

**SECTION 22 1500**  
**GENERAL-SERVICE COMPRESSED-AIR SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe and Pipe Fittings.
- B. Air compressor.
- C. Air receiver and accessories.
- D. Aftercooler.
- E. Refrigerated air dryer.
- F. Pressure reducing station.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Section 07 8400 - Firestopping.
- C. Section 22 0513 - Common Motor Requirements for Plumbing Equipment.
- D. Section 22 0523 - General-Duty Valves for Plumbing Piping.
- E. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- F. Section 22 0553 - Identification for Plumbing Piping and Equipment: Identification of piping system.
- G. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- E. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.
- F. ASME B31.1 - Power Piping; 2014.
- G. ASME B31.9 - Building Services Piping; 2014.
- H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- J. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- M. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
- N. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- O. NEMA ICS 4 - Application Guideline for Terminal Blocks; 2015.
- P. NEMA MG 1 - Motors and Generators; 2014.
- Q. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturers catalog literature with capacity, weight, and electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate piping system schematic with electrical characteristics and connection requirements.
- D. Certificates: Provide certificate of compliance from Authority Having Jurisdiction indicating approval of air receiver.
- E. Test Reports: Submit inspector's certificate for air receiver for inclusion in Operating and Maintenance Manuals.
- F. Manufacturer's Instructions: Indicate manufacturer's installation instructions, hoisting and setting requirements, starting procedures.
- G. Operation Data: Submit for air compressor, air receiver and accessories, after cooler, refrigerated air dryer, and pressure reducing station.
- H. Maintenance Data: Submit for air compressor, air receiver and accessories, after cooler, refrigerated air dryer, and pressure reducing station.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- J. Project Record Documents: Record actual locations of equipment and components. Modify shop drawings to indicate final locations.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Pressure Vessels: Conform to applicable code for installation of pressure vessels.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

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

- A. Accept air compressors, refrigerated air dryer on site in factory fabricated containers with shipping skids and plastic pipe end protectors in place. Inspect for damage.
- B. Protect piping and equipment from weather and construction traffic.

#### **1.07 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for reciprocating air compressors.

### **PART 2 PRODUCTS**

#### **2.01 PIPE AND PIPE FITTINGS**

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.
  - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
  - 2. Joints: Threaded or welded to ASME B31.1.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), annealed.
  - 1. Fittings: ASME B16.26, cast bronze.
  - 2. Joints: Flared.

#### **2.02 AIR OUTLETS**

- A. Quick Connector: 3/8 inch brass, snap on connector with self closing valve, Style A.

#### **2.03 UNIONS AND COUPLINGS**

- A. Unions:
  - 1. Ferrous Pipe: 150 psi malleable iron threaded unions.
  - 2. Copper Tube and Pipe: 150 psi bronze unions with soldered joints.

## 2.04 COMPRESSOR

- A. Manufacturers:
  - 1. Gardner Denver, Inc. (Champion); \_\_\_\_\_: [www.gardnerdenver.com](http://www.gardnerdenver.com).
  - 2. Ingersoll Rand Compressed Air Solutions; \_\_\_\_\_: [www.ingersollrandproducts.com](http://www.ingersollrandproducts.com).
  - 3. Sullair Corporation; \_\_\_\_\_: [www.sullair.com](http://www.sullair.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Type: Simplex compressor unit consisting of air cooled compressor, air receiver, after cooler, refrigerated air dryer.
- C. Screw Compressors:
  - 1. Unit: Direct drive, open drive, 3600 RPM, fixed compression, rotary screw compressor with control panel.
  - 2. Features: Differential pressure oil pump, oil separator and filter, oil charging valve, compressor bearings with ABMA STD 9, L10 life expectancy at 100,000 hours.
  - 3. Motor: Open drip proof flange squirrel cage induction, close coupled to compressor.
  - 4. Control panel: Factory mounted NEMA ICS 4 panel with starter and refrigeration controls including:
    - a. Non-fused molded case disconnect switch.
    - b. Single point power connection and grounding lug.
    - c. Anti-recycle timer.
    - d. Solid state overload relay for each compressor.
    - e. Phase loss/reversal monitor.
    - f. Cycle counter and hour meter per compressor.
    - g. Automatic shutdown on compressor overload.
  - 5. Automatic Capacity Reduction: Continuously variable slide valve with infinitely variable control to 25 percent of full load.
- D. Motor: Refer to Section 22 0513.
- E. Controls:
  - 1. Pressure Switch: Line voltage contactor to break at 100 psi with minimum differential of 20 psi.
  - 2. Compressor Regulation: Lead-lag switch with time delay relay.
  - 3. Electrical Alternation: Operate each compressor for 12 hours. If one compressor fails, second shall automatically maintain air pressure.
- F. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- G. Disconnect Switch: Factory mount disconnect switch in control panel.
- H. Cord and Plug: Provide unit with 6 foot cord and plug for connection to electric wiring system including grounding connector.

## 2.05 AFTERCoolER

- A. Manufacturers:
  - 1. Gardner Denver, Inc. (Champion); \_\_\_\_\_: [www.gardnerdenver.com](http://www.gardnerdenver.com).
  - 2. Ingersoll Rand Compressed Air Solutions; \_\_\_\_\_: [www.ingersollrandproducts.com](http://www.ingersollrandproducts.com).
  - 3. Sullair Corporation; \_\_\_\_\_: [www.sullair.com](http://www.sullair.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction: Removable tube nests of non-ferrous metal tubes and corrosion resistant tube plates, safety valves, pressure gage, moisture separator, moisture drain valve, water inlet piping with automatic water valve, automatic condensate trap and overflow piping with open funnel.
- C. Working Pressure: 135 psi.
- D. Discharge: Cool air to within 12 degrees F of ambient air temperature at specified flow capacity.

## 2.06 AIR DRYER

- A. Manufacturers:

1. Gardner Denver, Inc. (Champion); \_\_\_\_\_: www.gardnerdenver.com.
  2. Ingersoll Rand Compressed Air Solutions; \_\_\_\_\_: www.ingersollrandproducts.com.
  3. Sullair Corporation; \_\_\_\_\_: www.sullair.com.
  4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Type: Self contained mechanical refrigeration type complete with heat exchanger, refrigeration compressor, automatic controls, moisture removal trap, internal wiring and piping, and full refrigerant charge.
  - C. Air Connections: Inlet and outlet connections at same level, factory insulated.
  - D. Heat Exchangers: Air to air and refrigerant to air coils. Provide heat exchangers with automatic control system to bypass refrigeration system on low or no load condition.
  - E. Moisture Separator: Centrifugal type located at discharge of heat exchanger.
  - F. Refrigeration Unit: Hermetically sealed type to operate continuously to maintain specified 21 degrees F dew point. House unit in steel cabinet provided with access door and panel for maintenance and inspection.
  - G. Accessories: Air inlet temperature gage, air inlet pressure gage, on/off switch, high temperature light, power on light, refrigerant gage, air outlet temperature gage, air outlet pressure gage.

## **2.07 AIR RECEIVER**

- A. Manufacturers:
  1. Gardner Denver, Inc. (Champion); \_\_\_\_\_: www.gardnerdenver.com.
  2. Ingersoll Rand Compressed Air Solutions; \_\_\_\_\_: www.ingersollrandproducts.com.
  3. Sullair Corporation; \_\_\_\_\_: www.sullair.com.
  4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Receiver: Vertical, built to ASME regulations for working pressure of 125 psi. Flange or screw inlet and outlet connections.
- C. Fittings: Adjustable pressure regulator, safety valve, pressure gage, drain cock, and automatic float actuated condensate trap.
- D. Tank Finish: Shop primed.

## **2.08 PRESSURE REDUCING VALVE**

- A. Pressure Reducing Station: Consisting of automatic reducing valve and bypass, and low pressure side relief valve and gage. Provide oil separator where indicated.
- B. Valve Capacity: Reduce pressure from 200 psi to 30 psi, adjustable upwards from reduced pressure.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install equipment in accordance with manufacturer's instructions.
- B. Install compressor unit on vibration isolators. Level and bolt in place. Refer to Section 22 0548.
- C. Make air cock and drain connection on horizontal casing.
- D. Install line size gate valve and check valve on compressor discharge. Refer to Section 22 0523.
- E. Install replaceable cartridge type filter silencer of adequate capacity for each compressor.
- F. Place shut off valve on water inlet to aftercooler. Pipe drain to floor drain. Refer to Section 22 0523.
- G. Connect condensate drains to nearest floor drain.
- H. Install valved bypass around air dryer. Factory insulate inlet and outlet connections. Refer to Section 22 0523.
- I. Install valved drip connections at low points of piping system. Refer to Section 22 0523.
- J. Install takeoffs to outlets from top of main, with shut off valve after take off. Slope take off piping to outlets.

- K. Install compressed air couplings, female quick connectors, and pressure gages where outlets are indicated.
- L. Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.
- M. Identify piping system and components. Refer to Section 22 0553.

**3.02 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Compressed Air Piping Leak Test: Prior to initial operation, clean and test compressed air piping in accordance with ASME B31.1.
- C. Repair or replace compressed air piping as required to eliminate leaks, and retest to demonstrate compliance.
- D. Cap and seal ends of piping when not connected to mechanical equipment.

**END OF SECTION 22 1500**

