

## SECTION 226119 - COMPRESSED-AIR EQUIPMENT FOR LABORATORY FACILITIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Packaged, oilless reciprocating air compressors.
  - 2. Inlet-air filters.
  - 3. Refrigerant compressed-air dryers.
  - 4. Compressed-air filter assemblies.

#### 1.3 DEFINITIONS

Equipment for laboratory air systems in first paragraph below is not required to comply with NFPA 99.

- A. Laboratory Air Equipment: Compressed-air equipment and accessories for nonmedical laboratory facilities.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  - 1. Wiring Diagrams: For power, signal, and control wiring.
- B. Field quality-control reports.
- C. Operation and Maintenance Data: For compressed-air equipment to include in operation and maintenance manuals.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. ASME Compliance: Fabricate and label receivers to comply with ASME Boiler and Pressure Vessel Code.

#### 1.6 PROJECT CONDITIONS

Retain this article if interruption of existing compressed-air service is required.

- A. Interruption of Existing Laboratory Compressed-Air Service(s): Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without Owner's written permission.

#### 1.7 COORDINATION

- A. Coordinate sizes and locations of concrete bases with equipment provided.

#### 1.8 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Belts: One for each belt-driven compressor.

### PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR PACKAGED AIR COMPRESSORS

- A. Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty air compressors and receivers that deliver air of quality equal to intake air.
- B. Control Panels: Automatic control station with load control and protection functions. Comply with NEMA ICS 2 and UL 508.
  - 1. Enclosure: NEMA ICS 6, Type 12 control panel unless otherwise indicated.
  - 2. Motor Controllers: Full-voltage, combination-magnetic type with undervoltage release feature and motor-circuit-protector-type disconnecting means and short-circuit protective device.
  - 3. Control Voltage: 120-V ac or less, using integral control power transformer.
  - 4. Motor Overload Protection: Overload relay in each phase.
  - 5. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.
  - 6. Automatic control switches to alternate lead-lag air compressors for duplex and sequence lead-lag air compressors for multiplex air compressors.

7. Instrumentation: Include discharge-air and receiver pressure gages, air-filter maintenance indicator, hour meter, air-compressor discharge-air and coolant temperature gages, and control transformer.
  8. Alarm Signal Device: For connection to alarm system to indicate when backup air compressor is operating.
- C. Receivers: Steel tank constructed according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
1. Pressure Rating: At least as high as highest discharge pressure of connected air compressors and bearing appropriate code symbols.
  2. Interior Finish: Corrosion-resistant coating.
  3. Accessories: Include safety valve, pressure gage, automatic drain, and pressure regulator.

## 2.2 OILLESS, RECIPROCATING AIR COMPRESSORS

Retain "General Requirements for Packaged Air Compressors" Article if a packaged, reciprocating air compressor is specified.

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Quincy Compressor; an EnPro Industries company; QRD Series.
- B. Description: Packaged unit.

Select two-stage in first paragraph below for applications over 100 psi.

- C. Air Compressor(s): Single- or two-stage, oilless (nonlubricated), tank-mounted reciprocating-piston type, with sealed oil-free bearings, that will deliver air of quality equal to intake air.
1. High discharge-air temperature switch.
  2. OSHA-style belt guard totally enclosing pulleys and belts.
  3. Intercooler between stages of two-stage units.

## 2.3 INLET-AIR FILTERS

Retain one of two paragraphs in this article.

- A. Description: Combination inlet-air filter-silencer, suitable for remote installation, for each air compressor.

Revise first subparagraph below if filter is in-line type and installed in an interior space. Install goose-neck with screen on exterior air inlet.

1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
2. Capacity: Match capacity of air compressor, with collection efficiency of 99 percent retention of particles larger than 10 micrometers.

- B. Description: Combination inlet-air filter-silencer, suitable for remote installation, for multiple air compressors.

Revise first subparagraph below if filter is in-line type and installed in an interior space. Install goose-neck with screen on exterior air inlet.

1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
2. Capacity: Match total capacity of connected air compressors, with collection efficiency of 99 percent retention of particles larger than 10 micrometers.

#### 2.4 REFRIGERANT COMPRESSED-AIR DRYERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ingersoll-Rand; Air Solutions Group.
  2. Hankison International.
- B. Description: Noncycling, air-cooled, electric-motor-driven unit with steel enclosure and capability to deliver 35 deg F (2 deg C), 100-psig (690-kPa) air at dew point. Include automatic ejection of condensate from airstream, step-down transformers, disconnect switches, inlet and outlet pressure gages, thermometers, automatic controls, and filters.

#### 2.5 COMPRESSED-AIR FILTER ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ingersoll-Rand; Air Solutions Group.
  2. Hankison International.
- B. Description: Filter assemblies suitable for compressed air, in parallel duplex arrangement. Size each assembly for maximum capacity of connected equipment and operating pressure of compressed-air system. Include automatic ejection of condensate from airstream, inlet and outlet pressure gages, and shutoff valves.
1. Size filter assemblies for 5-psig (34.5-kPa) maximum air-pressure drop when filters are new and clean, at system rated capacity, and at 100-psig (690-kPa) pressure.
  2. Differential Pressure Switch: Adjustable, diaphragm type, with electrical connections for alarm system, to indicate when air-pressure drop through filters rises to more than 2 psig (13.8 kPa) greater than when new and clean.
  3. Particulate Filters: Collection efficiency of 98 percent retention of particles 1 micrometer and larger.
  4. Odor and Taste Filters: Vapor-absorbing, activated charcoal.
  5. Coalescing Filters: Collection efficiency of 99.9 percent retention of particles 0.3 micrometer and smaller.
  6. Include automatic drain trap for each filter.

## 2.6 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 22 Section "Common Motor Requirements for Plumbing Equipment."
  - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
  - 2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean compressed-air equipment, accessories, and components that have not been cleaned for oxygen service and sealed or that are furnished unsuitable for laboratory air applications, according to CGA G-4.1, "Cleaning Equipment for Oxygen Service."

### 3.2 COMPRESSED-AIR EQUIPMENT INSTALLATION

- A. General Requirements for Compressed-Air Equipment Installation:
  - 1. Install compressed-air equipment to allow maximum headroom unless specific mounting heights are indicated.
  - 2. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces unless otherwise indicated.
  - 3. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
  - 4. Install equipment to allow right of way for piping installed at required slope.
  - 5. Install the following devices on compressed-air equipment:
    - a. Thermometer, Pressure Gage, and Safety Valve: Install on each compressed-air receiver.
    - b. Pressure Regulators: Install downstream from air compressors, dryers, purification units, and filter assemblies.
    - c. Drain Valves: Install on aftercoolers, receivers, and dryers. Discharge condensate over nearest floor drain.
- B. Nonmedical Laboratory Compressed-Air Equipment Installation:
  - 1. Install compressed-air equipment, except wall-mounting equipment, on concrete bases. Maintain manufacturers' recommended clearances. Orient equipment so controls and devices are accessible for servicing.

Retain one of first two subparagraphs below. Rotating equipment and equipment with motors 5 hp and less can be installed on spring or restrained-spring isolators. Equipment with motors larger than 5 hp

should be installed on vibration isolation bases. Coordinate with Drawings and with Division 22 Section "Vibration Controls for Plumbing Piping and Equipment." Insert deflection according to supporting structure and seismic requirements.

- a. Vibration Isolation: Install spring isolators. Vibration isolation devices and installation requirements are specified in Division 22 Section "Vibration Controls for Plumbing Piping and Equipment."
- b. Vibration Isolation: Mount equipment on a vibration isolation equipment base as specified in Division 22 Section "Vibration Controls for Plumbing Piping and Equipment."

### 3.3 CONNECTIONS

- A. Comply with requirements for compressed-air piping specified in Division 22 Section "Compressed-Air Piping for Laboratory Facilities." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Connect compressed-air piping to compressed-air equipment, accessories, and specialties with shutoff valve and union or flanged connection.
- D. Install piping from automatic water drain valves on compressed air storage tanks and air dryers to nearest floor drain.

### 3.4 IDENTIFICATION

- A. Identify nonmedical laboratory compressed-air equipment system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

### 3.5 STARTUP SERVICE

- A. Perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.
  - 2. Check for lubricating oil in lubricated-type equipment.
  - 3. Check belt drives for proper tension.
  - 4. Verify that air-compressor inlet filters and piping are clear.
  - 5. Check for equipment vibration-control supports and flexible pipe connectors and verify that equipment is properly attached to substrate.
  - 6. Check safety valves for correct settings. Ensure that settings are higher than air-compressor discharge pressure but not higher than rating of system components.
  - 7. Drain receiver tanks.
  - 8. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 9. Test and adjust controls and safeties.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain air compressors, compressed-air dryers and compressed-air filter assemblies.

END OF SECTION 226119