

DEDICATED OUTDOOR AIR UNITS

- 2.03 OCCURS FIRST. CABINET, CASING, AND FRAME PANEL CONSTRUCTION SHALL BE DOUBLE-WALL CONSTRUCTION FOR ALL PANELS. ALL FLOOR PANELS SHALL HAVE A SOLID GALVANIZED STEEL INNER LINER ON THE AIR STREAM SIDE OF THE UNIT TO PROTECT INSULATION DURING SERVICE AND MAINTENANCE. INSULATION SHALL BE A MINIMUM OF 1" THICK WITH AN R-VALUE OF 7.0. AND SHALL BE 2 PART INJECTED FOAM. PANEL DESIGN SHALL INCLUDE NO EXPOSED INSULATION EDGES. UNIT CABINET SHALL BE DESIGNED TO OPERATE AT TOTAL STATIC PRESSURES UP TO 5.0 INCHES W.G. EXTERIOR SURFACES SHALL BE CONSTRUCTED OF PRE-PAINTED GALVANIZED STEEL FOR AESTHETICS AND LONG TERM DURABILITY. PAINT FINISH TO INCLUDE A BASE PRIMER WITH A HIGH QUALITY, POLYESTER RESIN TOPCOAT OF A NEUTRAL BEIGE COLOR. FINISHED PANEL SURFACES TO WITHSTAND A MINIMUM 750-HOUR SALT SPRAY TEST IN ACCORDANCE WITH ASTM B117 STANDARD FOR SALT SPRAY RESISTANCE. SERVICE DOORS SHALL BE PROVIDED ON THE FAN SECTION, FILTER SECTION, CONTROL PANEL SECTION, AND HEATING VESTIBULE IN ORDER TO PROVIDE USER ACCESS TO UNIT COMPONENTS. ALL SERVICE ACCESS DOORS SHALL BE MOUNTED ON MULTIPLE, STAINLESS STEEL HINGES AND SHALL BE SECURED BY A LATCH SYSTEM. REMOVABLE SERVICE PANELS SECURED BY MULTIPLE MECHANICAL FASTENERS ARE NOT ACCEPTABLE. THE UNIT BASE SHALL OVERHANG THE ROOF CURB FOR POSITIVE WATER RUNOFF AND SHALL SEAT ON THE ROOF CURB GASKET TO PROVIDE A POSITIVE, WEATHERTIGHT SEAL. LIFTING BRACKETS SHALL BE PROVIDED ON THE UNIT BASE TO ACCEPT CABLE OR CHAIN HOOKS FOR RIGGING THE EQUIPMENT. OUTDOOR/RETURN AIR SECTION UNIT SHALL BE PROVIDED WITH AN OUTDOOR AIR ECONOMIZER SECTION. THE ECONOMIZER SECTION SHALL INCLUDE OUTDOOR, RETURN, AND EXHAUST AIR DAMPERS. THE ECONOMIZER OPERATION SHALL BE FULLY INTEGRAL TO THE MECHANICAL COOLING AND ALLOW UP TO 100% OF MECHANICAL COOLING IF NEEDED TO MAINTAIN THE COOLING DISCHARGE AIR TEMPERATURE. THE OUTDOOR AIR HOOD SHALL BE FACTORY INSTALLED AND CONSTRUCTED FROM GALVANIZED STEEL FINISHED WITH THE SAME DURABLE PAINT FINISH AS THE MAIN UNIT. THE HOOD SHALL INCLUDE MOISTURE ELIMINATOR FILTERS TO DRAIN WATER AWAY FROM THE ENTERING AIR STREAM. THE OUTSIDE AND RETURN AIR DAMPERS SHALL BE SIZED TO HANDLE 100% OF THE SUPPLY AIR VOLUME. THE DAMPERS SHALL BE PARALLEL BLADE DESIGN. DAMPER BLADES SHALL BE GASKETED WITH SIDE SEALS TO PROVIDE AN AIR LEAKAGE RATE OF 15 CFM / SQUARE FOOT OF DAMPER AREA AT 1" DIFFERENTIAL PRESSURE IN ACCORDING WITH TESTING DEFINED IN AMCA 500. A BAROMETRIC EXHAUST DAMPER SHALL BE PROVIDED TO EXHAUST AIR OUT OF THE BACK OF THE UNIT. A BIRD SCREEN SHALL BE PROVIDED TO PREVENT INFILTRATION OF RAIN AND FOREIGN MATERIALS. EXHAUST DAMPER BLADES SHALL BE LINED WITH VINYL GASKETING ON CONTACT EDGES. CONTROL OF THE DAMPERS SHALL BE BY A FACTORY INSTALLED DIRECT COUPLED ACTUATOR. DAMPER ACTUATOR SHALL BE OF THE MODULATING, SPRING RETURN TYPE. A COMPARATIVE ENTHALPY CONTROL SHALL BE PROVIDED TO SENSE AND COMPARE ENTHALPY IN BOTH THE OUTDOOR AND RETURN AIR STREAMS TO DETERMINE IF OUTDOOR AIR IS SUITABLE FOR "FREE" COOLING. IF OUTDOOR AIR IS SUITABLE FOR "FREE" COOLING, THE OUTDOOR AIR DAMPERS SHALL MODULATE IN RESPONSE TO THE UNIT'S TEMPERATURE CONTROL SYSTEM. PROVIDE FACTORY INSTALLED AND TESTED, OUTDOOR AIR MONITOR THAT CONTROLS OUTDOOR AIR +/- 15% ACCURACY DOWN TO 40 CFM PER TON. ENERGY RECOVERY THE ROOFTOP UNIT SHALL BE PROVIDED WITH AN AHRI CERTIFIED ROTARY WHEEL, AIR-TO-AIR HEAT EXCHANGER IN A CASSETTE FRAME COMPLETE WITH SEALS, DRIVE MOTOR AND DRIVE BELT. THE ENERGY RECOVERY WHEEL SHALL BE AN INTEGRAL PART OF THE ROOFTOP UNIT WITH UNITARY CONSTRUCTION AND DOES NOT REQUIRE FIELD ASSEMBLY. BOLT-ON ENERGY RECOVERY UNITS THAT REQUIRE FIELD ASSEMBLY AND SECTION TO SECTION GASKETING AND SEALING ARE NOT ACCEPTABLE. THE WHEEL CAPACITY, AIR PRESSURE DROP AND EFFECTIVENESS SHALL BE AHRI CERTIFIED PER AHRI STANDARD 1060. THERMAL PERFORMANCE SHALL BE CERTIFIED BY THE MANUFACTURER IN ACCORDANCE WITH ASHRAE STANDARD 84, METHOD OF TESTING AIR-TO-AIR HEAT EXCHANGERS AND AHRI STANDARD 1060. RATING AIR-TO-AIR HEAT EXCHANGERS FOR ENERGY RECOVERY VENTILATION EQUIPMENT. THE ROOFTOP UNIT SHALL BE DESIGNED WITH A TRACK SO THE ENTIRE ENERGY RECOVERY WHEEL CASSETTE CAN SLIDE OUT FROM THE ROOFTOP UNIT TO FACILITATE CLEANING. THE UNIT SHALL HAVE 2" MERV 7 FILTERS FOR THE OUTDOOR AIR BEFORE THE WHEEL TO HELP KEEP THE WHEEL CLEAN AND REDUCE MAINTENANCE. FILTER ACCESS SHALL BE BY A HINGED ACCESS DOOR WITH X TURN LATCHES. THE MATRIX DESIGN SHALL HAVE CHANNELS TO REDUCE CROSS CONTAMINATION BETWEEN THE OUTDOOR AIR AND THE EXHAUST AIR. THE LAYERS SHALL BE EFFECTIVELY CAPTURED IN ALUMINUM AND STAINLESS STEEL SEGMENT FRAMES THAT PROVIDE A RIGID AND SELF-SUPPORTING MATRIX. ALL DIAMETER AND PERIMETER SEALS SHALL BE PROVIDED AS PART OF THE CASSETTE ASSEMBLY AND SHALL BE FACTORY SET. DRIVE BELT(S) OF STRETCH URETHANE SHALL BE PROVIDED FOR WHEEL RIM DRIVE WITHOUT THE NEED FOR EXTERNAL TENSIONERS OR ADJUSTMENT.

- F. THE TOTAL ENERGY RECOVERY WHEEL SHALL BE COATED WITH SILICA GEL DESICCANT PERMANENTLY BONDED WITHOUT THE USE OF BINDERS OR ADHESIVES, WHICH MAY DEGRADE DESICCANT PERFORMANCE. THE SUBSTRATE SHALL BE LIGHTWEIGHT POLYMER AND SHALL NOT DEGRADE NOR REQUIRE ADDITIONAL COATINGS FOR APPLICATION IN MARINE OR COASTAL ENVIRONMENTS. COATED SEGMENTS SHALL BE WASHABLE WITH DETERGENT OR ALKALINE COIL CLEANER AND WATER. DESICCANT SHALL NOT DISSOLVE NOR DELIQUESCENCE IN THE PRESENCE OF WATER OR HIGH HUMIDITY. WHEELS SHALL BE PROVIDED WITH REMOVABLE ENERGY TRANSFER MATRIX. WHEEL FRAME CONSTRUCTION SHALL BE A WELDED HUB, SPOKE AND RIM ASSEMBLY OF STAINLESS, PLATED AND/OR COATED STEEL AND SHALL BE SELF-SUPPORTING WITHOUT MATRIX SEGMENTS IN PLACE. SEGMENTS SHALL BE REMOVABLE WITHOUT THE USE OF TOOLS TO FACILITATE MAINTENANCE AND CLEANING. HOT GAS REHEAT UNIT SHALL BE EQUIPPED WITH A FULLY MODULATING HOT GAS REHEAT COIL WITH HOT GAS COMING FROM THE UNIT CONDENSER. HOT GAS REHEAT COIL SHALL BE A MICRO CHANNEL DESIGN. THE ALUMINUM TUBE SHALL BE A MICRO CHANNEL DESIGN WITH HIGH EFFICIENCY ALUMINUM FINNS. FINNS SHALL BE BRAZED TO THE TUBING FOR A DIRECT BOND. THE CAPACITY OF THE REHEAT COIL SHALL ALLOW FOR A 20°F TEMPERATURE RISE AT ALL OPERATING CONDITIONS. THE EXHAUST AIR FAN SHALL BE A DIRECT DRIVE SWSI PLENUM FAN. THE EXHAUST FAN SHALL BE SIZED FOR THE AIRFLOW REQUIREMENTS PER THE CONSTRUCTION SCHEDULE. THE UNIT CONTROLLER SHALL CONTROL THE EXHAUST FAN TO MAINTAIN BUILDING PRESSURE. A VFD SHALL BE PROVIDED FOR THE EXHAUST FAN MOTOR OR THE EXHAUST FAN MOTOR SHALL BE AN ECM MOTOR. THE ROOFTOP UNIT SHALL HAVE SINGLE POINT ELECTRICAL POWER CONNECTION AND SHALL BE ETL LISTED. THE CONTROL OF THE ENERGY RECOVERY WHEEL SHALL BE AN INTEGRAL PART OF THE ROOFTOP UNIT'S DDC CONTROLLER. THE DDC CONTROLLER SHALL HAVE VISIBILITY OF THE OUTDOOR AIR TEMPERATURE, LEAVING WHEEL TEMPERATURE, RETURN AIR TEMPERATURE, AND EXHAUST AIR TEMPERATURE. THESE TEMPERATURES SHALL BE DISPLAYED AT THE ROOFTOP UNITS DDC CONTROLLER LCD DISPLAY. ALL OF THESE TEMPERATURES SHALL BE MADE AVAILABLE THROUGH THE BACNET INTERFACE. THE ROOFTOP UNIT WITH THE ENERGY RECOVERY WHEEL SHALL INCORPORATE THE ECONOMIZER OPERATION. THE ENERGY RECOVERY WHEEL SHALL HAVE A BYPASS DAMPER WHEN THE UNIT IS IN THE ECONOMIZER MODE OF OPERATION THE ENERGY RECOVERY WHEEL SHALL STOP AND THE BYPASS DAMPERS SHALL BE OPENED. THE OUTDOOR AIR SHALL BE DRAWN THROUGH THE BYPASS DAMPERS TO REDUCE THE PRESSURE DROP OF THE OUTDOOR AIRSTREAM. THE ROOFTOP UNIT DDC CONTROLLER SHALL PROVIDE FROST CONTROL FOR THE ENERGY RECOVERY WHEEL. WHEN A FROST CONDITION IS ENCOUNTERED THE UNIT CONTROLLER SHALL STOP THE WHEEL. WHEN IN THE FROST CONTROL MODE THE WHEEL SHALL BE JOGGED PERIODICALLY AND NOT BE ALLOWED TO STAY IN THE STATIONARY POSITION. EXHAUST FAN EXHAUST FAN SHALL BE A SINGLE WIDTH, SINGLE INLET (SWSI) AIRFOIL CENTRIFUGAL FAN. THE FAN WHEEL SHALL BE CLASS II CONSTRUCTION WITH ALUMINUM FAN BLADES THAT ARE CONTINUOUSLY WELDED TO THE HUB PLATE AND END RIM. THE EXHAUST FAN SHALL BE A DIRECT DRIVE FAN MOUNTED TO THE MOTOR SHAFT. BELTS AND SHEAVES ARE NOT ACCEPTABLE DUE TO THE ADDITIONAL MAINTENANCE. THE FAN MOTOR SHALL BE A TOTALLY ENCLOSED EC MOTOR THAT IS SPEED CONTROLLED BY THE ROOFTOP UNIT CONTROLLER. THE MOTOR SHALL INCLUDE THERMAL OVERLOAD PROTECTION AND PROTECT THE MOTOR IN THE CASE OF EXCESSIVE MOTOR TEMPERATURES. THE MOTOR SHALL HAVE PHASE FAILURE PROTECTION AND PREVENT THE MOTOR FROM OPERATION IN THE EVENT OF A LOSS OF PHASE. MOTORS SHALL BE PREMIUM EFFICIENCY. THE SUPPLY FAN SHALL BE CAPABLE OF AIRFLOW MODULATION FROM 30% TO 100% OF THE SCHEDULED DESIGNED AIRFLOW. THE FAN SHALL NOT OPERATE IN A STATE OF SURGE AT ANY POINT WITHIN THE MODULATION RANGE. VARIABLE AIR VOLUME CONTROL THE UNIT CONTROLLER SHALL PROPORTIONALLY CONTROL THE ELECTRONICALLY COMMUTATED MOTORS (ECM) ON THE SUPPLY AND EXHAUST FANS. THE SUPPLY FAN SHALL BE CONTROLLED TO MAINTAIN AN ADJUSTABLE DUCT PRESSURE SETPOINT. A DUCT STATIC PRESSURE SENSOR SHALL BE FACTORY MOUNTED IN THE CONTROL PANEL. THE FIELD SHALL FURNISH AND INSTALL THE PNEUMATIC TUBING FOR THE DUCT STATIC PRESSURE SENSOR AND THE BUILDING PRESSURE SENSOR. THE FIELD SHALL FURNISH AND INSTALL THE OUTDOOR AIR PRESSURE SENSOR. THE UNIT CONTROLLER SHALL PROPORTIONAL CONTROL THE ECM MOTORS ON THE SUPPLY FAN BASED ON SPACE TEMPERATURE. THE UNIT CONTROLLER SHALL INCREASE/DECREASE THE SPEED OF THE SUPPLY FAN IN ORDER TO MAINTAIN THE SPACE TEMPERATURE WITHIN ITS SETPOINT AND DEADBAND. THE UNIT CONTROLLER SHALL PROVIDE DISCHARGE AIR TEMPERATURE CONTROL WITH THE COMPRESSOR MODULATION. HEATING SECTION THE ROOFTOP UNIT SHALL INCLUDE AN ELECTRICAL RESISTANCE HEATING COIL SECTION. STAGED ELECTRIC HEATING COIL MODULES SHALL BE FACTORY INSTALLED DOWNSTREAM OF THE SUPPLY AIR FAN IN THE HEATING SECTION OF THE ROOFTOP UNIT. HEATING COILS SHALL BE CONSTRUCTED OF A LOW WATT DENSITY, NICKEL - CHROMIUM ALLOY RESISTANCE WIRE WITH INTERMEDIATE SUPPORTS THAT INCLUDE CERAMIC BUSHINGS. THE ELECTRICAL CONTACTORS SHALL BE OF THE FULL LINE-BREAKING TYPE WITH ALL THE ELECTRICAL POWER LEGS BEING DISCONNECTED WHEN THE CONTACTORS ARE NOT ENERGIZED. ALL ELECTRICAL CIRCUIT WIRING SHALL BE DESIGNED WITH COPPER CONDUCTORS, ALUMINUM WIRES ARE NOT ACCEPTABLE. HEATING ELEMENT BRANCH CIRCUITS SHALL BE INDIVIDUALLY FUSED TO A MAXIMUM OF 48 AMPS PER NEC REQUIREMENTS. THE POWER SUPPLY FOR THE ELECTRIC HEATER SHALL BE FACTORY WIRED INTO THE UNITS MAIN POWER BLOCK OR DISCONNECT SWITCH. THE HEATING MODULES SHALL HAVE AN AUTOMATIC RESET, HIGH TEMPERATURE LIMIT SAFETY PROTECTION. A SECONDARY HIGH LIMIT PROTECTION SHALL ALSO BE PROVIDED THAT REQUIRES A MANUAL RESET. AN AIRFLOW SWITCH SHALL BE PROVIDED WITH THE HEATING MODULE TO PREVENT THE ELECTRIC HEATER FROM OPERATING IN THE EVENT OF NO AIRFLOW. THE COOLING COIL SHALL HAVE AN ELECTRONIC CONTROLLED EXPANSION VALVE. THE UNIT CONTROLLER SHALL CONTROL THE EXPANSION VALVE TO MAINTAIN LIQUID SUBCOOLING AND THE SUPERHEAT OF THE REFRIGERANT SYSTEM.

- D. THE REFRIGERANT SUCTION LINES SHALL BE FULLY INSULATED FROM THE EXPANSION VALVE TO THE COMPRESSORS. THE DRAIN PAN SHALL BE STAINLESS STEEL AND POSITIVELY SLOPED. THE SLOPE OF THE DRAIN PAN SHALL BE IN TWO DIRECTIONS AND COMPLY WITH ASHRAE STANDARD 62.1. THE DRAIN PAN SHALL HAVE A MINIMUM SLOPE OF 1/8" PER FOOT TO PROVIDE POSITIVE DRAINING. THE DRAIN PAN SHALL EXTEND BEYOND THE LEAVING SIDE OF THE COIL. THE DRAIN PAN SHALL HAVE A THREADED DRAIN CONNECTION EXTENDING THROUGH THE UNIT BASE. THE ELECTRIC HEAT ELEMENTS SHALL BE CONTROLLED BY THE FACTORY INSTALLED DDC UNIT CONTROL SYSTEM. THE HEATER SHALL HAVE PROPORTIONAL SCR CONTROL. THE UNIT CONTROLLER SHALL MODULATE THE ELECTRIC HEATER TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. FIELD INSTALLED HEATING MODULES SHALL REQUIRE A FIELD ETL CERTIFICATION. DUCT HEATERS MOUNTED WITHIN THE ROOFTOP UNIT IN THE FIELD SHALL NOT BE ACCEPTABLE. THE MANUFACTURER'S ROOFTOP UNIT ETL CERTIFICATION SHALL COVER THE COMPLETE UNIT INCLUDING THE ELECTRIC HEATING MODULES. CONDENSING SECTION OUTDOOR COILS SHALL BE CAST ALUMINUM, MICRO-CHANNEL COILS. PLATE FINNS SHALL BE PROTECTED AND BRAZED BETWEEN ADJOINING FLAT TUBES SUCH THAT THEY SHALL NOT EXTEND OUTSIDE THE TUBES. A SUB-COOLING COIL SHALL BE AN INTEGRAL PART OF THE MAIN OUTDOOR AIR COIL. EACH OUTDOOR AIR COIL SHALL BE FACTORY LEAK TESTED WITH HIGH-PRESSURE AIR UNDER WATER. OUTDOOR AIR COILS SHALL BE PROTECTED FROM INCIDENTAL CONTACT TO COIL FINNS BY A COIL GUARD. COIL GUARD SHALL BE CONSTRUCTED OF CROSS WIRE WELDED STEEL WITH PVC COATING. FAN MOTORS SHALL BE AN ECM TYPE MOTOR FOR PROPORTIONAL CONTROL. THE UNIT CONTROLLER SHALL PROPORTIONALLY CONTROL THE SPEED OF THE CONDENSER FAN MOTORS TO MAINTAIN THE HEAD PRESSURE OF THE REFRIGERANT CIRCUIT FROM AMBIENT CONDITION OF 0° TO 20°F. MECHANICAL COOLING SHALL BE PROVIDED TO 259 F. THE MOTOR SHALL INCLUDE THERMAL OVERLOAD PROTECTION AND PROTECT THE MOTOR IN THE CASE OF EXCESSIVE MOTOR TEMPERATURES. THE MOTOR SHALL HAVE PHASE FAILURE PROTECTION AND PREVENT THE MOTOR FROM OPERATION IN THE EVENT OF A LOSS OF PHASE. THE CONDENSER FAN SHALL BE LOW NOISE BLADE DESIGN. FAN BLADE DESIGN SHALL BE A DYNAMIC PROFILE FOR LOW TIP SPEED. FAN BLADE SHALL BE OF A COMPOSITE MATERIAL. THE UNIT SHALL HAVE SCROLL COMPRESSORS. ONE OF THE COMPRESSORS SHALL BE AN INVERTER COMPRESSOR PROVIDING PROPORTIONAL CONTROL. THE UNIT CONTROLLER SHALL CONTROL THE SPEED OF THE COMPRESSOR TO MAINTAIN THE DISCHARGE AIR TEMPERATURE. THE INVERTER COMPRESSOR SHALL HAVE A SEPARATE OIL PUMP AND AN OIL SEPARATOR FOR EACH COMPRESSOR THAT ROUTES OIL BACK TO THE COMPRESSOR INSTEAD OF THROUGH THE DISCHARGE LINE. PRESSURE TRANSDUCERS SHALL BE PROVIDED FOR THE SUCTION PRESSURE AND HEAD PRESSURE. TEMPERATURE SENSOR SHALL BE PROVIDED FOR THE SUCTION TEMPERATURE AND THE REFRIGERANT DISCHARGE TEMPERATURE OF THE COMPRESSORS. ALL OF THE ABOVE DEVICES SHALL BE AN INPUT TO THE UNIT CONTROLLER AND THE VALUES BE DISPLAYED AT THE UNIT CONTROLLER. REFRIGERANT CIRCUIT SHALL HAVE A BYPASS VALVE BETWEEN THE SUCTION AND DISCHARGE REFRIGERANT LINES FOR LOW HEAD PRESSURE COMPRESSOR STARTING AND INCREASED COMPRESSOR RELIABILITY. WHEN THERE IS A CALL FOR MECHANICAL COOLING THE BYPASS VALVE SHALL OPEN TO EQUALIZING THE SUCTION AND DISCHARGE PRESSURES. WHEN PRESSURES ARE EQUALIZED THE BYPASS VALVE SHALL CLOSE AND THE COMPRESSOR SHALL BE ALLOWED TO START. EACH CIRCUIT SHALL BE DEHYDRATED AND FACTORY CHARGED WITH R-410A REFRIGERANT AND OIL. ELECTRICAL UNIT WIRING SHALL COMPLY WITH NEC REQUIREMENTS AND WITH ALL APPLICABLE UL STANDARDS. ALL ELECTRICAL COMPONENTS SHALL BE UL RECOGNIZED WHERE APPLICABLE. ALL WIRING AND ELECTRICAL COMPONENTS PROVIDED WITH THE UNIT SHALL BE NUMBER AND COLOR-CODED AND LABELED ACCORDING TO THE ELECTRICAL DIAGRAM PROVIDED FOR EASY IDENTIFICATION. THE UNIT SHALL BE PROVIDED WITH A FACTORY WIRED WEATHERPROOF CONTROL PANEL UNIT SHALL HAVE A SINGLE POINT POWER TERMINAL BLOCK FOR MAIN POWER CONNECTION. A TERMINAL BOARD SHALL BE PROVIDED FOR LOW VOLTAGE CONTROL WIRING. BRANCH SHORT CIRCUIT PROTECTION, 115-VOLT CONTROL CIRCUIT TRANSFORMER AND FUSE, SYSTEM SWITCHES, AND A HIGH TEMPERATURE SENSOR SHALL ALSO BE PROVIDED WITH THE UNIT. EACH COMPRESSOR AND CONDENSER FAN MOTOR SHALL BE FURNISHED WITH CONTACTORS AND INHERENT THERMAL OVERLOAD PROTECTION. SUPPLY FAN MOTORS SHALL HAVE CONTACTORS AND EXTERNAL OVERLOAD PROTECTION. KNOCKOUTS SHALL BE PROVIDED IN THE BOTTOM OF THE MAIN CONTROL PANELS FOR FIELD WIRING ENTRANCE. A SINGLE NON-FUSED DISCONNECT SWITCH SHALL BE PROVIDED FOR DISCONNECTING ELECTRICAL POWER AT THE UNIT. DISCONNECT SWITCHES SHALL BE MOUNTED INTERNALLY TO THE CONTROL PANEL AND OPERATED BY AN EXTERNALLY MOUNTED HANDLE. CONTROLS PROVIDE A COMPLETE INTEGRATED MICROPROCESSOR BASED DIRECT DIGITAL CONTROL (DDC) SYSTEM TO CONTROL ALL UNIT FUNCTIONS INCLUDING TEMPERATURE CONTROL, SCHEDULING, MONITORING, UNIT SAFETY PROTECTION, INCLUDING COMPRESSOR MINIMUM RUN AND MINIMUM OFF TIMES, AND DIAGNOSTICS. THIS SYSTEM SHALL CONSIST OF ALL REQUIRED TEMPERATURE SENSORS, PRESSURE SENSORS, CONTROLLER AND KEYPAD/DISPLAY OPERATOR INTERFACE. ALL MBS AND SENSORS SHALL BE FACTORY MOUNTED, WIRED AND TESTED.

- B. THE STAND-ALONE DDC CONTROLLERS SHALL NOT BE DEPENDENT ON COMMUNICATIONS WITH ANY ON-SITE OR REMOTE PC OR MASTER CONTROL PANEL FOR PROPER UNIT OPERATION. THE MICROPROCESSOR SHALL MAINTAIN EXISTING SET POINTS AND OPERATE STAND ALONE IF THE UNIT LOSTS EITHER DIRECT CONNECT OR NETWORK COMMUNICATIONS. THE MICROPROCESSOR MEMORY SHALL BE PROTECTED FROM VOLTAGE FLUCTUATIONS AS WELL AS ANY EXTENDED POWER FAILURES. ALL FACTORY AND USER SET SCHEDULES AND CONTROL POINTS SHALL BE MAINTAINED IN NONVOLATILE MEMORY. NO SETTINGS SHALL BE LOST, EVEN DURING EXTENDED POWER SHUTDOWNS. THE DDC CONTROL SYSTEM SHALL PERMIT STARTING AND STOPPING OF THE UNIT LOCALLY OR REMOTELY. THE CONTROL SYSTEM SHALL BE CAPABLE OF PROVIDING A REMOTE ALARM INDICATION. THE UNIT CONTROL SYSTEM SHALL PROVIDE FOR OUTSIDE AIR DAMPER ACTUATION, EMERGENCY SHUTDOWN, REMOTE HEAT ENABLE/DISABLE, REMOTE COOL ENABLE/DISABLE, HEAT INDICATION, COOL INDICATION, AND FAN OPERATION. ALL DIGITAL INPUTS AND OUTPUTS SHALL BE PROTECTED AGAINST DAMAGE FROM TRANSIENTS OR INCORRECT VOLTAGES. ALL FIELD WIRING SHALL BE TERMINATED AT A SEPARATE, CLEARLY MARKED TERMINAL STRIP. THE DDC CONTROLLER SHALL HAVE A BUILT-IN TIME SCHEDULE. THE SCHEDULE SHALL BE PROGRAMMABLE FROM THE UNIT KEYPAD INTERFACE. THE SCHEDULE SHALL BE MAINTAINED IN NONVOLATILE MEMORY TO INSURE THAT IT IS NOT LOST DURING A POWER FAILURE. THERE SHALL BE ONE START/STOP PER DAY AND A SEPARATE HOLIDAY SCHEDULE. THE CONTROLLER SHALL ACCEPT UP TO SIXTEEN HOLIDAYS EACH WITH UP TO A 5-DAY DURATION. EACH UNIT SHALL ALSO HAVE THE ABILITY TO ACCEPT A TIME SCHEDULE VIA BAS NETWORK COMMUNICATIONS. THE KEYPAD INTERFACE SHALL ALLOW CONVENIENT NAVIGATION AND ACCESS TO ALL CONTROL FUNCTIONS. THE UNIT KEYPAD/DISPLAY CHARACTER FORMAT SHALL BE 4 LINES X 20 CHARACTERS. ALL CONTROL SETTINGS SHALL BE PASSWORD PROTECTED AGAINST UNAUTHORIZED CHANGES. FOR EASE OF SERVICE, THE DISPLAY FORMAT SHALL BE ENGLISH LANGUAGE READOUT. CODED FORMATS WITH LOOK-UP TABLES WILL NOT BE ACCEPTED. THE USER INTERACTION WITH THE KEYPAD SHALL PROVIDE THE FOLLOWING INFORMATION AS A MINIMUM: RETURN AIR TEMPERATURE, DISCHARGE AIR TEMPERATURE, OUTDOOR AIR TEMPERATURE, SPACE AIR TEMPERATURE, OUTDOOR ENTHALPY, HIGH/LOW COMPRESSOR SUCTION TEMPERATURE AND PRESSURE, COMPRESSOR HEAD PRESSURE AND TEMPERATURE, EXPANSION VALVE POSITION, CONDENSER FAN SPEED, INVERTER COMPRESSOR SPEED, DIRTY FILTER INDICATION, AIRFLOW VERIFICATION, COOLING STATUS, CONTROL TEMPERATURE (CHANGEOVER), VAV BOX OUTPUT STATUS, LOW COOLING STATION/CAPACITY, UNIT STATUS, ALL TIME SCHEDULES, ACTIVE ALARMS WITH TIME AND DATE, PREVIOUS ALARMS WITH TIME AND DATE, OPTIMAL START, SUPPLY FAN AND EXHAUST FAN SPEED, SYSTEM OPERATING HOURS, A. FAN, B. EXHAUST FAN, C. COOLING, D. INDIVIDUAL COMPRESSOR, E. HEATING, F. ECONOMIZER, G. TENANT OVERRIDE THE USER INTERACTION WITH THE KEYPAD SHALL PROVIDE THE FOLLOWING: 1. CONTROLS MODE a. A. OFF MANUAL b. B. AUTO c. C. HEAT/COOL d. D. COOL ONLY e. E. HEAT ONLY f. F. FAN ONLY 2. OCCUPANCY MODE a. A. AUTO b. B. OCCUPIED c. C. UNOCCUPIED d. D. TENANT OVERRIDE 3. UNIT OPERATION CHANGEOVER CONTROL a. A. RETURN AIR TEMPERATURE b. B. SPACE TEMPERATURE c. C. NETWORK SIGNAL 4. COOLING AND HEATING CHANGE-OVER TEMPERATURE WITH DEADBAND 5. COOLING DISCHARGE AIR TEMPERATURE (IDAT) 6. SUPPLY RESET OPTIONS a. A. RETURN AIR TEMPERATURE b. B. OUTDOOR AIR TEMPERATURE c. C. SPACE TEMPERATURE d. D. AIRFLOW (VAV) e. E. NETWORK SIGNAL f. F. EXTERNAL (0-10 VDC) g. G. EXTERNAL (0-20 MA) TEMPERATURE ALARM LIMITS a. A. HIGH SUPPLY AIR TEMPERATURE b. B. LOW SUPPLY AIR TEMPERATURE c. C. HIGH RETURN AIR TEMPERATURE 8. LOCKOUT CONTROL FOR COMPRESSORS. 9. COMPRESSOR INTERSTAGE TIMERS 10. NIGHT SETBACK AND SETUP SPACE TEMPERATURE. 11. BUILDING STATIC PRESSURE. 12. ECONOMIZER CHANGEOVER a. A. ENTHALPY b. B. DRYBULB TEMPERATURE 13. CURRENTLY TIME AND DATE 14. TENANT OVERRIDE TIME 15. OCCUPIED/UNOCCUPIED TIME SCHEDULE 16. ONE EVENT SCHEDULE 17. HOLIDAY DATES AND DURATIONS 18. ADJUSTABLE SET POINTS 19. SERVICE MODE a. A. TIMERS NORMAL (ALL TIME DELAYS NORMAL) b. B. TIMERS FAST (ALL TIME DELAYS 20 SEC) IF THE UNIT IS TO BE PROGRAMMED WITH A NIGHT SETBACK OR SETUP FUNCTION, AN OPTIONAL SPACE SENSOR SHALL BE PROVIDED. SPACE SENSORS SHALL BE AVAILABLE TO SUPPORT FIELD SELECTABLE FEATURES. SENSOR OPTIONS SHALL INCLUDE: 1. ZONE SENSOR WITH TENANT OVERRIDE SWITCH 2. ZONE SENSOR WITH TENANT OVERRIDE SWITCH PLUS HEATING AND COOLING SET POINT ADJUSTMENT. (SPACE COMFORT CONTROL SYSTEMS ONLY) TO INCREASE THE EFFICIENCY OF THE COOLING SYSTEM THE DDC CONTROLLER SHALL INCLUDE A DISCHARGE AIR TEMPERATURE RESET PROGRAM FOR PART LOAD OPERATING CONDITIONS. THE DISCHARGE AIR TEMPERATURE SHALL BE CONTROLLED BETWEEN A MINIMUM AND A MAXIMUM. DISCHARGE AIR TEMPERATURE (DAT) BASED ON ONE OF THE FOLLOWING INPUTS: 1. AIRFLOW 2. OUTSIDE AIR TEMPERATURE 3. SPACE TEMPERATURE 4. RETURN AIR TEMPERATURE 5. EXTERNAL SIGNAL OF 1-5 VDC 6. EXTERNAL SIGNAL OF 0-20 MA 7. NETWORK SIGNAL 2.016 ROOF CURB A. A PREFABRICATED HEAVY GAUGE GALVANIZED STEEL, MOUNTING CURB SHALL BE PROVIDED FOR FIELD ASSEMBLY ON THE ROOF DECKING PRIOR TO UNIT SHIPMENT. THE ROOF CURB SHALL BE A FULL PERIMETER TYPE WITH COMPLETE PERIMETER SUPPORT OF THE AIR HANDLING SECTION AND CONDENSING SECTION. THE CURB SHALL BE A MINIMUM OF 14" HIGH AND INCLUDE A NOMINAL 2" X 4" WOOD NAILING STRIP. GASKET SHALL BE PROVIDED FOR FIELD MOUNTING BETWEEN THE UNIT BASE AND ROOF CURB. THESE DRAWINGS ARE FOR THE EXCLUSIVE USE OF GLIDDEN SPINA + PARTNERS, INC. AND MAY NOT BE DUPLICATED, REPRODUCED OR USED IN ANY MANNER WITHOUT THE EXPRESS WRITTEN CONSENT OF GLIDDEN SPINA + PARTNERS, INC. ALL RIGHTS RESERVED. Revisions: Project no: 15435 Date: 09.09.16 Drawn by: RB/SK/JS Project Architect: BJ PERMIT / BID SET: 09/07/16 700 WEST HILLSBORO BLVD. - BLDG. #1, SUITE 204 OCEARFIELD BEACH, FLORIDA 33441 TEL: (561) 391-9292 FAX: (561) 391-9998 CERTIFICATE OF AUTHORIZATION NO. 28107 LINDA IARRATE, P.E. LICENSE #731122 STEPHEN F. ROLLIN, P.E. LICENSE #36428 DONALD H. AUSTIN, JR., PE LICENSE #60651 JASON BARBER, P.E. LICENSE #730550 E-MAIL: INFO@FAEDCONBUILDING.COM DESIGNED BY: BJ/SK/JS PM: BJ P/N 15434 MECHANICAL SPECIFICATIONS 09.09.16 BID/PERMIT

FOR SUBMITTING THE BID, THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND INFORM THE ARCHITECT AND THE ENGINEER OF ANY DISCREPANCY BETWEEN THESE DOCUMENTS AND THE EXISTING CONDITIONS AND SHALL INCLUDE IN THE BID TO CORRECT THE SAME AS DIRECTED. THE ENGINEER AND THE ARCHITECT ARE NOT RESPONSIBLE FOR ANY ADDITIONAL COSTS RESULTING FROM VERIFIABLE EXISTING CONDITIONS DISCOVERED AFTER CONTRACT HAS BEEN AWARDED. NO CHANGES SHALL BE MADE TO THESE PLANS WITHOUT PRIOR APPROVAL FROM THE ENGINEER OF RECORD. ALL CHANGES SHALL BE SUBMITTED FOR REVIEW PRIOR TO INSTALLATION. NOT FOR BID UNTIL PERMIT HAS BEEN ISSUED.

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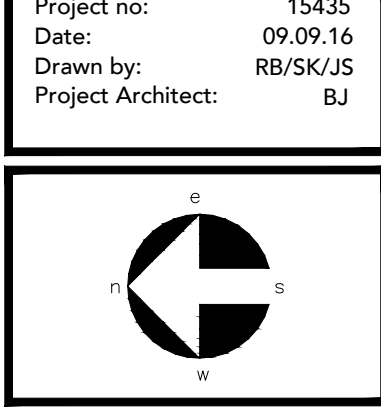
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New Building For: OPPORTUNITY INC. EARLY LEARNING CENTER 4171 Westgate Avenue Palm Beach County, Florida

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Revisions:

Project no: 15435 Date: 09.09.16 Drawn by: RB/SK/JS Project Architect: BJ



M6.2 09.09.16 BID/PERMIT