

# GUIDELINES FOR PROFESSIONAL SERVICES

## DIVISION 23 –Heating/Ventilating/Air Conditioning

The following items are to be included on the drawings and in the specifications by the Design Professional:

### I. GENERAL

- A. Before any design is started, convene a meeting with the design team, the Construction Services representative, and a Facilities Services representative, to review the Design Professional's recommendations.
- B. Evaluate feasibility of thermal energy storage systems as directed. If TES systems are not feasible, then independent stand-alone HVAC systems shall be provided to administration and large media areas.
- C. Refer to the Cafetorium Acoustics Guidelines for A/C noise criteria in cafeteriums.
- D. Electrical rooms containing transformers shall be mechanically ventilated.
- E. Provide a minimum 4" high concrete base (above the finish floor level) under air handlers, boiler, water heaters, tanks, large pumps and other heavy mechanical equipment.
- F. Provide emergency condensate overflow pans under A/C equipment located over ceilings, providing conspicuous secondary drainage to signal a drainage problem. Conspicuous locations include over doorways, hallways, etc. The use of float switches is prohibited. Outside of buildings, condensate shall not drop onto roofs. The use of dry wells is not acceptable without the written approval of the Owner.
- G. No piping or conduits of any nature shall be installed below a building or a structural slab except the mechanical and electrical lines serving fixtures and equipment within the building.
- H. Refrigerant suction line insulation shall be a minimum of 3/4 "thick
- I. Acceptable manufacturers of variable frequency drives are:

Danfoss  
Magnetek  
Square D  
Toshiba  
Trane  
Weg

## Yaskawa

- J. Schematic diagrams of control system, chilled and hot water piping system, along with chiller and boiler design and performance specification shall be mounted in a frame under unbreakable glass or plexiglass in mechanical rooms. Example: If A/H mechanical room, then all information pertaining to that equipment should be in that room with the equipment.
- K. The drawings shall include a large scale plan and elevation of each mechanical room depicting all equipment, piping, and required clearances. All piping up to 3” diameter may be shown single line and 4” and over shall be double line. All fittings, valves and accessories shall be shown.
- L. Provide labels on the grids of ceilings to identify the location of equipment (VAV’s, duct heaters, etc.) installed above lay-in ceilings.

## II. EQUIPMENT

### A. Manufacturers

- 1. Approved manufacturers of chillers and modular air handlers are:

Carrier  
Dunham-Bush  
McQuay  
Trane  
York

- 2. Approved manufacturer of thermal storage tanks are:

CalMac  
Fafco  
Ice-Cel

### B. Chillers

- 1. Use air-cooled screw or scroll compressor chillers.
- 2. Provide factory applied coating on condenser coils to reduce corrosion. Field applied coatings are not acceptable.
- 3. In addition to the normal one year parts and labor warranty, chiller compressors shall be warranted for five years (parts only).

4. Include a factory mounted starter and non-fused disconnect.
5. Provide a single point power connection.
6. Provide a control interface panel to communicate with the Owner's Trane Summit control system. The interface may be via Trane Tracer, or LONWORKS, or BACNET. All control objects and points available internally shall be accessible via this interface. The complete list of objects and control points shall be included in the pre-bid equipment checklist.

#### C. Modular Indoor Air Handling Units

1. Provide clean filters required prior to substantial completion and a new, clean set of filters installed in the equipment upon turning over the system to the Owner. Spare fan belts or other items shall not be required.
2. All modules shall be full double wall construction with no insulation exposed to the air streams.
3. Drain pans shall be of stainless steel construction.
4. Variable air volume units shall include a factory mounted airflow measurement station for measuring/controlling the outside air. Acceptable stations are Trane TRAQ or Ruskin IAQ 50. Constant volume units shall NOT have these stations.

#### D. Variable Volume Air Terminal Units

1. All units shall be of double wall construction with no insulation exposed to the air stream.

#### E. DX Equipment

1. Independent DX equipment shall be provided in the following spaces:
  - 1DF and MDF rooms
  - Custodial Office
  - Kitchen Dry Storage Room
  - Kitchen Manager's OfficeThermostats for DX Systems shall be Venstar programmable Model II 29005CH.

#### F. HVAC Equipment Pre-Bid Requirements

The following requirements shall be included in all project specifications.

1. Major HVAC equipment specified for School Board Projects shall be required to be reviewed by the Design Professional prior to being allowed to submit a bid. The

Design Professional shall include in the project specifications provisions for this process.

2. Major HVAC equipment shall include, but not be limited to, chillers, heat exchangers, thermal storage tanks, and modular air handlers.
3. The specifications shall require equipment checklists (not complete submittals) be submitted to the Design Professional at least fourteen days prior to the bid date. The Design Professional shall review the submitted checklists, allow the manufacturer to revise any deficient items, and distribute a final addendum listing the manufacturers acceptable to submit bids. The equipment checklists shall be complete enough for the Design Professional to determine whether or not the submitted equipment could meet the design intent, but not require a full submittal.
4. The equipment checklists shall be submitted by all listed manufacturers, including the basis of design.

#### G. Other

1. Every effort shall be made to not locate equipment or systems that will require use of ladders to oil, change belts, filters or service any part of the equipment.
2. Power ventilators shall be direct drive. Belt drive power ventilators must be approved in writing.
3. Provide a factory authorized representative for all chillers, variable frequency drives, and other equipment with control modules that interface with the Trane Summit building control system. The factory representative shall also provide on-site instruction and training of the owner's in-house staff and technicians.
4. The Engineer of Record shall provide an Instruction to Owner describing the design intent of the systems.
5. Kitchen hoods shall not discharge make-up air through the face of the hood. Hoods shall be equal to Captive-Aire Model ND with ACPSP accessory.
6. Heating water boilers, if used, shall be of the forced draft type.

### III. HYDRONIC

- A. Chilled and hot water lines shall be steel or copper. The use of plastic is not acceptable.

- B. On projects with multiple buildings or zones, provide chilled and heating water shut-off valves at each building or zone (supply & return). Whenever possible, install them in an exterior room that is easily accessible and not above ceilings.
  
- C. Install full port ball valves that can flush strainers in the chilled water system without removing insulation. Also, insulation over the cup of strainer should be removable type so strainer can be cleaned without damage to insulation. Design with a floor drain nearby.
  
- D. All valves on lines 2” or smaller shall be the full port ball type with nylon or equal seats. Valves on lines larger than 2” shall be the butterfly type with rubber, nylon or compatible sealing surfaces.
  
- E. All valves shall be identified with numbered round copper tags secured with chains and indexed to a master list, which gives location and system function. All valves in each piping system, with the exception of those normally found exposed in toilet rooms, shall be identified with color coded valve handles and valve tags. Tags shall be at least 1-1/2” in diameter and of the same material as specified above for nameplates or brass with stamped black enamel filled letters and numbers. Shut off valves shall be required on all branch lines. A valve tag list shall be posted in each mechanical room.
  
- F. Supply and return lines shall be equipped with pressure and temperature taps that are accessible. Provide two sets of taps at chillers and heat exchangers. Taps shall be brass. Steel taps are not acceptable.
  
- G. All hydronic sensors shall be installed facing down, between the four and eight o’clock position.
  
- H. All lines shall be properly and clearly labeled as to their function and flow.
  
- I. Closed cell insulation shall be used in chilled water lines. Use of fiberglass is not acceptable on chilled water lines.
  
- J. Supply and return lines for hot and/or chilled water shall not be run over any electrical or data equipment rooms or spaces.
  
- K. All hydronic piping shall be flushed per the following flushing schedule:

**10-DAY FLUSHING SCHEDULE**  
**Based on 2 each 5-Day work weeks**

**Day #1:** (1) Fill loop with fresh water.

- (2) Start pump(s) – (Minimum 6 fps velocity is desired)
- (3) Begin F & B (Feed and Bleed) – (Minimum 10 gpm and 50 psi make-up water – 1.5” firehose preferred)

Day #2: (1) Pull and clean EVERY strainer, re-install screens.

Day #3: (1) Rotate Bleed locations. (“a”)

Day #4: (1) Pull and clean EVERY strainer, re-install screens.  
(2) Blow down and flush from EVERY POSSIBLE LOW POINT.

Day #5: (1) Repeat Day 3.

Day #6: (1) Check samples with WCT (White Cup Test) (“b”)  
If WCT passed: (A) Stop F & B  
(B) Add cleaner to loop.  
If WCT failed: Repeat days 3 thru 6.

Day #7: (1) After Full 48 hours of cleaner circulation;  
(a) DROP ENTIRE LOOP, AND REFILL.  
(b) Begin F & B

Day #8: Repeat Day 4.

Day #9: Repeat Day 3.

Day #10: (1) Repeat Day 4.  
(2) Perform WCT again.

If Pass: Remove ALL startup screens. Call in for Inspection.  
If Fail: Repeat Days 8 thru 10

Once WCT passes, call water treatment contractor to have the loop tested for iron content and traces of cleaner, still in loop. When test is low on iron (1.5 ppm or less), and no indication of cleaner still present in loop, we pull all strainers and clean, one last time. System shall additionally be treated for biological rust. Once this is done, add the final inhibitor. Water treatment contractor then checks periodically (as required by specifications) and submits reports throughout warranty period.

(“a”): Minimum number of bleed points is 2 (two), Maximum number is dependant on incoming water pressure.

(“b”): WCT=White Cup Test=Take samples from ALL locations, Put sample in white Styrofoam cup. If water looks clean enough to drink, WCT passed.

L. Provide redundant (back-up lead/log) pumping

#### IV. AIRSIDE

- A. Multi-zone units for classroom applications are our preferred system. When specifically approved, VAV systems may be used providing the VAV terminal units are not located in the classrooms.
- B. Direct Outside Air Systems ( DOAS ) shall not be permitted.
- C. Separate HVAC zones shall be provided for each classroom and for each conference/meeting room. A single zone for offices shall not exceed three spaces that have similar occupancies and exposures. Do not mix interior and exterior spaces in the same zone.
- D. Administration area airside systems shall be independent and not part of assembly or classroom airside systems.
- E. Mechanical equipment rooms containing air handling units shall be pressurized with conditioned supply air where the room opens to the exterior of the building.
- F. Sheet metal ducts shall not be internally lined but EXTERNALLY wrapped. Flex duct may be used in lengths not to exceed five (5) feet. Use of fiber duct board is not acceptable except as an external insulation over sheet metal duct.
- G. Design air system equipment with metal on the airstream side.
- H. Supply and return registers and grills shall be metal and constructed with adjustable opposed blade dampers either at discharge or internal for adjusting of air flow.
- I. The design professional shall include in the contract documents, complete documentation demonstrating compliance with ASHRAE Standard 62, "Ventilation for Acceptable Indoor Air Quality".
- J. The bottom of outdoor air intakes shall be at least 4' above grade to minimize the intake of dirt, debris, and cut grass.

#### V. CONTROLS

- A. The owner has a long term agreement with Tampa Bay Trane to provide Tracer Summit Systems. The Design Professional shall contact Tampa Bay Trane and coordinate the design with the Trane representative.
- B. The basis of design for the controls system on new projects shall be Trane Tracer Summit/Enterprise using fiber optic technology where feasible. Coordinate fiber optic requirements with the Electrical Design Professional. Renovation/retrofit projects on existing campuses shall be evaluated for the type controls based on the existing controls

and the extent of the renovation/retrofit.

- C. Do not use combination temperature/humidity sensors in spaces. Separate sensors shall be provided. Space Sensors and Thermostats shall be installed 48" AFF to comply with ADA.
  
- D. Do not factory mount unit controllers on air handling units.
  
- E. Kitchen Dry Storage room design temperature setpoint shall be 74 degrees F.
  
- F. All outside air dampers shall be automatically controlled and interlocked with exhaust fan to insure closure upon shutdown of blower.
  
- G. Control systems and phone/modem to controls shall be protected electrically with surge suppression with battery backup.
  
- H. Kiln room ventilation shall not be interlocked or connected to the Building Automation System.
  
- I. The following sequences of operation shall be included in the design:
  - 1. Dedicated outside air cooling coil control. Reset the discharge air temperature (DAT) based on the space relative humidity. Reset the DAT up if the relative humidity is less than 55%.
  - 2. Multi-zone main/return air cooling coil. Reset the discharge air temperature up based on average space temperature. Close the chilled water control valve if the average zone damper position is less than 10%.
  - 3. Provide a freeze protection sequence for the heat exchanger if one is in the project. If the glycol entering temperature is less than 32 degrees, shut down chiller compressors.
  - 4. Provide an alarm to the summit if an air handling unit is shut down by the fire alarm system.
  - 5. All glycol system piping shall have a pressure sensor to be used by the controls to alarm for leak detection.
  - 6. The School's Kitchen walk-in Freezer shall have a Temperature Sensor which shall send an alarm on high Temperature. This sensor shall be separate and independent from the Security System Temperature alarm.