

**SECTION 23 74 00
PACKAGE MAKE-UP AIR UNIT**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2025.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- C. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.
- D. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.
- E. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

1.02 GENERAL REQUIREMENTS

1.03 THE CONTRACTOR IS REFERRED TO THE INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS, NYCHA CONTRACTS; THE SPECIAL NOTICE TO CONTRACTORS; THE FORM OF PROPOSAL; THE FORM OF BID BOND; DIVISION 01 - GENERAL REQUIREMENTS OF THE CONTRACT SPECIFICATIONS; THE CONTRACT DRAWINGS AND ALL AMENDMENTS AND ADDENDA THERETO; ALL OF WHICH GOVERN THE WORK OF THIS SECTION.

1.04 SUMMARY

1.05 THIS SECTION INCLUDES UNIT WITH INTEGRAL INDIRECT GAS-FIRED HEATING FOR ROOFTOP INSTALLATION. AIRFLOW ARRANGEMENT SHALL BE OUTDOOR AIR WITH VARIABLE AIR VOLUME. EACH UNIT SHALL BE CONSTRUCTED IN A HORIZONTAL CONFIGURATION AND SHALL INCORPORATE ADDITIONAL PRODUCT REQUIREMENTS AS LISTED IN SECTION 2 OF THIS SPECIFICATION.

1.06 RELATED SECTIONS INCLUDE THE FOLLOWING:

- A. Section 22 10 05: Plumbing Piping
- B. Section 23 00 00: HVAC Scope of Work
- C. Section 23 07 13: Insulation
- D. Section 23 09 00: Controls and Instrumentation
- E. Division 26 00 00: Electrical

1.07 SUBMITTALS

1.08 PRODUCT DATA: FOR EACH TYPE OR MODEL INCLUDE THE FOLLOWING:

- A. Complete fan performance curves for Supply Air, with system operating conditions indicated, as tested on an AMCA Certified Chamber.
- B. Sound performance data for Supply Air, as tested on an AMCA Certified chamber.
- C. Motor ratings, electrical characteristics and motor and fan accessories.
- D. Performance ratings for all chilled water or DX coils.
- E. Dimensioned drawings for each type of installation, showing isometric and plan views, to include location of attached ductwork and service clearance requirements.
- F. Estimated gross weight of each installed unit.
- G. Installation, Operating and Maintenance manual (IOM) for each model.
- H. Microprocessor Controller (DDC) specifications to include available options and operating protocols. Include complete data on all factory-supplied input devices.
- I. Remote Panel description to include all functions Note:

- J. AHRI Certified coil performance ratings with system operating conditions indicated. Ratings shall be in accordance with Standard 410.
- K. Color chart including a palette of available standard paint finishes.

1.09 QUALITY ASSURANCE

1.10 SOURCE LIMITATIONS: OBTAIN UNIT WITH INTEGRAL HEATING AND COOLING WITH ALL APPURTENANT COMPONENTS OR ACCESSORIES FROM A SINGLE MANUFACTURER.

1.11 PRODUCT OPTIONS: DRAWINGS MUST INDICATE SIZE, PROFILES AND DIMENSIONAL REQUIREMENTS OF UNIT AND ARE TO BE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 01 SECTION "PRODUCT REQUIREMENTS."

1.12 CERTIFICATIONS

- A. Entire unit shall be ETL Certified per ANSI Z83.4 or ANSI Z83.18 and bear an ETL mark.
- B. Coils shall be Recognized Components for ANSI/UL 1995, CAN / CSA C22.2 No 236.05. DX and water coils shall be AHRI Certified per standard 410-2001.
- C. Electric heaters shall be ETL Certified as a component of the unit.

1.13 COORDINATION

1.14 COORDINATE SIZE AND LOCATION OF ALL BUILDING PENETRATIONS REQUIRED FOR INSTALLATION OF EACH MAU AND ASSOCIATED DUCTING, PLUMBING AND ELECTRICAL SYSTEMS.

1.15 COORDINATE SEQUENCING OF CONSTRUCTION OF ASSOCIATED PLUMBING, HVAC AND ELECTRICAL SUPPLY ROOFING CONTRACTOR.

1.16 EXTRA MATERIALS

1.17 FURNISH EXTRA MATERIALS DESCRIBED BELOW THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.

- A. Filters: (Insert quantity) set(s) of MERV 8 disposable filters for each unit.
- B. One set of fan belts.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH SPECIFICATIONS CONTAINED WITHIN THIS DOCUMENT, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO:

- A. CaptiveAire.
- B. Or approve equal.

2.03 MANUFACTURED UNITS

2.04 UNIT WITH INTEGRAL ELECTRIC HEATING AND DIRECT EXPANSION COOLING SHALL BE FULLY ASSEMBLED AT THE FACTORY AND CONSIST OF AN INSULATED METAL CABINET, OUTDOOR AIR INTAKE WEATHER HOOD WITH BIRD SCREEN, MOTORIZED INTAKE DAMPER, SENSORS, CURB ASSEMBLY, SERVICE RECEPTACLE, FILTER ASSEMBLY FOR INTAKE AIR, SUPPLY AIR BLOWER ASSEMBLY AND AN ELECTRICAL CONTROL CENTER. ALL SPECIFIED COMPONENTS AND INTERNAL ACCESSORIES FACTORY INSTALLED AND TESTED AND PREPARED FOR SINGLE-POINT HIGH VOLTAGE CONNECTION.

2.05 CABINET

2.06 MATERIALS: DOUBLE WALL INSULATED METAL CABINET FABRICATED TO PERMIT ACCESS TO INTERNAL COMPONENTS FOR MAINTENANCE. UNDERSIDE OF UNIT SHALL HAVE FORMED METAL PANELS COVERING BASE PANEL INSULATION.

- A. Outside casing: Pre-painted components as supplied by the factory shall have polyester urethane paint on 18 gauge G60 galvaneal steel]. Base rail is 12 gauge, galvanized (G90) steel.
- B. Internal assemblies: 24 gauge, galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel.

2.07 CABINET INSULATION: COMPLY WITH NFPA 90A AND NFPA 90B AND EROSION REQUIREMENTS OF UL 181.

- A. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
 - 1. Thickness: 1 inch
 - 2. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
 - 3. Location and application: Floor of each unit shall be insulated with 1 inch thick rigid fiberglass insulation, covered on one surface with integral aluminum foil. Full interior coverage of entire cabinet to include walls and roof of unit shall be semi-rigid type and installed between inner and outer shells of all cabinet exterior components when double walls are specified. Full interior coverage from "Heating on"

2.08 ACCESS PANELS: UNIT SHALL BE EQUIPPED WITH INSULATED, REMOVABLE, AND HINGED ACCESS PANELS TO PROVIDE EASY ACCESS TO ALL MAJOR COMPONENTS. ACCESS PANELS SHALL BE FABRICATED OF 18 GAUGE GALVANIZED G90 STEEL. REMOVABLE ACCESS PANELS SHALL INCORPORATE A FORMED DRIP EDGE.

2.09 SUPPLY AIR BLOWER ASSEMBLY: BLOWER ASSEMBLY CONSISTS OF AN ELECTRIC MOTOR AND A BELT DRIVEN, DOUBLE WIDTH, AND DOUBLE INLET FORWARD CURVE BLOWER. ASSEMBLY SHALL BE MOUNTED ON HEAVY GAUGE GALVANIZED RAILS AND FURTHER MOUNTED ON [MINIMUM 1.125 INCH THICK NEOPRENE VIBRATION ISOLATORS OR SPRING ISOLATION DEVICES WITH 1.5 STATIC DEFLECTION.

2.10 CONTROL PANEL / CONNECTIONS: UNIT SHALL HAVE AN ELECTRICAL CONTROL CENTER WHERE ALL HIGH AND LOW VOLTAGE CONNECTIONS ARE MADE. CONTROL CENTER SHALL BE CONSTRUCTED TO PERMIT SINGLE-POINT HIGH VOLTAGE POWER SUPPLY CONNECTIONS.

- A. Shall be encased in a weather-tight metal housing with intake air vents. Large, metal lift-off or hinged door shall provide easy access to the enclosed vest plate, control circuitry, gas train, burner assembly and exhaust blower.
- B. Shall have solid state controls permitting stand-alone operation.

- 2.11** **MOTORIZED DAMPERS / INTAKE AIR: MOTORIZED DAMPER OF INSULATED LOW LEAKAGE TYPE SHALL BE FACTORY INSTALLED.**
- 2.12** **SENSORS SHALL BE FACTORY SUPPLIED AND INSTALLED.**
- 2.13** **CURB ASSEMBLY: THE CURB ASSEMBLY PROVIDES FULL PERIMETER SUPPORT OF THE UNIT AND ENSURES PROPER FLASHING AND INSULATION OF ALL ROOF PENETRATIONS AND PROVIDES ADEQUATE CLEARANCE FOR A P TRAP ASSEMBLY. A CURB ASSEMBLY MADE OF 14 GAUGE GALVANIZED STEEL SHALL BE PROVIDED BY THE FACTORY FOR ASSEMBLY AND INSTALLATION AS PART OF THIS DIVISION. THE CURB ASSEMBLY SHALL PROVIDE PERIMETER SUPPORT OF THE ENTIRE UNIT AND SHALL HAVE DUCT ADAPTER(S) FOR SUPPLY AIR AND RETURN AIR. CURB ASSEMBLY SHALL ENCLOSE THE UNDERSIDE OF THE UNIT AND SHALL BE SIZED TO FIT INTO A RECESS IN THE BOTTOM OF THE UNIT. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH ROOFING CONTRACTOR TO ENSURE CURB UNIT IS PROPERLY FLASHED TO PROVIDE PROTECTION AGAINST WEATHER/MOISTURE PENETRATION. CONTRACTOR SHALL PROVIDE AND INSTALL APPROPRIATE INSULATION FOR THE CURB ASSEMBLY].**
- 2.14** **SERVICE RECEPTACLE: 120 VAC GFCI SERVICE OUTLET SHALL BE FACTORY-PROVIDED AND INSTALLED BY THIS CONTRACTOR IN A LOCATION DESIGNATED BY THE NYCHA. SERVICE OUTLET REQUIRES A DEDICATED SINGLE PHASE ELECTRIC CIRCUIT.**
- 2.15** **BLOWER**
- 2.16** **BLOWER SECTION CONSTRUCTION, SUPPLY AIR: BELT DRIVE MOTOR AND BLOWER SHALL BE ASSEMBLED ONTO A MINIMUM 14 GAUGE GALVANIZED STEEL PLATFORM AND MUST HAVE NEOPRENE VIBRATION ISOLATION DEVICES, MINIMUM OF 1-1/8 INCHES THICK.**
- 2.17** **BLOWER ASSEMBLIES: SHALL BE STATICALLY AND DYNAMICALLY BALANCED AND DESIGNED FOR CONTINUOUS OPERATION AT MAXIMUM RATED FAN SPEED AND HORSEPOWER.**
- 2.18** **CENTRIFUGAL BLOWER HOUSING: FORMED AND REINFORCED STEEL PANELS TO MAKE CURVED SCROLL HOUSING WITH SHAPED CUTOFF.**
- 2.19** **FORWARD CURVED BLOWER (FAN) WHEELS: GALVANIZED OR ALUMINUM CONSTRUCTION WITH INLET FLANGE AND SHALLOW BLADES CURVED FORWARD IN DIRECTION OF AIRFLOW. MECHANICALLY ATTACHED TO SHAFT WITH SET SCREWS.**
- 2.20** **BLOWER SECTION MOTOR SOURCE QUALITY CONTROL: BLOWER PERFORMANCE SHALL BE FACTORY TESTED FOR FLOW RATE, PRESSURE, POWER, AIR DENSITY, ROTATION SPEED AND EFFICIENCY. RATINGS ARE TO BE ESTABLISHED IN ACCORDANCE WITH AMCA 210, "LABORATORY METHODS OF TESTING FANS FOR RATING".**
- 2.21** **MOTORS**
- 2.22** **GENERAL: BLOWER MOTORS GREATER THAN ¾ HORSEPOWER SHALL BE "NEMA PREMIUM™" UNLESS OTHERWISE INDICATED. COMPLIANCE WITH EP ACT MINIMUM ENERGY-EFFICIENCY STANDARDS FOR SINGLE SPEED ODP AND TE ENCLOSURES IS NOT ACCEPTABLE. MOTORS SHALL BE HEAVY-DUTY, PERMANENTLY LUBRICATED TYPE TO MATCH THE FAN LOAD AND FURNISHED AT THE SPECIFIED VOLTAGE, PHASE AND ENCLOSURE. DRIVES SHALL BE SIZED FOR A MINIMUM OF 150% OF DRIVEN HORSEPOWER AND PULLEYS SHALL BE FULLY MACHINED CAST-TYPE, KEYED AND FULLY SECURED TO THE FAN WHEEL AND MOTOR SHAFTS. ELECTRIC MOTORS OF TEN HORSEPOWER OR LESS SHALL BE SUPPLIED WITH AN ADJUSTABLE DRIVE PULLEY. COMPLY WITH REQUIREMENTS IN DIVISION 23 05 13, MATCHED WITH FAN LOAD.**
- 2.23** **MOTORS SHALL BE AS SCHEDULED ON DRAWINGS. THE DESIGNATION "NEMA PREMIUM™" APPLIES TO ELECTRIC MOTORS WITH EFFICIENCIES THAT ARE "BETTER THAN EP ACT.**
- 2.24** **UNIT CONTROLS**

- 2.25 THE UNIT SHALL BE CONSTRUCTED SO THAT IT CAN FUNCTION AS A STAND-ALONE HEATING SYSTEM CONTROLLED BY FACTORY-SUPPLIED CONTROLLERS, THERMOSTATS AND SENSORS. THIS UNIT SHALL BE CONTROLLED BY A FACTORY-INSTALLED MICROPROCESSOR PROGRAMMABLE CONTROLLER (DDC) THAT IS CONNECTED TO VARIOUS SENSORS.**
- 2.26 UNIT SHALL INCORPORATE A DDC CONTROLLER WITH INTEGRAL LCD SCREEN THAT PROVIDES TEXT READOUTS OF STATUS, OPERATING SETTINGS AND ALARM CONDITIONS. DDC CONTROLLER SHALL HAVE A BUILT-IN KEYPAD TO PERMIT OPERATOR TO ACCESS READ-OUT SCREENS AND CHANGE SETTINGS WITHOUT THE USE OF ANCILLARY EQUIPMENT, DEVICES OR SOFTWARE. DDC CONTROLLERS THAT REQUIRE THE USE OF EQUIPMENT OR SOFTWARE THAT IS NOT FACTORY-INSTALLED IN THE UNIT ARE NOT ACCEPTABLE. ALARM READOUTS CONSISTING OF FLASHING LIGHT CODES ARE NOT ACCEPTABLE. OWNER-SPECIFIED VENTILATING CONDITIONS CAN BE INPUT BY MEANS OF PUSHBUTTONS.**
- A. The DDC shall be factory-programmed for LonWorks or BACnet IP or equal for monitoring of the unit's status. Specify protocol.
 - B. Operating protocol: The DDC shall be factory-programmed for monitoring of the unit's status and control of the unit's functions]. Specify protocol.
- 2.27 VARIABLE FREQUENCY DRIVE (VFD), UNIT SHALL HAVE FACTORY INSTALLED VARIABLE FREQUENCY DRIVES FOR MODULATION OF THE BLOWER MOTORS THE VFDS SHALL BE FACTORY-PROGRAMMED FOR UNIT-SPECIFIED REQUIREMENTS AND SHALL NOT REQUIRE ADDITIONAL FIELD PROGRAMMING TO OPERATE.**
- 2.28 SENSORS TO BE PROVIDED WITH THE UNIT**
- A. Discharge Air Temperature Sensors
 - B. Heating Inlet Air Sensor
 - C. Dirty Filter Sensor
 - D. Fire Stat Type III
 - E. 120V/24V Smoke Detector

2.29 FILTERS

2.30 UNIT SHALL HAVE 2" THICK MERV 8 DISPOSABLE PLEATED FILTERS LOCATED IN THE OUTDOOR AIR INTAKE AND SHALL BE ACCESSIBLE FROM THE EXTERIOR OF THE UNIT.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 PRIOR TO START OF INSTALLATION, EXAMINE AREA AND CONDITIONS TO VERIFY CORRECT LOCATION FOR COMPLIANCE WITH INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING UNIT PERFORMANCE. SEE UNIT IOM.

3.03 EXAMINE ROUGHING-IN OF PLUMBING, ELECTRICAL AND HVAC SERVICES TO VERIFY ACTUAL LOCATION AND COMPLIANCE WITH UNIT REQUIREMENTS. SEE UNIT IOM.

3.04 PROCEED WITH INSTALLATION ONLY AFTER ALL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.05 INSTALLATION

3.06 INSTALLATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THESE WRITTEN SPECIFICATIONS, PROJECT DRAWINGS, MANUFACTURER'S INSTALLATION INSTRUCTIONS AS DOCUMENTED IN MANUFACTURER'S IOM, BEST PRACTICES AND ALL APPLICABLE BUILDING CODES.

3.07 3.3 CONNECTIONS

3.08 IN ALL CASES, INDUSTRY BEST PRACTICES SHALL BE INCORPORATED. CONNECTIONS ARE TO BE MADE SUBJECT TO THE INSTALLATION REQUIREMENTS SHOWN ABOVE.

- A. Piping installation requirements are specified in Division 22 (Plumbing). Drawings indicate general arrangement of piping, fittings and specialties.
- B. Duct installation and connection requirements are specified in Division 23 of this document.
- C. Electrical installation requirements are specified in Division 26 of this document.

3.09 3.4 FIELD QUALITY CONTROL

3.10 MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT FIELD ASSEMBLED COMPONENTS AND EQUIPMENT INSTALLATION, TO INCLUDE ELECTRICAL AND PIPING CONNECTIONS. REPORT RESULTS TO NYCHA IN WRITING. INSPECTION MUST INCLUDE A COMPLETE STARTUP CHECKLIST TO INCLUDE (AS A MINIMUM) THE FOLLOWING: COMPLETED START-UP CHECK LISTS AS FOUND IN MANUFACTURER'S IOM.

3.11 3.5 START-UP SERVICE

3.12 ENGAGE A FACTORY AUTHORIZED SERVICE REPRESENTATIVE TO PERFORM STARTUP SERVICE. CLEAN ENTIRE UNIT, COMB COIL FINS AS NECESSARY, AND INSTALL CLEAN FILTERS. MEASURE AND RECORD ELECTRICAL VALUES FOR VOLTAGE AND AMPERAGE. REFER TO DIVISION 23 "TESTING, ADJUSTING AND BALANCING" AND COMPLY WITH PROVISIONS THEREIN.

3.13 3.6 DEMONSTRATION AND TRAINING

3.14 ENGAGE A FACTORY AUTHORIZED SERVICE REPRESENTATIVE TO TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE AND MAINTAIN THE ENTIRE UNIT. REFER TO DIVISION 01 SECTION CLOSEOUT PROCEDURES AND DEMONSTRATION AND TRAINING.

END OF SECTION 23 74 00