

SECTION 23 24 00
FANS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Rooftop exhaust fans.
- B. Ceiling exhaust fans.
- C. Inline fans.
- D. Fly/Insect fans.
- E. Air intake/relief outlet hoods.

1.2 RELATED WORK

- A. Section 07724 - Prefabricated Curbs.
- B. Section 23 31 13 - Metal Ducts.

1.3 REFERENCES

- A. AMCA 99 - Standards Handbook.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- C. SMACNA - Low Pressure Duct Construction Standard.
- D. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

1.4 SUBMITTALS

- A. Submit product data under provisions of Division 1 - Submittal Procedures.
- B. Provide fan curves with specified operating point clearly plotted.
- C. Submit manufacturer's installation instructions under provisions of Division 1 - Submittal Procedures. Submit manufacturer's literature of air intakes/relief vents providing operating weight, free area of opening, maximum intake or exhaust velocity, pressure drop at design velocity including the bird screen.

1.5 DESIGN CRITERIA

- A. All rooftop exhaust fans, air intake hoods, roof curbs, curb extensions, etc. shall be designed and approved to sustain minimum 140 MPH hurricane force winds and shall require a Miami-Dade Product Approval Notice of Acceptance (NOA) or be engineered with signed and sealed calculations inclusive of overturning moment and

uplift in accordance with Chapter 16 of the current FBC – Building and Section 6 of ASCE Standard 7.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - ROOFTOP EXHAUST/SUPPLY AIR FANS

- A. Greenheck
- B. PennBarry
- C. Loren Cook
- D. Jenco
- E. Leader

2.2 ACCEPTABLE MANUFACTURERS - INLINE, CEILING

- A. Greenheck
- B. PennBarry
- C. Loren Cook
- D. Acme
- E. Jenco
- F. Leader

2.3 ACCEPTABLE MANUFACTURERS – AIR CURTAIN FANS

- A. Mars
- B. Leading Edge
- C. Greenheck

2.4 ROOFTOP EXHAUST FAN (General Purpose)

- A. Down blast Fan Unit: Direct drive or belt drive (if direct drive is not available) centrifugal fan with a heavy gauge spun aluminum housing containing a rigid internal support structure and rolled beaded windbands for added strength, riveted or robotically welded centrifugal backward inclined statically and dynamically balanced aluminum fan wheel, resilient mounted pre-wired motor mounted out of airstream on vibration isolators, precision ground and polished fan shaft mounted on permanently

- sealed lubricated pillow block bearings selected for a minimum L10 life in excess of 100,000 hours at maximum cataloged operating speed (L5 life of 500,000 hours), fully machined keyed cast iron adjustable pulley securely attached to wheel and motor shaft, direct drive motor mounted and wired solid state speed controller, factory installed NEMA-1 disconnect switch (non-fusible for thermal overload protected motors), gravity backdraft damper; 1/2 inch mesh x 16 gauge aluminum bird screen, curb cap with welded corners to suit roof curb with continuous curb gaskets, secured with stainless steel bolts and screws. Fan shall bear AMCA certified Ratings Seal for sound and air performance and be provided with a permanently affixed manufacturer's metal nameplate containing the model number and serial number. Fan shall be Model H-G or Model H-GB as manufactured by Greenheck or approved equal.
- B. Upblast Fan Unit: Direct drive or belt drive (if direct drive is not available) centrifugal fan with a heavy gauge spun aluminum housing containing a rigid internal support structure and rolled beaded windbands for added strength, riveted or robotically welded centrifugal backward inclined statically and dynamically balanced aluminum fan wheel, resilient mounted pre-wired motor mounted out of airstream on vibration isolators, precision ground and polished fan shaft mounted on permanently sealed lubricated pillow block bearings selected for a minimum L10 life in excess of 100,000 hours at maximum cataloged operating speed (L5 life of 500,000 hours), fully machined keyed cast iron adjustable pulley securely attached to wheel and motor shaft, direct drive motor mounted and wired solid state speed controller, factory installed NEMA-1 disconnect switch (non-fusible for thermal overload protected motors), gravity backdraft damper; 1/2 inch mesh x 16 gauge aluminum bird screen, curb cap with welded corners to suit roof curb with continuous curb gaskets, secured with stainless steel bolts and screws. Fan shall bear AMCA certified Ratings Seal for sound and air performance and be provided with a permanently affixed manufacturer's metal nameplate containing the model number and serial number. Fan shall be Model H-CUE or Model H-CUBE as manufactured by Greenheck or approved equal.
- C. Roof Curb: Pre-fabricated roof curb fabricated of minimum 18-gauge galvanized steel with continuously welded seams, 2-inch flashing flange, 4-inch minimum deck flange, 1-inch insulation for full height of curb and around inside perimeter of curb. Roof curb shall be a minimum of 2 inches smaller than the fan to allow for the roof flashing membrane. Roof curb shall be as manufactured by Greenheck, Thybar or approved equal.
- D. For new construction only, the roof curb height shall be 18 inches above finished roofing with reinforced fastening return at top. Therefore, a 24-inch-high curb is required.
- E. Curb Extension: Prefabricated curb extension possessing a NOA shall use the same gauge as the roof curb. For an engineered curb extension, a minimum 12 gauge galvanize steel curb extension shall be provided.
- F. Fan electrically interlocked to air handler serving that zone.

2.5 CEILING EXHAUST FAN
(Toilet, Custodian)

- A. Centrifugal Fan Unit: UL listed and AMCA certified for sound and air performance, direct drive with insulated galvanized steel housing lined with 1/2-inch-thick insulation, adjustable mounting brackets, resilient mounted motor with built-in overload protection, speed controller, gravity backdraft damper in discharge outlet, brick vent or louver. Model SP as manufactured by Greenheck or approved equal.
- B. Grille: Molded, eggcrate aluminum with baked white enamel finish.
- C. Disconnect Switch: Factory wired, non-fusible for thermal overload protected motor.
- D. Fan electrically interlocked to air handler unit serving that zone.

2.6 AIR CURTAIN FANS
(Pool Area)

- A. Cabinet: Door length, corrosion-resistant galvanized steel with adjustable full-length discharge nozzles, electrostatically applied epoxy enamel finish over powered primer.
- B. Motor: UL listed heavy duty, totally enclosed permanent split capacitor type, direct drive, two speed, thermal overload protection, permanently lubricated rubber sealed bearings, corrosion resistant blower wheels and scrolls, double width/double inlet squirrel cage design and quick disconnect internal power cord.
- E. Fan shall be WA Series as manufactured by Mars or approved equal.
- F. Fan provided with door mounted microswitch for automatic ON/OFF operation.

2.7 INLINE EXHAUST/SUPPLY FAN
(EHPA & General Purpose)

- A. Inline Fan Unit: UL listed and AMCA certified for sound and air performance direct or belt drive centrifugal inline fan with insulated galvanized steel housing lined with 1/2-inch-thick insulation; out-of-air stream resilient mounted motor with speed controller or adjustable speed V-belt pulley drive; statically and dynamically balanced backward inclined fan wheel; backdraft damper; Model SQ or BSQ as manufactured by Greenheck or approved equal.
- B. Disconnect Switch: Factory wired, non-fusible, for thermal overload protected motor.

PART 3 EXECUTION

3.1 ROOFTOP EXHAUST FAN HURRICANE ANCHORING

- A. All rooftop equipment not possessing an NOA such as roof mounted exhaust fans, air intake gravity ventilators, relief outlet gravity ventilators, A/C condensers units,

roof curbs, HVAC structural stands, etc. shall be engineered with signed and sealed calculations inclusive of overturning moment and uplift in accordance with Chapter 16 of the current FBC – Building and Section 6 of ASCE Standard 7.

- B. Securement of non-NOA rooftop equipment to the roof curb or structural stand shall be with jacketed Series 304 stainless steel cables provided with turnbuckles or ratchets as manufactured by Gripple, Inc. or approved equal.

3.2 INSTALLATION

- A. Install under provisions of the manufacturer's instructions.
- B. Secure non-NOA rooftop equipment such as roof mounted exhaust fans, air intake gravity ventilators, air relief outlet gravity ventilators, A/C condenser units, etc. to roof curbs with #12 minimum stainless steel fasteners at a maximum 6 inches on-center or #14 stainless steel fasteners at a maximum of 8 inches on-center and 5/8 inch neoprene washers and nuts at 1 inch from the edge of the roof curb corner in order to satisfy the wind load requirements of ASCE Standard 7. Provide details of the method of anchoring (1) the roof curb or structural stand to the roof deck and (2) the equipment to the roof curb or structural stand on both the mechanical and structural drawings to avoid installation conflicts.
- C. For roof mounted exhaust fans, mounted directly on roof curbs, the roof opening for any duct of 12x12 or smaller shall be 12x12. The roof opening for ducts greater than 12x12 in size shall be the duct size plus a minimum of 3/4 inch on each side.
- D. Coordinate the roof curb size to be a minimum of 2 inches smaller than the rooftop equipment to allow for the roof flashing membrane.
- E. The use of hinges on the exhaust fan is PROHIBITED with the exception of the kitchen hood exhaust fan, chemistry classroom fume hood exhaust fan and the science material storage/preparation area fume hood exhaust fan which are required to be hinged for cleaning purposes.
- F. For new construction only, the roof curbs are to be a minimum of 18 inches above finished roof and fastened to the roof structural members. Therefore, a 24-inch-high roof curb shall be required. Provide miscellaneous support steel where required at fan openings and fasten to roof structural members. Provide a detail showing the type of fasteners used, the fastener size and spacing between the fasteners.
- G. The general-purpose exhaust fans shall be electrically wired to the H.O.A. switch on the Central H.O.A. Control Panel which will be interfaced with the school-based TAC-Andover Energy Management/Security (EM/S) System and control the On/Off operation of the fans.
- H. The individual and group toilet exhaust fans shall be electrically wired to the H.O.A. switch on the Central H.O.A. Control Panel which will be interfaced with the school-based TAC-Andover Energy Management/Security (EM/S) System and control the On/Off operation of the fans.

- I. In addition to being controlled by a zone switch on the Central H.O.A. Control Panel, the group toilet exhaust fans located in the EHPA shall also be electrically interlocked to the emergency generator so that it is energized during hurricane periods in order to provide exhaust of toilet room odors.
- J. The flammable storage room and the science organic/inorganic storage room exhaust fans shall be continuous running.
- K. The flammable storage room exhaust fan shall be electrically interlocked to the emergency generator so that it is energized at all times during non-hurricane and hurricane periods. This will provide continuous exhaust in these rooms so as to prevent any flammable vapor buildup.
- L. Chemistry classrooms containing a fume hood shall be provided with a purge exhaust fan to be manually started and stopped by an ON/OFF wall mounted switch located behind the teacher's demo table. Provide an engraved sign by the switch stating "OPERATE PURGE FAN WITH ROOM DOOR OPEN". Take note that a motorized damper on the room HVAC return air duct shall be provided to automatically close when the purge fan is energized so that fumes are not captured by the return air duct and be redistributed throughout the zone.
- M. The science material storage/preparation area purge exhaust fan shall be manually started and stopped by an ON/OFF wall mounted switch located in the room.
- N. The chemistry classroom and science material storage/preparation area fume hood fans shall be electrically interlocked to the fume hood operation.
- O. The kiln room exhaust fan shall be manually started and stopped by an ON/OFF wall mounted switch located outside the kiln room and be electrically interlocked to the kiln operation so that the kiln operates only when the fan operates.
- P. The custodian room exhaust fans shall be electrically interlocked to the associated air handling unit serving that zone.
- Q. The electrical room exhaust fans not containing electrical transformers shall be controlled by a wall mounted thermostat set at 85 Degree F. Electrical rooms containing transformers shall be air conditioned on a 24/7 basis and shall not be required to be provided with exhaust fans.
- R. The fly/insect fans, installed in both the kitchen and multipurpose/dining room doors leading to the exterior, shall be automatically started and stopped by door mounted micro switches.
- S. Provide speed controls on all direct drive fans in order to balance them to specification requirements.
- T. An audible alarm activated by a pressure differential switch in the exhaust ductwork shall be provided for exhaust fans in potentially hazardous areas as the flammable storage room and the science organic/inorganic storage rooms to indicate fan failure. The alarm shall be wired on a separate circuit

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- U. All new exhaust fans, supply air fan, etc. shall be tagged and identified in a sequential numerical format with 2-inch-high stenciled painted alpha/numeric indicating the building number followed by the equipment number, area served and the ventilation rate for which the exhaust fan was designed such as EF-1-1/Custodian Room/60 CFM, EF-1-2/Toilet/ 50 CFM, EF-1-3/Flammable Storage Room/400 CFM, etc.

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