SECTION 15732

AIR CONDITIONING UNIT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Packaged, split system air conditioning unit No. 1.

1.02 REFERENCES

A. Air-Conditioning, Heating, and Refrigeration Institute (AHRI):
   1. 210-240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
   2. 270 - Sound Rating of Outdoor Unitary Equipment.
   3. 340/360 - Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment.

B. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE):
   1. Standard 15 - Safety Standard for Refrigeration System.
   2. Standard 52.2 - Methods of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
   3. Standard 62.1 - Ventilation for Acceptable Indoor Air Quality.

C. American National Standards Institute (ANSI):
   1. Z21.47 - Gas Fired Central Furnaces (except Direct Vent Central Furnaces) with Addenda.

D. Air Movement and Control Association International, Inc. (AMCA):
   1. 210 - Laboratory Methods for Testing Fans for Certified Aerodynamic Performance Rating.

E. Federal Specification (FS):
   1. Standard 141 - Paint, Varnish, Lacquer and Related Materials: Methods of Inspection, Sampling and Testing.

F. National Electrical Code (NEC).

G. National Electrical Manufacturers Association (NEMA):

1. 250 - Enclosures for Electrical Equipment (1000 V Maximum).

H. National Fire Protection Association (NFPA):
1. 54 - National Fuel Gas Code.
2. 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

I. National Roofing Contractors Association (NRCA).

J. Underwriters' Laboratories, Inc. (UL).

1.03 DEFINITIONS

A. NEMA Type 3R enclosure in accordance with NEMA 250.

1.04 SYSTEM DESCRIPTION

A. Design requirements:
1. Supports: Design support to meet criteria as specified in the Florida Building Code.
2. Wind supports: For exterior units, design support that meet the criteria as specified in the Florida Building Code.
3. Electrical components: UL listed and met the design and installation requirements of the NEC.
4. Gas, water piping, drains, and venting: In accordance with building code, mechanical code, and plumbing code in accordance with NFPA 90A.
5. Fans: Rated in accordance with AMCA 210.
6. Unit air conditioners: Rated in accordance with AHRI Standards 210-240 or 340/360 and AHRI 270. Conform to the latest version of ASHRAE 15.
7. Unit air conditioners with heating options: Certified in accordance with ANSI Z21.47.
8. Refrigerant: HFC R-410A.

B. Performance requirements:
1. As specified and as listed on the Air Conditioning Unit Schedule at the end of this Section.
2. Outdoor noise levels: Outdoor noise levels in the 8 octave band range as measured in accordance with AHRI Standard 270 for unit air conditioners and split system condensers shall not exceed the following:

Unit Nominal Capacity (Tons)	**OCTAVE BANDS, hertz**							
	63	**125**	**250**	**500**	**1,000**	**2,000**	**4,000**	**8,000**
3 to 5	64	70	71	74	74	71	67	61
6	79	85	78	74	71	73	66	59

7-1/2 to 10	64	70	73	79	82	78	74	67
12-1/2 and larger	84	88	84	83	84	78	72	68

3. Units shall be capable of starting and running at 125 degrees Fahrenheit ambient outdoor air temperature and exceeding the maximum load criteria of AHRI Standard 210-240 or 340/360.
4. Cooling capacities and energy efficiency ratios: Provide units with the following cooling capacities and energy efficiency ratios (EER) as rated in accordance with AHRI 210-240 or 340/360 and 270, unless scheduled otherwise.

Equipment Type	**Net Cooling Cap (Btuh)**	**EER(1)**
Air Cooled	>65,000 and <135,000	11.2
Air Cooled	>135,000 and < 240,000	11.0
Air Cooled	>240,000 and < 760,000	10.0
Air Cooled	> 760,000	9.7
Water Cooled	>65,000 and <135,000	12.1
Water Cooled	>135,000 and < 240,000	12.5
Water Cooled	>240,000 and < 760,000	12.4
Water Cooled	> 760,000	12.2
(1) Deduct 0.2 from the required EERs for units with a heating section other than electric resistance heat.		

5. Units capabilities: Meet or exceed the following efficiencies:
   a. Steady state efficiency: 80 percent.
6. Unit air flows for cooling: A minimum of 300 cubic feet per minute per ton but not exceeding 500 cubic feet per minute per ton of cooling unless scheduled otherwise.
7. Air filters: 25 to 30 percent efficiency when rated in accordance with ASHRAE Standard 52.2.

C. Electrical and control system design:
1. Design and supply necessary control systems, thermostats, components, and wiring to make a complete functioning system.
2. Owner will furnish and install electrical power wiring and disconnect switches for the air conditioning system

1.05 SUBMITTALS

A. Product data:

1. Shop drawings:
   a. System layout, mechanical, electrical power requirements, and control diagrams.
      b. Materials.
      c. Supports and bracing calculations and details.
      d. Cut sheets on all primary and ancillary equipment.
      e. Proposed cutting and patching.
      f. Noise levels in 8 octave bands showing compliance with specified levels.

   B. Installation instructions.

   C. Provide vendor operation and maintenance manual.

   D. Furnish bound sets of installation, operation, and maintenance instructions for each type of unit. Provide Manufacturer's Certificate of Source Testing.

   E. Provide Manufacturer's Certificate of Installation and Functionality Compliance.

   F. Manufacturer's warranties.

   G. Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

   A. NOT USED.

1.07 DELIVERY, STORAGE, AND HANDLING

   A. Deliver units in 1 piece, factory assembled, piped, internally wired, charged with refrigerant and compressor oil, and tested.

   B. Protect equipment from dust and atmospheric exposure:
      1. Provide temporary closures for equipment openings designed for airflow.

   C. Protect equipment from dust and atmospheric exposure as recommended by the unit manufacturer.
      1. Provide temporary closures for equipment openings designed for airflow.

1.08 SITE CONDITIONS

   A. Units shall be capable of starting and operating in ambient temperatures as specified in this Section.

1.09 WARRANTY

A. Special warranties: From the date of acceptance of the project or date of beneficial use.
   1. 1-year warranty: All components.
   2. 5 years: For refrigerant compressors and closed or sealed refrigerant systems.
   3. 5 years: For evaporator and condensing coils.

1.10 MAINTENANCE

A. Extra materials:
   1. Provide 2 extra sets of filters per unit installed.
   2. Provide 1 extra set of drive belts for each size belt system provided.

PART 2 PRODUCTS

2.01 SPLIT SYSTEM PACKAGED ELECTRIC-COOL AIR CONDITIONING UNITS

A. Manufacturers:
   1. Trane, Condenser Series ***4TTA3060***; when indoor handling unit scheduled, Series ***TWE061***.

B. Refrigerant components: Refrigerant circuit including:
   1. Accumulator and filter/drier.
   2. Compressor.
   3. Thermostatic expansion valve.
   4. Gauge ports.
   5. Flow control valves.
   6. Circuit feed system.
   7. Service gauge connections with gauges on suction, discharge, and liquid lines to charge, evacuate, and contain refrigerant.
   8. Insulate refrigerant piping.

C. Compressors:
   1. Fully hermetically sealed, high efficiency, reciprocating or scroll type, with internal and external vibration isolation.
   2. Equipped with high-pressure relief.
   3. Equipped with crankcase heater.

D. Condenser fan:

1. Propeller type, direct drive, aluminum blades, dynamically balanced, and vertical discharge.
    2. Permanently sealed ball bearings and permanently lubricated.

E. Condenser coil: Seamless copper tubes with mechanically bonded aluminum plate fins. Provide Surfsil R-5 coating to withstand a minimum of 10,008 hours under ASTM B117 salt spray test.

F. Condenser unit casing:
    1. Manufactured of minimum 22-gauge galvanized steel, bonderized, corrosion protected, and exterior coated with a baked enamel finish interior primer coated (Surfsil R-5). Coating shall withstand a minimum or 10,008 hours under ASTM B117 salt spray test.
    2. Weatherproof design, reinforced, and braced for maximum rigidity.
    3. Provide gasketed removable panels or access doors to service equipment components and connections.
    4. Provide with:
        a. Non-corrosive drain pan in accordance with ASHRAE Standard 62.1.
        b. Minimum 3/4-inch horizontal drain connection.
        c. Knockouts for utility and control connections.
        d. Minimum 14 gauge steel roll formed base rail with lifting holes; provide support feet for roof mounting on units under 6 tons size.

G. Controls and equipment safety features:
    1. Provide unit controls for a complete and properly functioning system. Provide, as a minimum, the following:
        a. Condenser fan controls.
        b. Evaporator fan controls with time delay after compressor shutdown.
        c. Motor contactors.
        d. 24-volt or 120-volt control circuit as scheduled; if 24-volt scheduled, provide control power transformer.
        e. Manually reset circuit breakers.
        f. 5-minute compressor cycle delay.
        g. Check filter switch suitable for field connection remote alarm.
    2. Equipment safety features, include:
        a. High-pressure switch.
        b. Compressor overtemperature and overcurrent.
        c. Loss of charge/low pressure switch.
        d. Freeze thermostat on evaporator.
        e. Lock out protection.
    3. I Temperature control system:

a. Provide unit interface devices and programmable electronic thermostat:
1) Setpoint range of 60 to 90 degrees Fahrenheit with digital temperature and setpoint indication.
2) Provide 2-stage heating and 2-stage cooling when specified unit has 2 stages.
3) ON-OFF-AUTO air handler fan selector switch.
4) HEAT-OFF-COOL unit selector switch or automatic switch over.
5) 7-day programming schedule with at least 1 set back period per day.
6) Indicator lights for unit operating mode and unit failure.
7) Wall mounted with insulated backing plate.
8) Time delay for compressor restarts and for automatic switch over.
9) Provide with differential enthalpy economizer control when economizer scheduled.

H. Electrical:
1. Unit power and control wiring entering unit cabinet at 1 location.
2. Condenser unit shall operate at 3 phase, 60 HZ, 480 volts
3. Air Handling Unit shall operate at 3 phase, 60 HZ, 208 volts.
4. Provide control power transformer and relays at air handling unit for interconnection with thermostat and with remote condenser.

I. Indoor air handling unit, when scheduled, provide:
1. Indoor air section compartment: Insulated with minimum 1/2 inch thick, permanent, fireproof, odorless glass fiber material, and coated on the air side.
2. Evaporator fan:
a. Belt driven, forward curved, double inlet, centrifugal type, steel with corrosion resistant finish, statically and dynamically balanced.
b. Permanently sealed ball bearings and permanently lubricated.
c. Adjustable pitch motor pulley.
d. Where the condenser fan is 7.5 horsepower or larger, provide a variable speed or 2 speed fan.
3. Provide with ducted discharge; orientation as indicated on the Drawings.
4. Provide with direct expansion coil aluminum drip pan and polyvinyl chloride drainpipe.
5. Filter section:
a. Provide filter with at least a MERV 8 rating.
b. Provide with 2-inch filters accessible through front of unit.
c. Provide with expanded metal return air grill to cover filter section.
d. Low velocity 2-inch thick pleated filters of commercially available sizes.
e. Filter face velocity: Not to exceed 350 feet per minute nominal flow.
f. All filters for any 1 unit shall be the same size.
g. Filter: Manufacturers: The following or equal:
1) American Air Filter.

6. Provide sub-base for floor mounting with room for condensate drain; when scheduled provide outside air connection and economizer.
    7. Evaporator coil: Seamless copper tubes with mechanically bonded aluminum plate fins. Surfsil R-5 coating to withstand a minimum of 10,008 hours under ASTM B117 salt spray test.
    8. All components factory painted with optional coating suitable for corrosive environments.

J. Motors:
    1. Compressor motors: Cooled by refrigerant gas passing through windings and with line break thermal and current overload protection.
    2. Evaporator fan motor, condenser fan motor, and supply air fan motor: Permanently lubricated ball bearings and inherent automatic reset thermal overload protection.

K. Accessories.
    1. Hail guard over condenser to protect against damage from hail and other flying debris.
    2. Coil guard grill to protect condenser coil from penetration by large objects.
    3. Provide condensate drainpipe in accordance with mechanical code.
    4. Provide flexible duct connector on supply and return ducts where connected to air handler or terminal units.

2.02 SOURCE QUALITY CONTROL

A. Completely factory test each unit in cooling modes including economizer operation. Coils and cooling system shall then be evacuated for 30 minutes prior to final charging of unit before shipment.

PART 3EXECUTION

3.01 EXAMINATION

A. Examine and verify that Work is in condition to receive installation specified in this Section.
    1. Take measurements and verify dimensions to ascertain fit of installation.
    2. Ascertain structural sufficiency to support installation.
    3. Ascertain that supports and openings are correctly located; otherwise cut new openings where required.
        a. Submit details of proposed cutting and patching.
    4. Confirm specified thermostat or other controls are compatible with specified equipment.

B. Examine and verify structural details and sections indicated on the Drawings, ascertain adequacy, and determine conflicts in dimensions and clearances.

3.02 PREPARATION

A. Before installation, remove dust and debris from equipment and ducts.

B. During installation and until equipment is operated, protect equipment and ducts from dust and debris by covering openings with tape or plastic.

3.03 INSTALLATION

A. Observe applicable installation requirements as recommended by air conditioning manufacturer.

B. Anchoring and support:
   1. Provide anchoring and support designed in accordance with current engineering practice for equipment and appurtenances by attaching or connecting to supporting members or by providing other supports.

C. Adjust alignment of ducts where necessary to resolve conflicts with architectural features or to resolve conflicts with the work of other trades.

D. Install and wire unit air conditioners, controls, and thermostats in accordance with manufacturer's recommendations.

E. Provide flexible duct and flexible piping connections at connections to unit air conditioners.

F. Install NRCA approved flashing and counterflashing.

G. Provide venting in accordance with building code, mechanical code, and plumbing code as specified in accordance with NFPA 54.

H. Upon completion of installation, clean equipment.

3.04 FIELD QUALITY CONTROL

A. Test equipment and installation to verify tightness, operation, and outdoor sound power at levels.

B. Test equipment performance

3.05 COMMISSIONING AND PROCESS START-UP REQUIREMENTS

A. Manufacturer (each) services for each type of unit.
   1. Provide Manufacturer’s Certificate of Source Testing.

2. Provide Manufacturer's Certificate of Installation and Functionality Compliance.
3. Training and other on-site services.

	Training Requirements		**Functional Testing**		
Source Testing (Witnessed or Non-witnessed)	**Maintenance (hrs per session)**	**Operation (hrs per session)**	**Trips**		
Non-Witnessed	2	1	1		

3.06 SCHEDULES

A. Air Conditioning Unit Schedule.
1. Refer to Drawings

END OF SECTION