



Specifications For Apartment Fan Coil Unit Replacement

at

**The Olympic Tower
Condominium
641 5th Ave
NEW YORK, N.Y., 10022**

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Specifications for the Apartment Fan Coil Unit Replacement

1. GENERAL

- A. The "General Conditions of the Contract for Construction", AIA Document A201, 5th edition, 1997, and this specification as applicable are part of this contract.
- B. Materials and workmanship, unless otherwise noted, shall be in accordance with building standards, local codes or as specified, which ever is more stringent.
- C. All applicable codes, laws and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the contractor who shall inform the owner, prior to submitting a proposal, of any work or materials which violate any of the above laws and regulations. Any work done by the contractor causing such violation shall be corrected by the contractor at no additional cost to the tenant.
- D. Investigate each space through which equipment must be moved. Where necessary, equipment shall be shipped from manufacturer in sections of size suitable for moving through available restrictive spaces. Ascertain from building management, apartment owner or tenant at what times of day equipment may be moved through all areas.
- E. All piping is shown diagrammatically and does not show all offsets, drops and rises of runs. The contractor shall allow in his price for routing of piping to avoid obstructions. Exact locations subject to approval of architect.
- F. Install work as to be readily accessible for operation, maintenance and repair with clear and unobstructed access to unit components, isolation valves, risers, & controls. This includes but is not limited to counters, cabinetry, furniture ETC. No deviations from the original building system design drawings may be installed without specific written approval of Building Management. Any deviation must be fully engineered by a New York State Licensed Professional Engineer or Architect. The Plans and Specifications must be submitted to Management for



review and approval. After approval is granted the plans must be filed with the NYC Department of Buildings and receive all required permits and approvals.

- G. Removal and relocation of certain existing work will be necessary for the performance of general work. All existing conditions cannot be completely detailed on the drawings. The contractor shall survey the site and include all changes in making up the work proposal.
- H. Submission of a proposal shall be construed as evidence that a careful examination of the portion of the existing building, equipment, etc., which affect this work and the access to this spaces has been made, and that the contractor is familiar with existing conditions and difficulties encountered which could have been foreseen during such an examination.
- I. Plan installation of new work and connections to existing work to insure no interference with regular operation of existing facilities. All system shutdowns affecting other areas shall be coordinated with Building Management. Install new isolation valves at point of connection to existing piping.
- J. Connect new work to existing work in neat and approved manner. Restore existing work disturbed while installing new work to acceptable condition as determined by building Architect, Engineer or Building Management.
- K. Disconnect, remove and/or relocate existing material, equipment and other work as noted or required for proper installation of new fan coil units.
- L. The work in the building shall be done when and as directed, and in a manner satisfactory to the building management and owner. The work shall be performed so as to cause the least possible inconvenience and disturbance to the building occupants.
- M. The contractor's proposal for all work shall be predicated on the performance of the work during regular working hours (Monday – Friday, 9 AM-5 PM) or as directed by Building Management . When so directed, however, the contractor shall install work on overtime and the additional cost to be charged therefore shall be only the "premium" portion of the wages paid.

- N. The contractor shall keep all equipment and materials, and all parts of the building, exterior spaces and adjacent streets, sidewalks and pavements, free from material and debris resulting from the execution of this work. Excess materials will not be permitted to accumulate either on the interior or the exterior.
- O. All present material and equipment to be removed under this contract will become the property of the contractor and shall be legally disposed of by this contractor on a daily basis as directed by the Building Management.
- P. Seal openings around piping through partitions, walls and floors with mineral wool or other equivalent noncombustible fireproofing material. Firestop all piping penetrations at the floor and ceiling to maintain a minimum 2-Hour Rating
- Q. Controlled inspection for Fire-stopping and Insulation of the chilled and hot water piping and condensate drain risers shall be performed by a Qualified Independent Inspector hired by the Building Management. All fees and charges for the inspections shall be paid directly by the individual apartment owner. The Installing Contractor shall coordinate with the inspectors to provide ample time for the inspector to review and inspect the complete installation without multiple visits where feasible.

The fan coil enclosure must remain open for inspection of the fire-stopping and insulation. The fan coil may only be installed after the inspector has approved the installation. The inspector will submit a certified report to the Building Management and the Apartment Owner for each installation.
- R. All materials and equipment shall be new unless otherwise noted.
- S. Submission of a proposal shall be construed as evidence that a careful examination of the portions of the existing building, equipment, etc, which affect this work and the access to such spaces, has been made and that the contractor is familiar with existing conditions and difficulties that will affect the execution of the work. Later claims shall not be made for labor, equipment or materials required because of difficulties encountered which



could have been foreseen during such an examination. These specifications, sketches and drawings are issued to give contractor the general scope of work.

2. SCOPE OF WORK

- A. The work under contract includes all labor, materials and appliances necessary for the removal of the existing Fan coil systems, Modifications and reconstruction of existing drywall enclosures, reconnection to existing piping services including furnishing new fan coil systems, installing, wiring and testing, complete and ready for safe operation. Work shall be installed in a neat, workmanlike manner.
- B. The restoration of the drywall enclosure shall match the existing materials. The drywall shall be spackled, taped and sanded as required for a smooth finish. A prime coat of flat finish white acrylic latex primer shall be applied. Future finishing shall be the responsibility of the apartment owner. Any other surface finish materials removals or restorations (such as wallpaper, paneling, mirrors, custom grilles, Etc.) are the responsibility of the Apartment Owner unless otherwise agreed to in writing.

3. HVAC DEMOLITION

- A. Present material and equipment to be removed under this contract will become the property of the contractor and shall be legally disposed of by this contractor on a daily basis as directed by the building management.
- B. All equipment shall be removed in a carefully planned manner. No dropping of existing equipment onto the floor slab will be allowed.
- C. Patching of existing wall or slab openings shall be by general contractor (G.C.) HVAC contractor to coordinate with GC.
- D. Disconnect and remove power wiring associated with equipment being removed. Coordinate with electrical contractor as required.
- E. HVAC piping systems are shown on these drawings. Contractor shall identify each pipe prior to demolition.

- F. Sizes of piping and ductwork to be removed and/or remain may have not been indicated. Contractor shall survey existing space, verify sizes and include in scope of work.
- G. No piping or equipment shall be removed unless branch shut-off valves are identified, closed and tested for tightness prior to actual removal.
- H. The existing building chilled and hot water systems will remain in operation during all work. The contractor shall coordinate the individual riser drain-downs with Building Management prior to commencing any work. The contractor is responsible for any and all damages caused as a result of his work.
- I. Valved and capped connections shall be provided for all piping removed at point of disconnection where connected to existing piping to remain.
- J. Drain all piping sections to be removed prior to actual removal. No spilling over floor slabs will be permitted. Drain pipes into portable containers to be disposed of as required.

4. **SHOP DRAWINGS AND EQUIPMENT SUBMISSIONS**

- A. Quantities
 - 1) One (1) reproducible copy and Four (4) black and white copies of all drawings larger than 11" x 17".
 - 2) Four (4) black and white copies of any other materials.
- B. Indicate in each submission:
 - 1) Project Name and Location, Apartment #. Owners Name
 - 2) Architect and Engineer including Name, Address, Phone #, Email Address, Contact Names.
 - 3) Item identification.
 - 4) Approval stamp of prime contractor.

5) Contractors Name, Address Telephone #, Fax #, Email Address

C. Prior to purchase and shipment of equipment or start of installation of system components, submit the following for approval. The Submission shall be submitted to Building Management for review and approval by a Professional Engineer. The costs for the review shall be paid by the Apartment Owner as required by Building Management.

- 1) Fan coil units
- 2) Air outlets and grilles.
- 3) Vibration isolation.
- 4) Sheet metal details.
- 5) Insulation.
- 6) Thermostats.
- 7) Catalog cuts of valves
- 8) Balancing Valves
- 9) Flexible hoses
- 10) Piping materials and joining methods.
- 11) Fire-stopping Materials
- 12) Mastics and Adhesives

D. Equipment substitutions:

- 1) If the contractor elects to propose equipment substitutions, they shall be submitted in advance and shall include a complete detailed list indicating all deviations item by item.

- 2) Submissions shall include a list of local installations not less than five years with Contact names, addresses and phone numbers. Submissions will be automatically rejected without review if required information is not submitted.
- 3) It shall remain the sole responsibility of the contractor to adequately demonstrate to the engineer's satisfaction that the substitution is equivalent or better. The engineer's approval or disapproval shall be final.
- 4) Any additional cost incurred as a result of an equipment substitution by this contractor, such as an increase in scope of work for another contractor, shall be the responsibility of this contractor.

5. SHEET METAL WORK

- A. Except as otherwise shown or noted, all ductwork and other sheet metal shall be galvanized sheet steel and shall be installed in accordance with the Latest edition of Sheet Metal and Air Conditioning Contractors National Association, Inc. Duct construction standards, pressure classification shall be minimum 2.0 in. Wg. Sheet metal shall be no less than 24 gauge minimum thickness.

6. PIPING AND VALVES

- 1) Piping system complete with: pipe, fittings, valves, strainers, hangers, supports, hoses, sleeves, accessories :
- 2) Copper tubing:
 - A. ASTM B88, hard drawn, Type L minimum thickness with wrought copper soldered joint fittings; 95/5 solder for water piping.
 - B. Fittings: wrought copper,ANSI b16.22

- C. Service: branch runout piping to fan coil units for chilled and hot water piping.
- D. Flush out and clean piping after soldering. Remove all excess flux with hot water and wire brush to remove all soldering residues.
- E. Schedule 40 red brass piping and fittings may be utilized for transition fittings.

3) CPVC Piping

Chlorinated Polyvinyl Chloride (CPVC) Pipe and Fittings:

- A. Pipe: CPVC, ASTM F441. Schedule 40
- B. Fittings: CPVC, socket type, ASTM F438 with solvent cement, ASTM F493.
- C. Service : Fan Coil System Condensate Drain piping.
- D. Provide plastic or rubber coated pipe anchor clamp to anchor condensate riser at each floor slab.

4) Stainless Steel Flexible Hose

- A. Flexible Hose shall be constructed of corrugated 316 Stainless Steel with a protective 321 stainless steel outer braid.
- B. The working pressure rating shall be a minimum of 900 psig at 265 degrees F.
- C. The hose shall have ½ Male NPT Stainless steel connection on one end and a ½" male 300 Psig rated union connection on the other end.
- D. The hose shall have a minimum bend radius no greater than 3".
- E. The Hose shall be as manufactured by Flex-Weld/ Keflex Inc. Woodstock Illinois. or Engineer approved equal

- F. Service: Provide at connection between Fan coil unit coil valves and branch runout isolation valves for hot and chilled water.
- G. Plastic hose material is not permitted.

5) VALVES:

A. BALL VALVES:

1. ON PIPE SIZES UP TO 1" -:Water - Two-piece body of ASTM B-62 bronze, Full port, chrome plated bronze ball, replaceable TFE seats, packing and gasket, adjustable packing box, threaded end and ***ASTM A276-316 annealed and passivated stainless steel tailpiece union end with fluorocarbon O-ring gasket***, blow-out proof brass stem and steel "T" handle with plastic cover. Valve must meet or exceed ANSI Standard B1.20.1, for threaded connections. ANSI Standards B16.18, for soldered connections. Minimum Rating 150 psi SWP, 600 psi CWP @ 100F.
2. Manufacturer-APOLLO VALVE- ***Fig. No. 70-303-B7***. FEMALE Threaded end and FEMALE Threaded union end, or Engineer approved equal.
3. Install all valves in accessible locations to facilitate operation, repair or replacement. Valve shall be of the same size as the upstream pipe, unless otherwise indicated. Provide sweat to thread adaptor fittings as required.

7. INSULATION

- A. Complete insulation for all of the following except as noted otherwise:
 - 1) Chilled water piping and condensate drain piping, including existing risers, valves, flexible hose, unions,

flanges, etc.,

1/2" thick CLOSED CELL, FIRE RETARDANT FOAM INSULATION

- 2) Hot water piping, risers, and branch piping outside of the fan coil unit enclosure only: 1/2" thick Fiberglass.

B. Non-insulated piping:

- 1) Cooling coil condensation drain hose except concealed horizontal portions.
- 2) Hot water piping within the fan coil unit enclosure.

C. Quality assurance:

- 1) All insulation materials, including jackets, facing, adhesive, coatings, and accessories are to be fire hazard rated and listed by underwriters laboratories, inc, using Steiner tunnel test method for fire hazard classification of building materials, standard UL 723 (ASTM E-84), (NFPA-225), (ASA A2.5-1963).
 - a. Flame spread: maximum 25.
 - b. Fuel contributed and smoke developed: maximum 50.
- 2) Flame proofing treatments subject to deterioration from moisture or humidity are not acceptable.
 - a. Underwriters Laboratories, Inc listed.

D. Insulation materials:

- 1) Fiberglass:
 - a. Molded: one piece, maximum 0.26 k-factor at 75 deg f mean temperature. Thickness: 3/4" thickness up to 4 1/2-" O.D.

- 2) Insulation for valves, fittings, flanges and accessories:
 - a. Exposed: premolded fiberglass fitting covers.
- 3) CLOSED CELL, FIRE RETARDANT FOAM INSULATION.
" AP ARMAFLEX"
 - A. Insulation material shall be a flexible, closed-cell electrometric insulation in tubular or sheet form: AP Armaflex, AP Armaflex W,. This product meets the requirements as defined in ASTM 534, "Specification for performed electrometric cellular thermal insulation in sheet and tubular form."
 - B. Insulation materials shall have a closed-cell structure to prevent moisture from wicking which makes it an efficient insulation.
 - C. Materials shall have a flame spread index of less than 25 and a smoke developed index of less than 50 when tested in accordance with ASTM E 84, latest revision. In addition, the product, when tested, shall not melt or drip flaming particles, the flame shall not be progressive and all materials shall pass simulated end-use fire tests.
 - D. Materials shall have a minimum thermal conductivity of 0.27 Btu-in.H/ft2-°F at a 75°F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518, latest revisions.
 - E. Install in accordance with manufacturers instructions. Provide complete adhesive coverage for all seams and joints to create a vapor tight seal.
 - F. Adhesive shall be the insulation manufacturer's recommended contact adhesive: Armaflex 520. or Armaflex 520 BLV Adhesive.
 - G. Accessories such as adhesives, mastics and cements shall have the same properties as listed above and shall



not detract from any of the system ratings as specified above.

E. Jacket and Facing material:

1) Insulation jackets:

- a. All service or all purpose: laminate of white Kraft facing, glass scrim reinforcing and aluminum foil.
- b. Adhere longitudinal laps. Adhere 3 in. Wide joint strip of same material as facing, at center of each butt joint. Seal all ends of insulation with vapor barrier mastic coating.

F. Adhesive coatings

1) Similar to Foster product names and figure numbers as follows:

- a. Lagging adhesive: 30-04 UL Label.
- b. Vapor barrier coating: Tite-fit 30-35 UL label.
- c. Vaporseal adhesive: Spark-Fas 85-20 UL label.

G. Wire, banding, and fastening devices

1) Wire: minimum 16 gauge copper-clad annealed steel wire.

2) Bands: 3/4 in. Nominal width with wing seals, of minimum thickness as follows:

- a. Alum: 0.007 in.
- b. Galvanized steel: 0.005 in.
- c. Stainless steel: 0.010 in.

H. Insulation Installation:



- 1) General:
 - a. Insulation shall be continuous passing through sleeves or other openings. Provide neoprene rubber grommets in metal frames and casing openings to protect insulation jacket. Seal all openings with Black or Clear silicone rubber sealant
- 2) Jackets and Facings.
 - a. Vapor sealed types: staples not permitted. Use vapor seal adhesive.

I. Acoustic Lining and Coatings

- 1) The interior of the fan coil units are lined with Black neoprene coated fiberglass acoustic lining. All modifications or work that expose raw fiberglass edges shall be sealed with Black Acoustic Mastic.
- 2) Finish and butter all open seams and seal acoustic lining tight against the unit casing as required so that there are no exposed fiberglass edges or loose material.
- 3) Acoustic mastic shall be as manufactured by Mon- Eco Industries, 5 Joana Court, East Brunswick, New Jersey, 08816, Tel # (732-257-7942) or 800-899-6326. Eco Perm Coating # 11-02 Black, or Engineer approved equal.

8. RIGGING

- A. Contractor shall provide all rigging, hoisting, ladders, and services necessary for access to work spaces, for delivery into the building, and for setting in places of any material, equipment or apparatus furnished or installed.
- B. Contactor shall also provide for covering and protection of all floors, carpets, walls, and finishes, etc that are traversed or



affected by the work in accordance with Building Standards as defined by the Building General Manager and Building Engineer.

9. VIBRATION ISOLATION

- A. Provide neoprene vibration isolator pads under each fan coil unit. Mount minimum 2" x 2" x 3/4" pads under the corners of the fan coil unit housing.
- B. Acceptable manufacturers:
 - 1) Vibration isolators
 - a. Mason Industries, Inc.- Type SW- 50- durometer
 - b. Or equivalent of Vibration Eliminator co., or Korfund Dynamics corp.



10. PIPE EXPANSION

- A. All pipe connections shall be installed to allow for freedom of movement of the piping during expansion and contraction without springing swing joints. Existing Expansion loops, expansion joints, anchors and guides shall be provided where necessary. Anchors and guides shall be maintained.
- B. Re-support piping and restore supports and guides for existing piping risers and enclosure. Re-secure existing riser piping enclosures and pipe supports to new fan coil unit.
- C. Provide a new plastic covered pipe riser anchored to the slab at the underside of each floor slab to support the condensate drain piping riser.

11. WATER SYSTEM SPECIALTIES

- A. General requirements
 - 1) All piping shall be so pitched that all air in the system can be vented through manual air vents. Provide all required Vents.
 - 2) All piping shall be arranged so that entire system may be drained.
 - 3) Extra drain valves shall be provided and suitably located so that sections of the system can be drained without draining the entire system.
 - 4) Piping shall be installed so as to avoid trapping of air.



12. WATER BALANCING VALVES

- A. Provide (Tour & Andersson Series 786-Solder type / or 787 NPT female threaded Type) Circuit Balancing Valves with provision for connecting a portable differential (Ft. of Head) pressure meter
ON EACH FANCOIL UNIT HEATING AND COOLING COIL.
Each metering valve connection shall have pressure/temperature probes. Read-out ports shall be fitted with internal EPT inserts and check valves.
- B. Design Pressure/Temperature: Minimum 250 psig @ 200F
 - (1) The balancing valves shall be Y-pattern globe style design and all metal parts of nonferrous, pressure die cast, nonporous copper alloy. Each valve shall provide four (4) functions: Precise flow measurement, (2) Precision flow balancing, (3) Positive shut-off with no drip seat, eliminating the need of an additional isolation valve, (4) Drain connection using 3/4" NPT hose end thread.
- C. These valves shall have four (4) 360° adjustment turns of the hand wheel for precise setting with hidden memory to provide a tamper-proof balancing setting. Hand wheel shall have digital readout.
- D. Valves shall be designed to allow this contractor to pre-set balance points for proportional system balance prior to system start-up in accordance with balance schedule.
- E. Minimum valve size shall be 1/2" with a minimum full open CV rating of 2.9. For coils with a flow greater than 4.0 Gpm balancing valve shall be 3/4" with a minimum full open CV rating of 6.6. Provide adaptor fittings as required.
- F. No Substitutions are permitted.



13. FAN COIL UNITS-VERTICAL HIGH RISE TYPE

A. GENERAL

1. SECTION INCLUDES

A. High Rise Vertical Stacking Fan-coil Unit(s)

1.01 SUBMITTALS

A. Shop Drawings: Indicate unit Model #, height, length and depth, coil connection sizes & locations, filter size. All data indicated below.

B. Product Data.

1. Certification - Acceptable Fan-coil Unit(s) are to be certified in accordance with ARI Standard 440 and bear the ARI label. Manufacturer must be ISO 9002 certified. Units shall be UL listed and be wired in compliance with ANSI / UL 1995.
2. Identify unit configuration.
3. Show unit shipping weight and Dimensions
4. State maximum airflows at high, medium and low speeds with wet coils with clean air filters.
5. Indicate entering & leaving air and water temperatures, sensible and latent capacities, water flow and water pressure drop at peak design condition for the heating and cooling coils.
6. Submit integral Flow measuring and Balancing valves.
7. Submit Integral piped and wired motorized valves.
8. Submit Electronic Thermostat with digital readout.
9. Sound power levels at High speed
10. Electrical connection location, voltage, minimum circuit ampacity and fuse protection required.



1.02 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing HiLine Vertical Stacking Fan-coil Unit(s) specified in this section must show a minimum five years experience and issue complete catalog data.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept products on site wrapped in protective cardboard wrap. Inspect for damage.
- C. Store in a clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- D. Dispose of wrapping materials and debris.

1.04 ACCEPTABLE MANUFACTURERS

- A. McQueen shall be the basis of design.

1.05 GENERAL DESCRIPTION

- A. Furnish as shown on plans and as described in this specification, McQuay HiLine Vertical Stacking Fan-coil Unit(s).
- B. Units shall be as manufactured by McQuay or Engineer approved equal.
- C. Furnish and install McQuay HiLine Vertical Stacking Fan-coil Unit(s), Model KZZ, where shown on the plans. Types, sizes and performance shall be as tabulated in the Fan Coil Schedule. Unit shall be four-pipe system blow-through configuration with completely removable chassis. Filter, fan assembly, drain line and motor shall be accessible by removing the return air grille panel. Internal controls, service valves, motorized valves, drain pan and coil shall be accessible by removing the access and sound baffle panel. The knock-down unit configuration shall permit



installation and connection to existing risers and valved stub-out connections for ease of leak testing and insulation prior to placement of the units. The unit bottom half shall be installed first making necessary water connections and top half placed thereafter along with thermostatic control wiring connections.

- D. Cabinet shall be fabricated of heavy-gauge G-90 galvanized steel (Minimum 20 Gauge). Fully insulate all surfaces with ½" multi-density Neoprene coated glass fiber thermal and acoustical insulation. An insulated galvanized steel access and sound baffle panel shall completely enclose the coil section.
- E. The return air grille panel shall be heavy-gauge steel with a stamped grille and electrostatic applied baked semi-gloss finish. Standard color shall be Antique Ivory-(Provide Alternate additional cost for custom color finishes). The panel incorporates surface mounted hanging Brackets and extends 5/8" in front of the unit or wall mounting surface.
- F. Discharge air grilles shall be fabricated of aluminum. Double deflection type. See specifications below.

1.06 FAN AND MOTOR ASSEMBLY

- A. Fan shall be a single DWDI forwardly curved, centrifugal type. Fan wheel shall be constructed of galvanized steel and be statically and dynamically balanced. Fan wheel shall be directly connected to the motor shaft. Fan housing shall be two-piece with integral scroll and inlets.
 - 1. The motor shall be a 115 volt, 60 hertz, single phase PSC three (3) speed, sleeve bearing motor with oilers, motor shall incorporate inherent thermal overload protection with automatic reset. The Motor and fan shall be resiliently mounted.



1.07 CONTROLS

A. The unit shall be furnished with a 120/24 volt A.C. control transformer with adequate ampacity to operate the electronic thermostat, three fan speed relays for use with a 24 volt A.C. low voltage digital thermostat, the heating and cooling zone control valves and condensate pan overflow switch/sensor relay. The transformer shall be protected by a circuit breaker on the line side of the transformer. All the unit controls shall be housed in a separate protected galvanized steel enclosure. The controls enclosure shall incorporate a disconnect switch for unit service. The disconnect switch shall be readily accessible through the return air grille without the use of tools.

B. Digital Thermostat

1. Provide a digital readout 24 volt A.C. low voltage digital thermostat. Thermostat shall be mounted on the face of the unit or remote wall mounted with appropriate extension of the connecting cables. The thermostat shall be specifically designed for four pipe fan coil use.
2. Thermostat shall be manufactured by Peco Inc. Model FT-170 or Engineer Approved Equal.
3. Thermostat shall permit full control of all the fan coil unit functions.
 - a. On-Off
 - b. Fan speed control (Low-Medium- High)
 - c. Function- (Automatic- Heating only- Cooling only)
 - d. Temperature set point adjustment.
 - e. Temperature readout.
 - f. The thermostat shall be field convertible to accept a remote temperature sensor where required.

C. Zone Control Valves-

1. Provide a separate factory mounted and wired zone control valve for each of the heating and cooling coil circuits. The valves shall be ASME rated for 300 psig minimum water working pressure at 200F. The valve shall be (2) piece design with a removable motor actuator that requires no tools to remove. The motor actuator shall operate on 24



Volts A.C. The motor actuator shall be high close off pressure type with normally closed spring actuator and manual override lever. The valve body shall forged Brass, metal to metal seat, ½” NPT or Sweat connections and have a minimum CV rating of 3.5. The valve must meet ANSI IV standards for close-off and have a minimum differential close-off pressure of 30 Psig at 200F. A removable terminal block shall be provided for wiring of the valve motor and control circuit. The valve must be suitable for operation with chilled or hot water.

2. The valve shall be manufactured by TAS / ERIE, Pop Top with High pressure close off pressure Actuator AH13A01A and VT 2213 Valve body with female NPT connections, or VT2213 for Sweat type connections.

1.08 HEAT TRANSFER

A. Cooling.

1. The high capacity cooling coil shall be constructed with ½” O.D. Seamless copper tubes. The minimum tube thickness shall be 0.016”. The tubes shall be mechanically expanded into rippled aluminum fins for a permanent bond insuring reliable heat transfer. Provide a manual air vent. The minimum Fin thickness shall be 0.006”. Coil and piping assembly shall be ASME rated for 250 psig minimum water working pressure and be tested at a minimum of 320 psig. Tube burst pressure shall be minimum 600 psig. Coil capacity shall be as outlined on the project schedule and confirmed and certified with computer generated output.
2. The coil shall be connected to the control valve or balancing valve connections with stainless steel braided hose.
3. Coils shall be installed with manual Schrader type air vents with a sealing cap and be located at the highest point of the coil. The cap shall have a dual purpose, to seal any potential water leakage in the eventuality of Schrader valve failure and as a service tool for the extraction/insertion of the internal Schrader valve.



4. Coordinate and field verify required hose length. Do not kink or coil excessive hose.

B. Heating.

1. The heating coil shall be constructed with ½" O.D. Seamless copper tubes. The minimum tube thickness shall be 0.016". The tubes shall be mechanically expanded into rippled aluminum fins for a permanent bond insuring reliable heat transfer. Provide a manual air vent. The minimum Fin thickness shall be 0.006". Coil and piping assembly shall be ASME rated for 250 psig minimum water working pressure and be tested at a minimum of 320 psig. Tube burst pressure shall be minimum 600 psig. Coil capacity shall be as outlined on the project schedule and confirmed and certified with computer generated output.
2. The coil shall be connected to the control valve or balancing valve connections with stainless steel braided hose.
3. Coils shall be installed with manual Schrader type air vents with a sealing cap and be located at the highest point of the coil. The cap shall have a dual purpose, to seal any potential water leakage in the eventuality of Schrader valve failure and as a service tool for the extraction/insertion of the internal Schrader valve.
4. Coordinate and field verify required hose length. Do not kink or coil excessive hose.

1.09 CONDENSATE DRAIN PAN AND OVERFLOW SWITCH

- A. The condensate drain pan is fabricated of minimum 18 gauge 304 stainless steel and coated outside with minimum ¼" thick high density closed cell, fire retardant foam insulation to prevent condensation.

B. Water leak detection sensors

1. The ac units shall be provided with one (1) liquid level sensor or float switch. The solid state water sensor or float switch shall be mounted in the condensate pan by the fan coil manufacturer to sense the presence of water prior to overflowing the pan. The sensor shall be



connected to the fan coil controls and be wired to shut down the fan coil and close the control valves when a near overflow condition is detected. Upon shutdown a local audible alarm shall sound.

1.10 FILTERS

- A. Filter shall be 1-inch pleated filter with an average atmospheric dust spot efficiency range of 20 - 30% per ASHRAE Standard 52.1 test method, Filters shall be throwaway type.
- B. The filter shall be retained in a factory mounted galvanized steel tracks that retain the filter on a minimum of three sides.

1.11 RETURN AND DISCHARGE AIR OPENINGS

- A. The unit return air opening shall be located in the front bottom of the unit.
- B. The unit discharge air grille shall be specified on the register schedule. The unit discharge plenum shall be provided with 4 discharge air knock-outs (left, right, front, and top). The installing contractor shall determine the proper discharge air knock-out and configure properly.
- C. Provide field measured sheet metal extension collars to provide air tight connection between the fan coil return grille/access cover and the unit return / filter opening.
- D. Provide field measured sheet metal extension collar coordinated with the supply air register dimensions to the allow connection of the supply air grille to the fan coil discharge plenum. Utilize clinch type sheet metal connector. Seal all connections air tight with mastic. Collars shall be constructed of minimum 20 GA galvanized steel.
- E. Insulate the exterior of the supply collar with minimum 3/4" thick, foil faced 1 # density fiberglass insulation. Foil tape or seal all exposed insulation edges.
- F. Paint interior of the collars with flat black enamel.



1.12 ACOUSTICAL PERFORMANCE

The acoustical performance of the fan coil units shall not exceed the sound power levels indicated on Table I below for high speed operation as tested in accordance with ARI Standard 350-00.

Table I

Maximum Sound Power Levels
in dB re: 10⁻¹² Watts

<u>Unit</u> <u>CFM</u>	<u>Frequency</u>						
	<u>125</u>	<u>250</u>	<u>500</u>	<u>1 kHz</u>	<u>2 kHz</u>	<u>4 kHz</u>	<u>8 kHz</u>
300	63	53	47	44	36	32	29
400	65	56	50	49	42	38	33
600	64	58	58	55	52	48	43
800	66	60	58	56	53	49	43

1.13 INSTALLATION

- A. The HiLine Vertical Stacking Fan-coil Unit(s) shall be installed per Lilker Associates Vertical Fan Coil Unit Elevation Detail Drawing # M-6, Revised June 17, 2010 and manufacturer's Installation & Maintenance Bulletin.
- B. The fan coil unit shall be mounted on a 4 to 6 inch high welded steel angle iron frame designed to support the fan coil unit. The frame shall be custom fabricated to accommodate field conditions.

14. LOW PROFILE VERTICAL FAN COIL UNITS

- A. Furnish and install TITUS models low profile VBLC fan coils of sizes and capacities shown on the plans to meet prevailing cooling and heating requirements. Alternate manufacturers must be specifically approved by the Building Design Engineer.
- B. Fan coils shall be performance certified to ARI Standard 440. Units shall be wired in compliance with ANSI/UL 1995 Standard and listed with ETL.
- C. SUBMITTALS
 - 1. Shop Drawings: Indicate unit height, length and depth, coil connection sizes & locations, filter size, and electrical connection location.
 - 2. Product Data.
 - 3. Certification - Acceptable Fan-coil Unit(s) are to be certified in accordance with ARI Standard 440 and bear the ARI label. Manufacturer must be ISO 9002 certified. Units shall be UL listed and be wired in compliance with ANSI / UL 1995
 - 4. Identify unit configuration.
 - 5. Show unit shipping weight and dimensions
 - 6. State maximum airflows at high, medium and low speeds with wet and coils with clean air filters.
 - 7. Indicate entering & leaving air and water temperatures, water flow and water pressure drop sensible and latent capacities at peak design condition.
 - 8. Submit integral Flow measuring and Balancing valves.
 - 9. Submit Integral piped and wired motorized valves.
 - 10. Submit Electronic Thermostat with digital readout.
 - 11. Sound power levels at High speed



- D Fan coils shall be sound tested in accordance with ARI Standard 260 for ducted units and ARI Standard 350 for non-ducted units. Manufacturer shall provide these dB ratings on for each model specified.
- E. Unit casing shall be 18-gauge, zinc coated, phosphate treated, galvanized steel. Painted sheet metal components (VBA, VBF and VBLC units only) components shall be 18-gauge galvanized sheet metal.
- F Painted panels (VBA, VBF and VBLC units only) shall be painted with a polyester powder coating, electrostatically applied, oven baked to 400°F for 10 minutes in beige or white tones.
- G. The high capacity cooling coil shall be constructed with ½" O.D. Seamless copper tubes. The minimum tube thickness shall be 0.016". The tubes shall be mechanically expanded into rippled aluminum fins for a permanent bond insuring reliable heat transfer. Provide a manual air vent. The minimum Fin thickness shall be 0.006". Coil and piping assembly shall be ASME rated for 250 psig minimum water working pressure and be tested at a minimum of 320 psig. Tube burst pressure shall be minimum 600 psig. Coil capacity shall be as outlined on the project schedule and confirmed and certified with computer generated output.
- H. Unit pipe entry location shall be FIELD COORDINATED
- I. Coils shall be installed with manual Schrader type air vents with a sealing cap and be located at the highest point of the coil. The cap shall have a dual purpose, to seal any potential water leakage in the eventuality of Schrader valve failure and as a service tool for the extraction/insertion of the internal Schrader valve.
- J. Standard filters shall be 1-inch nominal thickness of the disposable type with a one-piece moisture resistant chipboard frame to eliminate corner separations. The spun glass filtering media shall be bonded with a resinous agent providing rigidity and resistance to media compression and meets UL class 2.
- K. Cabinets shall be lined with ½-inch dual-density fiberglass with a density of 1.5lbs/ft³ and 4.0lbs/ft³ for the face meeting NFPA 90A and 90B (appliances), NFPA 255, UL 181, UL723 and ASTM E84.

- L. Motors shall be multi-speed of the permanent split capacitor type (PSC) and be directly coupled to the centrifugal fan blower. Motor shall be suitable for a power supply of 115V/1Ph/60Hz and shall be internally protected with an automatic thermal overload. Motor shaft shall be supported by sleeve bearings of the permanently lubricated type for the full life expectancy of the motor. All motors shall be directly mounted to the fan deck and be isolated from the unit casing by two resilient anti-vibration mounts.
- M. Direct-driven fan shall be of the whisper quite type, double width double inlet (DWDI) forward curved statically and dynamically balanced at the factory. The fan wheel and casing shall be constructed of galvanized steel.
- N. Electric components shall be wired to a single control panel for single point power supply. Wiring exposed to the outside of the units shall be installed in conduits to meet UL 1995 safety requirements.
- O. The unit shall be furnished with a 120/24 volt A.C. control transformer with adequate ampacity to operate the electronic thermostat, three fan speed relays for use with a 24 volt A.C. low voltage digital thermostat and the heating and cooling zone control valves and condensate pan overflow sensor relay. The transformer shall be protected by a circuit breaker on the line side of the transformer. All the unit controls shall be housed in a separate protected galvanized steel enclosure. The controls enclosure shall incorporate a disconnect switch for unit service. The disconnect switch shall be readily accessible through the return air grille without the use of tools.
- P. Digital Thermostat

Provide a digital readout 24 volt A.C. low voltage digital thermostat. Thermostat shall be mounted on the face of the unit or remote wall mounted with appropriate extension of the connecting cables

1. Thermostat shall be Manufactured by Peco Inc. Model FT-170 or Engineer Approved Equal.
2. Thermostat shall permit full control of all the fan coil unit functions.
 - a. On-Off
 - b. Fan speed control (Low-Medium- High)



- c. Function- (Automatic- Heating only- Cooling only)
- d. Temperature set point adjustment.
- e. Temperature readout.
- f. The thermostat shall be field convertible to accept a remote temperature sensor where required.

Q. Zone Control Valves-

1. Provide a separate factory mounted and wired zone control valve for each of the heating and cooling coil circuits. The valves shall be ASME rated for 300 psig minimum water working pressure at 200F. The valve shall be (2) piece design with a removable motor actuator that requires no tools to remove. The motor actuator shall operate on 24 Volts A.C. The motor actuator shall be high close off pressure type with normally closed spring actuator and manual override lever. The valve body shall be forged Brass, metal to metal seat, 1/2" NPT or Sweat connections and have a minimum CV rating of 3.5. The valve must meet ANSI IV standards for close-off and have a minimum close-off pressure of 30 Psig at 200F. A removable terminal block shall be provided for wiring of the valve motor and control circuit. The valve must be suitable for operation with chilled or hot water.
 2. The valve shall be manufactured by TAS / ERIE, Pop Top with High close off pressure Actuator AH13A01A and VT 2213 Valve body with female NPT connections, or VT2213 for Sweat type connections.
- R. Condensate pans shall be single wall 20-gauge 304Stainless steel, thermally protected on the outside with fire and smoke rated 1/4-inch high-density insulation to prevent condensation. The factory installed 7/8-inch OD sweat copper condensate connection shall be located at the lowest point of the condensate pan to ensure all water drains from the condensate pan.



- S. Auxiliary condensate pan shall be removable, single wall 20-gauge 304 stainless steel, thermally protected on the outside with fire and smoke rated ¼-inch high-density insulation to prevent condensation. The factory installed 7/8-inch OD sweat copper condensate field connection shall be located at the lowest point of the auxiliary condensate pan to ensure that all water is drained from the condensate pan.
- T. An automatic safety overflow switch shall be located in the auxiliary condensate pan and be interconnected to the unit electric system preventing the unit operation if an overflow status is detected.
- U. Discharge air flange (VBC and VBLC units only) shall be ½-inch to facilitate the field connection of ducts.
- V. Discharge Air Grilles and Accessories
Unit mounted (VBA and VBF units only) discharge air grille shall be double-deflection, made of aluminum and painted white for white painted cabinet units or aluminum for beige painted cabinets, or
- W. Provide alternate pricing for custom discharge air grilles colors.
- X. Access doors shall be provided for access to the electric controls and valve package.
- V. Acoustical Performance

The acoustical performance of the fan coil units shall not exceed the sound power levels indicated on Table I below for high speed operation as tested in accordance with ARI Standard 350-00.

Table I

Maximum Sound Power Levels
in dB re: 10⁻¹² Watts

Frequency

<u>Unit</u> <u>CFM</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1 kHz</u>	<u>2 kHz</u>	<u>4 kHz</u>	<u>8 kHz</u>
400	65	56	50	49	42	38	33
600	64	58	58	55	52	48	43

15. SUPPLY AIR GRILLES

- A. Supply grilles shall be TITUS Model 300FS (double deflection) constructed of Aluminum. The sizes and mounting types are shown on the Supply Air Grille Schedule.
- B. The deflection blades shall be available parallel to the short dimension of the grille or register. Construction shall be of aluminum with a 1¼-inch wide border on all sides. Sizes 24 x 24 inches and below shall have roll-formed borders with a minimum thickness of 0.032 inch. Mounting arrangement shall be Type C with mounting clip and concealed screw fasteners. COUNTER SUNK SCREWS SHALL NOT BE USED.
- C. Margin types, colors, finish and methods of attachments for all diffusers, grilles, and registers shall be coordinated with wall details and specifications. Provide sheet metal extension collars to provide air tight connection between the fan coil supply grille and the unit supply plenum.
- D. Double Deflection blades shall be contoured to a specifically designed and tested cross-section to meet published test performance data. Blades shall be spaced on ¾-inch centers. Blades shall have friction pivots on both sides to allow individual blade adjustment without loosening or rattling or be inserted through the frame and held tight with steel friction wire interlocked to the frame on both ends of each side. Plastic blade pivots are not acceptable.
- E. The grille finish shall be #26 white. (Provide alternate additional cost for custom color match to fan coil return air panel or other custom, color as selected by the Owner.)
The finish shall be an anodic acrylic paint, baked at 315° F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.
- F. The manufacturer shall provide published performance data for the grille including CFM, area, throw, core velocity, NC level, and air



pressure drop. The grille shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

- G. Exact location of all air outlets shall be coordinated in the field. Mount grilles on unit centerline unless directed by Owner
- H. Grilles shall be suitable for operation at 10 percent excess and 25 percent less than noted capacity. Manufacturer responsible for examining application of each outlet and guarantee that each will provide required NC levels and comfort space conditions without drafts throughout operating range.
- I. See schedule on plans for diffuser sizing and model #.
- J. Manufacturer: Titus or Engineer approved equal of Anemostat

16. **FIREPROOFING**

- A. After the removal of the existing piping insulation and re-insulation of the existing chilled water, hot water and condensate piping risers. The existing sleeves or concrete penetrations must be repacked with mineral wool insulation within 2" of the floor slab and ceiling slab surfaces(Follow Directions required by the Manufacturer of the fire stopping compound to create a minimum 2 hour fire rating.) The remaining gap shall be filled with fire stopping compound applied between the insulation and the remaining sleeve or penetration.
- B. The fire stopping compound Shall be as manufactured by Hilti Corporation: Elastic Fire stop Sealant # CP-601-S.
- C. Material and assembly system must be UL Classified under UL 2079, UI1479 and have NYC MEA Approval.
- D. Store material and install in accordance with manufacturers instructions.
- E. Perform and submit certification of New York City Special Inspection to Building Management.



17. AUTOMATIC CONTROLS

- A. All automatic control work to be electric and performed by this contractor. Work to include all wiring, interlocks, equipment, etc, to make this system complete and operating.

18. TESTING AND BALANCING

- A. Balancing contractor shall balance the new chilled and hot water piping system flow to each fan coil unit for each heating and cooling coil.
- B. The contractor shall provide all labor and equipment required to balance each fan coil system.
- C. Balancing report shall be submitted TYPED in triplicate for approval to the Building Management on typewritten AABC-type forms.
- D. Balancing and testing shall be performed and supervised by one of the following independent firms specializing in testing and balancing:
 - 1) AIR BALANCING AND TESTING CORP.
 - 2) AIR CONDITIONING TEST AND BALANCING CORP.
 - 3) THERMAL THINKERS.
 - 4) MERENDINO ASSOCIATES
 - 5) DYNAMIC BALANCING
 - 6) Engineer and Building Management Approved Equal
- E. Each coil shall be balanced within 5 % of the scheduled flow.
 - 1. The balancing report shall indicate the design and actual flow for each coil, and actual system supply and return

pressure in psig , and the differential pressure in psi across each coil.

2. In addition the position indication (# turns on each balancing valve shall be submitted in the report for each coil, with flow meter differential pressure reading, manufacturers flow curve and Gpm reading for each balancing valve.

19. ELECTRICAL WORK

Furnish and install wiring for equipment. Coordinate with other trades for details of installation and wiring requirements. The term “wiring”, as used herein, shall include furnishing and installing conduit, wires, junction/outlet boxes, disconnects, overcurrent protection devices and final connections. Coordinate final conductor sizes, quantities, voltage requirements, and overcurrent protection device and outlet ratings with actual equipment to be furnished to the site prior to finalizing wiring installation. Minor adjustments to wiring requirements, necessary to accommodate actual furnished equipment shall be provided at no additional cost to the owner.

The electrical contractor shall comply with the following codes and standards:

- A. Underwriters Laboratories, Inc. (UL)
- B. National Electrical Code of the NFOA (NEC)
- C. Electrical Code of the City of New York (NEC 2005 Amendments)
- D. Building Code of the City of New York (NYCBC)
- E. Occupational Safety and Health Act (OSHA)
- F. American Disabilities Act (ADA)
- G. Building Rules and Regulations
- H. All Local Jurisdiction Directives and Requirements

Upon completion of all electrical work, electrical contractors shall adjust and test circuit, motors and any other electrical items installed. Any defective items shall be immediately repaired or replaced with new equipment r materials and that portion of the system shall be retested. All such remedial work shall be provided at no additional cost to the owner.



20. GUARANTEE

Contractor shall guarantee installation of his work and provide all materials and labor to correct any defects in materials or workmanship or operation for a period of one year following acceptance of the project by the Building Management and Owner.



22. FAN COIL SCHEDULE (BASED ON ENTERING CONDITION OF 78° F Dry Bulb (DB) 65° F Wet Bulb (WB))

TYPE	CFM @ HIGH SPEED	FAN CHARACTERISTICS			COOLING COIL								HEATING COIL					FILTER SIZE	MANUFACTURER MODEL #	REMARKS	
		WATTS	VOLT	Ø/ HZ	GPM	EWT	LWT	Max P.D. PSI(2)	Min Area S.F.	BTU/ HR		GPM	EWT	LWT	Max P.D. PSI(2)	Min Area S.F.	BTU/HR				
										Sensible	Total										
22nd to 48th & 50 th Floors	FC - A	300	70	115	1/60	1.2	42	55	12	1.45	6400	7700	0.5	170	150	12	1.46	7800	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-03	North - 2 Mullions, 1 Column
	FC - B	400	146	115	1/60	2.3	42	52	12	2.18	9200	11300	0.5	170	150	12	1.96	11300	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-04	North - 3 Mullions, 1 Column
	FC - C	600	195	115	1/60	2.1	42	56	12	2.43	12200	14000	0.5	170	150	12	2.2	14800	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	North - 4 Mullions, 1 Column
	FC - D	600	195	115	1/60	1.8	42	57	12	2.43	11060	13700	0.5	170	150	12	2.2	7800	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	South - 2 Mullions, 1 Column
	FC - E	800	314	115	1/60	1.8	42	62	12	2.43	15890	17600	0.5	170	150	12	2.2	11300	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-08	South - 3 Mullions, 1 Column
	FC - F	800	314	115	1/60	3.2	42	58	12	2.43	20900	26000	0.5	170	150	12	2.2	14800	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-08	South - 4 Mullions
	FC - G	400	146	115	1/60	1.6	42	58	12	2.18	9700	12900	0.5	170	150	12	1.96	7400	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-04	East - 2 Mullions, 1 Column
	FC - H	600	195	115	1/60	2.4	42	58	12	2.43	14800	18600	0.5	170	150	12	2.2	14000	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	East - 4 Mullions, 1 Column
	FC - I	400	146	115	1/60	1.6	42	58	12	2.18	9500	12500	0.5	170	150	12	1.96	7400	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-04	West - 2 Mullions, 1 Column
	FC - J	600	195	115	1/60	2.4	42	58	12	2.43	14800	18600	0.5	170	150	12	2.2	14000	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	West - 4 Mullions, 1 Column
	FC - K	400	146	115	1/60	2.5	42	50	12	2.18	6000	9000	0.5	170	150	12	1.96	5000	36"x 10"	Titus-VBLC-04	22nd FL. South Mullions, 1 Column (Low Vertical Unit)
FC - L	600	195	115	1/60	3.3	42	52	12	2.43	11100	16000	0.5	170	150	12	2.2	7800	44" x10"	Titus-VBLC-06	22nd FL. South Mullions, 1 Column (Low Vertical Unit)	
49th & 51st Floors	FC - M	300	70	115	1/60	2.7	42	48	12	2.43	5500	7800	0.5	170	150	12	1.46	4700	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-03	North - 1 Mullions, 1 Column
	FC - N	400	146	115	1/60	1.5	42	56	12	2.18	8400	10100	0.5	170	150	12	1.46	8300	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-04	North - 2 Mullions, 1 Column
	FC - O	600	195	115	1/60	2.3	42	56	12	2.43	13000	15400	0.5	170	150	12	2.2	12000	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	North - 3 Mullions, 1 Column
	FC - P	600	195	115	1/60	3.8	42	54	12	2.43	16500	22500	0.5	170	150	12	2.2	15500	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	North - 4 Mullions, 1 Column
	FC - Q	600	195	115	1/60	2.9	42	54	12	2.43	13000	17100	0.5	170	150	12	2.2	8300	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	South - 2 Mullions, 1 Column
	FC - R	800	275	115	1/60	5	42	54	12	2.43	21500	29200	0.5	170	150	12	2.2	12000	20" X 25"	Williams-ER-008	South - 3 Mullions, 1 Column- See Note# 1
	FC - S	800	314	115	1/60	2.9	42	54	12	2.43	13000	17100	0.5	170	150	12	2.2	8300	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-08	East - 2 Mullions, 1 Column
	FC - T	800	314	115	1/60	3.9	42	56	12	2.43	20900	26000	0.5	170	150	12	2.2	12000	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-08	East - 3 Mullions, 1 Column
	FC - U	600	195	115	1/60	2.3	42	56	12	2.43	13000	15400	0.5	170	150	12	2.2	16000	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	East - 3 Mullions + 1 Column Skylight
	FC - V	600	195	115	1/60	2.4	42	58	12	2.43	14000	18600	0.5	170	150	12	2.2	8300	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-06	West - 2 Mullions, 1 Column
	FC - W	800	314	115	1/60	3.2	42	58	12	2.43	20900	26000	0.5	170	150	12	2.2	12000	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-08	West - 3 Mullions, 1 Column
FC - X	800	314	115	1/60	3.9	42	56	12	2.43	18200	20600	0.5	170	150	12	2.2	16600	13-3/4" X 18-7/8"	Mcquay-FKZZ*S-08	East & West 4 Mullions + Column 49th Floor only	

1. Williams unit will require enclosure and piping modifications
2. Maximum pressure drop includes Balancing valve, Motorized valve and Coil Pressure drop.
3. Fan coil unit size and type shall be selected from drawings M-1 Through M-5

End of Specifications

21. LIST OF DRAWINGS

Drawing #	Title	Date
M-1	22nd Floor Mechanical Plan	October 10, 2007
M-2	23rd thru 48th Floor Mechanical Plan	Revised- August 1, 2011
M-3	49th Floor Mechanical Plan	October 10, 2007
M-4	50th Floor Mechanical Plan	October 10, 2007
M-5	51st Floor Mechanical Plan	Revised- August 1, 2011
M-6	Vertical Fan Coil Unit Elevation Detail	Revised- June17, 2010