. All pipe sizes shall be designated by the internal diameter.
- B. Valves shall be two-piece construction full port ball valves with bronze body. Manufacturer shall be Apollo series #77-20x or equal.

**2.5 REFRIGERANT PIPING SYSTEMS**

- A. Pipe materials shall be copper tube, cleaned and capped, type 'L' hard drawn seamless (ASTM B819), bearing the one or more of the following markings: OXY, MED, OXY/MED, ACR/OXY, or ACR/MED. Fittings shall be cleaned wrought copper, all elbows shall be long radius. All pipe sizes shall be designated by the external diameter.
- B. Brazing filler materials shall be copper-phosphorus alloy metal, BcuP-5 (Staysilv), containing 15% silver, 5% phosphorus, remaining elements are copper.
- C. Valves shall be two piece construction full port ball valves with forged brass body, factory cleaned for oxygen, and suitable for brazing. Manufacturer shall be Apollo series #79-70x-01 or equal
- D. Moisture/liquid Indicators shall be 500 psig maximum operation pressure, 200°F maximum operating temperature; forged brass body, with replaceable polished optical viewing window, and solder end connections.
- E. Filter-driers shall be 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter-drier core kit, including gaskets, standard capacity desiccant sieves to provide micronic filtration.
- F. Flexible Connectors shall be 500 psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections, and synthetic covering; dehydrated, pressure tested, minimum 7 inch in length.

**PART 3 – EXECUTION**

**3.1 INSTALLATION OF LABORATORY DRAINAGE SYSTEMS**

- A. Install laboratory drainage piping in accordance with DC Standard, "DRAINAGE AND VENT SYSTEMS".

**3.2 HIGH PURITY DISTRIBUTION SYSTEMS**

- A. All joints shall be butt fusion welded using a non-contact IR welder. Each weld shall be recorded, a log maintained for the project, and a label affixed to the pipe adjacent to the weld. Data on the label shall include individual performing the weld and a pass/fail designation
- B. Pipe shall be continuously supported with a 'V' shaped sheetmetal reinforcement.

**3.3 NITROGEN PIPING SYSTEMS**

- A. All nitrogen pipe connections shall be brazed joints. Brazing shall be performed only when there is an inert gas, such as nitrogen, being bled through the system to prevent the formation of scale. The installer is to take the necessary precautions to insure there is adequate ventilation so as to prohibit affixation.

**3.4 REFRIGERANT PIPING INSTALLATION**

- A. Install refrigerant piping in accordance with ASHRAE Standard 15 - "The Safety Code for Mechanical Refrigeration."

- B. Install isolation valves on both suction and liquid lines at both the indoor and outdoor units where the nominal capacity is  $\geq 10$  tons.
- C. Ductless split air conditioners shall have soldered connection, 'quick connect' devices are not allowed.
- D. All refrigerant pipe connections shall be brazed joints. Brazing shall be performed only when there is an inert gas, such as nitrogen, being bled through the system to prevent the formation of scale. The installer is to take the necessary precautions to insure there is adequate ventilation so as to prohibit affixation.
- E. All systems shall have a deep vacuum drawn to 0.5 mm Hg (500 microns) before final charging.

END OF SECTION 15064