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SECTION 23 34 33

AIR CURTAINS

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Air curtains for pedestrian entrances.

B. Air curtains for countertop and drive through windows.

1.2 RELATED SECTIONS

A. Section 05 50 00 – Metal Fabrications: Concealed steel support members.

B. Section 06 10 00 – Rough Carpentry.

C. Section 05 41 00 – Structural Metal Studs.

D. Section 07 62 00 – Sheet metal flashing.

E. Section 07 92 00 – Joint Sealants.

F. Section 08 10 00 – Metal Doors and Frames.

G. Section 08 33 00 – Overhead Coiling Doors.

H. Section 08 42 00 – Entrance Doors.

I. Section 22 10 00 – Plumbing Piping:

J. Section 23 21 00 – Hydronic Piping: Hot water heating piping to units.

K. Section 23 22 13- Steam and Condensate Piping: Steam heating piping to units.

L. Section 26 05 00 – Equipment Wiring: Connections to building power distribution.

1.3 REFERENCES

A. ASTM A240 / A240M -10 – Standard Specification for Chromium and Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

B. ASTM A591 / A591M -98 – Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight (Mass) Application (Withdrawn in 2005, replaced by A879/A879M).

C. ASTM A879 / A879M -06 – Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Application Requiring Designation of the Coating Mass on Each Surface.

D. ASTM A653 / A653M -09a – Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

E. AHRI 410-2001 – Standard for Forced-Circulation Air-cooling and Air-Heating Coils.

F. NSF/ANSI 37 – Air Curtains for entranceways in food and food service establishments – ETL Sanitation.

G. CRN – Canadian Registration Number Coil.

H. ANSI Z223-NFPA 54 – National Fuel Gas Code/

I. UL 507 – UL Standard for Safety Electric Fans – Intertek Testing Services Listed for US and Canada

J. UL 2021 – UL Standard for Fixed and Location-Dedicated Electric Room Heaters – Listed for US and Canada.

K. NEC – National Electric Code.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Include plans, elevations, sections, and details, indicating dimensions, tolerances, materials, fasteners, hardware, finish, piping, electrical wiring diagrams, options, and accessories.

D. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
   1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
   2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.

E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, two samples, minimum size 6.25 inches (160 mm) square, representing actual product, color, and patterns.

G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

H. Operation and Maintenance Manual: Submit manufacturer's operation and maintenance manual, including operation, maintenance, adjustment, and cleaning instructions, troubleshooting guide, parts list, and electrical wiring diagrams.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum ten years documented experience producing the products specified in this Section

B. Installer Qualifications: Minimum five years documented experience installing products specified in this Section

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store in a dry, heated storage area until installation of products.

C. Protect materials and finish from damage during handling and installation.

1.7 SEQUENCING

A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

B. Coordinate the installation of wiring and control switches for air curtains with the openings and the hardware provided for such openings.

C. Install after doors, walls, ceilings, and other adjacent surfaces are finished and painted.

1.8 WARRANTY

A. Standard five-year limited parts warranty for unheated units against defects in workmanship and material.

B. Standard 18-month limited parts warranty for heated units against defects in workmanship and materials.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturer: Mars Air Systems, LLC; 14716 South Broadway St., Gardena, CA 90248. Tel: (310) 532-1555 or (800) 421-1266. Fax: (310) 324-3030. Email: info@marsair.com. Web: www.marsair.com.

B. Delete one of the following two paragraphs: coordinate with requirements of Division 1 section on product options and substitutions.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 33 00.

2.2 AIR CURTAIN ASSEMBLIES

A. Motor Fan Assembly: Design for easy removal, assembly, repair, and maintenance.
   1. Motor: Totally enclosed air over (TEAO) cooled motor with sealed lifetime pre-lubricated ball bearings, motor starter and thermal overload protection.
      a. PH8 Units: Wired for variable speed operation.
      b. Electrical Characteristics: 115V AC, single phase; 2.4 Amp (units up to 48 inches wide) or 2.6 Amp (units 60 to 72 inches wide) full load per motor/fan.
      c. Electrical Characteristics: 208/230V AC, single phase; 1.2 Amp (units up to 48 inches wide) 1.4 Amp (units 60 to 70 inches wide) full load per motor/fan.
      d. Meets NEC. ETL Listed to conform to UL 507 (US) and CSA22.2 (Canada) Standards.
   2. Fans: Tangential type, double width, directly driven by an electric motor.
      a. Provide resilient isolation dampening mountings between motor frame and housing.
      b. Factory balanced blower wheel assembly statically and dynamically.

B. Housing: Self-contained one-piece type for units up to 72 inches in length with sufficient strength for mounting from pre-punched mounting holes at both ends to ceiling without intermediate support. Units longer than 72” are two units tandem mounted next to each other.
   1. Size:
      a. Unheated: 17-1/4 inches deep by 7-3/4 inches high (including discharge nozzle) by width of unit.

b. Electric Heated: 17-1/4 inches deep by 7-3/4 inches high (including discharge nozzle) by width of unit.
c. Hot Water/Steam Heated: 17-1/4 inches deep by 7-3/4 inches high (including discharge nozzle) by width of unit plus 10 inches for manifolds

2. Mounting:
   a. Unheated Inside Mount.
   b. Heated Inside Mount.
   c. Unheated Outside Mount.
   d. Mount Location Indicated.
3. Material:
   a. Provide T5052 18-gauge aluminum conforming to ASTM B209 and 18- and 20-gauge electro or hot dipped galvanized steel sheet housing conforming to ASTM A 591 and/or ASTM A 653.
4. Air Inlet Grille and Filters:
   a. Location: Front.
   b. Type: Fixed air intake grille.
      1) Filter: Aluminum mesh, 1/4 inch (6.4 mm), washable.
5. Discharge: Provide integral discharge nozzle specified.
6. Finish and Color: Provide with, no VOC, corrosion resistant polyurethane powder coated finish for sheet metal housings.
   a. Pearl White. (Standard Color)
   b. Obsidian Black.
   c. Titanium Silver.
   d. Stainless Steel.

C. Environmental Air Curtains: Models for Heights up to 8 feet (2438 mm) for Environmental Separation and Temperature Control and up to 7 feet (2133 mm) for Flying Insect Control.
1. Discharge Nozzle: Adjustable air foil vanes with a plus/minus 40-degree sweep front to back.
2. Air Velocity at Nozzle:
   a. PH825-1: 25 Inch (635 mm) Wide Units: 1800 feet/min (9.1 m/s) single 1/6HP motor/fan assembly.
   b. PH836-1: 36 Inch (915 mm) Wide Units: 1800 feet/min (9.1 m/s) single 1/6HP motor/fan assembly.
   c. PH842-1: 42 Inch (1067 mm) Wide Units: 1800 feet/min (9.1 m/s) single 1/6HP motor/fan assembly.
   d. PH848-1: 48 Inch (1220 mm) Wide Units: 1800 feet/min (9.1 m/s) single 1/6HP motor/fan assembly.
   e. PH860-1: 60 Inch (1524 mm) Wide Units: 1800 feet/min (9.1 m/s) single 1/6HP motor/fan assembly.
   f. PH872-1: 72 Inch (1830 mm) Wide Units: 1800 feet/min (9.1 m/s) single 1/6HP motor/fan assembly.
   g. PH884-2: 86 Inch (2184 mm) Wide Units: 1800 feet/min (9.1 m/s) two 1/6HP motor/fan assembly.
   h. PH896-2: 98 Inch (2489 mm) Wide Units: 1800 feet/min (9.1 m/s) two 1/6HP motor/fan assembly.

i. PH8108-2: 110 Inch (2794 mm) Wide Units: 1800 feet/min (9.1 m/s) two 1/6HP motor/fan assembly.
j. PH8120-2: 122 Inch (3099 mm) Wide Units: 1800 feet/min (9.1 m/s) two 1/6HP motor/fan assembly.
k. PH8144-2: 146 Inch (3708 mm) Wide Units: 1800 feet/min (9.1 m/s) two 1/6HP motor/fan assembly.

3. Air Speed at Floor: Minimum of 400 fpm (2 m/s) at 1 foot (304 mm) from the floor.
4. Air Inlet Grille and Filters:
   a. Location: Front.
   b. Type: Fixed air intake grille.
      1) Filter: Aluminum mesh, 1/4 inch (6.4 mm), washable.
   c. Speed: 625 cu ft/min (295 L/s), minimum, per motor/fan assembly.
5. Sound Pressure Level At 10 feet (3 m) From Nozzle:
   a. Single Motor/Fan Units (PH8 25-PH8 36): 49 dBA.
   b. Single Motor/Fan Units (PH8 42): 50 dBA.
   c. Single Motor/Fan Units (PH8 48): 52 dBA.
   d. Single Motor/Fan Units (PH8 60-PH8 72): 53 dBA.
   e. Two Motor/Fan Units (PH8 84-PH8 96): 53 dBA.
   f. Two Motor/Fan Units (PH8 108-PH8 144): 54 dBA.

2.3 COMPONENTS

A. Electric Heaters: Provide complete with motor control panel factory mounted to air curtain housing, and thermostat to be field installed.
   1. Temperature limit controller.
   2. Thermostat: Wall-mounted, 115-Volt operation, with heater on/off selection.
   3. Thermostat: Wall-mounted, 208-Volt operation, with heater on/off selection.
   4. Thermostat: Wall-mounted, 230-Volt operation, with heater on/off selection
   5. Thermostat: Wall-mounted, 24-Volt operation, with heater on/off selection.
   6. Heating Coils: ETL approved as part of unit. CEC tested by ETL. Factory mounted on the discharge end of the motor fan assembly and located within the nozzle outlet.

B. Steam Heaters: Provide finned tube steam coils for field mounting on air intake side of the air curtain cabinet with opposite end connections.
   1. Meets NEC and CEC tested by ETL Certified to conform to UL1995(US) and CSA22.2 (Canada) Standards.
   2. Output: Air curtain manufacturer's standard, one-row coils.
   3. Coils: Certified in accordance with AHRI 410.
   4. Connections: Same end, right hand, horizontal.
   5. Connections: Same end, left hand, horizontal.
   6. Casing: One-piece unpainted galvanized steel, bolted to air curtain housing
   7. Supply and return fittings on ends of casing.
   8. Thermostat: Wall-mounted 115-Volt operation, with heater on/off selection.
   9. Thermostat: Wall-mounted 208-Volt operation, with heater on/off selection.
   10. Thermostat: Wall-mounted 230-Volt operation, with heater on/off selection.
   11. Thermostat: Wall-mounted optional 24-Volt operation, with heater on/off selection.

C. Hot Water Heaters: Provide finned tube water coils for field mounting on air intake side of the air curtain cabinet with opposite end connections.
   1. Meets NEC and CEC tested by ETL Certified to conform to UL1995(US) and CSA22.2 (Canada) Standards.
   2. Output: Air curtain manufacturer's standard, one-row coils.
   3. Coils: Certified in accordance with AHRI 410.
   4. Connections: Same end, right hand, horizontal.
   5. Connections: Same end, left hand, horizontal.
   6. Casing: One-piece unpainted galvanized steel, bolted to air curtain housing.
   7. Supply and return fittings on ends of casing.
   8. Thermostat: Wall-mounted 115-Volt operation, with heater on/off selection.
   9. Thermostat: Wall-mounted 208-Volt operation, with heater on/off selection.
   10. Thermostat: Wall-mounted 230-Volt operation, with heater on/off selection.
   11. Thermostat: Wall-mounted optional 24-Volt operation, with heater on/off selection.

D. Door-Activated Limit switch(s): Provide, field installed 250-Volts, 20 amps limit switch to control air curtain(s) as follows; Automatic on/off control, activates air curtain when door is opened and turns off when door is closed. Provide limit switch for direct control one 1 HP or up to two 1/2 HP single phase motors without a separate control panel. Provide a separate control panel for three-phase motors and/or units exceeding 1 HP, 250-Volts or 20 amps controlled by a limit switch.
   1. Type: Combination plunger/roller switch for swing and sliding doors.
      a. Provide limit switches with NEMA 1 (20 amps) ratings in locations indicated.
      b. Provide limit switches with NEMA 4X (10 amps) ratings in locations indicated.
      c. Provide limit switches with NEMA 7 (10 amps) ratings in locations indicated.
   2. Type: Magnetic reed switch and actuator for swing and sliding doors. Industrial floor mounted or surface mounted switches for roll up doors
   3. Operation for Unheated Units: Automatic on/off control, on when door is opened, off when door is closed.
   4. Operation for Heated Units: Automatic on when door is opened, off after time delay period after door is closed, maintaining heat in the event door is opened within time delay period. Field adjustable from 1 to 17 minutes.

E. Optional Digital Programmable Controller:
   1. WiFi enabled controller for wireless interface with field supplied smartphone, tablet or computer
   2. No download or app required for wireless interface
   3. Wireless control range up to minimum of 50 feet from controller
   4. Fully factory assembled and wired inside the air curtain for easy field installation
   5. Optional remote mounted high resolution 7” Color LCD Display with resistive touchscreen technology
   6. Fully programmable controller
   7. Connect and control via any web browser
   8. Factory built wireless router with over 50 feet range

9. Pre-set and fully customizable programs
10. Time delay (Passive & Adaptive)
11. Factory Integrated temperature control sensors. No external thermostat required.
12. Heat on Demand Mode to regulate the space temperature
13. Summer-Winter modes
14. 24/7/365 timer
15. Maintenance schedule alerts
16. Password protected
17. High temperature lock from fan failure
18. Low voltage control signal for door activation
19. Multispeed fan control
20. Optional Integrated BMS controls
21. Optional BACnet MS/TP
22. Optional BACnet IP
23. Optional adaptive fan speed control and heat control based on existing field conditions. Field mounted outdoor temperature sensors required.

F. Provide mounting hardware as required for the opening.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that required utilities are in correct location and are of correct capacities for specified products.

B. Verify openings to receive air curtains are plumb, level, square, accurately aligned, correctly located, and in tolerance.

C. Examine surfaces to receive air curtains. If surface preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

A. Install air curtains in accordance with approved shop drawings and manufacturer's printed installation instructions.

B. Install air curtains plumb, level, square, true to line, and weathertight, without warp or rack.

C. Anchor air curtains securely in place to supports.

D. Coordinate with sheet metal flashing as specified in Section 07 62 00.

E. Install joint sealants as specified in Section 07 92 00.

F. Coordinate with electrical power as specified in Section 26 05 00.

G. Install door limit switches and adjust for correct operation.

H. Provide connection to piped services and utilities as specified in Section 22 10 00 and 23 21 00.

3.3 FIELD QUALITY CONTROL

A. Adjust air curtains to function properly.

B. Adjust air foil vanes located within the discharge nozzle as required for prevailing conditions at each opening.

C. Check heated air curtain performance on a calm day by measuring air temperature 6 inches off the floor. Optimal reading is halfway between the temperature inside and outside the building.

3.4 CLEANING

A. Clean air curtains promptly after installation in accordance with manufacturer's instructions.

B. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

C. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.5 PROTECTION

A. Protect materials and finish from damage until substantial completion.

3.6 SCHEDULES

A. Refer to Air Curtain Schedule appended to this section.

END OF SECTION