225 97/225

-1-

HEATING AND COOLING

INSTALLATION SPECIFICATIONS

(1) SCOPE

This installation shall include, but not be limited to, furnishing and installing an air to air electric heat pump system complete with temperature controls, accessories, refrigerant piping, condensate drain piping, insulation of ductwork and piping, and sheet metal ductwork with registers, louvers, and dampers.

(2) WORK NOT INCLUDED IN THIS CONTRACT

(To be performed by the City of Hartford P.W.D.)

A. Cutting and Patching.
B. New partitions with doors.
C. Finish painting.
D. Base concrete pad for outdoor coil.
E. Addition of, or relocation of present electric clock.
F. Temporary removal and replacement of ceiling pads.
G. Electric Power and control wiring. However, this contractor shall provide complete and carefully detailed control wiring diagrams to the City for wiring.

(3) INSTALLATION

Because of the nature of the equipment, this installation of the heat pump system must be performed by skilled tradesmen with a proven record and adequate experience in the installation and service of heat pumps. The City reserves the right to reject the services of any individual or organizations who is not thoroughly qualified to provide a highly skilled installation. All equipment and piping must be installed in strict accordance with the Manufacturer's instructions and recommendations.

The fan coil unit specified requires a minor modification of the DX coil for use in the horizontal air flow position. Unit must be hung using vibration isolation to prevent transmission of vibration to structure. The 20 K.W. electric heating coil specified is rated for 15 K.W. when supplied with 208 volt power.

-2-

(4) DUCTWORK

(a) General: This Contractor shall furnish and install all ductwork as shown on the Drawings. Furnish and install all miscellaneous materials and accessories required to complete all various duct systems and do all cleaning, testing, adjustments, etc., necessary. The Contractor shall fully cooperate with other Contractors so that all ductwork is run to provide maximum head room and clear the work of other trades.

(b) Material: All ducts shall be constructed of galvanized steel sheets of the following minimum thicknesses:

Max. Side Inches	U.S. Std. Gauge	Type of Transverse Joint Connection	Bracing
Up to 24:	24	: S. Drive, pocket or bar slips on 7'10" centers	None
25 to 30:	24	: S. Drive, 1" pocket or 1" bar slips on 7' 10" centers	: 1 x 1 x 1/8" angles : 4' from joint.
31 to 40:	22	: Drive, 1" pocket or 1" bar slips on 7' 10" centers	: 1 x 1 x 1/8" angles : 4' from joint.

All ducts 18 inches and larger shall be cross broken or made two (2) gages heavier.

(c) Fabrication: All ducts shall be built airtight and in a strong and substantial manner with joints presenting smooth surfaces on the inside and a neat appearance on the outside. Square elbows, or elbows having an inside radius of less than one-half the width of the duct shall be provided with approved turning vanes. All ducts shall be constructed, braced and supported in such manner that they will not sag or vibrate to any perceptible extent when the fans are operating at a maximum speed and capacity.

(d) Flexible Collars: Flexible collars shall be installed in the inlet and outlet connections of each fan and unit connected to ductwork. These collars shall be at least 4 inches long with 1 inch slack. Collars shall be securely fastened and ductwork made airtight. The ducts shall be in perfect alignment with the openings in the fans before the collars are installed. Flexible material shall be 100% asbestos fibres woven into a fabric, with both ends selvaged, weighing approximately 6 oz. per square foot. Material used near electric heater must be an approved heat resistant type.

(e) Fire Dampers: Furnish and install fire dampers where required or shown on the Drawings. Fire dampers shall be arranged to close automatically and remain tightly closed upon the operating of a fusible link located where readily affected by an abnormal rise of temperature in the duct. Dampers shall be constructed in accordance with the requirements of governing codes and NFPA.

(f) Volume Control Dampers: Shall be provided where shown or required for balancing and shall be of the butterfly single blade type mounted on rods. Both ends of the dampers shall extend through drilled holes in duct. All dampers shall have locking quadrant.

~~(g) Fresh air intake motor operated damper shall be of the tight closing type. Damper motor shall be suitable for use with 24 volt power and be equipped with spring return to close damper with the interruption of power.~~

(h) Provide auxilary drain pan with soldered seams under entire fan coil unit, with 2½" high sides. Pipe to suitable drain as per code and/or fan coil unit manufacturer's instructions.

-3-

(i) Provide where shown, an outside air intake weather type louver constructed of extruded aluminum with welded joints and ½" mesh aluminum bird screen.

(j) Provide 1" thick fiberglas acoustical duct liner, properly cemented to the duct, on the return duct and the supply duct and branches, down to the elbow (approx. 10 feet). Lining shall be installed in accordance with the latest edition of SMACNA, and shall have a UL fire hazard classification working of FHC-25/50 or less and meet NFPA requirements.

(5) INSULATION

(a) Ductwork which is not acoustically lined, shall be covered with 1½" thick fiberglas blanket with vapor barrier securely fastened and properly sealed against moisture intrusion.

(b) Refrigerant vapor line and horizontal condensate drain lines shall be insulated with ½" thick closed cell foam plastic with thermal conductivity of 0.28 BTU per sq. ft. per degree F. per inch of thickness.

(6) REGISTERS AND GRILLES

(a) Supply registers shall be of the double deflection type with vertical face bars, horizontal rear bars, and key operated opposed blade damper, complete with sponge rubber gaskets and prime coat painted equal to Tuttle and Bailey model T647.

(b) Return grilles shall be equal to Tuttle & Bailey T70D. Make-up air register shall be equal to T & B T78D

(7) REFRIGERANT PIPING Shall be installed in the best practices of the industry and shall include but not be limited to:

(a) Use ACR refrigerant grade cleaned and sealed copper tubing to prevent plugging up metering orifices.

(b) Flow dry nitrogen through tubing whenever high temperature soldering is performed.

(c) Provide required traps and proper pitch of refrigerant lines to enhance oil return to compressor.

(d) Provide evacuation valves in vapor and liquid lines.

(e) After all lines are connected, leak test using an electronic leak detector after system has been pressurized to 175 psig, with refrigerant and dry nitrogen.

(f) When no leaks appear, evacuate system down to 1 p.s.i.a. or less, and seal for 12 hours. If pressure is not maintained during that period of time, locate and repair leaks and repeat above procedures.

(g) When established that system is without leaks, use procedure of double evacuation of system to ensure that all moisture is removed. After properly evacuated, system can be charged with refrigerant which must be accurately weighed for proper operation. Do not overcharge.

NOTE: Isolate components which retain factory charge of refrigerant under pressure. These do not require further testing or evacuation. Procedures outlined are primarily for field piping and for components which have lost the factory refrigerant charge.

(h) Refrigerant piping must be hung in an approved manner so that it is isolated from building structure.

(8) EQUIPMENT

A. (1) Furnish and install a Carrier Model 38QB060-601 air-to-air electric

-4-

heat pump (out-door unit) with a Sound Rating Number (SRN) of 20 or less at full capacity. The unit shall be designed and tested for use with Refrigerant 22 and contain sufficient charge (R-22) for complete system. Brass service valves with refrigerant line fittings and service ports shall be located on exterior of unit.

Nominal unit electrical characteristics shall be 460 V, 3 ph, 60 Hertz. Unit shall be capable of satisfactory operation within voltage range of 414 v to 506 volts.

(2) Total cooling capacity shall not be less than 53,000 Btuh with indoor air quantity of 2100 dfm at 67 F wet-bulb temperature coincident with 95F dry-bulb temperature of air entering outdoor unit. Sensible heat capacity shall not be less than 41,000 Btuh with 75 F room dry-bulb temperature. Energy Efficiency Ratio (EER) shall be 7.1 or more.

(3) Heating capacity shall not be less than 39,400 Btuh with air entering outdoor unit at 17 F dry-bulb temperature at 85% relative humidity, and 70 F dry-bulb temperature of air entering indoor unit. One 20 kw electric heater shall be provided for indoor coil.

(4) Outdoor coil shall be constructed with aluminum fins mechanically bonded to non-ferrous tubing with a total face area of 17.2 square feet. Coil shall be 2 rows deep with a nominal fin spacing of 20 fins per inch. Coil shall be protected by powder coated grille. Factory-installed coil refrigerant metering device shall be mounted on unit liquid service valve. Metering device internal components shall be removable for cleaning or replacement.

Outdoor unit fan shall be propeller type, direct driven, and arranged for vertical air discharge. Fan motor shall be factory lubricated, inherently protected and resiliently mounted.

(5) Compressor shall be of the welded-hermetic type with internal vibration isolation and shall be covered with a shield to muffle operating sound. Compressor motor shall have both thermal and current-sensitive overload device. Compressor shall be equipped with a crank-case heater and have internal high-pressure relief valve.

(6) Controls shall be factory wired and located in a readily accessible location on unit control ring. Controls and protective devices shall include a liquid line low-pressure switch, suction line accumulator and pressure relief device. An automatic defrost control shall be included to accomplish defrosting (only if coil saturated suction temperature indicates freezing temperatures) every 90 minutes for a period of not more than 10 minutes. Control wiring terminal board shall be designed to match indoor. (40 QB) unit terminal board and accessory thermostat terminals for standardized point-to-point connection.

(7) Maximum dimensions: Diameter 30 in., height 38 inches.

(8) Accessories shall include Indoor Thermostat, Outdoor Thermostat, Supplemental Heat Relay, Solid-State Time Guard II, Service Sentry Control, Biflow, Liquid Line Filter Drier, Heat Pump Rack.

B. (1) Furnish and install a Carrier Model 40QB060 equipped with cooling control kit, electric heater, in the location and manner shown on the plan. Unit shall operate properly in horizontal position.

(2) Unit enclosure shall be insulated and constructed of cold-rolled steel, bonderized and finished with baked enamel. Large front service access panels shall provide easy access to all components.

(3) Fan shall be forward curved with double inlet, mounted on motor shaft, dynamically and statically balanced. The fan shall deliver 2100 cfm with 0.49 in. wg external static pressure operating at high fan speed. The multi-speed fan motor shall be factory lubricated, have internal overload protection, be resiliently mounted and shall not exceed 0.75 hp. Fan-motor assembly

-5-

shall be removable for service. Fans are factory connected for two speed operation with electric heater.

(4) Cooling coil shall have a face area of not less than 5.0 sq. ft and be constructed with aluminum plate fins mechanically bonded to nonferrous tubing with all joints brazed. Coil shall have factory installed: refrigerant metering device; refrigerant line fittings which permit mechanical connections. Condensate pans shall be equipped with primary and auxiliary drain connections.

(5) Electric heater shall be factory installed. Heater shall have heating elements sequenced on and off in 5-Kw increments and shall be wired for 2-stage operation. All heaters shall be equipped with thermal overload device, current overload, circuit breakers, and the required heating and cooling system controls including - 60-va control circuit (24-v) transformer. Low voltage connections shall be point-to-point on terminal board.

(6) Maximum dimensions: length 57 in.,; width 27 in.,; height 21 inches.

(9) TESTING & ADJUSTING

(a) General: After the entire installation has been completed, operate the equipment under normal conditions during the winter and summer seasons, making all required adjustments to compressors, fans, valves, controls, etc., until all performance requirements are met. Advise Engineer 24 hours before testing.

(b) Air Tests: All volume dampers and registers shall be adjusted to obtain the air quantities shown on the Drawings. Where anemometer or velometer tests are found impractical, air quantities shall be determined by means of a standard pitot tube and manometer. After final adjustments, the air quantities obtained at the various outlets shall be listed and copies furnished. The aforementioned test shall prove that the fan systems are delivering the scheduled or specified air quanties. Should the observed air quantities be less than 90% of that specified or scheduled, the Contractor, at his own expense shall make such approved changes to obtain the specified or scheduled air quantities.

CITY OF HARTFORD, CONNECTICUT
DEPARTMENT OF PUBLIC WORKS
FACILITIES SERVICES BUREAU

SPECIFICATIONS - INSTALLATION - HEATING & COOLING
SUPPLEMENTARY - 2ND FLOOR - HOME HEALTH AID AREA
VISITING NURSE'S ASSOCIATION
BORGDORF HEALTH CENTER, 80 COVENTRY ST., HARTFORD, CT.

SUBMITTED	APPROVED	APPROVED
R.I. Miller	Paul Anthony (CHIEF FAC. SER. BU.)	George E. Heppner (CITY ENGR.)

DRAWN R.I.M. — DAYBOOK NO. 010834-C
CHECKED
SCALE NONE — DATE MAR. 21, 1983 — DRAWING NO. H&C-3

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