

SECTION 15720
AIR HANDLING UNIT

PART 1: GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 15050, "Basic Mechanical Materials and Methods" apply to work specified in this Section.

1.02 SUMMARY

- A. This section includes Air handling units.
- B. Related Work Specified in Other Sections:
 - 1. Section 15070, "Vibration Control & Seismic Restraints" for vibration hangers and supports.
 - 2. Section 15910, "Control Systems" for control devices.
 - 3. Section 16420, "Motor starters"
 - 4. Division 16, Electrical power wiring.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements. Include a detailed layout to identify Fit in existing penthouse. Proposed location may require some component disassembly/re-assembly. Assume access through existing 3'-0" X 7'-0" doorway but with limited turning radius.
- B. Submit computer generated fan curves for each air handling unit with specific design operating point noted.
- C. Submit a computer generated psychometric chart for each coil with design points and final operating point clearly noted.
- D. Submit sound data for discharge, radiated and return position by octave band for each unit.
- E. Product Data:
 - 1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, gauges and finishes of materials, and electrical characteristics and connection requirements.
 - 2. Provide data of filter media, filter performance data, filter assembly, and filter frames.
- F. Manufacturer's Installation Instructions.

1.04 QUALITY ASSURANCE

- A. Comply with USM IDAT per section 01810
- B. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.
- C. Codes and Standards:
 - 1. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
 - 2. AMCA 99 - Standards Handbook.
 - 3. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
 - 4. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
 - 5. AMCA 500 - Test Methods for Louver, Dampers, and Shutters.
 - 6. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
 - 7. ARI 430 - Central-Station Air-Handling Units.
 - 8. ARI 435 - Application of Central-Station Air-Handling Units.
 - 9. NEMA MG1 - Motors and Generators.
 - 10. NFPA 70 - National Electrical Code.
 - 11. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
 - 12. UL 723 – Test for Surface Burning Characteristics of Building Materials
 - 13. UL 900 - Test Performance of Air Filter Units.
 - 14. UL 1995 – Standard for Heating and Cooling Equipment
 - 15. UL 94 – Test for Flammability of Plastic Materials for Parts in Devices and Appliances

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids. Inspect for damage.
- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
- D. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.06 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.
- B. Provide one additional set of fan belts and filters.

1.07 WARRANTY

- A. AHU authorized representative will provide startup and one year warranty service. This responsibility shall not be waived or assumed by another party. Coordinate start-up with

phased construction. Extend start-up services to correspond to schedule of phased construction where required.

- B. Provide warranty service to one year from the date of project substantial completion.

1.08 SPARE PARTS

- A. Extra materials: Furnish the following spare parts for the air handling unit to the owner; obtain receipt:
 1. One set of matched fan belts for each belt driven fan
 2. One spare set of filters of each type and size.
 3. Spare gaskets for each casing section.

PART 2: PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide an air handling unit manufactured by one of the following:
 1. McQuay
 2. York
 3. Trane
 4. Carrier
- B. Subject to compliance with requirements, provide internal face and by-pass coils manufactured by one of the following:
 1. Wing
 2. Control Air 'Isomix'
 3. Aerofin 'Aeromix'

2.02 GENERAL DESCRIPTION

- A. Configuration: Fabricate as shown to efficiently fit in allocated position.
- B. Performance: Conform to ARI 430 and as scheduled
- C. Acoustics: Sound power levels (dB) for the unit shall not exceed the following specified levels. The manufacturer shall provide the necessary sound treatment to meet these levels if required.

Octave Band at Center Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000
Radiated	81	80	78	70	65	53	46	38
Discharge	99	101	102	97	94	88	84	76
Return	94	96	96	89	81	73	63	58

2.03 CASING

- A. Fabricate unit casing of 16 gauge channel posts and removable panels assembled with mechanical fasteners and a galvanized steel finish. Assemble sections with high compression

gasketing between each frame member and unit panel or door to prevent thermal bridging from interior to exterior of unit.

1. Outside casing: 18 gauge, G90 galvanized steel;
 2. Inner lining: 20 gauge, solid G90 galvanized steel.
 2. Floor plate: 20 gauge, G90 galvanized steel checker plate.
 3. Base rail: 8 inch full perimeter base rail for structural rigidity and condensate trapping.
- B. Module to module assembly: overlapping, full perimeter internal splice joint that is sealed with bulb type gasketing on both mating modules.
- C. Unit casing leak rate: no greater than 0.5 cfm per square foot of cabinet area at 5" static pressure.
- D. Insulation: 2 inch thick, 3 lb. per cu ft density, neoprene coated, glass fiber insulation.
- E. Access Doors: Galvanized steel, flush mounted to cabinetry, with minimum of two six inch long stainless steel piano-type hinges, latch and full size (4.5" minimum) handle assembly. Provide inspection window for fan section. Arrange access doors to swing outward for unit sections under negative pressure (inward for unit sections under positive pressure). Provide a secondary latch to relieve pressure on doors limited from swinging inward (such as side access filter sections) on positive pressure sections.
- F. Construct drain pans from 304 stainless steel with cross break and double sloping pitch to drain connection. Provide drain pans under cooling coil, energy recovery coil and filter/mixing box sections. Locate drain connection centerline a minimum of 3" above the base rail to aid in proper condensate trapping. Provide double pitch in filter/mixing box drain pan to drain fitting at access door. Do not penetrate base rail for drain connections.
- G. Arrange unit frame, support channels, base and internal components such as fans, coils, filter rack, etc. to allow disassembly and re-assembly at the job site for "knock-down" construction for rigging purposes without disrupting unit integrity.

2.04 SUPPLY FANS

- A. Provide DWDI airfoil supply fan. Dynamically balance fan assemblies at the factory including fan, motor and sheaves on all three planes and at all bearing supports. Ensure maximum fan RPM is below the first critical speed. Isolate fan discharge from casing with flexible connector.
- B. Bearings: Self-aligning, grease lubricated, ball or roller bearings with extended copper lubrication lines to access side of unit. Attach grease fittings to the fan base assembly near access door.
- C. Mount fan and motor internally on a steel base. Factory mount motor on slide base that can be slid out the side of unit if removal is required. Provide access to motor, drive, and bearings through hinged access door. Mount fan and motor assembly on 2" deflection spring vibration type isolators inside cabinetry.

2.05 BEARINGS AND DRIVES

- A. Bearings: Bearings shall be air handling quality, heavy duty grease lubricated, ball or roller type. Select bearings for a Basic Rating Life, (L_{10}) of 100,000 hours at maximum operating speed and horsepower for each construction level.
- B. Shafts: solid, hot rolled steel, ground and polished, keyed to shaft, and protectively coated with lubricating oil.
- C. V-Belt drives: cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Fixed sheaves, matched belts, and drive rated based on motor horsepower. Provide a minimum of 2 belts on all fans. Standard drive service factor 1.3 times fan brake horsepower.

2.06 ELECTRICAL

- A. Wiring Termination: terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.
- B. Motors: ODP type with premium efficiency suitable for operation with variable frequency drives.
- C. Electrical characteristics: as scheduled.

2.07 COIL SECTIONS

- A. Provide access to coils from opposite side of unit for service and cleaning. Enclose coil headers and return bends fully within unit casing. Provide unit with coil connections that extend a minimum of 5" beyond unit casing for ease of installation. Extend drain and vent connections to unit casing exterior. Factory seal coil connections with grommets on interior and exterior and gasket sleeve between outer wall and liner where each pipe extends through the unit casing to minimize air leakage and condensation inside panel assembly. Arrange coils for removal through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.
- B. Certify air coil capacities, pressure drops, and selection procedures in accordance with ARI 410.
- C. Water Coils:
 - 1. Fins: minimum thickness of 0.0075" of aluminum plate construction; full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Mechanically expand tubes into the fins to provide a continuous primary to secondary compression bond over the entire finned length. Bare copper tubes shall not be visible between fins.
 - 2. Coil tubes: 5/8 inch OD seamless copper, 0.020" nominal tube wall thickness, expanded into fins, brazed at joints. Provide soldered U-bends having a minimum tube wall thickness of .025".

3. Provide water coils with headers of seamless copper tubing with intruded tube holes to permit expansion and contraction without creating undue stress or strain. Provide carbon steel coil connections with connection size determined by manufacturer based upon the most efficient coil circuiting. Provide vent connections at the highest point to assure proper venting. Provide drain connections at the lowest point to insure complete drainage and prevent freeze-up.
4. Coil casings: formed galvanized steel channel frame..
5. Provide two row high chilled water and energy recovery (run around loop) coils.

D. Steam Coils:

1. Type: Vertical internal face and by-pass, 2 row.
2. Dampers: 16 gauge roll-formed cold-rolled steel with air dried enamel finish.
3. Casing: 14 gauge galvanized steel; rigid framework, completely painted.
4. Finned heating elements: tube-within-a-tube 5/8" X 0.035" heavy wall seamless straight vertical copper tubes with 1/2" high x 0.012" thick solder coated copper fins.
5. Headers and connections: carbon steel.
6. Linkages: Corrosion resistant with ball joint ends using lever arms welded to a common shaft; bronze, oil impregnated journal bearing pivot points with factory installed damper actuator.

2.08 FILTERS

- A. Provide the filter section with filter racks and guides with hinged and latching access doors on both sides, for side loading and removal of filters
- B. Filter media shall be UL 900 listed, Class I or Class II.
- C. Flat arrangement with 2" deep pre-filters followed by 12" cartridge filters

2.09 ADDITIONAL SECTIONS

- A. Provide Mixing box section shall be with factory mounted low leak airfoil blade outside and return air dampers of galvanized steel in a galvanized frame. Dampers shall be hollow core airfoil blades, fully gasketed and have continuous vinyl seals between damper blades. Dampers shall have stainless steel jamb seals along end of dampers. Linkage and ABS plastic end caps shall be provided when return and outside air dampers sized for full airflow. Secure return air dampers. Blank-off return air inlet on the unit exterior.
- B. Access section shall provide access between components shall be a minimum of 36" deep. Access doors of galvanized steel for flush mounting, with gasket, latch and full size (minimum of 4.5") handle assembly. Heavy-duty floor thickness to be 14 gauge to accommodate walk-in weight of service technician.

2.10 DAMPERS

- A. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500.

PART 3: EXECUTION

3.01 AIR HANDLING UNITS INSTALLATION

- A. Air handling unit will be installed by a qualified contractor in accordance with manufacturer's installation instructions, standards and codes specified in "Quality Assurance".
- B. Installation shall be coordinated with existing conditions and the manner in which the air handling unit will be delivered and brought to the penthouse.
- C. Install per manufacturer's instructions.

3.02 START-UP, ADJUSTMENT, AND TESTING

- A. Coordination: Coordinating all equipment and specified personnel necessary for start-up, adjustment, and testing will be the responsibility of the installing contractor.

3.03 MANUFACTURER'S FIELD SERVICES

- A. AHU Manufacturer: Furnish services of factory authorized agent to provide unit and controls start-up, adjustment, and testing as specified in "Start-Up."

3.04 SYSTEM START UP

- A. AHU authorized representative will provide startup and one year warranty service. This responsibility shall not be waived or assumed by another party. Coordinate start-up with phased construction. Extend start-up services to correspond to schedule of phased construction where required.
- B. Provide warranty service to one year from the date of project substantial completion.
- C. Make appropriate allowance, if required, for services required until date of substantial completion.
- D. Warranty service includes labor and materials to replace any parts or controls which might fail in service as the result of a defect in material or manufacture.

3.05 DEMONSTRATION AND TRAINING

- A. Owner's Instructions: Provide services of a factory-trained representative for full instruction on the care, operation, maintenance, and troubleshooting of the air handling unit. Training shall be a minimum of eight (8) hours. Schedule training with Owner.

END OF SECTION 15720