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SECTION 23 0000 - HVAC

THE REQUIREMENTS OF THE GENERAL CONDITIONS AND DIVISION 1 SECTIONS OF THE SPECIFICATIONS SHALL APPLY TO THIS SECTION OF THE SPECIFICATIONS.

PART 1 - GENERAL

1.01 SUMMARY

- A. THE CONTRACTOR SHALL PROVIDE A COMPLETE AND OPERATIONAL HVAC SYSTEM AS SHOWN ON THE DRAWINGS INCLUDING EQUIPMENT, MATERIAL, LABOR, DUCTWORK, PIPING, DIFFUSERS, GRILLES AND REQUIRED ELECTRICAL. THE CONTRACTOR SHALL PROVIDE OPERATING AND MAINTENANCE INSTRUCTIONS TO THE OWNER FOR ALL EQUIPMENT. ALL COMPRESSORS SHALL BE PROVIDED WITH A FIVE (5) YEAR EXTENDED WRITTEN WARRANTY ON PARTS AND, WHERE APPLICABLE, ALL GAS FIRED HEAT EXCHANGERS SHALL BE PROVIDED WITH AN EXTENDED TEN (10) YEAR PARTS WARRANTY. THE CONTRACTOR SHALL PROVIDE AN UNCONDITIONAL WARRANTY OF ONE YEAR FOR ALL OTHER ASSOCIATED EQUIPMENT AND DEVICES.
- B. ALL WORK SHALL BE PERFORMED IN COMPLIANCE WITH THE LOCAL BUILDING, MECHANICAL, AND ENERGY CODES ASHRAE, SMACNA, AND ALL OTHER APPLICABLE STATE AND FEDERAL CODES.
- C. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED FOR THE EXECUTION OF THIS WORK.
- D. ALL EQUIPMENT AND MATERIALS SHALL BE NEW AND SHALL DISPLAY A UL LABEL WHERE APPLICABLE.
- E. ALL INTERIOR INSULATION MATERIALS, JACKETS, COVERINGS, SEALS AND MASTICS SHALL HAVE A FLAME SPREAD INDEX OF 25 OR LESS AND SMOKE DEVELOPED INDEX OF 50 OR LESS PER ASTM E84 (NFPA 255).

1.02 SUBMITTALS

- A. PRODUCT DATA: INCLUDE MANUFACTURER'S TECHNICAL DATA FOR EACH MODEL INDICATED, INCLUDING RATED CAPACITIES, DIMENSIONS, REQUIRED CLEARANCES, CHARACTERISTICS, FURNISHED SPECIALTIES AND ACCESSORIES.
- B. OPERATION AND MAINTENANCE DATA: FOR ROOFTOP AIR CONDITIONERS, FURNACE AND UNIT HEATERS.
- C. AT THE END OF THE PROJECT TURNS OVER THE FOLLOWING TO THE OWNER:

- 1. FURNACE - PROVIDE MANUFACTURER'S OPERATION AND MAINTENANCE MANUAL.
- 2. AIR CONDITIONER - PROVIDE MANUFACTURER'S WARRANTY.
- 3. STARTUP - PROVIDE ONE (1) COPY OF THE (EACH) EQUIPMENT OPERATION CERTIFICATE FOR EACH UNIT INSTALLED.

1.03 QUALITY ASSURANCE

- A. PRODUCT SELECTIONS: DRAWINGS INDICATE SIZE, PROFILES AND DIMENSIONAL REQUIREMENTS OF ROOFTOP AIR CONDITIONERS AND ARE BASED ON THE SPECIFIC SYSTEM LISTED.
- B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN 90.1, ARTICLE 100, BY A LISTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
- C. FABRICATE AND INSTALL REFRIGERATION SYSTEM TO COMPLY WITH ASHRAE 15, "SAFETY CODE FOR MECHANICAL REFRIGERATION".
- D. ENERGY-EFFICIENT DESIGN: EQUAL TO OR GREATER THAN PRESCRIBED BY ASHRAE 90.1, "ENERGY EFFICIENT DESIGN OF NEW BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS".
- E. COEFFICIENT OF PERFORMANCE: EQUAL TO OR GREATER THAN PRESCRIBED BY ASHRAE 90.1, "ENERGY EFFICIENT DESIGN OF NEW BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS".
- F. COMPLY WITH NFPA 54 FOR GAS-FIRED FURNACE SECTION.
- G. ARI CERTIFICATION: UNITS SHALL BE ARI CERTIFIED AND LISTED.
- H. ARI COMPLIANCE FOR UNITS WITH CAPACITIES LESS THAN 135,000 BTUH: RATE ROOFTOP AIR-CONDITIONER CAPACITY ACCORDING TO ARI 210/240, "UNITARY AIR-CONDITIONING AND AIR-SOURCE HEAT PUMP EQUIPMENT".
  - 1. SOUND POWER LEVEL RATINGS: COMPLY WITH ARI 270, "SOUND RATING OF OUTDOOR UNITARY EQUIPMENT".
  - I. ARI COMPLIANCE FOR UNITS WITH CAPACITIES 135,000 BTUH AND MORE: RATE ROOFTOP AIR-CONDITIONER CAPACITY ACCORDING TO ARI 340/360, "COMMERCIAL AND INDUSTRIAL UNITARY AIR-CONDITIONING AND HEAT PUMP EQUIPMENT".

PART 2 - PRODUCTS

2.01 FURNACES AND CONDENSING UNITS

- A. MANUFACTURERS ARE LIMITED TO AIREASE OR ARMSTRONG AIR AS MANUFACTURED BY ALLIED AIR ENTERPRISES.
- B. RAINBOW CHILD CARE CENTER HAS A NATIONAL ACCOUNT AGREEMENT WITH ALLIED AIR ENTERPRISES. ALL FURNACES, CONDENSING UNITS, AND EVAPORATOR COILS SHALL BE ORDERED THRU JUDY HENDRIX OF ALLIED AIR. CALL (803) 738-4060 OR EMAIL judy.hendrix@alliedair.com.

2.02 EXHAUST FANS

- A. MANUFACTURERS ARE LIMITED TO GREENHECK, COOK OR PENN.
- B. EQUIPMENT OTHER THAN SCHEDULED MUST MEET OR EXCEED SCHEDULED EQUIPMENT PERFORMANCE.

2.03 TEMPERATURE CONTROLS

- A. THERMOSTATS SHALL BE PROGRAMMABLE, SHALL HAVE AUTOMATIC CHANGEOVER, SHALL HAVE PROGRAMMABLE FAN AND SHALL HAVE REMOTE SENSORS.

2.04 DUCTWORK AND SPECIALTIES

- A. ALL DUCTWORK SHALL BE GALVANIZED SHEET METAL OF GAUGES AND JOINT TYPES AS SPECIFIED IN THE SMACNA MANUAL FOR THE APPLICABLE SIZES. VOLUME DAMPERS SHALL BE MANUAL LOCKING, BLADE-TYPE, TWO GAUGES HEAVIER THAN DUCT. DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA STANDARDS FOR TWO-INCH STATIC PRESSURE. ALL DUCTWORK SHALL BE SEALED WITH MASTIC. ACCESS DOORS SHALL BE PROVIDED IN DUCTWORK AT FIRE DAMPERS OR OTHER CONTROL DEVICES AS REQUIRED FOR MAINTENANCE. DOUBLE-THICKNESS TURNING VANES SHALL BE PROVIDED AT ALL RECTANGULAR ELBOWS. FLEXIBLE CONNECTIONS TO AIR HANDLING UNITS SHALL BE PROVIDED.

2.05 INSULATION

- A. DUCTWORK INSULATION SHALL BE 1" THICK WITH A MINIMUM R VALUE OF R-6.0. DUCT DIMENSIONS INDICATED ARE NET INSIDE DIMENSIONS REQUIRED FOR AIR FLOW. INCREASE DUCT SIZE TO ALLOW FOR INSULATION THICKNESS. ALL DUCTWORK SHALL BE INSULATED BY WRAP INSULATION. DUCT LINING SHALL NOT BE PERMITTED.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. INSTALL UNITS LEVEL AND PLUMB, MAINTAINING MANUFACTURER'S RECOMMENDED CLEARANCES. INSTALL ACCORDING TO ARI GUIDELINE B.
- B. ALL DUCTWORK AND EXHAUST FANS SHALL BE SUPPORTED PROPERLY FROM THE TOP CHORD OF ROOF JOISTS. NO DUCTWORK OR DEVICES SHALL BE ATTACHED DIRECTLY TO ROOF DECK.
- C. THE HVAC SYSTEM SHALL OPERATE WITHOUT OBJECTIONABLE VIBRATION, PULSATION, OR RATTLE. MOTORS SHALL BE MOUNTED ON RUBBER VIBRATION ISOLATORS OR THE COMPLETE UNIT SHALL BE ISOLATED FROM THE BUILDING WITH ISOLATION PADS. ALL DAMPERS, GRILLES, AND ACCESSORIES SHALL HAVE NO MOVEMENT UNDER OPERATING CONDITIONS AND SHALL OPERATE WITHOUT NOISE. ALL DUCTWORK INSTALLED EXTERNAL TO THE BUILDING SHALL BE COMPLETELY WEATHERPROOF AND INSULATED.

3.02 EQUIPMENT START-UP

- A. THE CONTRACTOR'S HVAC CONTRACTOR SHALL COORDINATE AT LEAST TWO (2) WEEKS PRIOR TO CHECKOUT AND PROVIDE AN EQUIPMENT OPERATION CERTIFICATE (EOC) FOR ALL ROOFTOP UNITS AFTER STARTUP BY THE MANUFACTURER'S FACTORY EMPLOYED FIELD SERVICE REPRESENTATIVE. AT TIME OF STARTUP, A QUALIFIED HVAC TECHNICIAN SHALL BE PRESENT TO RE-TEST, SERVICE AND CORRECT ANY PROBLEMS DISCOVERED DURING THE EQUIPMENT PERFORMANCE CHECKOUT.
- B. EQUIPMENT OPERATION CERTIFICATE (EOC), POWER AND GAS SERVICES SHALL BE IN OPERATION FOR A MINIMUM 24-HOUR PERIOD.

3.03 EQUIPMENT IDENTIFICATION

- A. FOR ALL EQUIPMENT, CONTRACTOR SHALL PROVIDE AND INSTALL BLACK ALUMINUM NAMEPLATE WITH WHITE LETTERING SECURED PERMANENTLY TO THE EQUIPMENT. ADJACENT TO MANUFACTURER'S EQUIPMENT TAGS, SIZE OF LETTERS SHALL BE MINIMUM 2" IN HEIGHT. SAMPLE AS FOLLOWS: CU-1.

3.04 CONNECTIONS

- A. INSTALL PIPING EQUIPMENT TO ALLOW SERVICE AND MAINTENANCE.
- B. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF UNITS. THE FOLLOWING ARE SPECIFIC CONNECTION REQUIREMENTS:
  - 1. INSTALL DUCTS TO TERMINATION AT ROOF CURB.
  - 2. REMOVE ROOF DECKING ONLY AS REQUIRED FOR PASSAGE OF DUCTS. DO NOT CUT OUT DECKING UNDER ROOF CURB.
- C. ELECTRICAL SYSTEM CONNECTIONS: COMPLY WITH APPLICABLE REQUIREMENTS IN DIVISION 16 SECTIONS FOR WIRING, SWITCHES, AND MOTOR CONTROLS.
- D. GROUND EQUIPMENT ACCORDING TO DIVISION 16 SECTIONS "GROUNDING AND BONDING". TIGHTEN ELECTRICAL CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A AND UL 486B.

3.05 TESTING, ADJUSTING AND BALANCING

- A. TEST, ADJUST, AND BALANCE THE FOLLOWING MECHANICAL SYSTEMS:
  - 1. SUPPLY AIR SYSTEMS.
  - 2. RETURN AIR SYSTEMS.
  - 3. EXHAUST AIR SYSTEMS.
  - 4. OUTSIDE AIR SYSTEMS.
- B. MAKE ADJUSTMENTS AND RE-TEST SYSTEM TO ACHIEVE THE REQUIRED FLOW WITHIN 10% OF SPECIFIED FLOW FOR AIR SYSTEMS.
- C. WHEN DEFICIENCIES ARE IDENTIFIED, RE-TEST AND ADJUST FLOWS AFTER CORRECTIVE MEASURES ARE TAKEN.
- D. PERMANENTLY IDENTIFY POSITION OF SPEED CONTROLLER AND DAMPERS FOR FUTURE REFERENCE.
- E. CERTIFIED REPORTS: SUBMIT TESTING, ADJUSTING, AND BALANCING REPORTS BEARING THE SEAL AND SIGNATURE OF THE TEST AND BALANCE ENGINEER. THE REPORTS SHALL BE CERTIFIED PROOF THAT THE SYSTEMS HAVE BEEN TESTED, ADJUSTED, AND BALANCED IN ACCORDANCE WITH THE REFERENCED STANDARDS; ARE AN ACCURATE REPRESENTATION OF HOW THE SYSTEMS HAVE BEEN INSTALLED; ARE A TRUE REPRESENTATION OF HOW THE SYSTEMS ARE OPERATING AT THE COMPLETION OF THE TESTING, ADJUSTING, AND BALANCING PROCEDURES; AND ARE AN ACCURATE RECORD OF ALL FINAL QUANTITIES MEASURED, TO ESTABLISH NORMAL OPERATING VALUES OF THE SYSTEMS.
- F. REPORT FORMAT: REPORT FORMS SHALL BE THOSE STANDARD FORMS PREPARED BY THE REFERENCED STANDARD FOR EACH RESPECTIVE ITEM AND SYSTEM TO BE TESTED, ADJUSTED, AND BALANCED. BIND REPORT FORMS COMPLETE WITH SCHEMATIC SYSTEMS DIAGRAMS AND OTHER DATA IN REINFORCED, VINYL AND THREE-RING BINDERS. PROVIDE BINDING EDGE LABELS WITH THE PROJECT IDENTIFICATION AND A TITLE DESCRIPTIVE OF THE CONTENTS.
- G. NEBB: "PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS.
- H. ASHRAE: ASHRAE HANDBOOK, 1984 SYSTEMS VOLUME, CHAPTER 37, TESTING, ADJUSTING AND BALANCING.

END OF SECTION 23 0000

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PROJECT NO: 2017.0250  
DATE: 12.22.17

M.500  
MECHANICAL  
SPECIFICATIONS

CHECKED: JL DRAWN: PH