

SECTION 236200
PACKAGED COMPRESSOR AND CONDENSER UNITS

PART 1 GENERAL**1.01 SUMMARY**

- A. Section includes packaged, refrigerant compressor and condenser units.

1.02 SUBMITTALS

- A. Product Data: For each compressor and condenser unit. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include equipment dimensions, weights and structural loads, required clearances, method of field assembly, components, and location and size of each field connection.
- B. Shop Drawings: For compressor and condenser units. Include plans, elevations, sections, details, and attachments to other work.
1. Wiring Diagrams: For power, signal, and control wiring.
 2. Refrigerant Piping Diagrams: As required/recommended by the factory for the split system components/equipment furnished.
 - a. Detail on the contract drawings are to be modified to ensure manufacturer's recommendations are met/included.
 - b. Line Sizes, for refrigerant suction, liquid, and hot gas bypass.
 - c. Schematic Arrangement including connections, oil traps, and double risers as required.
 - d. Show and list all Refrigeration Specialties and Valves, oil separators, suction accumulators,
 3. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - a. Structural members to which compressor and condenser units will be attached/mounted
 4. Clearance to screen walls, and other adjacent equipment, structure, etc
- C. Warranty: Sample of special warranty.

1.03 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. Fabricate and label refrigeration system according to ASHRAE 15, "Safety Standard for Refrigeration Systems."
- C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6, "Heating, Ventilating, and Air-Conditioning."
- D. ASME Compliance: Fabricate and label water-cooled compressor and condenser units to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

1.04 COORDINATION

- A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements with construction manager and concrete contractor.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations with the construction manager and the roofing contractor.
- C. Coordinate location of piping and electrical rough-ins.

1.05 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of compressor and condenser units that fail in materials or workmanship within specified warranty period. Manufacturer's warranty shall be supplemented by installer's special warranty of work for the entire refrigerant piping system to cover gaps due to difference between delivery date and date of substantial completion.

1. Failures include, but are not limited to, the following:
 - a. Compressor failure.
 - b. Failure of Sensors/Switches/Controls and Electrical Components
 - c. Condenser coil leak.
 - d. Field Installed Refrigerant Piping/Specialties Leaks/Failures
2. Warranty Period (Entire unit, Parts and Labor): Two Years from start of beneficial use.
3. Warranty Period (Compressor Only): Five Years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 COMPRESSOR AND CONDENSER UNIT, AIR COOLED, ACCU-1 AND ACCU-2

- A. Manufacturers: Subject to Compliance with specifications provide unit as manufactured by one of the following
 1. Trane
 2. AAON
 3. Daikin
- B. Description: Factory assembled and tested, air cooled; consisting of casing, compressors, condenser coils, condenser fans and motors, and unit controls.
- C. Capacity Control: RAWAL APR Valve or Digital Scroll Compressors on each circuit
- D. Compressor: Hermetic scroll compressor designed for service with crankcase sight glass, crankcase heater, and backseating service access valves on suction and discharge ports.
- E. Refrigerant: R-410A
- F. Condenser Coil: Aluminum tube micro-channel or seamless copper tube, aluminum-fin coil, including subcooling circuit and backseating liquid-line service access valve. Factory pressure test coils, then dehydrate by drawing a vacuum and fill with a holding charge of nitrogen or refrigerant.
- G. Condenser Fans: Propeller-type vertical discharge; either directly or belt driven. Include the following:
 1. Permanently lubricated, ball-bearing motors.
 2. Separate motor for each fan.
 3. Dynamically and statically balanced fan assemblies.
- H. Operating and safety controls include the following:
 1. Manual-reset, high-pressure cutout switches.
 2. Automatic-reset, low-pressure cutout switches.
 3. Low-oil-pressure cutout switch.
 4. Compressor-winding thermostat cutout switch.
 5. Three-leg, compressor-overload protection.
 6. Control transformer.
 7. Magnetic contactors for compressor and condenser fan motors.
 8. Timer to prevent excessive compressor cycling.
- I. Factory Installed Accessories:
 1. Power Factor Correction: 0.95
 2. Low-Ambient Controller: Cycles condenser fan to permit operation down to 0 deg F with time-delay relay to bypass low-pressure switch.
 3. Phase Monitor Kit: with control and fully wired.
 4. Gage Panel: Package with refrigerant circuit suction and discharge gages.
 5. Part-winding-start timing relay, circuit breakers, and contactors.
 6. 115V/1ph Convenience Receptacle: Factory Prewired
- J. Field Installed Accessories (As approved for use with equipment by equipment manufacturer to be installed by mechanical contractor per manufacturers installation instructions): Refer to detail on drawings and manufacturer's installation manual for additional information.
 1. Thermal Expansion Valves
 2. Core Driers with bypass and bypass valving per detail.

3. Sight Glass
 4. Solenoid Valves
 5. Hot Gas Bypass (on lead circuit, as applicable)
 6. AS REQUIRED BY UNIT MANUFACTURER based on refrigerant piping layout:
 - a. Oil Separators: One for each circuit, Temprite Coalescent or equivalent with heater and mounting bracket.
 - b. Suction Accumulator: One for each circuit, as approved by unit manufacturer.
- K. Unit Casings: Designed for outdoor installation with weather protection for components and controls and with removable panels for required access to compressors, controls, condenser fans, motors, and drives. Additional features include the following:
1. Steel, galvanized or zinc coated, for exposed casing surfaces; treated and finished with manufacturer's standard paint coating.
 2. Perimeter base rail with forklift slots and lifting holes to facilitate rigging.
 3. Gasketed control panel door.
 4. Nonfused disconnect switch, factory mounted and wired, for single external electrical power connection.
 5. Condenser coil guards: Grille type.
- L. Capacities and Characteristics: As Scheduled on the Drawings

2.02 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate compressor and condenser units according to ARI 206/110 or ARI 306/110.
- B. Salt Spray Testing: Certified 1000 hrs per ASTM B-117.
- C. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1-2010, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," Section 6, "Heating, Ventilating, and Air-Conditioning."
- D. Test and inspect shell and tube condensers according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- E. Testing Requirements: Factory test sound-power-level ratings according to ARI 270.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of compressor and condenser units.
- B. Examine roughing-in for refrigerant piping systems to verify actual locations of piping connections before equipment installation.
- C. Examine walls, floors, and roofs for suitable conditions where compressor and condenser units will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install units level and plumb, firmly anchored in locations indicated.
- B. Install roof-mounting units on equipment supports specified in architectural plans and associated specification sections.
- C. On Grade Equipment Mounting: Install compressor and condenser units on cast-in-place concrete equipment bases.
- D. Maintain manufacturer's recommended clearances for airflow, service, and maintenance.
- E. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

3.03 CONNECTIONS

- A. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- B. Connect pre-charged refrigerant tubing to unit's quick-connect fittings. Install tubing so it does not interfere with access to unit. Install accessories.
- C. Connect refrigerant piping to air-cooled compressor and condenser units; maintain required access to unit. Install furnished field-mounted accessories. Refrigerant piping and specialties are specified in Section 232300 "Refrigerant Piping."

3.04 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test. Certify compliance with test parameters.
 - 2. Leak Test: After installation, charge system with refrigerant and oil and test for leaks. Repair leaks, replace lost refrigerant and oil, and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor operation and unit operation, product capability, and compliance with requirements.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 5. Verify proper airflow over coils.
- B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
- C. Compressor and condenser units will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.05 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service:
 - 1. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - a. Inspect for physical damage to unit casing.
 - b. Verify that access doors move freely and are weathertight.
 - c. Clean units and inspect for construction debris.
 - d. Verify that all bolts and screws are tight.
 - e. Adjust vibration isolation and flexible connections.
 - f. Verify that controls are connected and operational.
- B. Lubricate bearings on fan motors.
- C. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
- D. Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.
- E. Measure and record airflow and air temperature rise over coils.
- F. Verify proper installation AND operation of condenser capacity control device.
- G. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
- H. Verify proper installation of refrigerant specialties and appurtenances including field installed devices such as, driers, expansion valves, oil separators and accumulators.
- I. After startup and performance test, lubricate bearings.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain compressor and condenser units.

END OF SECTION 236200

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