SECTION 23 80 00

DECENTRALIZED HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY:

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:
1. Split System Air Conditioning Units
2. Unit Heaters
3. Miscellaneous Appurtenances

C. Related Sections:

1. Division 01 -- Commissioning
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment
5. Section 23 05 53 – Identification for HVAC Piping and Equipment
6. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
7. Section 23 09 00 – Instrumentation and Control for HVAC
8. Section 23 20 00 – HVAC Piping and Pumps
9. Section 23 30 00 – HVAC Air Distribution
10. Section 23 50 00 – Central Heating Equipment
11. Section 23 60 00 – Central Cooling Equipment

1.2 REFERENCES:

A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.

B. Air Moving and Conditioning Association, Inc. (AMCA):

Bulletin 210	Standard Test Code for Air Moving Devices

C. Air Conditioning and Refrigeration Institute (ARI):

Standard 210	Standard for Unitary Air Conditioning Equipment
Standard 240	Standard for Unitary Heat Pump

Standard 310	Standard for Packaged Terminal Air Conditioners
Standard 410	Standard for Forced Circulation Air Cooling and Heating Coils
Standard 440	Standard for Room Fan Coil Air Conditioners

D. American National Standards Institute (ANSI):

Standard B31.1	Code for Pressure Piping

E. American Society of Heating, Refrigeration and Air Conditioning Engineers (ANSI/ASHRAE):

Standard 15	Safety Code for Mechanical Refrigeration

F. National Fire Protection Association (NFPA):

Standard 90A	Air Conditioning and Ventilating Systems of other than Residence Type

G. National Electrical Manufacturers Association (NEMA)

H. Sheet Metal and Air Conditioning Contractors' Association (SMACNA)

Duct Construction Standards (Latest Edition)

I. Underwriters Laboratories, Inc. (UL)

1.3 EQUIPMENT LABEL:

A. All mechanical equipment and appliances shall be listed and labeled by a nationally recognized testing and inspection agency approved by the authority having jurisdiction. All equipment and appliances shall be installed in accordance with the conditions of the listing. Manufacturer's installation instructions shall be available at the job site at the time of inspection.

1.4 COMMISSIONING OF HVAC SYSTEMS:

A. The Contractor shall provide contact information to the Commissioning Agent indicated in Division 1 for all major items of Equipment.

B. Provide additional submittal copy of major equipment for Commissioning Agent specified in Division 1.

1.5 SUBMITTALS:

A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.

B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.

C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 01 00.

1.6 SPARE PARTS:

A. Each cooling or heating unit shall be provided with 3 sets of filters. At end of construction each unit shall be provided with a clean filter and one set shall be turned over to the Owner as spares.

PART 2 - PRODUCTS

2.1 SPLIT SYSTEM AIR CONDITIONING UNITS [S] [O/M]:

A. General: Equipment and material specified under this heading shall be furnished and installed by a certified representative of Carrier or Trane. Each system shall consist of condensing unit, air unit, refrigerant piping and system controls. Each system shall conform with the applicable ARI Standard.

B. Condensing (outdoor) unit shall be complete with compressor-motor unit, condenser coil, welded-wire or stamped sheet metal condenser coil guards, condenser fans, motor starters, compressor hard start kit, controls and piping enclosed in a sheet steel enclosure recommended for outside installation. Condenser fans shall be vertical or horizontal discharge as shown. Intake and discharge openings shall be provided with welded-wire or stamped sheet metal coil guards. Condensing unit controls shall provide automatic capacity modulation and condenser and evaporator pressure control for operation down to 0°F outside air temperature. Provide controls as required for enthalpy economizer. Crankcase heater shall be provided in compressor body.

C. Fan coil (indoor) unit shall be complete with cooling coils, heating coils, fans, fan motor and drive, filters, drain pan, controls and refrigerant piping enclosed in an insulated casing. Cooling coils shall be non-ferrous direct expansion type. Unit shall be provide without heating coil. Fan motor drive shall be adjustable, fully guarded. Filters shall be one inch thick pleated media. Provide thermal expansion valve and sight glass for each cooling coil circuit and liquid solenoid as required for compressor capacity control.

D. Refrigerant piping and specialties are specified in Section 23 20 00.

E. Controls for safe automatic controlled operation of each system shall be provided. Unit shall be provided with manufacturer provided programmable thermostat with integrated

single zone variable air volume operation. Thermostat shall be capable of displaying discharge air temperature alarms. Thermostat shall be capable of day of the week scheduling of space temperature set points. Provide thermostat to limit cooling coil discharge air to 45°F or above by cycling the compressor(s).

F. Refrigerant: Each system shall be cleaned, purged and completely charged with refrigerant and oil, and guaranteed to be free of leakage for one year.

G. Performance Test: Each system shall be tested and checked out for safe controlled operation. One week before final inspection, a letter in three copies from the certified representative shall be submitted to the Engineer certifying that each system is performing safely and satisfactorily.

H. Warranty: Motor-compressor shall be guaranteed for five (5) years.

I. See PART 1 for spare parts requirements.

2.2 HEATING AND COOLING COILS [S]:

A. General: This specification applies to all coils whether remote mounted, mounted in factory fabricated air handling units or mounted in site-built units and shall be used as a guideline to establish the minimum requirements unless definitely specified otherwise for the particular case involved.

B. Direct expansion (DX) refrigerant evaporator coils shall be full tube face, fin and tube type constructed of seamless copper tubes and aluminum fins mechanically bonded to tubes. Coil support frame shall be heavy gauge galvanized steel with heavy gauge flanges and support plates. Tubes shall be 1/2 inch or 5/8 inch diameter. Tube wall shall be minimum 0.020 inch thickness. Fins shall be minimum .0075 inch thickness. Tubes shall be staggered and circuited with equalizing distributing tubes to match the number of compressor refrigerant circuits provided. Coil circuiting shall be full face interlaced type where required for optimum capacity reduction. Units shall be provided with brass liquid distributors for each circuit. Coils shall be factory proof tested at 450 psig and leak tested at 300 psig, cleaned, dehydrated and sealed with dry nitrogen charge. Coils shall be coordinated with the manufacturer of the condensing unit for capacities indicated. Cooling coil ratings shall be certified in accordance with ARI Standard #410. Maximum cooling coil face velocity shall not exceed 550 feet per minute.

C. Electric coils shall be UL approved and shall be 80% nickel – 20% chromium bare wire heating elements, unless indicated otherwise, mounted in a frame and wired at the factory to an identified terminal strip enclosed in a metal box on one end of the coil. Heater frame shall be constructed for slip-in or flanged frame installation as applicable. Thermal cutout shall be provided to prevent the coil from overheating. Solid state silicone controlled rectifiers (SCR) shall be provided for fully modulating control. Control voltage shall be suitable for control system indicated. Contactors and fuse block shall be UL approved and mounted and wired inside a steel cabinet for remote

mounting with all wiring terminated at an identified terminal strip inside the cabinet. Provide air motion switch to prevent heater from operating unless there is proper air flow. Provide additional interlock connections as indicated in Section 23 09 00. An interlocking safety disconnect switch shall be provided in the terminal box door of each coil.

D. Heating and cooling coils in the same unit shall be provided as separate coils with independent fin sheets to allow preheat, dehumidification, and individual removal of each coil.

2.3 UNIT HEATERS [S] [O/M]:

A. Electric unit heaters shall be Markel heavy duty unit heater complete with UL approved steel finned tubular electric heating element, thermal limit switch, direct connected motor and propeller fan, decorative steel enclosure, individually adjustable louvers, suspension hanger accessories, built-in non-fused disconnect switch, wall thermostat and contactor. Unit heater fan and heating element shall be factory wired.

B. See PART 1 for spare parts requirements.
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2.4 MISCELLANEOUS APPURTENANCES [S] [O/M]:

A. Gravity Dampers [S] shall be Ruskin counter balanced back draft damper constructed of felt edged aluminum blades. Set to open at .10” H_2O.

B. Miscellaneous electric appurtenances such as transformers, solenoid valves, electric relays, selector switches, on-off switches, pilot lights and other similar items required by the electric sequence control diagrams and not shown to be provided by the Electrical Contractor shall be provided as part of the Mechanical Contract.

1. Solenoid valves shall be Asco or Alco of coil rating and size to accomplish the indicated requirement.
2. On-Off switches shall be toggle type, 20 amp. contract rating complete with engraved cover plate where required.
3. Selector switches shall be manual selector type with the indicated poles and contacts and engraved cover plate. Contact rating shall be a minimum of 20 amps.
4. Relays shall be G.E., Square D, or Cutler-Hammer 20 amp rating with sufficient contacts for the sequence indicated.

C. Thermostats [S] [O/M] shall be provided as indicated below. The use of thermostats containing mercury is not allowed.

1. Programmable Thermostats (s):

a. Programmable thermostats shall be Honeywell T7300A thermostat and a Q7300 subbase, or approved equal for conventional heating/cooling

operation. The thermostat shall contain a keyboard for entering the times and temperatures along with a liquid crystal display for reading information. The thermostat shall contain a microprocessor that performs the calculations to control the system.

b. The T7300A thermostat shall contain a three hour override button, enabling programmed temperatures to be overridden from unoccupied mode to occupied mode.

c. The T7300A thermostat with Q7300 subbase shall provide a system that will control with system or fan switching and seven-day flexible programming with two occupied and two unoccupied periods per day for each of the seven days of the week. The system shall have individual setpoints for occupied heat and cool, and unoccupied heat and cool. System shall have auxiliary relay output for occupied/unoccupied control of auxiliary fans and dampers. System shall have capability to provide contact closures for two stages of output for heating and two stages of output for cooling.

2. Unit heater thermostats for space mounting shall be Johnson Controls T26, line voltage type with SP-ST switching action rated 6 amp. full load and 36 amp. locked rotor at 120 volts.
3. Exhaust fan thermostats shall be Johnson Controls T22 with auto-off fan switch. The thermostat shall be rated for 6 amps. at 120 volts.
4. Heavy duty heating thermostats shall be Johnson Controls T22 rated for 16 amps. at 120 volts.
5. Electric cooling thermostats shall be Johnson Controls T26J rated for 6 amps. at 120 volts.
6. Outdoor thermostats shall be Johnson Controls A19 Series.
7. Firestats shall be UL approved, Johnson Controls A25 manual reset type with an adjustable temperature setting. Set at 125°F.
8. Thermostat guards shall be rectangular (wire, plastic, cast aluminum) with baseplate (except wire type) and all required accessories for wall mounting. Guards shall have ample openings to allow fast sensing of room air conditions. Guards and baseplate shall be selected and sized to suit type of thermostat and mounting where installed.

D. Pipe Heat Trace [S] shall be Chromalox, UL Listed, RAPID-TRACE, Type SRL self-regulating heating cable. Buss wires shall be 16 AWG copper. Heating matrix shall be semi-conductive polymer for self regulation. Jacket shall be water and chemical resistant, flame-retardant thermoplastic rubber with protective tinned-copper braid. Provide all accessories required for a safe watertight installation. Heat Trace shall protect piping indicated to -10°F.

E. Blowdown separator [S] [O/M] shall be Johnston Boiler Company, or accepted equal, complete with after cooler, drain and vent fittings and ASME stamped for 150 psi service.

F. Dampers and Damper Motors:

1. Automatic control dampers shall be opposed blade construction for modulating service and parallel blade construction for two-position service. Dampers shall be of the multi-louver construction with brass bearings, channel iron frame and maximum width of 10”. Damper blades shall be interlocking felt edged and air tight.
2. Damper motors shall be provided for all automatic dampers and shall be sufficient capacity to operate the connected damper. Damper motor shall be electric type.

PART 3 - EXECUTION

3.1 GENERAL:

A. All equipment and materials, specified herein or shown on the drawings shall be installed complete, coordinated with all other work, tested and made tight and put into safe controlled operation to perform its intended function as a part of this project.

B. All rooftop equipment shall be secured to the roof framing structure.

3.2 ROOFTOP AIR CONDITIONING UNITS:

A. Coordinate all openings and location with structural systems.

B. Contractor’s attention is directed to Section 23 05 48 for requirements.

C. Install and connect unit in accordance with manufacturer’s recommendations and contract drawing details. Should conflicts in the two occur notify the Architect/Engineer.

D. Coordinate all control items with Section 23 09 00.

3.3 UNIT HEATERS:

A. Coordinate all heater locations with all lights, piping, ductwork and structural systems.

END OF SECTION 23 80 00