PART 1: GENERAL PROVISIONS: HEATING, VENTILATING AND AIR CONDITIONING:

PART 1 GENERAL PROVISIONS - HEATING, VENTILATING AND AIR CONDITIONING

1.1 RELATED DOCUMENTS:

A. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 REGULATIONS AND PERMITS:

A. ALL WORK SHALL BE IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE CONTRACT DOCUMENTS.

B. ALL WORK SHALL COMPLY WITH THE FOLLOWING CODES:

- B.1. INTERNATIONAL BUILDING CODE - 2015.
- B.2. NFPA 90A, STANDARD FOR THE INSTALLATION OF AIR-CONDITIONING AND VENTILATING SYSTEMS
- B.3. NFPA 90B, STANDARD FOR THE INSTALLATION OF WARM AIR HEATING AND AIR-CONDITIONING SYSTEMS

C. WORK SHALL COMPLY WITH THE FOLLOWING STANDARDS:

- C.1. AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR CONDITIONING ENGINEERS. (ASHRAE).
- C.2. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME).
- C.3. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).
- C.4. AMERICAN SOCIETY FOR TESTING AND MATERIALS. (ASTM)
- C.5. UNDERWRITER'S LABORATORIES, INC. (UL).
- C.6. SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA).
- C.7. NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION NEMA).
- C.8. AMERICAN REFRIGERATION INSTITUTE (ARI).
- C.9. ASSOCIATED AIR BALANCE COUNCIL (AABC).
- C.10. AIR MOVEMENT AND CONTROL ASSOCIATION (AMCA).
- C.11. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA).
- C.12. THERMAL INSULATION MANUFACTURER'S ASSOCIATION (TIMA).

D. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS AND PAY FOR ALL FEES, CHARGES AND PERMITS REQUIRED AS WELL AS FOR ALL HAULING, RIGGING AND TRANSPORTATION CHARGES.

1.3 DESCRIPTION OF WORK:

A. THE WORK INCLUDED IN THIS SECTION SHALL COMPRISE ALL LABOR, MATERIALS, EQUIPMENT, MACHINERY AND SERVICE INCIDENTAL TO THE INSTALLATION OF A COMPLETE HEATING, COOLING AND VENTILATION SYSTEM AS HEREINAFTER SPECIFIED, AND SHOWN ON DRAWINGS.

B. THE CONTRACTOR SHALL LAY OUT HIS OWN WORK AND COORDINATE HIS WORK WITH THAT OF OTHER TRADES AND BE RESPONSIBLE FOR ALL MEASUREMENTS.

C. ALL WORK SHALL BE SUBJECT TO APPROVAL OF OWNER OR HIS REPRESENTATIVE.

D. WHERE SINGLE POINT ELECTRICAL CONNECTION IS CALLED FOR, PROVIDE ADDITIONAL OVER CURRENT PROTECTION AND WIRING BEYOND SINGLE POINT CONNECTION FOR HEATER AND FAN WHEN UNIT HAS TWO POINTS OF CONNECTION.

E. THE MECHANICAL CONTRACTOR SHALL SURVEY SITE AND STUDY CONTRACT DOCUMENTS PRIOR TO BEGINNING CONSTRUCTION. ALL PROBLEMS CONCERNING COORDINATION OF DIFFERING TRADES, INTERFERENCES, LACK OF CEILING CAVITY SPACE, OR ANY PROBLEMS IN UNDERSTANDING THE SPECIFICATIONS HEREIN AND DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER PRIOR TO CONSTRUCTION.

F. THE MECHANICAL CONTRACTOR SHALL FIELD VERIFY ALL BUILDING CONDITIONS PRIOR TO START OF WORK. ANY DISCREPANCIES BETWEEN ACTUAL CONDITIONS AND WHAT IS SHOWN ON PLANS THAT AFFECT THE WORK SHALL BE BROUGHT TO THE ARCHITECT/ENGINEER'S ATTENTION IMMEDIATELY.

G. ALL ROOF-MOUNTED DEVICES, EQUIPMENT AND SYSTEMS SHALL BE CONSTRUCTED, DESIGNED AND FASTENED TO WITHSTAND WIND LOADS OF VELOCITIES UP TO 155 MPH. STRUCTURAL CALCULATIONS FOR ROOF-MOUNTED EQUIPMENT SHALL BE COMPLETED IN ACCORDANCE WITH FLORIDA BUILDING CODE REQUIREMENTS AND SUBMITTED BY A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF FLORIDA.

H. CONTRACTOR SHALL CHECK SIZE OF ENTRANCE WAYS TO MAKE SURE SUFFICIENT SPACE IS AVAILABLE FOR ENTRANCE OF EQUIPMENT.

I. THE WORK INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:

- I.1. FURNISH AND INSTALL ALL DUCTLESS SPLIT SYSTEMS, AIR CONDITIONING UNITS, DUCTWORK, INSULATION, PIPING DUCT SMOKE DETECTORS, ELECTRIC RESISTANCE HEATERS, AIR DEVICES, AND CONTROLS NEEDED FOR A COMPLETE HEATING, VENTILATING AND AIR CONDITIONING SYSTEM.
- I.2. FURNISH AND INSTALL ALL CONDENSATE DRAINS AND SUPPORTS.
- I.3. FURNISH AND INSTALL ALL TEMPERATURE CONTROLS AS HEREINAFTER SPECIFIED.
- I.4. BALANCE HEATING, VENTILATING AND AIR CONDITIONING SYSTEM SO AS TO MEET SCHEDULES AND FOR PROPER AC WORKING ORDER.
- I.5. FURNISH AND INSTALL ALL DUCTWORK AS SHOWN ON PLANS AND AS HEREIN SPECIFIED.
- I.6. FURNISH AND INSTALL ALL EXHAUST FANS AND SUPPLY FANS SPECIFIED HEREIN AND AS SHOWN ON DRAWINGS.
- I.7. MECHANICAL CONTRACTOR SHALL PROVIDE ALL CONTROL WIRING REQUIRED TO PROVIDE A COMPLETE AUTOMATIC CONTROL SYSTEM. PROVIDE IN CONDUIT IN EXPOSED LOCATIONS AND WALLS, SUPPORT EVERY 3 FEET ABOVE CEILING USING J-HOOKS. CONTROL WIRING ABOVE CEILING SHALL BE PLENUM RATED.

J. THE ELECTRICAL PROVISIONS OF MECHANICAL WORK TO BE FURNISHED BY THE MECHANICAL CONTRACTOR CAN BE SUMMARIZED BY (BUT NOT LIMITED TO) THE FOLLOWING:

- J.1. MOTORS AND MOTOR STARTERS.
- J.2. CONTROL SWITCHES, PILOT LIGHTS, INTERLOCKS AND SIMILAR DEVICES.
- J.3. HEATING COILS.
- J.4. LOW VOLTAGE CONTROL WIRING.
- J.5. OTHER EQUIPMENT, DEVICES, ETC., AS SPECIFIED AS MECHANICAL WORK IN THE FOLLOWING SPECIFICATIONS AND IN THE DRAWINGS.

1.4 PRODUCT HANDLING:

A. ALL MATERIALS SHALL BE HANDLED AND STORED IN A MANNER SO AS TO PREVENT DAMAGE. MATERIALS SHALL BE STORED UNDER COVER AND ABOVE GROUND.

B. ALL PRODUCTS SHALL BE SHIPPED TO THE JOB SITE IN UNOPENED CARTONS, CONTAINERS, ETC., AS RECEIVED FROM THE MANUFACTURER.

C. ALL ROOF MOUNTED AND/OR WALL MOUNTED AND/OR GROUND MOUNTED DEVICES: EQUIPMENT AND SYSTEMS SHALL BE CONSTRUCTED, DESIGNED AND FASTENED PER MANUFACTURE'S DETAILS AND/OR STRUCTURAL ENGINEERING DOCUMENTS TO MEET ALL LOCAL AND STATE SEISMIC AND/OR WIND LOADING REQUIREMENTS.

PART 2 PRODUCTS:

2.1 PACKAGED ROOFTOP AIR CONDITIONING UNITS:

A. GENERAL: PROVIDE FACTORY ASSEMBLED AND TESTED ROOFTOP UNITS AS INDICATED, DESIGNED FOR ROOF OR SLAB MOUNTING, CONSISTING OF COMPRESSORS, CONDENSERS, EVAPORATOR COILS, CONDENSER AND EVAPORATOR FANS, ELECTRIC HEATING COILS, REFRIGERATION AND TEMPERATURE CONTROLS, FILTERS, AND DAMPERS. PROVIDE CAPACITIES AND ELECTRICAL CHARACTERISTICS AS SCHEDULED. UNITS SHALL HAVE A MINIMUM SEER OF 13.0, OR GREATER IF REQUIRED BY THE FLORIDA BUILDING CODE.

B. CASING: PROVIDE MANUFACTURER'S STANDARD CASING CONSTRUCTION, CORROSION PROTECTION COATING, AND EXTERIOR FINISH. PROVIDE REMOVABLE PANELS AND/OR ACCESS DOORS FOR INSPECTION AND ACCESS TO INTERNAL PARTS. INSULATE CASING WITH 1" THICK MINIMUM THERMAL INSULATION. PROVIDE KNOCKOUTS FOR ELECTRICAL AND PIPING CONNECTION. PROVIDE CONDENSATE DRAIN CONNECTION, AND LIFTING LUGS.

C. EVAPORATOR FANS: PROVIDE VARIABLE SPEED, FORWARD CURVED, CENTRIFUGAL, DIRECT DRIVEN FANS; AND PERMANENTLY LUBRICATED MOTOR BEARINGS.

D. CONDENSER FANS: PROVIDE PROPELLER TYPE, DIRECT DRIVEN FANS WITH PERMANENTLY LUBRICATED BEARINGS.

E. COILS: FOR EVAPORATOR AND CONDENSER, PROVIDE NON FERROUS CONSTRUCTION WITH ALUMINUM PLATE FINS MECHANICALLY BONDED TO SEAMLESS COPPER TUBES; WITH BRAZED TUBING JOINTS.

- E.1. CIRCUIT EVAPORATOR TO PROVIDE FULL ACTIVE FACE ON MINIMUM COOLING STEP. COILS: FOR EVAPORATOR AND CONDENSER, PROVIDE NON FERROUS CONSTRUCTION WITH ALUMINUM PLATE FINS

F. COMPRESSORS: PROVIDE SERVICEABLE, HERMETIC COMPRESSORS, VARIABLE STAGE SCROLL TYPE WITH CENTRIFUGAL TYPE OIL PUMPS. PROVIDE VIBRATION ISOLATORS, AND CRANKCASE HEATERS WHICH DE ENERGIZE DURING COMPRESSOR OPERATION.

- F.1. PROVIDE CYLINDER UNLOADERS FOR CAPACITY CONTROL, WITH MINIMUM STEPS AS SCHEDULED.
- F.2. PROVIDE THERMAL EXPANSION VALVES, FILTER DRYERS, SIGHT GLASSES, COMPRESSOR SERVICE VALVES, LIQUID LINE SERVICE VALVES; AND PROVIDE MINIMUM OF 2 REFRIGERANT CIRCUITS FOR UNITS HAVING 2 OR MORE COMPRESSORS.
- F.3. REFRIGERANT CHARGE: R-410A.

G. SAFETY CONTROLS: PROVIDE THE FOLLOWING CONTROLS:

- G.1. LOW PRESSURE CUTOUT, MANUAL RESET.
- G.2. HIGH PRESSURE CUTOUT, MANUAL RESET.
- G.3. COMPRESSOR MOTOR OVERLOAD PROTECTION, MANUAL RESET.
- G.4. ANTI RECYCLING TIMING DEVICE.
- G.5. ADJUSTABLE LOW AMBIENT LOCKOUT.
- G.6. SAIL SWITCH FOR ELECTRIC RESISTANCE HEATERS.

H. FILTERS: PROVIDE FILTER SECTION CONSISTING OF MERV 8, 2" THICK PLEATED FILTERS IN FILTER RACK, WITH MAXIMUM FACE VELOCITY OF 300 FPM.

I. ELECTRICAL: PROVIDE 115V CONVENIENCE OUTLET, SEPARATELY FUSED, FOR UNIT SERVICE. PROVIDE MEANS FOR UNIT POWER CONNECTION EITHER THROUGH UNIT CABINET OR WITHIN ROOF CURB PERIMETER.

J. HOT GAS REHEAT: UNIT SHALL BE PROVIDED WITH INTEGRAL HOT GAS REHEAT COIL OPTION FOR DEHUMIDIFICATION. UNIT CONTROLLER SHALL BE ABLE TO OPERATE IN A DEHUMIDIFICATION MODE TO DELIVER DEHUMIDIFIED SPACE NEUTRAL AIR TO THE SPACE.

K. ACCESSORIES: PROVIDE THE FOLLOWING ACCESSORIES AS INDICATED AND/OR SCHEDULED.

- K.1. CURB: PROVIDE MANUFACTURER'S PRE-INSULATED / PRE-ENGINEERED ROOF CURB, CONSTRUCTED IN ACCORDANCE WITH NRCA STANDARDS. PROVIDE SEAL STRIP BETWEEN CURB AND UNIT, AND WOOD NAILER FOR FLASHING.
- K.2. ANTI RECYCLING CONTROL: PROVIDE CONTROL TO AUTOMATICALLY PREVENT COMPRESSOR RESTART FOR 5 MINUTE AFTER SHUTDOWN.
- K.3. AIR FLOW SWITCH: PROVIDE SAIL SWITCH TO PREVENT ACTIVATION OF ELECTRIC RESISTANCE HEATERS UNDER INSUFFICIENT AIR FLOW.
- K.4. PROVIDE UNIT WITH DEHUMIDIFICATION OPTION. THIS INCLUDES CAPABILITY OF MEASURING SPACE HUMIDITY AND OPERATING IN A DE-HUMIDIFICATION MODE WITH REHEAT ACHIEVED VIA A HOT GAS REHEAT COIL

L. MANUFACTURER: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ROOFTOP UNITS BY ONE OF THE FOLLOWING: CARRIER, YORK, TRANE, LENNOX.

2.3 CONDENSATE PIPING:

CONDENSATE PIPING SHALL BE TYPE "M" COPPER OR SCHEDULE 40 PVC. IF COPPER IS USED, INSULATE WITH 1" ARMAFLEX OR APPROVED EQUAL. TRANSITION TO COPPER SHALL BE MADE BEFORE PIPE ENTERS RETURN AIR PLENUM. DO NOT INSTALL PVC PIPING IN ANY RETURN AIR PLENUM. ARMAFLEX SHALL BE RATED FOR USE IN RETURN AIR PLENUM. PAINT ARMAFLEX INSULATION IN EXTERIOR LOCATIONS WITH ALUMINUM JACKETING, FITTINGS AND STRAPPING FOR UV AND PHYSICAL PROTECTION. INSTALL SHALL YIELD CONDENSATE FREE OPERATION AND SHALL BE IN ACCORDANCE TO MANUFACTURER'S RECOMMENDATIONS.

A. MINIMUM CONDENSATE PIPING SIZE SHALL BE AS FOLLOWS:

UP TO	5 TONS	1"
5 TO	30 TONS	1-1/4"
LARGER THAN	30 TONS	2"

BASED ON TOTAL CAPACITY OF A/C UNITS CONNECTED TO BRANCH OR MAIN CONDENSATE DRAIN.

2.4 REFRIGERANT PIPING:

A. REFRIGERANT PIPING SHALL BE HARD TEMPERED, SEAMLESS COPPER TUBING TYPE L-ARC CONFORMING TO ASTM SPECIFICATION B-88. MANUFACTURERS NAME OR TRADEMARK AND TYPE OF TUBING SHALL BE IDENTIFIED AT 3-FOOT INTERVALS. FITTINGS SHALL BE FROST PROOF TYPE AND ELBOWS SHALL BE LONG RADIUS SOLDER TYPE. WHEN ASSEMBLING CUT PIPE SQUARE, CLEAN AND POLISH TUBE ENDS ALSO INNER SURFACE OF FITTINGS. APPLY FLUX AND SOLDER JOINTS AS RECOMMENDED BY MANUFACTURER OF SOLDER TYPE FITTINGS. SOLDER WITH 15% SILVER CONTENT, EQUAL TO SIL-FLOS 15.

B. REFRIGERANT PIPING SHALL BE SIZED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. INSULATE SUCTION LINES WITH 1" ARMAFLEX, RATED FOR USE IN RETURN PLENUM. COVER ARMAFLEX INSULATION IN EXTERIOR LOCATIONS WITH ALUMINUM JACKETING, FITTINGS AND STRAPPING FOR UV AND PHYSICAL PROTECTION.

2.5 DUCTWORK:

A. ALL DUCTWORK SHALL BE FABRICATED AND INSTALLED IN STRICT ACCORDANCE WITH SMACNA STANDARDS.

B. OUTSIDE AIR DUCTWORK AND PLENUMS SHALL BE LOW PRESSURE GALVANIZED METAL DUCT (GALVANIZED STEEL, G90TYPE) WITH 2" FIBERGLASS WRAP AND VAPOR BARRIER.

- B.1. IF FOUND ACCEPTABLE TO THE OWNER AND ENGINEER, FIBERGLASS DUCT BOARD CAN BE USED IN PLACE OF SHEET METAL DUCTWORK. FIBERGLASS DUCTBOARD SHALL ACHIEVE THE SAME MIN. R-VALUE (MIN. 1" THICKNESS). INTERIOR FACE (AND/OR ANY SURFACE COMMUNICATING WITH THE AIR STREAM) SHALL HAVE ANIT-MICROBIAL COATING.

C. EXHAUST AIR DUCTWORK SHALL BE LOW PRESSURE GALVANIZED METAL DUCT (GALVANIZED STEEL, 590 TYPE). INSULATE DUCTWORK WITHIN 10FT OF EXTERIOR TERMINATION POINT WITH 2" FIBERGLASS WRAP AND VAPOR BARRIER. DUCTWORK FURTHER THAN 10FT FROM EXTERIOR TERMINATION POINT DOES NOT NEED TO BE INSULATED IF LOCATED WITHIN A PLENUM OR CONDITIONED AREA.

D. SUPPLY AND RETURN DUCTWORK SHALL BE LOW OR MEDIUM PRESSURE GALVANIZED G90 TYPE SHEET METAL DUCT AND SHALL BE EXTERNALLY WRAPPED WITH 2" FIBERGLASS INSULATION (MIN. R-6) AND VAPOR BARRIER.

- D.1. LOW PRESSURE DUCTWORK SHALL BE ANY DUCTWORK CONVEYING AIR OR GASES LESS THAN 2000FPM OR LESS THAN 2.0" INCHES W.C..
- D.2. MEDIUM PRESSURE DUCTWORK SHALL BE DUCTWORK CONVEYING AIR OR GASES ABOVE 2000FPM OR 2.0" W.C. OR HIGHER.
- D.3. DUCTWORK SHALL BE CONSTRUCTED TO ADHERE TO THE ASSOCIATED SMACNA DUCT PRESSURE CLASS REQUIREMENTS/STANDARDS.
- D.4. IF FOUND ACCEPTABLE TO THE OWNER AND ENGINEER, FIBERGLASS DUCT BOARD CAN BE USED IN PLACE OF SHEET METAL DUCTWORK. FIBERGLASS DUCTBOARD SHALL ACHIEVE THE SAME MIN. R-VALUE (MIN. 1" THICKNESS). INTERIOR FACE (AND/OR ANY SURFACE COMMUNICATING WITH THE AIR STREAM) SHALL HAVE ANIT-MICROBIAL COATING.

E. FURNISH AND INSTALL ALL EXTRACTORS, TURNING VANES, SPLITTER DAMPERS, FIRE DAMPERS, ETC., PER SMACNA AND AS SHOWN ON PLANS.

F. SEAL DUCTWORK AFTER INSTALLATION TO SEAL CLASS RECOMMENDED, AND METHOD PRESCRIBED IN SMACNA STANDARDS.

G. ALL DUCTWORK INSTALLED IN AN ATTIC, OR OTHER UNCONDITIONED SPACE, SHALL BE INSULATED. ALL METAL SUPPLY DUCTWORK INSTALLED IN A VENTILATED CRAWL SPACE OR OTHER NONCONDITIONED AREA SHALL BE INSULATED. INSULATION SHALL BE A MINIMUM 2 IN THICK, 3/4 POUND DENSITY BLANKET OR 1 IN THICK, 1-1/2 LB. DENSITY LINER. WHEN DUCTS USED FOR COOLING ARE EXTERNALLY INSULATED, THE INSULATION SHALL BE COVERED WITH A VAPOR BARRIER HAVING A MAXIMUM PERMEANCE OF 0.05 PERMS OR ALUMINUM FOIL HAVING A MINIMUM THICKNESS OF 2 MILS. WHEN NONMETALLIC DUCTS OR OTHER APPROVED INSULATING OR LINING MATERIALS ARE USED, THE MAXIMUM THERMAL CONDUCTANCE VALUE OF THE MATERIAL SHALL BE 0.23 AT 75 F. ALL EXTERIOR DUCTS AND INSULATION, SHALL BE PROPERLY PROTECTED WITH AN APPROVED WEATHERPROOF VAPOR BARRIER.

H. ALL EXTERIOR DUCTWORK SHALL BE SHEETMETAL DUCTWORK WITH EXTERNAL RIGID FIBERGLASS INSULATION (MIN. R-7) WITH CORNER ANGLES AND SHEET METAL JACKETING SEALED WITH FLEX-CLAD 400.

I. VIBRATION ISOLATION CONNECTORS BETWEEN DUCTS AND MECHANICAL SYSTEMS SHALL BE OF AN APPROVED FLAME RETARDANT FABRIC, AND SHALL BE 10 IN OR LESS IN LENGTH. ON COMMERCIAL SYSTEMS, A SLEEVE JOINT PACKED WITH AN APPROVED MATERIAL HAVING A MAXIMUM FLAMESPREAD RATING OF 25 AND MAXIMUM SMOKE DEVELOPED RATING OF 50 MAY BE USED.

2.6 EXHAUST AND VENTILATION FANS:

A. PROVIDE EXHAUST FANS AS SCHEDULED. ALL DIRECT DRIVE FANS SHALL BE FURNISHED WITH A SPEED CONTROLLER. ANY ECM MOTORS SHALL BE FURNISHED WITH A POTENTIOMETER SPEED CONTROLLER. ALL ROOFTOP FANS SHALL BE FURNISHED WITH A MANUFACTURER FABRICATED ROOF CURB (ACOUSTICALLY INSULATED WHERE NOTED ON THE SCHEDULE). WHERE FOUND FULLY COMPLIANT WITH THIS SPECIFICATIONS SECTION AND EQUIVALENT TO THE SCHEDULED EQUIPMENT, FANS FROM THE FOLLOWING MANUFACTURER'S ARE ACCEPTABLE: GREENHECK, LOREN COOK AND PENNBARRY.

B. PROVIDE CENTRIFUGAL ROOF EXHAUST FANS:

1. DIRECT OR ADJUSTABLE PITCH BELT DRIVE AS SCHEDULED.
2. HOUSING HEAVY GAUGE, ALUMINUM, WEATHERPROOF.
3. WHEELS CENTRIFUGAL TYPE.
4. MOTOR OUTSIDE OF AIR STREAM IN ISOLATED MOTOR COMPARTMENT WITH FORCED OUTSIDE AIR COOLING FAN MOTOR.
5. FAN AND MOTOR ON VIBRATION ISOLATION MOUNTS.
6. MOTORS CONTINUOUS DUTY TYPE PERMANENTLY LUBRICATED BEARINGS HAVING A MINIMUM AVERAGE LIFE OF L10-40,000 HOURS. FACTORY WIRED TO JUNCTION BOX WITH DISCONNECT SWITCH.
7. TIP SPEED AND MOTOR HORSEPOWER SHALL NOT EXCEED CATALOG RATINGS.
8. ACCESSORIES TO INCLUDE 18" SOUND ATTENUATING CURB, BIRD SCREEN, BACK DRAFT DAMPER AND HINGED SUB_BASE FOR DAMPER ACCESS

C. CEILING EXHAUST FANS:

1. DIRECT OR BELT DRIVEN AS SCHEDULED.
2. HOUSING HEAVY GAUGE METAL WITH SOUND ATTENUATING DUCT LINER.
3. WHEELS SHALL BE FORWARD CURVED CENTRIFUGAL TYPE WITH PERMANENTLY LUBRICATED BALL BEARINGS.
4. PROVIDE INTEGRAL OR MATCHED INLET GRILLE PROVIDED BY THE FAN MANUFACTURER.
5. MOTORS CONTINUOUS DUTY PERMANENT SPLIT CAPACITOR TYPE PERMANENTLY LUBRICATED BEARINGS. FACTORY WIRED TO JUNCTION BOX WITH CORD AND PLUG OR DISCONNECT SWITCH.
6. PROVIDE INTEGRAL FAN SPEED CONTROLLER.

2.7 CONTROLS:

A. THERMOSTATS (BASIS OF DESIGN):

- A.1. PROVIDE UNIT WITH FIELD INSTALLED FIELD INSTALLED DDC GATEWAY INTERFACE COMMUNICATION MODULE BETWEEN UNIT APPLICATION SPECIFIC CONTROLLER AND BUILDING LEVEL CONTROL SYSTEM - BACNET COMPATIBLE, PROVIDED BY FACILITY AUTOMATION SOLUTIONS. UNIT SHALL BE FULLY COMPATIBLE WITH UNIT SERVED.
- A.2. PROVIDE PACKAGED UNIT WITH FIELD INSTALLED COMBINATION THERMOSTAT/HUMIDISTAT, DIGITAL PROGRAMMABLE THERMOSTAT - BACNET COMPATIBLE, PROVIDED BY FACILITY AUTOMATION SOLUTIONS. UNIT SHALL BE FULLY COMPATIBLE WITH UNIT SERVED.

2.8 SEALANTS:

A. ALL VOIDS, CRACKS, HOLES AND SPACES AROUND DUCTS AND PIPES PENETRATING FIRE RATED CEILINGS AND WALLS SHALL BE SEALED USING 3 M BRAND "FIRE BARRIER" CAULK # CP 25 OR PUTTY #303. THE CAULK OR PUTTY SHALL BE A ONE PART, INTUMESCENT ELASTOMER. UNDER NORMAL ENVIRONMENTAL CONDITIONS THE MATERIAL SHALL BE NON CORROSIVE TO METAL. WHEN EXPOSED TO FLAME OR HEAT, IT SHALL BE CAPABLE OF EXPANDING UP TO 10 TIMES.

2.9 HANGARS AND SUPPORTS:

A. PIPE HANGERS: WHERE NEEDED, SHALL BE GRINNEL #260 CLEVIS TYPE, 5'-0" ON CENTER, SECURELY ATTACHED TO BUILDING CONSTRUCTION. SPACE AT MIN. 5'-0" INTERVALS.

B. PIPE SUPPORT:
ATTACH LINES SECURELY ALONG PAD/FLOOR/EQUIPMENT/STRUCTURE TO PREVENT MOVEMENT. SUPPORT IN A MANNER THAT LINES DO NOT HANG FROM EVAPORATOR CONNECTIONS OR BLOCK ACCESS TO FILTERS, CONTROLS, ETC.

SUPPORT AT MIN. 8'-0" INTERVALS FOR VERTICAL PIPES, 5'-0" FOR SUSPENDED HORIZONTAL PIPING.

C. PROVIDE ALL NECESSARY HANGER RODS, CLAMPS AND ATTACHMENTS TO PROPERLY INSTALL AND SUPPORT DUCTWORK, PIPING AND EQUIPMENT FROM THE BUILDING STRUCTURE. PROVIDE ANY ANGLE IRON OR UNISTRUT AND SUSPENSION RODS REQUIRED TO INSTALL EQUIPMENT, PIPING AND DUCTWORK.ALL SUPPORTS EXPOSED TO OUTDOORS SHALL BE CLEANED, PRIMED AND PAINTED TO PREVENT RUSTING. FINISH COLOR AS SELECTED BY OWNER. THE USE OF BALING WIRE OR PERFORATED METAL STRAPPING IS NOT ACCEPTABLE FOR SUPPORTS.

PART 3 EXECUTION:

3.1 ERECTION AND WORKMANSHIP:

A. THE CONTRACTOR SHALL ADAPT HIS WORK TO JOB CONDITIONS AND MAKE SUCH CHANGES AS REQUIRED AND PERMITTED BY THE ARCHITECT, SUCH AS MOVING HIS WORK TO CLEAR BEAMS, JOISTS, LIGHT FIXTURES, AND ADJUSTING HIS RISERS OR OTHER APPARATUS TO AVOID INTERFERENCES WITH WINDOWS AND OPENINGS; OR RAISING OR LOWERING HIS WORK TO PERMIT THE PASSING OF DUCTWORK OR THE WORK OF OTHER TRADES; ALL AS REQUIRED OR AS JOB CONDITIONS DICTATE, WITHOUT ANY ADDITIONAL COSTS TO THE OWNER.

B. ALL APPLIANCES AND EQUIPMENT SHALL BE INSTALLED AND CONNECTED WITH THE BEST ENGINEERING PRACTICES AND IN ACCORDANCE WITH THE MANUFACTURERS BEST INSTRUCTIONS AND RECOMMENDATIONS. ALL PIPING, VALVES, CONNECTIONS, AND SIMILAR ITEMS RECOMMENDED BY THE MANUFACTURER OR AS REQUIRED FOR PROPER OPERATION SHALL BE PROVIDED COMPLETE, WITHOUT ADDITIONAL COST TO THE OWNER.

C. ALL PIPES, FIXTURES, TRAPS, EQUIPMENT, AND OTHER PARTS OF THE CONTRACTOR'S WORK SHALL BE PROTECTED AGAINST INJURY BY FREEZING OR OTHER MEANS DURING CONSTRUCTION. CONTRACTOR SHALL IDENTIFY ALL ITEMS REQUIRED FOR COMPLETE INSTALLATION AND COMPARE TO EQUIPMENT TO BE FURNISHED. ANY ADDITIONAL REQUIREMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO INSTALLATION.

D. UPON COMPLETION, AND BEFORE FINAL ACCEPTANCE OF THE WORK, ALL DEBRIS, RUBBISH, LEFTOVER MATERIALS, TOOLS, AND EQUIPMENT SHALL BE REMOVED FROM THE SITE.

E. ALL SECTIONS OF THE HEATING AND COOLING SYSTEM, UPON COMPLETION, SHALL BE THOROUGHLY CLEANED TO REMOVE ALL DIRT, DEBRIS, ETC., BEFORE THE SYSTEM IS PUT INTO OPERATION.

3.2 GUARANTEE AND SERVICE:

A. THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR AFTER DATE OF ACCEPTANCE WITH AN ADDITIONAL FOUR (4) YEAR WARRANTY ON ALL COMPRESSORS, AND SHALL REPAIR OR REPLACE AT NO ADDITIONAL COST TO THE OWNER, ANY PART THEREOF WHICH MAY BECOME DEFECTIVE WITHIN THE PERIOD OF GUARANTEE, ORDINARY WEAR AND TEAR EXPECTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND PAY FOR ANY DAMAGE CAUSED BY OR RESULTING FROM DEFECTS IN HIS WORK.

B. IN ADDITION, CONTRACTOR SHALL PROVIDE FREE SERVICE, INSPECTION AND ADJUSTMENT OF THE COMPLETE SYSTEM, INCLUDING ALL CONTROLS, AND ANY NECESSARY BALANCING AND ADJUSTMENTS WHICH MAY DEVELOP FOR ONE (1) YEAR BEGINNING FROM DATE OF ACCEPTANCE EXCEPT FOR OILING OF MOTORS AND REPLACING AIR FILTERS.

3.3 TEST AND BALANCE:

A. MECHANICAL CONTRACTOR SHALL TEST AND BALANCE ALL AIR AND WATER SYSTEMS IN ACCORDANCE WITH AND BY A CERTIFIED TEST AND BALANCE AGENCY IN ACCORDANCE WITH ASSOCIATED AIR BALANCE COUNCIL (AABC).

B. THE HEATING, VENTILATING AND/OR COOLING SYSTEMS INSTALLED UNDER THIS CONTRACT SHALL BE TESTED TO DEMONSTRATE THAT SPECIFIED CAPACITIES OF THE VARIOUS PARTS OF THE SYSTEM AS SHOWN ON THE DRAWINGS CAN BE MET.

C. A DIRECT READING VELOCITY INSTRUMENT THAT HAS BEEN RECENTLY TESTED AND CALIBRATED SHALL BE USED TO TEST THE AIR FLOW IN THE VARIOUS DUCT INLETS AND OUTLETS.

D. THE CONTRACTOR SHALL REGULATE AND ADJUST ALL SPLITTER, DEFLECTORS AND DAMPERS SO THAT THE INLET OR OUTLET SHALL DELIVER OR REMOVE THE REQUIRED NUMBER OF CUBIC FEET OF AIR PER MINUTE (CFM) AT THE RESPECTIVE OPENINGS.

E. THIS SHALL INCLUDE SETTING UP DAMPER POSITION FOR MINIMUM OUTSIDE AIR DAMPERS AND SHALL BE MARKED AS SAME.

F. ALL TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE CONSTRUCTION SUPERINTENDENT, OR HIS REPRESENTATIVE AND HE SHALL BE NOTIFIED 2 DAYS PRIOR TO THE TIME OF TESTING.

G. THE CONTRACTOR SHALL FURNISH ALL INSTRUMENTS, TESTING EQUIPMENT AND PERSONNEL THAT MAY BE REQUIRED FOR THE TESTS.

H. THE CONTRACTOR SHALL SUBMIT TO ARCHITECT/ENGINEER TWO (2) COPIES OF HIS FINAL CERTIFIED TEST READINGS WITH THE FOLLOWING INFORMATION:

1. STATIC RESISTANCE IN INCHES OF WATER INTAKE AND DISCHARGE FOR EACH SYSTEM.
2. THE RPM OF EACH FAN OR UNIT.
3. THE VOLUME OF AIR HANDLED BY EACH FAN OR UNIT (QUANTITIES OF SUPPLY, RETURN, OUTSIDE AIR).

3.4 VIBRATION AND NOISE:

A. PROVIDE APPROVED VIBRATION ISOLATORS AND ACOUSTIC INSULATION AS REQUIRED TO ELIMINATE ANY OBJECTIONABLE NOISE OR VIBRATION RESULTING FROM THE OPERATING OF THE AIR CONDITIONING, HEATING AND VENTILATING SYSTEMS.

INTERPLAN LLC

ARCHITECTURE
ENGINEERING
INTERIOR DESIGN
PROJECT MANAGEMENT

F-3219

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SEAL: NOT FOR REGULATORY APPROVAL, PERMITTING OR CONSTRUCTION UNLESS THE ARCHITECTS OR ENGINEER'S SIGNATURE AND SEAL APPEAR BELOW

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NO DATE REMARKS
REVISIONS

WOODHOUSE DAY SPA
RENOVATION

MARKET STREET
9595 SIX PINES DRIVE
THE WOODLANDS, TEXAS 77680

PROJECT NO: 2019.0172
DATE: APRIL 08, 2019

M0.1

CHECKED: LMS DRAWN: AJB

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