SECTION 15482 - LABORATORY GAS SYSTEMS
[Add6-8]

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit under provisions of Section 15010.

B. Shop Drawings: Indicate general assembly of components, mounting and installation details.

C. Product Data: Provide manufacturers literature and illustrations for all components indicating size, dimensions and configuration.

D. Manufacturer's Installation Instruction: Indicate requirements for equipment and systems.

1.02 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 15010.

1.03 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 15010.

B. Operation Data: Include installation instructions, assembly views, lubrication instructions, and assembly views.

C. Maintenance Data: Include maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with these specifications.

B. Maintain one copy of each document on site.

1.05 REGULATORY REQUIREMENTS

A. Conform with applicable codes for gas systems.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery, store, protect and handle products to site under provisions of Section 15010.

B. Accept material on site in factory containers and packing. Inspect for damage.

C. Protect from damage and contamination by maintaining factory packaging and caps in place until installation.

1.07 SCHEDULING

A. Schedule work under the provisions of Section 15010.

B. Schedule Work to ensure equipment is installed and systems tested and certified prior to substantial completion.

1.08 SCOPE

A. Provide all labor, materials, equipment, tools and services and perform all operations required in connection with or properly incidental to the installation and testing of compressed air and vacuum piping systems including fittings, valves, etc. for complete operable systems.

B. The stock and model numbers of equipment listed hereinafter identify equipment manufactured by NCG Division of Chemetron Corp., Chicago, Ill.

PART 2 - PRODUCTS

2.01 PIPING:

A. All piping for vacuum and gases of every character shall be ASTM Specification B-88, Type L, hard drawn, seamless copper tubing with wrought copper solder fittings. No ferrous piping will be permitted in the system. Where threaded nipples are required these shall be I.P.S. brass. All vacuum piping shall be purged with dry nitrogen while being soldered.

B. All piping shall be pitched back so as to drain to the point shown on the Drawings. All branch takeoffs shall be made from the top of the mains.

C. Fittings for copper tube shall be wrought copper fittings and attached with silver solder alloy containing not less than 50% silver. All joining operations shall be done with pure dry nitrogen flowing through the pipe to prevent oxidation and scale information. During joining operations, nitrogen flow shall be verified by an oxygen sensor at the free end of the piping and by a pressure alarm on the nitrogen supply. When there are no active joining operations being performed, the system shall be securely sealed and maintained with a nitrogen charge in the sealed system.

D. Before erection, all pipe, tubing, valves and fittings (except those supplied expressly cleaned for air-and-vacuum service by manufacturer) shall be thoroughly cleansed of all grease, oil and other combustible materials by washing in a hot solution of sodium carbonate or trisodium phosphate mixed in equal proportions of one pound to three gallons of water. Scrubbing and continuous agitation of the parts shall be employed where necessary to remove all deposits and to insure complete cleansing. After washing, all materials shall be rinsed thoroughly in clean, hot water. After rinsing, great care must be exercised in the storage and handling of all materials and in the condition of tools used in cutting and reaming to prevent oil or grease being introduced into the tubing. Where such contamination is known to have occurred, the materials affected must be rewashed and then rinsed.

E. Where screwed connections are required at equipment, suitable adapters shall be provided with threaded connections. A thin paste of litharge and glycerin shall be applied to the external threads only.

F. After erection of pipe and tubing, but prior to installation of the service outlet valves, each system shall be blown clear of moisture and foreign matter by means of dry nitrogen or oil free air.

G. After installing service valves, each system shall be subjected to a test pressure of 150 psig by means of water-pumped (oil free) nitrogen or air. This test pressure shall be maintained until each joint has been thoroughly examined for leaks by means of soapy water. A soap solution mixed in the following proportions should be used: one ounce of castile or palm oil soap, eight ounces of water, and four ounces of glycerine. Dissolve the soap in the water, add the glycerine and mix thoroughly. Wipe joints clean after test. All leaks shall be properly repaired and the system retested.

H. A final test shall be 24 hours standing pressure test with water pumped (oil free) air or dry nitrogen at 150 psig to check the completeness of prior joint pressure tests. If water pumped nitrogen is used, particular care must be exercised to assure that it is all flushed out with oxygen before placing the system in service.

I. Laboratory air systems shall be finally cleaned using the high-pressure pulse-purge proceedure described in NFPA 99. During this proceedure, sufficient volume of dry nitrogen shall be provided to

insure a minimum velocity of 2000 fpm in the largest section of pipe being cleaned. Note: It is nor required that the entire system be tested at one time. The system can be divided into convenient sections. Upon the successful completion of the operation on a section, it shall be sealed and left with a holding charge of dry nitrogen.

2.02 LABORATORY GASES VALVES:

A. Valves not in boxes shall be NCG bronze bodied, double seal, full flow ball type, with Teflon seat seals and 0-ring packing designed for working pressures up to 300 psi with a chrome plated brass ball which seals in both directions. The valves shall be so designed that only a quarter turn of the lever type handle is necessary between the open and closed positions. Valves shall be supplied and properly washed for oxygen service. Gas service labels shall be provided for each service as required.

2.03 FINAL CHECKING AND OPERATING INSTRUCTIONS:

A. A representative of the equipment manufacturer shall periodically check with the Contractor during initial installation of the pipeline systems equipment. He shall assist the Contractor in final check to make certain that all systems are in perfect operating condition. The equipment manufacturer's representative shall provide 8 hours of instruction to the staff personnel in the use of the piping systems and the related equipment which is operated from those systems.

2.04 LABORATORY FITTINGS:

A. Laboratory fittings will be furnished to the job site by the laboratory equipment supplier, with necessary holes cut in the laboratory equipment. The Mechanical Contractor shall receive, store and install the fittings and make all necessary connections thereto.

2.05 STANDARDS AND CODES:

A. The recommendations of the National Fire Protection Association (NFPA) as set forth in Pamphlet No. 45 AND 99 shall apply to this installation and shall be adhered to in all respects.

PART 3 - VACUUM PUMP SYSTEM

3.01 VACUUM PUMP SYSTEM

A. Provide vacuum pump system equal to Squire-Cogswell/Aeros Model # D500-T2 Duplex Tank Mounted Oil-Less Rotary Vane Vacuum Pump System total capacity two vacuum pumps --- 44.2 SCFM @ 19"HGV 10 HP TOTAL (5 HP EACH) / 460/3/60 voltage / 120 gallon horizontal receiver tank composed of Squire Cogswell Model # D5 Single-Stage, Air Cooled, Oil-Less (Dry Running) Rotary Vane Vacuum Pumps, each with a direct driven by a 230/460/3/60 Voltage Motor, 5 HP TEFC Enclosure, vacuum regulator, and integral inlet filter, Inlet Check Valves, Pump Isolation Valves, 4-1/2" Vacuum Gauge and Operation & Maintenance Manuals

B. Each vacuum pump will have the capacity of 22.1 SCFM @ 19"HGV when operating at 1750 RPM. Above items are completely assembled, pre-piped, and pre-wired.

3.02 ELECTRICAL CONTROL PANEL:

A. Underwriters Laboratory Listed, Duplex Electrical Control shall be mounted in a NEMA 12 dustproof cabinet. Control of the motors shall be "Continuous On Demand" and shall stop the operation of the motors during periods of low or no air demand. The components include individual fusible disconnect switches with motor protection fuses, magnetic motor starters with three phase thermal overload protection, five (5) minute minimum run timers, individual 120 volt control circuit transformers with fused primary and secondary, vacuum control switches and a solid state alternator to automatically switch the operating sequence of the pumps. The cabinet door shall have Hand-Off-Automatic selector switches, run lights, elapsed time meters, an audible and visual lag alarm with reset and silence button and safety disconnect operating handles

(Mounted & Wired).

3.03 RECEIVER TANK:

A. 120 Gallon Horizontal ASME Code Receiver Tank (rated at full vacuum) with Manual Drain Valve, Vent Valve, and a THREE VALVE BY-PASS so tank acts both as inventory receiver and liquid/solids knock-out tank to protect the vacuum pumps from carryover from lab area.

3.04 ACCESSORIES:

A. 1 Set of Vibration Pads

B. 1 Set of Flexible Connectors

C. 1 Source Isolation Valve

3.05 NOTES:

A. System meets NFPA 99 Standards for Labs.

B. Equipment conforms to the National Electrical Code.

C. For motor protection, the equipment should not be operated in ambient temperatures above 104F.

D. Manufacturer shall provide Start-Up Assistance and In-Service Training.

PART 4 - EXECUTION

4.01 Install in complete compliance with governing Codes and manufacturers instructions.

4.02 Except for piping and pipe fittings, all components shall be supplied by a single manufacturer and shall be fully compatible with Owner's existing system and service devices.

4.03 Tests to include procedures described in NFPA 99, Sections 4-3 through 4-10 and the procedures contained elsewhere in these specifications. Provide to Owner a notarized letter of certification from equipment manufacturer certifying the following:

1. No cross connections exist.

2. All components have been installed, adjusted and are functioning in accordance with manufacturer's recommendations.

END OF SECTION