



SECTION 233433

AIR CURTAINS

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## PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Air curtains for pedestrian entrances.
- B. Air curtains for vehicular entrances.
- C. Air curtains for large loading dock doors.

### 1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Concealed steel support members.
- B. Section 06100 - Rough Carpentry.
- C. Section 05410 - Load-Bearing Metal Studs.

- D. Section 07900 - Joint Sealers.
- E. Section 08110 - Steel Doors and Frames.
- F. Section 08330 - Overhead Coiling Doors.
- G. Section 15145 - Plumbing Piping:
- H. Section 15182 - Hydronic Piping: Hot water heating piping to units.
- I. Section 15184 - Steam and Condensate Piping: Steam heating piping to units.
- J. Section 16150 (20 05 00) - Equipment Wiring: Connections to building power distribution.

### 1.3 REFERENCES

- A. ASTM A240 / A240M -10 – Standard Specification for 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-98 – Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight (Mass) Application (Withdrawn in 2005, replaced by A879/A879M).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. UL 507 – Standard for Safety Electric Fans – UL Listed for US and Canada.
- F. UL 507 – UL Standard for Safety Electric Fans – Intertek Testing Services Listed for US and Canada.
- G. UL 2021 – UL Standard for Fixed and Location-Dedicated Electric Room Heaters – Listed for US and Canada.
- H. UL 2021 – Standard for Fixed and Location-Dedicated Electric Room Heaters – Intertek Testing Services Listed for US and Canada.
- I. ARI 410-2001 – Standard for Forced-Circulation Air-cooling and Air-Heating Coils.
- J. CRN – Canadian Registration Number Coil.

- K. ANSI Z223-NFPA 54 – National Fuel Gas Code.
  
- L. NSF 37 - Air Curtains for entranceways in food and food service establishments – ETL Sanitation.
  
- M. AMCA 211 (Air Movement & Control Association International, Inc.) - Certified Ratings Program - Product Rating Manual for Fan Air Performance.
  - 1. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance.
  - 2. AMCA 220 - Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating.
  
- N. CE – Certified a product has met EU consumer safety, health or environmental requirements – Intertek Testing Services Listed.
  
- O. NEC – National Electric Code.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
  
- 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. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6.25 inches (160 mm) square, represent actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- G. Operation and Maintenance Manual: Submit manufacturer's operation and maintenance manual, including operation, maintenance, adjustment, and cleaning instructions, trouble shooting 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 materials.

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

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- 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. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

### 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. Wired for single speed operation.
    - b. Wired for two speed operation. (Not Applicable for Fly Insect Control Unit)

- c. Wired for three speed operation. (Not applicable for Fly Insect Control Unit)
  - d. Provide wash down type motors, NEC IP-54 for the locations indicated.
  - e. Provide explosion proof type motors, NEC Class 1, Division 1, Group D for the locations indicated.
  - f. Electrical Characteristics: 115V AC, single phase; 5.1 Amp full load per motor/fan.
  - g. Electrical Characteristics: 208/230V AC, single phase; 2.5 Amp full load per motor/fan.
  - h. Electrical Characteristics: 208/230V AC, three phase; 1.8/1.6 Amp full load per motor/fan.
  - i. Electrical Characteristics: 460V AC, three phase; 0.8 Amp full load per motor/fan.
  - j. Electrical Characteristics: 575V AC, three phase; 0.65 Amp full load per motor/fan.
  - k. \*Note: Explosion Proof and Wash-down models' Amp – Please see submittals
2. Fans: Forward curved centrifugal type, double width, and double inlet design, directly driven to an electric motor.
  3. Provide resilient isolation dampening mountings between motor frame and motor mounting pan.
  4. Factory balanced blower wheel assembly statically and dynamically.
- B. Housing: Self-contained one-piece type for units up to 48 inches in length with sufficient strength for mounting from pre-punched mounting holes at both ends to ceiling without intermediate support. Units longer than 48" are two units tandem mounted next to each other.
1. Size:



- a. Unheated: 20 inches deep by 12 inches high (including discharge nozzle) by width of unit.
  - b. Electric Heated: 20 inches deep by 12 inches high (including discharge nozzle) by width of unit.
  - c. Hot Water/Steam Heated: Depth 20 inches single row and double row by 12 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 11 and 18 gauge aluminum conforming to ASTM B209 and 14 and 20 gauge electro or hot dipped galvanized steel sheet housing conforming to ASTM A 591 and/or ASTM A 653.
  - b. Provide type 304 stainless steel housing with brushed finish. ASTM A 240/A 240M.
4. Air Inlet Grille and/or Filters: Provide air inlet grille and/or filters specified.
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. Anodized Aluminum (Standard Color)
  - b. Pearl White.
  - c. Titanium Silver
  - d. Obsidian Black.
  - e. Stainless Steel.

- C. Environmental Air Curtains: Models for Heights to 12 feet (3658 mm).
1. Discharge Nozzle: Wedge-shaped discharge outlet nozzle with adjustable air foil vanes with a plus/minus 40 degree sweep front to back.
  2. Air Velocity at Nozzle:
    - a. QP1036-1: 36 Inch (915 mm) Wide Units: 2206 feet/min (11.2 m/s) single 1/2HP motor/fan assembly.
    - b. QP1042-1: 42 Inch (1065 mm) Wide Units: 1945 feet/min (9.9 m/s) single 1/2HP motor/fan assembly.
    - c. QP1048-1: 48 Inch (1220 mm) Wide Units: 1730 feet/min (8.8 m/s) single 1/2HP motor/fan assembly.
    - d. QP1072-2: 72 Inch (1830 mm) Wide Units: 2206 feet/min (11.2 m/s) two 1/2HP motor/fan assemblies.
    - e. QP1084-2: 84 Inch (2133 mm) Wide Units: 1945 feet/min (9.9 m/s) two 1/2HP motor/fan assemblies.
    - f. QP1096-2: 96 Inch (2440 mm) Wide Units: 1730 feet/min (8.8 m/s) two 1/2HP motor/fan assemblies.
    - g. QP10108-2: 108 Inch (2743 mm) Wide Units: 1547 feet/min (8.0 m/s) two 1/2HP motor/fan assemblies.
    - h. QP10120-3: 120 Inch (3050 mm) Wide Units: 2084 feet/min (10.6 m/s) three 1/2HP motor/fan assemblies.
    - i. QP10144-3: 144 Inch (3660 mm) Wide Units: 1730 feet/min (8.8 m/s) three 1/2HP motor/fan assemblies.
  3. Air Speed at Floor: Minimum of 300 fpm (1.53 m/s) at 3 feet (914 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. Type: Filter Only as follows:
5. Sound Pressure Level At 10 feet (3 m) From Nozzle:
  - a. Single Motor/Fan Units: 53 dBA.
  - b. Two Motor/Fan Units: 55 dBA.
  - c. Three Motor/Fan Units: 57 dBA.
  - d. Four Motor/Fan Units: 59 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, 24-Volt operation, with heater on/off selection.
  3. 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. Output: Air curtain manufacturer's standard, one-row coils.
  2. Coils: Certified in accordance with ARI 410.
  3. Connections: Opposite end.
  4. Connections: Same end, right hand.
  5. Connections: Same end, left hand.

6. Casing: One piece unpainted galvanized steel, bolted to air curtain housing.
  7. Supply and return fittings on ends of casing.
  8. \*Steam Distributing coil required for 8 feet and above for same end coils.  
Dual supply, Single returns.
  9. Thermostat: Wall-mounted, 110-Volt operation, with heater on/off selection.
  10. Thermostat: Wall-mounted, 208/230-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. Output: Air curtain manufacturer's standard, one-row coils.
  2. Output: Air curtain manufacturer's standard, two-row coils.
  3. Coils: Certified in accordance with ARI 410.
  4. Connections: Opposite end.
  5. Connections: Same end, right hand.
  6. Connections: Same end, left hand.
  7. Casing: One piece unpainted galvanized steel, bolted to air curtain housing.
  8. Supply and return fittings on top of casing.
  9. Thermostat: Wall-mounted, 110-Volt operation, with heater on/off selection.
  10. Thermostat: Wall-mounted, 208/230-Volt operation, with heater on/off selection.

- D. Motor Control Panels For Unheated Units: Recommended for all three phase units and single phase units with combined motor capacities of more than 1HP whenever a door limit switch is used to automatically start and stop the air curtain. Provide motor control panels as follows:
1. Mounting: Shipped loose to be field mounted.
  2. Mounting: Factory mounted on right hand side of air curtain housing.
  3. Mounting: Factory mounted on left hand side of air curtain housing.
  4. Electrical components UL/CUL listed.
  5. Panels UL 508A listed.
- E. Motor Control Panels For Electric Heated Units: Recommended for all three phase units and single phase units with combined motor capacities of more than 1HP whenever a door limit switch is used to automatically start and stop the air curtain. Motor Control Panel is included for all electric heated units. Thermostat is provided for field installation. Provide motor control panels as follows:
1. Mounting: Factory mounted on the inside of air curtain housing.
  2. Mounting: Factory mounted on left hand side of air curtain housing.
  3. Electrical components UL/CUL listed.
- F. Motor Control Panels For Hot Water, Steam and Gas Heated Units: Recommended for all three phase units and single phase units with combined motor capacities of more than 1HP whenever a door limit switch is used to automatically start and stop the air curtain. Provide motor control panels as follows:
1. Mounting: Shipped loose to be field mounted.
  2. Mounting: Factory mounted on right hand side of air curtain housing.
  3. Mounting: Factory mounted on left hand side of air curtain housing.
  4. Provide with remote mount thermostat for field installation.
  5. Electrical components UL/CUL listed.

- G. 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 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 4X (15 amps) ratings in locations indicated.
    - d. 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 delay time period. Field adjustable from 1 to 17 minutes.
- H. 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

**\*\* NOTE TO SPECIFIER \*\* Indicate the mounting location(s) on the Drawing or on the Schedule at the end of this Section. Units are typically wall mounted horizontally above the door opening. Units can also be suspension mounted from the ceiling or vertically mounted along side the opening. Units are ETL Listed (US and Canada) for either an inside or outside mount. Heated units must be mounted on the inside or protected side of the opening. The appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction. Children are not to play with the appliance.**

- 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. Install sheet metal flashing as specified in Section 07620.
- E. Install joint sealants as specified in Section 07920.
- F. Install electrical power as specified in Section 16100.
- G. Install door limit switches and adjust for correct operation.
- H. Provide connection to piped services and utilities as specified in Sections of Divisions 15.

### 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 SCHEDULE

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

END OF SECTION