

## **SECTION 11370**

### **AIR COMPRESSORS AND ACCESSORIES**

#### **PART 1 – GENERAL**

##### **1.01 WORK INCLUDED**

- A. This specification includes air compressors with air dryers.
- B. Furnish, install, start-up, and test air compressors and dryer. Included with the air compressor shall be a refrigerated dryer, pre- and after filters, adjustable pressure regulator, automatic drain, and all other accessories necessary for a complete, operable system. The components of this system shall be furnished by the pneumatic actuator supplier.  
(Section \*\*\*\*)

##### **1.02 RELATED WORK AND SPECIFICATIONS**

- A. Division 15: Mechanical Piping, Valves, Pipe Hangers, and Supports.
- B. Division 16: Electrical

##### **1.03 QUALITY ASSURANCE**

- A. Compressor manufacturer shall maintain a complete stock of spare parts commonly needed for the pumps specified at a location within the State of Texas or shall be able to deliver the spare parts within 48 hours of notification.
- B. The equipment manufacturer shall furnish a qualified field representative for a minimum of four (4) hours to inspect all equipment described herein after installation, and advise the CONTRACTOR and OWNER during startup and testing, and to train OWNER's personnel in routine maintenance and troubleshooting procedures. Travel to and from the project site shall not be included in the 4-hour period. CONTRACTOR shall coordinate the scheduling of such training and startup assistance with OWNER's personnel. OWNER may videotape training session.

##### **1.04 SUBMITTALS**

- A. Submittals shall be prepared and submitted in accordance with Section 01301.
- B. The following submittals are required, at a minimum, in addition to the applicable requirements of Section 01301.

1. Shop drawings and product data, including the following minimum information, bound neatly in a single package.
  - a. Design information for air demand, tank size, compressor, filter and dryer size.
  - b. Complete performance data for each item furnished.
  - c. Dimensions, connection sizes and types, anchor bolt and mounting information and drawings, and clearances required for all items furnished.
  - d. Listing of materials of construction for all items furnished.
  - e. Overall schematic showing compressor, dryer, and all devices furnished.
  - f. Complete wiring diagrams and data on controls to be furnished.
  - g. Location of nearest stocking distributor of spare parts.
  - h. Any other information necessary for ENGINEER to determine whether or not the equipment complies with these specifications
2. Complete operation and maintenance data for all compressors and controls in accordance with Section 01301.

C. Partial or incomplete submittals will not be reviewed by ENGINEER.

#### **1.05 EXPERIENCE REQUIRMENTS**

- A. All equipment shall be the product of a manufacturer having at least twenty (20) U.S. installations of the type being proposed, each with a minimum of 5 years of installations of satisfactory service. Consideration shall be given only to the products of those manufacturers who can demonstrate at least ten (10) years experience in the manufacture, operation, and servicing of equipment of a type, size, quality, performance and reliability equal to that specified.
- B. A list of similar installations shall be furnished upon request with the shop drawing submittal, including names and telephone numbers of contacts.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery, storage, and handling shall be in accordance with manufacturer's instructions.

#### **1.07 SPECIAL EQUIPMENT WARRANTY**

- A. All equipment furnished under this section shall have a special warranty, in accordance with the Contract Documents, for a period of one (1) year after final acceptance of this equipment. The costs of removal, shipment, repair and installation by contractor shall all be included in warranty and correction of defective work.

## **PART 2 – PRODUCTS**

### **2.01 DESIGN REQUIREMENTS**

- A. Air compressors shall be shop assembled and ready for installation by the contractor.
- B. Air compressors and dryers shall be sized to meet the requirements below and in the related equipment specifications and drawings.
- C. System shall be sized to carry the required capacity while running 25 to 30 percent of the time. Air shall be stored at 125 to 175 psi and used at 80 to 100 psi unless otherwise shown.
- D. The storage tanks shall be a minimum 200-gallon tank with an automatic moisture drain, except as noted above.
- E. Filters shall be designed for calculated CFM demand and per the specifications. Provide automatic condensate drains on the coalescing filter and receiver. Provide float drain on 2-micron final filter. Air supply free of oil and vapor down to 0.015 ppm
- F. Compressor and accessories shall be designed to be installed and operated in an indoor, washdown environment that is moist, humid, ventilated but not air-conditioned. All electrical components and enclosures shall be NEMA 4 rated and suitable for washdown type installation.
- G. Units shall be provided complete with controls, starter, and alternator prewired to the compressor. The alternator shall automatically sequence the units from the lead to lag thus equalizing the service demand on each compressor.
- H. The control shall have a pre-wired terminal for PLC feedback to indicate compressor failure.

### **2.02 AIR COMPRESSORS**

- A. The compressor configuration is to be a duplex style system mounted to the receiver tank unless otherwise specified.
- B. The cylinder and crankshaft with permanently sealed ball bearings shall be frame (crankcase) supported at front and rear.
- C. Crankshaft shall be ductile iron construction liberally sized with two heavy-duty ball bearings. Engineered shaft is balanced with a counterweight to ensure minimum running vibration.

- D. Connecting rods are single piece cast iron with sealed needle bearings on the piston pin end and sealed ball bearings on crankshaft end that require no maintenance or adjustment.
- E. Cylinders shall be anodized aluminum. The cylinders shall be precision honed for compatibility with the piston rings and employ deep radial fins to help remove the heat of compression. The cylinder heads shall be easily removable for inspection.
- F. The low and high-pressure pistons shall be aluminum. The low-pressure piston shall have one (1) compression ring and two (2) rider bands. The high-pressure piston shall have three (3) compression rings and two (2) rider bands. Rings and rider bands shall be Teflon
- G. The cooling fan shall provide cooling for the deep finned cylinders and multi-tube intercooler. Shrouds are to be used to direct the air blast. The fan shall be direct drive off the compressor crankshaft.
- H. The compressors shall have an intercooler. The intercooler between stages is to be finned multi-tube construction to provide maximum cooling area. It shall be located directly in the flywheel air blast to remove the heat of compression between stages keeping running temperatures and power needs to a minimum, and ensuring high air delivery for horsepower expended.
- I. Intercooler shall be provided with a safety valve to prevent over-pressurization.
- J. Centrifugal unloader shall be automatic in operation as a function of speed. It shall be simple in construction and sealed in the frame against wear and dirt. The unloader shall bleed air from intercooler and cylinders upon stopping, and prevent the compressor from starting against full load.
- K. A heavy-duty canister with dry type 4-micron inlet filter/silencer shall be provided.
- L. Aluminum heads shall be mounted on top of stainless steel finger valves. The valves shall provide a minimum 8,000 hours of life and require no lubrication.
- M. Drive shall be V-belt type with provision for easy take-up of belt slack. An easily removed totally enclosed belt guard shall be provided.
- N. The compressor and motor shall be aligned on a heavy steel base.
- O. AC motors shall be minimum hp listed above, 1800 rpm, TEFC enclosure, Class B insulation, 1.15 service factor, and self-lubricated ball bearings. Motors shall be for 480 volt, 3-phase. Motor submittals shall be in accordance with Division 16.

- P. Receivers shall be ASME, National Board coded, 125 psi, and include pressure gauge, drain valve, service valve, and safety valve. An automatic condensate drain trap with heater shall be provided.
- Q. Units shall be equipped for both automatic start and stop operation with NEMA 4 pressure switch and constant speed operation with reliable suction unloader on compressor inlet. Unloaded horsepower requirement shall be 15 percent of fully loaded horsepower requirement.
- R. An air-cooled aftercooler shall be included for all air compressors with dryers, which shall lower package discharge air to within 25°F of ambient temperature. A safety valve is to be provided to protect against over-pressurization.

### **2.03 REFRIGERATED DRYER AND FILTERS**

- A. Prefilter - Filter shall be coalescing/particulate prefilter supplied by Dryer manufacturer. Removes particulates down to 0.01 micron and equipped with an automatic drain and visual flow indicator.
- B. Refrigerated Dryer
  1. Performance: Refrigerated air dryer capable of reducing the temperature of moisture saturated air at 150 psig at the required system scfm with an inlet air temperature of 140°F to a NFPA Class H pressure dew point (33°F to 39°F) when operating in a 120°F max ambient temperature, and removing the condensed liquids (water and others) via an integral centrifugal moisture separator and self actuating drain valve.
  2. Compressed Air Circuit - The dryer shall include precooling and reheating air circuits. The precooling portion of this air circuit shall lower the inlet air temperature to the compressed air, thus reducing the required refrigeration horsepower. The reheater portion of the air circuit shall reheat the cool dry air so as to prevent condensation on the down stream piping. Heat exchangers used to chill the air and evaporate the refrigerant are to be non-fouling smooth copper tubes and are to be completely encapsulated in flexible closed cell insulation.
  3. Refrigeration System - The dryer shall incorporate a fully hermetic aircooled refrigeration compressor/condenser, automatic expansion valve, and liquid refrigerant filter dryer. The dryer shall be charged with refrigerant 134A. Refrigerants, such as R12, which are no longer acceptable to the environment, are not to be used. The dryer shall be equipped with a pressure dew point colored scale indicator, and a power on light located in the on – off switch. The drain valve shall be mechanical float type.
  4. Packaging - The dryer shall be shipped in a plastic wrap with a cardboard box mounted on a wooden pallet.
  5. Testing - Each dryer shall undergo a complete refrigerant leak check and working test.

6. Warranty - The dryer shall carry a comprehensive one- (1) year factory warranty on parts and labor.
  7. Electrical - Power shall be 115 volts, 60 Hz, and 1 pH.
- C. After-filter - Filter shall be coalescing and designed to remove oil and particulates down to a size of 3 microns and shall be located following a refrigerated dryer capable of producing air with a dew point of 38°F or less. Filter to be equipped with an automatic drain and visual flow indicator.

#### **2.04 ACCEPTABLE MANUFACTURERS**

- A. Ingersoll Rand

#### **2.05 INSTALLATION**

- A. Installation of the compressed air system is the responsibility of the contractor in accordance with the illustration provided by the actuator supplier.

#### **2.06 SPARE PARTS**

- A. Furnish one (1) set of belts for each compressor and one (1) spare air filter for each pre-filter and after filter furnished.