15010 - GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE

A. PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY FOR AND INCIDENTAL TO THE MECHANICAL WORK AS SHOWN ON THE DRAWINGS OR SPECIFIED AND IN CONFORMANCE WITH ALL OTHER CONTRACT DOCUMENTS.

B. PERFORM ALL MECHANICAL WORK IN STRICT ACCORDANCE WITH ALL APPLICABLE STATE AND LOCAL CODES, NATIONAL FIRE PROTECTION ASSOCIATION, REFERENCED CODES AND STANDARDS BY VARIOUS TECHNICAL SOCIETIES, FEDERAL OCCUPATIONAL SAFETY AND HEALTH STANDARDS, LOCAL INSPECTOR REQUIREMENTS, AND OWNER INSURING AGENCY REQUIREMENTS.

C. CONTRACTOR SHALL APPLY AND PAY FOR ALL NECESSARY PERMITS AND CERTIFICATES OF INSPECTION REQUIRED BY THE CODE AUTHORITY.

D. ALL FINISH PAINTING IS TO BE PROVIDED BY THE GENERAL CONTRACTOR, EXCEPT AS NOTED ELSEWHERE. THIS CONTRACTOR SHALL RESTORE TO THE ORIGINAL CONDITION , ANY PAINTING DEFACED BY HIM AFTER ORIGINAL PAINTING.

E. THE ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED, SHALL PROVIDE POWER WIRING FOR EACH ITEM OF ELECTRICAL EQUIPMENT AND MAKE FINAL CONNECTIONS TO MOTORS.

F. PROVIDE ALL NECESSARY CONTROLS, RELAYS, ETC. REQUIRED FOR PROPER OPERATION OF ALL EQUIPMENT.

G. GUARANTEE MECHANICAL INSTALLATION AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR ONE (1) YEAR FROM DATE OF FINAL ACCEPTANCE.THIS CONTRACTOR WILL BE RESPONSIBLE FOR ALL ADJUSTMENTS TO INSURE EFFICIENT AND PROPER OPERATION OF ALL MECHANICAL SYSTEMS AND EQUIPMENT DURING THE GUARANTEE PERIOD.

1.02 CUTTING AND PATCHING

A. THE CONTRACTOR FOR THIS DIVISION SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR THE INSTALLATION OF HIS WORK.

1.03 EXAMINATION OF SITE

A. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS. LOCATIONS OF EXISTING UTILITIES INDICATED ARE APPROXIMATE. THE CONTRACTOR SHALL FIELD VERIFY ALL SIZES, LOCATIONS AND INVERTS AS NECESSARY.

1.04 OPERATION AND MAINTENANCE MANUALS

A. UPON COMPLETION OF ALL WORK, OPERATION AND MAINTENANCE (O&M) MANUALS SHALL BE SUBMITTED FOR APPROVAL.O & M MANUALS SHALL BE BOUND IN A HARD COVER 3 RING BINDER AND LABELED WITH THE PROJECT NAME.MANUALS SHALL INCLUDE NAME, ADDRESSES, AND PHONE NUMBERS OF THE CONTRACTOR(S) FOR EACH DISCIPLINE AND THE APPROVED MANUFACTURERS LIST. THE MANUALS SHALL ALSO INCLUDE COPIES OF ALL APPROVED SHOP DRAWINGS AS WELL AS ALL APPLICABLE (AND APPROPRIATELY EDITED) MANUFACTURERS MAINTENANCE AND OPERATING INSTRUCTIONS.

1.05 RECORD DRAWINGS

A. WITHIN 60 DAYS AFTER THE DATE OF OCCUPANCY, PROVIDE RECORD OF DRAWINGS OF THE ACTUAL INSTALLATION TO THE OWNER. RECORD DRAWINGS SHALL INCLUDE AT MINIMUM ALL DEVIATIONS FROM THE PLANS, THE LOCATION AND PERFORMANCE DATA OF EACH PIECE OF EQUIPMENT, AND THE GENERAL CONFIGURATION OF DUCT AND PIPING DISTRIBUTION SYSTEMS INCLUDING SIZES.

15700 - HEATING, VENTILATION, AND AIR CONDITIONING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. FURNISH ALL LABOR, MATERIALS, EQUIPMENT, SERVICES, TOOLS, AND SUPERVISION REQUIRED TO PROVIDE COMPLETE AND WORKING HVAC SYSTEMS AS INDICATED ON THE DRAWINGS AND AS OTHERWISE INDICATED TO BE REQUIRED.

1.02 WORK INCLUDED

A. THE WORK SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FURNISHING AND INSTALLATION OF THE FOLLOWING:
1. HVAC SYSTEMS
2. DUCTWORK AND HANGERS
3. AUTOMATIC TEMPERATURE CONTROLS AND CONTROL WIRING
4. CUTTING AND PATCHING IN CONNECTION WITH THE WORK
5. TESTING, CLEANING AND PLACING IN OPERATION ALL SYSTEMS AND EQUIPMENT SPECIFIED UNDER THIS SECTION OF THE SPECIFICATION
6. WORK SHALL COMPLY WITH APPLICABLE CODES AND ORDINANCES
7. CONTRACTOR SHALL OBTAIN PERMITS AND REQUIRED INSPECTIONS
8. COORDINATE THE WORK OF THIS DIVISION WITH OTHER TRADES

1.03 RELATED WORK TO BE PERFORMED UNDER OTHER SECTIONS

A. POWER WIRING, AND POWER CONNECTIONS TO MECHANICAL EQUIPMENT SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED
B. MOTOR STARTERS AND DISCONNECTS WITH FUSES SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED
C. CONTROL WIRING SHALL BE IN CONDUIT
D. ELECTRICAL WORK SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND ALL LOCAL CODES AND JURISDICTIONS

1.04 CODES AND STANDARDS

A. ALL APPLICABLE STATE AND LOCAL CODES AND ORDINANCES AND THE FOLLOWING STANDARDS:

1.	NFPA-90	AIR CONDITIONING AND VENTILATING SYSTEM
2.	ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
3.	ARI	AMERICAN REFRIGERATION INSTITUTE
4.	SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTOR'S NATIONAL ASSOCIATION, INC.
5.	ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
6.	ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
7.	ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
8.	UL-181	UNDERWRITERS LABORATORIES, INC.
9.	NEC	NATIONAL ELECTRIC CODE
10.	AMCA	AIR MOVING AND CONDITIONING ASSOCIATION
11.	ICC	INTERNATIONAL CODE COUNCIL
12.	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

1.05 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

A. MATERIALS AND ADHESIVES USED THROUGHOUT THE MECHANICAL AND ELECTRICAL SYSTEMS FOR INSULATION, AND JACKETS OR COVERINGS OF ANY KIND, OR FOR PIPING OR CONDUIT SYSTEM COMPONENTS, SHALL HAVE A FLAMESPREAD RATING NOT OVER 25 WITHOUT EVIDENCE OF CONTINUED COMBUSTION AND WITH A SMOKE DEVELOPED RATING NOT HIGHER THAN 50.

1.06 SUBMITTALS

A. THREE COMPLETE SCHEDULES OF PROPOSED MATERIALS AND EQUIPMENT SHALL BE SUBMITTED TO THE OWNER FOR REVIEW WITHIN 30 DAYS OF CONTRACT AWARD, INCLUDING:
1. GAS FIRED ROOFTOP UNIT
2. KITCHEN EXHAUST FAN
3. MAKE-UP AIR UNIT
4. EXHAUST FANS
5. AIR DEVICES
6. THERMOSTATS AND CONTROLS.

B. CONTRACTOR SHALL PROVIDE MARKED UP DRAWINGS OF THE ORIGINAL CONTRACT DRAWINGS TO REFLECT CHANGES MADE TO THE INSTALLATION, TO THE OWNER

1.08 PRODUCT HANDLING AND STORAGE

A. MATERIALS AND EQUIPMENT USED SHALL BE NEW, DAMAGE FREE AND SHALL BE PROPERLY STORED AND PROTECTED BY THE MANUFACTURER'S RECOMMENDATION, THE CONTRACTOR SHALL STORE THE MATERIALS AND EQUIPMENT IN A PROTECTED AREA TO PREVENT DAMAGE, CORROSION, OR LOSS. THE CONTRACTOR SHALL INSPECT ALL MATERIAL AND EQUIPMENT UPON RECEIPT AND BEFORE INSTALLATION. ANY DAMAGED OR DEFECTIVE MATERIAL OR EQUIPMENT SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER PRIOR TO INSTALLATION. DAMAGED OR DEFECTIVE MATERIAL OR EQUIPMENT SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT THE OPTION OF THE OWNER. THE CONTRACTOR WILL HANDLE ANY FREIGHT CLAIMS THAT MAY ARISE.

B. WORKMANSHIP SHALL CONFORM TO INDUSTRY STANDARDS FOR THE TRADE INVOLVED.

1.09 PAINTING

A. FACTORY PAINTED EQUIPMENT THAT HAS BEEN SCRATCHED OR MARRED SHALL BE REPAINTED TO MATCH ORIGINAL FACTORY COLOR AND FINISH.

1.10 CONTRACTOR'S WARRANTY

A. THE CONTRACTOR SHALL FURNISH A WRITTEN WARRANTY GUARANTEEING THE SYSTEM AGAINST DEFECTS IN WORKMANSHIP, MATERIALS, EQUIPMENT FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE. PARTS AND LABOR SHALL BE INCLUDED WITH THE EXCEPTION OF BELTS, FILTERS, AND FUSES.THE CONTRACTOR SHALL FURNISH A FIVE YEAR WRITTEN WARRANTY GUARANTEEING THE COMPRESSORS AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS.

PART 2 PRODUCTS

2.01 AIR DEVICES

A. PROVIDE BASIS-OF-DESIGN PRODUCT INDICATED ON THE DRAWINGS BY TITUS, METALAIRE,PRICE OR APPROVED EQUAL.

B. DIFFUSERS SHALL BE SIZED AS INDICATED AND DESIGNED TO DISTRIBUTE THE AIR QUANTITY EVENLY OVER THE SPACE INTENDED WITH ALLOWANCE FOR DIFFUSION, SPREAD, DROP AND THROW. THE DIFFUSERS, REGISTERS, AND GRILLES SHALL BE FACTORY FABRICATED OF STEEL AND/OR ALUMINUM CONSTRUCTION FINISHED WITH A WHITE ENAMEL PAINT. DIFFUSERS AND GRILLES SHALL BE TESTED AND LISTED UNDER THE AIR DIFFUSION COUNCIL, (ADC), TEST CODE AND EQUAL TO MODELS INDICATED.

C. COORDINATE EXACT LOCATION OF DIFFUSERS WITH LIGHTING FIXTURES AND EXISTING AIR CONDITIONING DEVICES.

2.02. DUCTWORK

A. DUCT SIZES SHALL BE AS INDICATED ON THE DRAWINGS.

B. DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED STEEL SHEETS. DUCTS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH SMACNA AND THE ASHRAE GUIDE.

C. FLEXIBLE CONNECTIONS SHALL BE INSTALLED ON THE CONNECTIONS TO AIR HANDLING UNITS. FLEXIBLE CONNECTIONS SHALL BE MINIMUM LENGTH AND MADE OF NFPA 90A APPROVED FLAME PROOF FABRIC.

D. PROVIDE TURNING VANES IN RECTANGULAR DUCT ELBOWS. BLADES SHALL BE HOLLOWED-FORMED DOUBLE-THICKNESS VANES.

E. PROVIDE SUPPLY, RETURN AND EXHAUST DIFFUSERS AND GRILLES AS INDICATED ON THE DRAWINGS AND AS SCHEDULED.

F. FLEXIBLE SUPPLY AIR DUCTWORK SHALL BE PROVIDED WITH 1" THICK FIBERGLASS BLANKET INSULATION WITH METALIZED FILM VAPOR BARRIER OUTER JACKET. FLEXIBLE DUCTWORK LENGTH SHALL NOT EXCEED 5'-0".

G. ALL SPIRAL DUCT SHALL BE MANUFACTURED FROM G-90 GALVANIZED STEEL, CONFORMING TO ASTM AND SMACNA STANDARDS. STANDARD ELBOW SHALL HAVE 1.5 CENTERLINE RADIUS. ELBOWS THROUGH 12" SHALL BE DIE-FORMED WITH STITCH WELDED JOINTS. ELBOWS 14" THROUGH 30" SHALL BE GORE-LOCKED CONSTRUCTION. BRANCH CONNECTIONS IN MEDIUM PRESSURE SHALL BE CONICAL FOR 90 DEGREE TAPS AND STRAIGHT FOR 45 DEGREES. STANDARD CONNECTIONS ARE SLIP FIT WITH COUPLINGS AND GASKETED.

H. DUCT SOUND LINING. SOUND LINING SHALL BE 1" THICK, 1-1/2 POUND DENSITY PER CUBIC FOOT, K=0.29 AT 75 DEGREE F MEAN TEMPERATURE WITH A COATING ON ONE SIDE. FIRE HAZARD CLASSIFICATION SHALL NOT EXCEED 25 FOR FLAME SPREAD AND 50 FOR SMOKE DEVELOPED. LINING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THE LATEST SMACNA DUCT LINER APPLICATION STANDARD. LINING SHALL BE EQUAL TO CERTAINEED ULTRALITE OR APPROVED EQUAL.

I. KITCHEN HOOD EXHAUST DUCTS: COMPLY WITH NFPA 96.

1. INSTALL COMMERCIAL KITCHEN HOOD EXHAUST DUCTS WITHOUT DIPS AND TRAPS THAT MAY HOLD GREASE, AND SLOPED A MINIMUM OF 2 PERCENT TO DRAIN GREASE BACK TO THE HOOD
2. MATERIAL: 1.6 MM (16 GAGE) STEEL SHEET (BLACK IRON), ASTM A1011, OR 1.3 MM (18 GAGE) STAINLESS STEEL. USE STAINLESS STEEL FOR EXPOSED DUCT IN OCCUPIED AREAS.
3. CONSTRUCTION: LIQUID TIGHT WITH CONTINUOUS EXTERNAL WELD FOR ALL SEAMS AND JOINTS. WHERE DUCTS ARE NOT SELF DRAINING BACK TO THE EQUIPMENT, PROVIDE LOW POINT DRAIN POCKET WITH COPPER DRAIN PIPE TO SANITARY SEWER. PROVIDE ACCESS DOORS OR PANELS FOR DUCT CLEANING INSIDE OF HORIZONTAL DUCT AT DRAIN POCKETS, AT 20 FEET INTERVALS, AND AT EACH CHANGE OF DIRECTION.
4. ACCESS DOORS OR PANELS SHALL BE OF THE SAME MATERIAL AND THICKNESS OF THE DUCT WITH GASKETS AND SEALANTS THAT ARE RATED 815 DEGREES C (1500 DEGREES F) AND SHALL BE GREASE-TIGHT. LOCATE ACCESS PANEL ON TOP OR SIDES OF DUCT A MINIMUM OF 1-1/2 INCHES FROM BOTTOM OF DUCT.

2.03 DAMPERS

A. MANUFACTURERS SHALL BE AMERICAN WARMING AND VENTILATING CO, PREFCO, RUSKIN OR APPROVED EQUAL.

B. RECTANGULAR DUCT: GALVANIZED STEEL MANUAL VOLUME DAMPER WITH 6" WIDE OPPOSED BLADES, CHANNEL FRAME WITH BRACED CORNERS, CONCEALED LINKAGE, TEFLON FILLED BEARINGS, 3/8" DIAMETER AXLE, 6" LONG CONTROL SHAFT.

C. ROUND DUCT: GALVANIZED STEEL MANUAL VOLUME DAMPER WITH SINGLE BLADE, CHANNEL FRAME, STAINLESS STEEL SLEEVE BEARINGS PRESSED INTO FRAME, 3/8" DIAMETER AXLE EXTENDED 6" FOR CONTROL SHAFT, BLADE STOP.

D. PROVIDE DAMPERS WITH LOCKING QUADRANTS.

E. VOLUME DAMPERS SHALL BE TWO GAUGES HEAVIER THAN DUCT IN WHICH INSTALLED.

F. CHECK DAMPERS FOR PROPER OPERATION BEFORE AND AFTER INSTALLATION.

G. INSTALL VOLUME DAMPERS AT BRANCH TAKE-OFFS IN SUPPLY AND RETURN FROM MAIN DUCTS. WHERE INDICATED ON DRAWINGS, AND WHERE REQUIRED TO OBTAIN PROPER SYSTEM BALANCE.

2.04 DUCT INSULATION

A. PROVIDE PRODUCTS BY JOHNS MANVILLE, KNAUF, OWENS CORNING OR APPROVED EQUAL.

B. TYPE 1: MINERAL-FIBER BLANKET INSULATION WITH MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 553, TYPE II AND ASTM C 1290, TYPE III WITH FACTORY-APPLIED FSK JACKET. FSK JACKET SHALL BE ALUMINUM-FOIL, FIBERGLASS-REINFORCED SCRIM WITH RAFT-PAPER BACKING; COMPLYING WITH ASTM C 1136, TYPE II. PROVIDE JOHNS MANVILLE MICROLITE OR EQUAL BY MANUFACTURERS SPECIFIED.

C. INSULATION SHALL NOT BE APPLIED UNTIL THE GENERAL CONSTRUCTION HAS PROGRESSED SUFFICIENTLY TO ENSURE AGAINST PHYSICAL OR MOISTURE DAMAGE TO THE INSTALLATION. ALL INSULATION DAMAGED THROUGH THE FAILURE TO OBSERVE THIS DIRECTIVE SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.

D. HANGER RODS MUST BE PERPENDICULAR TO DUCTWORK BEFORE INSULATION IS INSTALLED.

E. INSULATION SHALL BE APPLIED OVER FLANGES, JOINTS, AND SEAMS IN DUCTWORK.

F. JOINTS AND SEAMS IN DUCTWORK INSULATION SHALL BE PROPERLY SEALED TO MAINTAIN VAPOR BARRIER INTEGRITY.

G DUCT INSULATION SCHEDULE, GENERAL

1. PLENUMS AND DUCTS REQUIRING INSULATION:
   a. INDOOR, CONCEALED SUPPLY.
   b. INDOOR, EXPOSED SUPPLY.
   c. INDOOR, CONCEALED RETURN LOCATED IN UNCONDITIONED SPACE.
2. ITEMS NOT INSULATED:
   a. INDOOR, EXPOSED SUPPLY IN CONDITIONED SPACE.
   b. INDOOR, EXPOSED RETURN IN CONDITIONED SPACE.
   c. METAL DUCTS WITH DUCT LINER OF SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE AND ASHRAE/IESNA 90.1.
   d. FACTORY-INSULATED FLEXIBLE DUCTS.
   e. FACTORY-INSULATED PLENUMS AND CASINGS.
   f. FLEXIBLE CONNECTORS.
   g. VIBRATION-CONTROL DEVICES.
   h. FACTORY-INSULATED ACCESS PANELS AND DOORS.

2.05 FANS

A. TYPE A:

1. MANUFACTURER SHALL BE GREENHECK, LOREN COOK, TWIN CITY OR APPROVED EQUAL.
2. FAN SHALL BE SPUN ALUMINUM DOWN BLAST, BELT-DRIVEN TYPE DESIGNED FOR ROOF APPLICATION. FAN SHALL BE CENTRIFUGAL NON-OVERLOADING BACKWARD INCLINED WITH A WHEEL CONE MATCHED TO THE INLET CONE. WHEELS SHALL BE STATICALLY AND DYNAMICALLY BALANCED IN ACCORDANCE WITH AMCA 204-05.
3. MOTOR SHALL BE HEAVY-DUTY BALL BEARING TYPE MATCHED TO THE FAN LOAD AT SPECIFIED VOLTAGE AND PHASE. DRIVES SHALL BE SIZED FOR ALUMINUM 150% OF DRIVEN HORSEPOWER. MOTOR AND DRIVE SHALL BE MOUNTED ON VIBRATION ISOLATORS OUT OF THE AIRSTREAM.
4. FAN SHALL BE PRECISION GROUND AND POLISHED STEEL WITH ANTI-CORROSIVE COATING. FAN SHAFT SHALL BE MOUNTED IN PERMANENTLY SEALED, LUBRICATED, PILLOW BLOCK BALL BEARINGS. BEARINGS SHALL BE SELECTED FOR A MINIMUM L10 LIFE IN EXCESS OF 100,000 HOURS.
5. FAN HOUSING SHALL CONSIST OF THE MOTOR COVER, SHROUD, CURB CAB AND LOWER WIND BAND.
6. PROVIDE WITH CURB, AUTO-BELT TENSIONER, CURB EXTENSION, CURB SEAL, DISCONNECT SWITCH, MOTOR OPERATED DAMPER, AND BIRDSCREEN.

2.06 PACKAGED ROOFTOP AIR HANDLING UNITS (ELECTRIC COOLING/GAS HEATING)

A. PROVIDE BASIS-OF-DESIGN PRODUCTS AS INDICATED ON THE DRAWINGS OR COMPARABLE PRODUCTS BY TRANE, CARRIER, YORK OR APPROVED EQUAL.

B. UNIT SHALL BE FACTORY ASSEMBLED AIR TO AIR ELECTRIC COOLING UNIT WITH NATURAL GAS COMBUSTION HEATING SECTION, REFRIGERATION SYSTEM, AIR HANDLING SYSTEM CASING, CURB, AND CONTROLS.

C. CABINET SHALL BE GALVANIZED STEEL, BONDERIZED AND COATED WITH BAKED ENAMEL. UNIT SHALL BE ARRANGED FOR ALL EXTERIOR CONNECTIONS TO BE WITHIN ROOF CURB. CABINET SHALL BE LINED WITH 1" THICK NEOPRENE-COATED FIBERGLASS WITH EASILY REMOVABLE SERVICE PANELS TO ALL OPERATING COMPONENTS.

D. CONDENSATE DRAIN PAN SHALL BE A SLOPED PAN MADE OF NON-CORROSIVE MATERIAL WITH A MINIMUM 3/4" DRAIN CONNECTION.

E. GAS PIPING CONNECTIONS SHALL ENTER THE UNIT AT A SINGLE LOCATION ON THE SIDE OF THE UNIT.

F. REFRIGERATION SYSTEM SHALL INCLUDE ONE FULLY HERMETIC SCROLL COMPRESSOR FOR EACH REFRIGERANT CIRCUIT, CONDENSERS, INTERTWINED CIRCUIT EVAPORATOR COIL, EXPANSION VALVES, SERVICE VALVES, VIBRATION ISOLATORS, CRANKCASE HEATERS, SIGHT GLASSES, FILTER DRIERS, HOT GAS MUFFLERS, AND REFRIGERANT PIPING. SAFETY CONTROLS SHALL INCLUDE FUSIBLE PLUG, LOW AND HIGH PRESSURE THERMOSTATS, COMPRESSOR MOTOR OVERLOADS, TIMER TO PREVENT SHORT CYCLING COMPRESSORS, AND LEAD-LAG SEQUENCING SWITCH TO CHANGE LEAD COMPRESSOR.

G. UNITS SPECIFIED SHALL HAVE FULL ECONOMIZER PACKAGE INCLUDING ENTHALPY CONTROL AND 100% OUTSIDE AIR HOOD.

H. CONDENSER FANS SHALL BE VERTICAL DISCHARGE PROPELLER TYPE DIRECT DRIVEN BY PERMANENTLY LUBRICATED MOTORS WITH INHERENT THERMAL OVERLOAD PROTECTION WITH AN AUTOMATIC RESET FEATURE.

I. EVAPORATOR AND CONDENSER COILS SHALL HAVE ALUMINUM PLATE FINS MECHANICALLY BONDED TO SEAMLESS INTERNALLY GROOVED COPPER TUBES WITH ALL JOINTS BRAZED.

J. EVAPORATOR FAN SHALL BE CENTRIFUGAL, DOUBLE-INLET TYPE WITH FORWARD-CURVED BLADES, BELT-DRIVEN. EVAPORATOR FAN MOTOR SHALL BE EQUIPPED WITH PERMANENTLY LUBRICATED BEARINGS AND SHALL HAVE INHERENT AUTOMATIC-RESET THERMAL OVERLOAD PROTECTION OR CIRCUIT BREAKER.

K. GAS HEATING SECTION SHALL HAVE AN INDUCED DRAFT DESIGN HEAT EXCHANGER WITH DIRECT-SPARK IGNITION AND REDUNDANT MAIN GAS VALVE. HEAT EXCHANGER SHALL BE STAINLESS STEEL IN CONSTRUCTION. BURNERS SHALL BE THE IN-SHOT TYPE CONSTRUCTED OF ALUMINUM-COATED STEEL. INDUCED DRAFT COMBUSTION MOTOR AND BLOWER SHALL BE A DIRECT DRIVE, SINGLE-INLET, FORWARD-CURVED CENTRIFUGAL TYPE, STEEL WITH A CORROSION RESISTANT FINISH. BLOWER SHALL BE EQUIPPED WITH PERMANENTLY LUBRICATED, SEALED BEARINGS WITH INHERENT THERMAL OVERLOAD PROTECTION AND AUTOMATIC RESET.

L. CONTROLS:
1. THE COOLING SYSTEM SHALL BE PROTECTED WITH HIGH PRESSURE SAFETIES, LOW PRESSURE SAFETIES, LOSS-OF-CHARGE PROTECTION, INDOOR COIL FREEZE THERMOSTATS, AND CURRENT AND TEMPERATURE SENSITIVE OVERLOAD DEVICES.
2. ALL DEVICES SHALL BE WIRED TO PREVENT COMPRESSOR RESTART UNTIL RESET OF CIRCUIT BREAKER.
3. FURNISH HEATING/COOLING THERMOSTATS TO PROVIDE STAGED HEATING AND COOLING WITH AUTOMATIC CHANGEOVER, LOCKING OPAQUE PLASTIC COVER "FAN ON" SWITCH POSITION. MOUNT THE BOTTOM OF THE THERMOSTAT 48" ABOVE THE FLOOR.
4. HVAC CONTROL SYSTEMS SHALL BE TESTED TO ENSURE THAT CONTROL ELEMENTS ARE CALIBRATED, ADJUSTED, AND IN PROPER WORKING CONDITION.
5. TIME GUARD CIRCUIT TO PREVENT COMPRESSOR SHORT CYCLING AS A RESULT OF A RAPID CHANGE IN THERMOSTAT SETTING AND AUTOMATICALLY PREVENT COMPRESSOR RESTART FOR AT LEAST FIVE MINUTES AFTER SHUTDOWN.
6. CONTROLS AND THERMOSTAT SHALL BE INSTALLED APPROXIMATELY 48" ABOVE FINISH FLOOR.

M. PROVIDE WITH THE FOLLOWING ACCESSORIES:
1. OUTDOOR AIR ENTHALPY SENSOR.
2. RETURN AIR ENTHALPY SENSOR.

N. CURBS TO BE PROVIDED BY UNIT MANUFACTURER AND INSTALLED BY THE CONTRACTOR. COORDINATE PENETRATIONS OF THE ROOF WITH THE ROOFING CONTRACTOR.

O. HVAC CONTRACTOR TO SET UNIT ON CURB AND MAKE CONTROL CONNECTIONS.

P. ELECTRICAL CONTRACTOR TO MAKE POWER CONNECTIONS TO UNITS.

Q. HVAC CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL CONTROLS AND CONTROL WIRING.

R. HVAC CONTRACTOR SHALL CHANGE OUT ALL AIR FILTERS ONE DAY PRIOR TO COMPLETION OF WORK AND HOLD REMOVED AIR FILTERS FOR OWNER'S INSPECTION.

PART 3 EXECUTION

3.01 GENERAL

A. EQUIPMENT AND SYSTEMS, DESIGNS, INSTALLATIONS, AND TESTING SHALL BE IN CONFORMANCE WITH APPLICABLE STATE AND LOCAL CODES, STANDARDS, AND ORDINANCES, THE MANUFACTURER'S RECOMMENDATIONS, AND THE CRITERIA NOTED.

B. DUCTWORK SHALL BE PLACED TO NOT INTERFERE WITH PLUMBING PIPES, ELECTRICAL CONDUITS AND OTHER TRADES.

C. DUCTWORK SHALL BE LOCATED AT SUFFICIENT DISTANCE FROM WALLS, PIPES, EQUIPMENT AND OTHER OBSTACLES TO PERMIT THE APPLICATION OF FULL THICKNESS OF INSULATION SPECIFIED.

D. WHERE DUCTS PASS THROUGH NON-FIRE-RATED INTERIOR PARTITIONS AND EXTERIOR WALLS AND ARE EXPOSED TO VIEW, COVER THE OPENING BETWEEN THE PARTITION AND DUCT OR DUCT INSULATION WITH SHEET METAL FLANGES OF SAME METAL THICKNESS AS THE DUCT. OVERLAP OPENINGS ON FOUR SIDES BY AT LEAST 1-1/2 INCHES.

E. WHERE DUCTS PASS THROUGH FIRE-RATED INTERIOR PARTITIONS AND EXTERIOR WALLS, INSTALL FIRE OR SMOKE DAMPERS AS REQUIRED.

F. MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRESTOP MATERIALS. COMPLY WITH REQUIREMENTS FOR FIRESTOPPING AS SPECIFIED IN ARCHITECTURAL SPECIFICATIONS.

3.03 SYSTEM TESTING

A. AIR SYSTEMS SHALL BE TESTED AND BALANCED BY A CERTIFIED (AABC OR NEBB) CONTRACTOR REGULARLY ENGAGED IN THE TESTING AND BALANCING OF HVAC SYSTEMS. THREE COPIES OF THE REPORT SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL.

B. AUTOMATIC CONTROL SYSTEMS SHALL BE ADJUSTED AND TESTED IN OPERATION TO ASSURE SATISFACTORY OPERATION.

C. AFTER TESTING AND ADJUSTMENT PROCEDURES HAVE BEEN COMPLETED, A SYSTEM CHECKOUT SHALL BE PERFORMED. THE OWNER'S REPRESENTATIVE SHALL BE GIVEN 48 HOURS NOTICE THAT THE SYSTEM IS READY FOR FINAL CHECKOUT. ANY DEFECTS FOUND IN THE WORK SHALL BE CORRECTED.

3.04 CLEANING AND ADJUSTING

A. OCCUPANCY ADJUSTMENTS: WHEN REQUESTED WITHIN 12 MONTHS OF DATE OF SUBSTANTIAL COMPLETION, PROVIDE ON-SITE ASSISTANCE IN ADJUSTINGAIR HANDLING SYSTEMS TO SUIT ACTUAL SITE CONDITIONS. PROVIDE UP TO TWO VISITS TO THE SITE DURING OTHER-THAN-NORMAL OCCUPANCY HOURS FOR THIS PURPOSE.

B. AFTER COMPLETING SYSTEM INSTALLATION AND TESTING, ADJUSTING, AND BALANCING OF AIR HANDLING UNITS AND AIR DISTRIBUTION SYSTEMS, CLEAN FILTER HOUSING AND INSTALL NEW AIR FLITERS.

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REV. #	ISSUE / DESCRIPTION	DATE

SHEET TITLE:

MECHANICAL SPECIFICATIONS

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