SECTION 221519 - GENERAL-SERVICE PACKAGED AIR COMPRESSORS AND RECEIVERS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

Lubricated, reciprocating air compressors.

Oil-free, reciprocating air compressors.

Oilless, reciprocating air compressors.

Oil-free, rotary-screw air compressors.

Oil-flooded, rotary-screw air compressors.

Oil-free, rotary, sliding-vane air compressors.

Oil-sealed, rotary, sliding-vane air compressors.

Inlet-air filters.

Air-cooled, compressed-air aftercoolers.

Water-cooled, compressed-air aftercoolers.

Refrigerant compressed-air dryers.

Desiccant compressed-air dryers.

Computer interface cabinet.

* + - 1. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

* + - * 1. Actual Air: Air delivered from air compressors. Flow rate is delivered compressed air measured in acfm.
				2. Standard Air: Free air at 68 deg F and 1 atmosphere before compression or expansion and measured in scfm.
			1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer's installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product.

Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

* + - * 1. Shop Drawings:

Include diagrams for power, signal, and control wiring.

Retain "Delegated-Design Submittal" paragraph below if design services have been delegated to Contractor.

* + - * 1. Delegated-Design Submittal: For compressed-air equipment mounting.

Detail fabrication and assembly of supports.

Include design calculations for selecting vibration isolators[**and seismic restraints**] and for designing vibration isolation bases.

Retain "Seismic Qualification Certificates" paragraph below if required by seismic criteria applicable to Project. Coordinate with Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment." See ASCE/SEI 7 for certification requirements for equipment and components.

* + - * 1. Seismic Qualification Certificates: For compressed-air equipment, accessories, and components, from manufacturer.

Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

* + - 1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For compressed-air equipment to include in emergency, operation, and maintenance manuals.
			2. MAINTENANCE MATERIAL SUBMITTALS
				1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Air-Compressor, Inlet-Air-Filter Elements: Equal to <**Insert number**> percent of amount installed, but no fewer than <**Insert number**> units.

Belts: [**One**] [**Two**] <**Insert number**> for each belt-driven compressor.

* + - 1. FIELD CONDITIONS

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

* + - * 1. Interruption of Existing Compressed-Air Service: Do not interrupt service to facilities occupied by Director’s Representative or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

Notify [**Construction Manager**] [**Director’s Representative**] no fewer than [**two**] <**Insert number**> days in advance of proposed interruption of compressed-air service.

Do not proceed with interruption of compressed-air service without [**Construction Manager's**] [**Director’s Representative's**] written permission.

* + - 1. COORDINATION
				1. Coordinate sizes and locations of concrete bases with actual equipment provided.
1. PRODUCTS

See Editing Instruction No. 1 in the Evaluations for cautions about named manufacturers and products.

* + - 1. SYSTEM DESCRIPTION
				1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 “Standard for Electrical Safety in the Workplace”, by a qualified testing agency, and marked for intended location and application.
				2. ASME Compliance: Fabricate and label receivers to comply with ASME Boiler and Pressure Vessel Code.
			2. PERFORMANCE REQUIREMENTS

Retain "Delegated Design" paragraph below if Contractor is required to assume responsibility for design.

* + - * 1. Delegated Design: Engage a qualified professional Director’s Representative to design compressed-air equipment mounting.

Retain "Seismic Performance" paragraph below with "Seismic Qualification Certificates" paragraph in "Informational Submittals" Article for projects requiring seismic design. Delete paragraph if performance requirements are indicated on Drawings. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Coordinate requirements with structural engineer.

* + - * 1. Seismic Performance: Compressed-air equipment shall withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

Retain subparagraph below to define the term "withstand" as it applies to this Project. Definition varies with type of building and occupancy and is critical to valid certification. Option is used for essential facilities where equipment must operate immediately after an earthquake.

The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified[**and the unit will be fully operational after the seismic event**]."

* + - 1. GENERAL REQUIREMENTS FOR PACKAGED AIR COMPRESSORS AND RECEIVERS
				1. General 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.
				2. Control Panels: Automatic control station with load control and protection functions. Comply with NEMA ICS 2 “Industrial Control and Systems Controllers, Contractors and Overload Relays Rated 600 Volts” and UL 508 “Standard for Safety for Industrial Control Equipment”.

Enclosure: NEMA ICS 6 “Industrial Control and Systems: Enclosures”, Type 12 control panel unless otherwise indicated.

Motor Controllers: Full-voltage, combination magnetic type with undervoltage release feature and motor-circuit-protector-type disconnecting means and short-circuit protective device.

Control Voltage: 120-V ac or less, using integral control power transformer.

Motor Overload Protection: Overload relay in each phase.

Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.

Retain first subparagraph below if Project has duplex and multiplex air compressors.

Automatic control switches to [**alternate lead-lag compressors for duplex**] [**sequence lead-lag compressors for multiplex**] air compressors.

Instrumentation: Include discharge-air pressure gage, air-filter maintenance indicator, hour meter, compressor discharge-air and coolant temperature gages, and control transformer.

Alarm Signal Device: For connection to alarm system to indicate when backup air compressor is operating.

* + - * 1. Receivers: Steel tank constructed according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

Pressure Rating: At least as high as highest discharge pressure of connected compressors and bearing appropriate code symbols.

Interior Finish: Corrosion-resistant coating.

Accessories: Include safety valve, pressure gage, drain, and pressure-reducing valve.

Retain "Mounting Frame" paragraph below for projects in seismic areas.

* + - * 1. Mounting Frame: Fabricate mounting and attachment to pressure vessel with reinforcement strong enough to resist packaged equipment movement during a seismic event when base is anchored to building structure.
			1. LUBRICATED, RECIPROCATING AIR COMPRESSORS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2343) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Atlas Copco](http://www.specagent.com/Lookup?uid=123457132565).

[General Air Products, Inc](http://www.specagent.com/Lookup?uid=123457132563).

[Powerex, Inc](http://www.specagent.com/Lookup?uid=123457132561).

Approved equivalent.

Verify that products of listed manufacturers below can produce volume of air at pressure required.

* + - * 1. Compressor(s): Lubricated, reciprocating-piston type with lubricated compression chamber and crankcase.

Submerged gear-type oil pump.

Oil filter.

Combined high discharge-air temperature and low lubrication-oil pressure switch.

Belt guard totally enclosing pulleys and belts.

If Project has more than one type or configuration of lubricated, reciprocating air compressor, delete "Capacities and Characteristics" paragraph below and schedule compressors on Drawings.

* + - * 1. Capacities and Characteristics:

Air Compressor(s): [**One**] [**Two**] [**Three**] <**Insert number**>; [**single**] [**single or two**] [**two**] stage.

Intercooler between stages of two-stage units.

Retain one of or both "Standard-Air Capacity of Each Air Compressor" and "Actual-Air Capacity of Each Air Compressor" subparagraphs below.

Standard-Air Capacity of Each Air Compressor: <**Insert scfm**> free air.

Actual-Air Capacity of Each Air Compressor: <**Insert acfm**> delivered.

Discharge-Air Pressure: [**100 psig**] [**125 psig**] [**175 psig**] <**Insert value**>.

Intake-Air Temperature: <**Insert deg F**>.

Discharge-Air Temperature: <**Insert deg F**>.

Mounting: [**Freestanding**] [**Tank mounted**].

Motor (Each Air Compressor):

Horsepower: <**Insert value**>.

Speed: [**1750**] [**3400**] <**Insert value**> rpm.

Electrical Characteristics:

Volts: [**120**] [**208**] [**240**] <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Receiver: ASME construction steel tank.

Arrangement: [**Horizontal**] [**Vertical**].

Capacity: <**Insert gal.**>.

Interior Finish: [**Epoxy**] [**Epoxy or galvanized**] [**Galvanized**] <**Insert coating**> coating.

Pressure Rating: [**100 psig**] [**125 psig**] [**150 psig**] [**200 psig**] [**250 psig**] <**Insert value**> minimum.

Pressure Regulator Setting: <**Insert psig**>.

Pressure Relief Valve Setting: <**Insert psig**>.

Drain: [**Automatic**] [**Manual**] valve.

* + - 1. OIL-FREE, RECIPROCATING AIR COMPRESSORS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2345) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Gast Manufacturing Inc](http://www.specagent.com/Lookup?uid=123457132569).

Approved equivalent.

Verify that products of listed manufacturers below can produce volume of air at pressure required.

* + - * 1. Compressor(s): Oil-free, reciprocating-piston type with nonlubricated compression chamber, lubricated crankcase, and of construction that prohibits oil from entering compression chamber.

Submerged gear-type oil pump.

Oil filter.

Combined high discharge-air temperature and low lubrication-oil pressure switch.

Belt guard totally enclosing pulleys and belts.

If Project has more than one type or configuration of oil-free, reciprocating air compressor, delete "Capacities and Characteristics" paragraph below and schedule compressors on Drawings.

* + - * 1. Capacities and Characteristics:

Air Compressor(s): [**One**] [**Two**] [**Three**] <**Insert number**>; single stage.

Retain one of or both "Standard-Air Capacity of Each Air Compressor" and "Actual-Air Capacity of Each Air Compressor" subparagraphs below.

Standard-Air Capacity of Each Air Compressor: <**Insert scfm**> free air.

Actual-Air Capacity of Each Air Compressor: <**Insert acfm**> delivered.

Discharge-Air Pressure: [**100 psig**] [**125 psig**] [**175 psig**] <**Insert value**>.

Intake-Air Temperature: <**Insert deg F**>.

Discharge-Air Temperature: <**Insert deg F**>.

Mounting: [**Freestanding**] [**Tank mounted**].

Motor (Each Air Compressor):

Horsepower: <**Insert value**>.

Speed: [**1750**] [**3400**] <**Insert value**> rpm.

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Receiver: ASME construction steel tank.

Arrangement: [**Horizontal**] [**Vertical**].

Capacity: <**Insert gal.**>.

Interior Finish: [**Epoxy**] [**Epoxy or galvanized**] [**Galvanized**] <**Insert coating**> coating.

Pressure Rating: [**100 psig**] [**125 psig**] [**150 psig**] [**200 psig**] [**250 psig**] <**Insert value**> minimum.

Pressure Regulator Setting: <**Insert psig**>.

Pressure Relief Valve Setting: <**Insert psig**>.

Drain: [**Automatic**] [**Manual**] valve.

* + - 1. OILLESS, RECIPROCATING AIR COMPRESSORS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2347) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Gast Manufacturing Inc](http://www.specagent.com/Lookup?uid=123457132637).

[General Air Products, Inc](http://www.specagent.com/Lookup?uid=123457132638).

[Powerex, Inc](http://www.specagent.com/Lookup?uid=123457132639).

Approved equivalent.

Verify that products of listed manufacturers below can produce volume of air at pressure required.

* + - * 1. Compressor(s): Oilless (nonlubricated), reciprocating-piston type, with sealed oil-free bearings, that deliver air of quality equal to intake air.

High discharge-air temperature switch.

Belt guard totally enclosing pulleys and belts.

If Project has more than one type or configuration of oilless, reciprocating air compressor, delete "Capacities and Characteristics" paragraph below and schedule compressors on Drawings.

* + - * 1. Capacities and Characteristics:

Air Compressor(s): [**One**] [**Two**] [**Three**] <**Insert number**>; [**single**] [**single or two**] [**two**] stage.

Intercooler between stages of two-stage units.

Retain one of or both "Standard-Air Capacity of Each Air Compressor" and "Actual-Air Capacity of Each Air Compressor" subparagraphs below.

Standard-Air Capacity of Each Air Compressor: <**Insert scfm**> free air.

Actual-Air Capacity of Each Air Compressor: <**Insert acfm**> delivered.

Discharge-Air Pressure: [**100 psig**] [**125 psig**] [**175 psig**] <**Insert value**>.

Intake-Air Temperature: <**Insert deg F**>.

Discharge-Air Temperature: <**Insert deg F**>.

Mounting: [**Freestanding**] [**Tank mounted**].

Motor (Each Air Compressor):

Horsepower: <**Insert value**>.

Speed: [**1750**] [**3400**] <**Insert value**> rpm.

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Receiver: ASME construction steel tank.

Arrangement: [**Horizontal**] [**Vertical**].

Capacity: <**Insert gal.**>.

Interior Finish: [**Epoxy**] [**Epoxy or galvanized**] [**Galvanized**] <**Insert coating**> coating.

Pressure Rating: [**100 psig**] [**125 psig**] [**150 psig**] [**200 psig**] [**250 psig**] <**Insert value**> minimum.

Pressure Regulator Setting: <**Insert psig**>.

Pressure Relief Valve Setting: <**Insert psig**>.

Drain: [**Automatic**] [**Manual**] valve.

* + - 1. OIL-FREE, ROTARY-SCREW AIR COMPRESSORS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2349) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Atlas Copco](http://www.specagent.com/Lookup?uid=123457132647).

[CompAir, Ltd](http://www.specagent.com/Lookup?uid=123457132645).

Approved equivalent.

Verify that products of listed manufacturers below can produce volume of air at pressure required.

* + - * 1. Compressor(s): Oil-free, rotary-screw type with nonlubricated helical screws and lubricated gear box, and of construction that prohibits oil from entering compression chamber.

Coupling: Nonlubricated, flexible type.

Cooling/Lubrication System: Unit-mounted, air-cooled exchanger package prepiped to unit; with air pressure circulation system with coolant stop valve, full-flow coolant filter, and thermal bypass valve.

Air Filter: Dry type, with maintenance indicator and cleanable, replaceable filter element.

Air/Coolant Receiver and Separation System: 150-psig- rated steel tank with ASME safety valve, coolant-level gage, multistage air-coolant separator element, minimum pressure valve, blowdown valve, discharge check valve, coolant stop valve, full-flow coolant filter, and thermal bypass valve.

Capacity Control: Capacity modulation between zero and 100 percent air delivery, with operating pressures between 50 and 100 psig. Include necessary control to hold constant pressure. When air demand is zero, unload compressor by using pressure switch and blowdown valve.

If Project has more than one type or configuration of oil-free, rotary-screw air compressor, delete "Capacities and Characteristics" paragraph below and schedule compressors on Drawings.

* + - * 1. Capacities and Characteristics:

Air Compressor(s): [**One**] [**Two**] <**Insert number**>; single stage.

Retain one of or both "Standard-Air Capacity of Each Air Compressor" and "Actual-Air Capacity of Each Air Compressor" subparagraphs below.

Standard-Air Capacity of Each Air Compressor: <**Insert scfm**> free air.

Actual-Air Capacity of Each Air Compressor: <**Insert acfm**> delivered.

Discharge-Air Pressure: [**100 psig**] [**125 psig**] [**175 psig**] <**Insert value**>.

Intake-Air Temperature: <**Insert deg F**>.

Discharge-Air Temperature: <**Insert deg F**>.

Motor (Each Air Compressor):

Horsepower: <**Insert value**>.

Speed: [**1750**] [**3400**] <**Insert value**> rpm.

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Receiver: ASME construction steel tank.

Arrangement: [**Horizontal**] [**Vertical**].

Capacity: <**Insert gal.**>.

Interior Finish: [**Epoxy**] [**Epoxy or galvanized**] [**Galvanized**] <**Insert coating**> coating.

Pressure Rating: [**100 psig**] [**125 psig**] [**150 psig**] [**200 psig**] <**Insert value**> minimum.

Pressure Regulator Setting: <**Insert psig**>.

Pressure Relief Valve Setting: <**Insert psig**>.

Drain: [**Automatic**] [**Manual**] valve.

Enclosure: Steel with sound-attenuating material lining.

* + - 1. OIL-FLOODED, ROTARY-SCREW AIR COMPRESSORS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2350) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Atlas Copco](http://www.specagent.com/Lookup?uid=123457132582).

[CompAir, Ltd](http://www.specagent.com/Lookup?uid=123457132578).

[Gardner Denver, an Ingersoll Rand business](http://www.specagent.com/Lookup?uid=123457132579).

Approved equivalent.

Verify that products of listed manufacturers below can produce volume of air at pressure required.

* + - * 1. Compressor(s): Oil-flooded, rotary-screw type with lubricated helical screws and lubricated gear box.

Coupling: Nonlubricated, flexible type.

Cooling/Lubrication System: Unit-mounted, air-cooled exchanger package prepiped to unit; with air pressure circulation system with coolant stop valve, full-flow coolant filter, and thermal bypass valve.

Air Filter: Dry type, with maintenance indicator and cleanable, replaceable filter element.

Air/Coolant Receiver and Separation System: 150-psig- rated steel tank with ASME safety valve, coolant-level gage, multistage air-coolant separator element, minimum pressure valve, blowdown valve, discharge check valve, coolant stop valve, full-flow coolant filter, and thermal bypass valve.

Capacity Control: Capacity modulation between zero and 100 percent air delivery, with operating pressures between 50 and 100 psig. Include necessary control to hold constant pressure. When air demand is zero, unload compressor by using pressure switch and blowdown valve.

If Project has more than one type or configuration of oil-flooded, rotary-screw air compressor, delete "Capacities and Characteristics" paragraph below and schedule compressors on Drawings.

* + - * 1. Capacities and Characteristics:

Air Compressor(s): [**One**] [**Two**] <**Insert number**>; [**single**] [**single or two**] [**two**] stage.

Retain one of or both "Standard-Air Capacity of Each Air Compressor" and "Actual-Air Capacity of Each Air Compressor" subparagraphs below.

Standard-Air Capacity of Each Air Compressor: <**Insert scfm**> free air.

Actual-Air Capacity of Each Air Compressor: <**Insert acfm**> delivered.

Discharge-Air Pressure: [**100 psig**] [**125 psig**] [**175 psig**] [**200 psig**] <**Insert value**>.

Intake-Air Temperature: <**Insert deg F**>.

Discharge-Air Temperature: <**Insert deg F**>.

Motor (Each Air Compressor):

Horsepower: <**Insert value**>.

Speed: [**1750**] [**3400**] <**Insert value**> rpm.

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Receiver: ASME construction steel tank.

Arrangement: [**Horizontal**] [**Vertical**].

Capacity: <**Insert gal.**>.

Interior Finish: [**Epoxy**] [**Epoxy or galvanized**] [**Galvanized**] <**Insert coating**> coating.

Pressure Rating: [**100 psig**] [**125 psig**] [**150 psig**] [**200 psig**] [**250 psig**] <**Insert value**> minimum.

Pressure Regulator Setting: <**Insert psig**>.

Pressure Relief Valve Setting: <**Insert psig**>.

Drain: [**Automatic**] [**Manual**] valve.

Enclosure: Steel with sound-attenuating material lining.

* + - 1. OIL-FREE, ROTARY, SLIDING-VANE AIR COMPRESSORS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2352) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Becker Pumps Corp](http://www.specagent.com/Lookup?uid=123457132650).

[Gast Manufacturing Inc](http://www.specagent.com/Lookup?uid=123457132649).

Approved equivalent.

Verify that products of listed manufacturers below can produce volume of air at pressure required. Manufacturers in first two subparagraphs make low-capacity air compressors that deliver air at a maximum of 20 to 25 psig (138 to 173 kPa).

* + - * 1. Compressor(s): Oil-free, nonpulsating, rotary, sliding-vane type with nonlubricated sliding vanes.

Cleanable inlet screens.

Outlet silencers on discharge connections.

If Project has more than one type or configuration of oil-free, rotary, sliding-vane air compressor, delete "Capacities and Characteristics" paragraph below and schedule compressors on Drawings.

* + - * 1. Capacities and Characteristics:

Air Compressor(s): [**One**] [**Two**] <**Insert number**>; single stage.

Retain one of or both "Standard-Air Capacity of Each Air Compressor" and "Actual-Air Capacity of Each Air Compressor" subparagraphs below.

Standard-Air Capacity of Each Air Compressor: <**Insert scfm**> free air.

Actual-Air Capacity of Each Air Compressor: <**Insert acfm**> delivered.

Discharge-Air Pressure: [**15 psig**] [**20 psig**] [**25 psig**] <**Insert value**>.

Intake-Air Temperature: <**Insert deg F**>.

Discharge-Air Temperature: <**Insert deg F**>.

Mounting: [**Freestanding**] [**Tank mounted**].

Motor (Each Air Compressor):

Horsepower: <**Insert value**>.

Speed: [**1750**] [**3400**] <**Insert value**> rpm.

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Receiver: ASME construction steel tank.

Arrangement: [**Horizontal**] [**Vertical**].

Capacity: <**Insert gal.**>.

Interior Finish: [**Epoxy**] [**Epoxy or galvanized**] [**Galvanized**] <**Insert coating**> coating.

Pressure Rating: [**100 psig**] <**Insert value**> minimum.

Pressure Regulator Setting: <**Insert psig**>.

Pressure Relief Valve Setting: <**Insert psig**>.

Drain: [**Automatic**] [**Manual**] valve.

* + - 1. OIL-SEALED, ROTARY, SLIDING-VANE AIR COMPRESSORS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2355) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[CompAir, Ltd](http://www.specagent.com/Lookup?uid=123457132589).

[Gast Manufacturing Inc](http://www.specagent.com/Lookup?uid=123457132586).

Approved equivalent.

Verify that products of listed manufacturers below can produce volume of air at pressure required. Manufacturers in first two subparagraphs make low-capacity air compressors that deliver air at a maximum of 25 to 30 psig (173 to 207 kPa). Manufacturer in fourth subparagraph below makes high-capacity air compressors that deliver air at pressures of up to 150 psig (1035 kPa).

* + - * 1. Compressor(s): Nonpulsating, rotary, sliding-vane type with oil-sealed sliding vanes.

Cleanable inlet screens.

Outlet silencers and oil-mist separators on discharge connections.

If Project has more than one type or configuration of oil-sealed, rotary, sliding-vane air compressor, delete "Capacities and Characteristics" paragraph below and schedule compressors on Drawings.

* + - * 1. Capacities and Characteristics:

Air Compressor(s): [**One**] [**Two**] <**Insert number**>; single stage.

Retain one of or both "Standard-Air Capacity of Each Air Compressor" and "Actual-Air Capacity of Each Air Compressor" subparagraphs below.

Standard-Air Capacity of Each Air Compressor: <**Insert scfm**> free air.

Actual-Air Capacity of Each Air Compressor: <**Insert acfm**> delivered.

Discharge-Air Pressure: [**20 psig**] [**25 psig**] [**30 psig**] [**100 psig**] [**125 psig**] <**Insert value**>.

Intake-Air Temperature: <**Insert deg F**>.

Discharge-Air Temperature: <**Insert deg F**>.

Mounting: [**Freestanding**] [**Tank mounted**].

Motor (Each Air Compressor):

Horsepower: <**Insert value**>.

Speed: [**1750**] [**3400**] <**Insert value**> rpm.

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

Receiver: ASME construction steel tank.

Arrangement: [**Horizontal**] [**Vertical**].

Capacity: <**Insert gal.**>.

Interior Finish: [**Epoxy**] [**Epoxy or galvanized**] [**Galvanized**] <**Insert coating**> coating.

Pressure Rating: [**100 psig**] [**125 psig**] [**150 psig**] <**Insert value**> minimum.

Pressure Regulator Setting: <**Insert psig**>.

Pressure Relief Valve Setting: <**Insert psig**>.

Drain: [**Automatic**] [**Manual**] valve.

* + - 1. INLET-AIR FILTERS

Retain one of two "Description" paragraphs in this article.

* + - * 1. Description: Combination inlet-air filter-silencer, suitable for remote installation, for each air compressor.

Revise "Construction" subparagraph below if filter is in-line type and installed in an interior space. Install gooseneck with screen on exterior air inlet.

Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.

Capacity: Match capacity of air compressor, with filter having collection efficiency of 99 percent retention of particles larger than 10 micrometers.

* + - * 1. Description: Combination inlet-air filter-silencer, suitable for remote installation, for multiple air compressors.

Revise "Construction" subparagraph below if filter is in-line type and installed in an interior space. Install gooseneck with screen on exterior air inlet.

Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.

Capacity: Match total capacity of connected air compressors, with filter having collection efficiency of 99 percent retention of particles larger than 10 micrometers.

* + - 1. AIR-COOLED, COMPRESSED-AIR AFTERCOOLERS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2357) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

AKG Group.

IPAC, Inc.

[Van Air Systems, Inc](http://www.specagent.com/Lookup?uid=123457132597).

Approved equivalent.

* + - * 1. Description: Electric-motor-driven, fan-operation, finned-tube unit; rated at [**250 psig**] <**Insert value**> and leak tested at 350-psig minimum air pressure; in capacities indicated. Size units to cool compressed air in compressor-rated capacities to [**10 deg F**] <**Insert temperature**> above summertime maximum ambient temperature. Include moisture separator and automatic drain.

If Project has more than one type or configuration of air-cooled, compressed-air aftercooler, delete "Capacities and Characteristics" paragraph below and schedule aftercoolers on Drawings.

* + - * 1. Capacities and Characteristics:

Standard-Air Capacity of Each Aftercooler: <**Insert scfm**> free air.

Pressure: <**Insert psig**>.

Entering, Compressed-Air Temperature: <**Insert deg F**>.

Leaving, Compressed-Air Temperature: <**Insert deg F**>.

Ambient-Air Temperature: <**Insert deg F**>.

Maximum Compressed-Air-Pressure Drop: <**Insert psig**>.

Motor Horsepower: <**Insert value**>.

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

* + - 1. Water-Cooled, Compressed-Air Aftercoolers

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2358) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Aircel.

IPAC, Inc.

Approved equivalent.

* + - * 1. Description: Shell-and-tube unit, rated at [**250 psig**] <**Insert value**> and leak tested at 350-psig minimum air pressure, in capacities indicated. Include moisture separator and automatic drain.

If Project has more than one type or configuration of water-cooled, compressed-air aftercooler, delete "Capacities and Characteristics" paragraph below and schedule aftercoolers on Drawings.

* + - * 1. Capacities and Characteristics:

Standard-Air Capacity of Each Aftercooler: <**Insert scfm**> free air.

Pressure: <**Insert psig**>.

Entering-Water Temperature: <**Insert deg F**>.

Water Flow: <**Insert gpm**>.

Entering, Compressed-Air Temperature: <**Insert deg F**>.

Leaving, Compressed-Air Temperature: <**Insert deg F**>.

* + - 1. REFRIGERANT COMPRESSED-AIR DRYERS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2359) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Air/Tak, Inc](http://www.specagent.com/Lookup?uid=123457132617).

[Atlas Copco](http://www.specagent.com/Lookup?uid=123457132619).

[Pioneer Air Systems, Inc](http://www.specagent.com/Lookup?uid=123457132622).

Approved equivalent.

* + - * 1. Description: Noncycling, air-cooled, electric-motor-driven unit with steel enclosure and capability to deliver 35 deg F, 100-psig 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.

If Project has more than one type or configuration of refrigerant compressed-air dryer, delete "Capacities and Characteristics" paragraph below and schedule dryers on Drawings.

* + - * 1. Capacities and Characteristics:

Standard-Air Capacity of Each Compressed-Air Dryer: <**Insert scfm**> free air.

Pressure: <**Insert psig**>.

Entering-Air Temperature: <**Insert deg F**>.

Leaving-Air Temperature: <**Insert deg F**>.

Leaving-Air Dew Point Temperature: <**Insert deg F**>.

Ambient-Air Temperature: <**Insert deg F**>.

Maximum Air-Pressure Drop: <**Insert psig**>.

Inlet Filter: [**5**] <**Insert number**> micrometers.

Outlet Filter: [**1**] <**Insert number**> micrometer(s).

Motor Horsepower: <**Insert value**>.

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

* + - 1. DESICCANT COMPRESSED-AIR DRYERS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2360) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Numatics, Incorporated](http://www.specagent.com/Lookup?uid=123457132659).

[Van Air Systems, Inc](http://www.specagent.com/Lookup?uid=123457132654).

Approved equivalent.

* + - * 1. Description: Twin-tower unit with purge system, mufflers, and capability to deliver [**plus 10 deg F, 100-psig**] <**Insert values**> air at dew point. Include dew point controlled purge, step-down transformers, disconnect switches, inlet and outlet pressure gages, thermometers, automatic controls, and filters.

If Project has more than one type or configuration of desiccant compressed-air dryer, delete "Capacities and Characteristics" paragraph below and schedule dryers on Drawings.

* + - * 1. Capacities and Characteristics:

Standard-Air Capacity of Each Compressed-Air Dryer: <**Insert scfm**> free air.

Pressure: <**Insert psig**>.

Entering-Air Temperature: <**Insert deg F**>.

Leaving-Air Temperature: <**Insert deg F**>.

Leaving-Air Dew Point Temperature: <**Insert deg F**>.

Ambient-Air Temperature: <**Insert deg F**>.

Maximum Air-Pressure Drop: <**Insert psig**>.

Inlet Filter: [**5**] <**Insert number**> micrometers.

Outlet Filter: [**1**] <**Insert number**> micrometer(s).

Electrical Characteristics:

Volts: <**Insert value**>.

Phase(s): [**Single**] [**Three**].

Hertz: [**60**] <**Insert value**>.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

* + - 1. COMPUTER INTERFACE CABINET

Cabinet in this article is for connection to facility computer.

* + - * 1. Description:

Wall mounting.

Welded steel with white enamel finish.

Gasketed door.

Grounding device.

Factory-installed, signal circuit boards.

Power transformer.

Circuit breaker.

Wiring terminal board.

Internal wiring capable of interfacing [**20**] <**Insert number**> alarm signals.

* + - 1. MOTORS

Default motor characteristics are specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

* + - * 1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

Verify enclosure types with manufacturer of specified equipment. Delete "Enclosure" subparagraph below if included in schedule on Drawings or in "Capacities and Characteristics" paragraphs.

Enclosure: [**Open, dripproof**] [**Totally enclosed, fan cooled**] [**Totally enclosed, air over**] [**Open, externally ventilated**] [**Totally enclosed, nonventilated**] [**Severe duty**] [**Explosion proof**] [**Dust-ignition-proof machine**].

Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load does not require motor to operate in service factor range above 1.0.

If unique characteristics are required for motors in this Section, retain paragraph below.

* + - * 1. <**Insert unique motor characteristics**>.
1. EXECUTION
	* + 1. EQUIPMENT INSTALLATION
				1. Equipment Mounting:

Retain one of first two subparagraphs below to require equipment to be installed on cast-in-place concrete equipment bases.

Install air compressors[**and aftercoolers**] [**and air dryers**] [**, aftercoolers, and air dryers**] on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

Install [**water-cooled, compressed-air aftercoolers**] [**and**] [**desiccant compressed-air dryers**] on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

Retain one of two subparagraphs below. Retain first for projects in seismic areas; retain second for projects not in seismic areas. Indicate vibration isolation and seismic-control device type and minimum deflection in supported equipment schedule on Drawings.

Comply with requirements for vibration isolation and seismic control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment"

Comply with requirements for vibration isolation devices specified in Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment."

* + - * 1. Install compressed-air equipment anchored to substrate.
				2. Arrange equipment so controls and devices are accessible for servicing.
				3. Maintain manufacturer's recommended clearances for service and maintenance.
				4. Install the following devices on compressed-air equipment:

Thermometer, Pressure Gage, and Safety Valve: Install on each compressed-air receiver.

Pressure Regulators: Install downstream from air compressors[**and dryers**].

Automatic Drain Valves: Install on aftercoolers, receivers, and dryers. Discharge condensate over nearest floor drain.

* + - 1. CONNECTIONS

Coordinate piping installations and specialty arrangements with Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Comply with requirements for piping specified in Section 221513 "General-Service Compressed-Air Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
				2. Where installing piping adjacent to machine, allow space for service and maintenance.
			1. IDENTIFICATION
				1. Identify general-service air compressors and components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."
			2. STARTUP SERVICE
				1. [**Engage a Company Field Advisor per OGS Spec Section 014216 to perform**] [**Perform**] startup service.

Complete installation and startup checks according to manufacturer's written instructions.

Check for lubricating oil in lubricated-type equipment.

Check belt drives for proper tension.

Verify that air-compressor inlet filters and piping are clear.

Check for equipment vibration-control supports and flexible pipe connectors and verify that equipment is properly attached to substrate.

Check safety valves for correct settings. Ensure that settings are higher than air-compressor discharge pressure, but not higher than rating of system components.

Retain first subparagraph below if seismic restraints are required.

Check for proper seismic restraints.

Drain receiver tanks.

Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

Test and adjust controls and safeties.

* + - 1. DEMONSTRATION
				1. [**Engage a Company Field Advisor per OGS Spec Section 014216 to train**] [**Train**] Facility’s maintenance personnel to adjust, operate, and maintain air compressors[**and aftercoolers**][**and air dryers**] [**, aftercoolers, and air dryers**].

END OF SECTION 221519