

SECTION 23 34 00

HVAC FANS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Centrifugal utility fans.
2. Propeller fans.
3. Downblast centrifugal roof fans.
4. Upblast centrifugal roof fans.
5. Ceiling fans.
6. Inline ceiling fans.
7. Duct blowers or cabinet fans.
8. Centrifugal square inline fans.
9. Roof ventilators.
10. Roof curbs.

B. Related Sections:

1. Division 23 - Vibration and Seismic Controls for HVAC and Plumbing Piping and Equipment: Product requirements for resilient mountings and snubbers for fans for placement by this section.
2. Division 23 - HVAC and Plumbing Insulation: Product requirements for power ventilators for placement by this section.
3. Division 23 - HVAC Ducts and Casings: Product requirements for hangers for placement by this section.
4. Division 23 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.
5. Division 26 - Equipment Wiring Connections: Execution and product requirements for connecting equipment specified by this section.

1.02 REFERENCES

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. Air Movement and Control Association International, Inc.:

1. AMCA 99 - Standards Handbook.
2. AMCA 204 - Balance Quality and Vibration Levels for Fans.
3. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
4. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
5. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

C. American Refrigeration Institute:

1. ARI 1060 - Air-to-Air Energy Recovery Ventilation Equipment Certification Equipment Program.

D. National Electrical Manufacturers Association:

1. NEMA MG 1 - Motors and Generators.

2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. Underwriters Laboratories Inc.:
1. UL 705 - Power Ventilators.
- 1.03 SUBMITTALS
- A. Division 01 - Submittal Procedures: Submittal procedures.
 - B. Shop Drawings: Indicate size and configuration of fan assembly, mountings, weights, ductwork and accessory connections.
 - C. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.
 - D. Manufacturer's Installation Instructions: Submit fan manufacturer's instructions.
 - E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- 1.04 CLOSEOUT SUBMITTALS
- A. Division 01 - Execution and Closeout Requirements: Closeout procedures.
 - B. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
- 1.05 QUALITY ASSURANCE
- A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.
 - B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
 - C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
 - D. Balance Quality: Conform to AMCA 204.
 - E. Energy Recovery Unit Wheel Energy Transfer Rating: Meet ARI 1060.
- 1.06 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
 - B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- 1.07 PRE-INSTALLATION MEETINGS
- A. Division 01 - Administrative Requirements: Pre-installation meeting.
 - B. Convene minimum one week prior to commencing work of this section.
- 1.08 DELIVERY, STORAGE, AND HANDLING
- A. Division 01 - Product Requirements: Product storage and handling requirements.

- B. Protect motors, shafts, and bearings from weather and construction dust.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

1.11 EXTRA MATERIALS

- A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two sets of belts for each fan.

PART 2 PRODUCTS

2.01 CENTRIFUGAL UTILITY FANS

A. Manufacturers:

1. Acme Engineering and Manufacturing Corp.
2. Greenheck Corp.
3. Loren Cook Company
4. Substitutions: Division 01 - Product Requirements.

B. Performance:

1. Performance Base: Sea level conditions.
2. Temperature Limit: Maximum 300 degrees F.
3. Static and Dynamic Balance: Eliminate vibration or noise transmission to occupied areas.

C. Wheel and Inlet:

1. Backward Inclined: Steel construction with smooth curved inlet flange, back plate, backward curved blades welded or riveted to flange and back plate; cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws.
2. Forward Curved: Galvanized steel construction with inlet flange, back plate, shallow blades with inlet and tip curved forward in direction of airflow, mechanically secured to flange and back plate; steel hub swaged to back plate and keyed to shaft with set screw.
3. Airfoil Wheel: Steel construction with smooth curved inlet flange, back plate die formed hollow airfoil shaped blades continuously welded at tip flange, and back plate; cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws.
4. Radial: Steel construction with inlet flange, back plate, plate blades with reinforcing gussets and wearing strips welded or riveted to back plate cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws.

D. Housing:

1. Steel, spot welded braced, designed to minimize turbulence with spun inlet bell and shaped cut-off.
2. Factory finish before assembly to manufacturer's standard.
3. Bolted construction with horizontal flanged split housing where indicated.
4. Fabricate plug fans without volute housing, in lined steel cabinet.

- E. Bearings and Sleeves:
1. Bearings: Pillow block type, self-aligning, grease-lubricated ball bearings, with ABMA 9 L-10 life at 120,000 hours.
 2. Shafts: Hot rolled steel, ground and polished, with key way, protectively coated with lubricating oil, and shaft guard.
 3. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves for motors 15 hp and under, selected so required rpm is obtained with sheaves set at mid-position. Fixed sheave for 20 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of motor.
 4. Belt Guard: Fabricate to SMACNA Standard; 0.106 inch thick, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
- F. Accessories:
1. Inlet/Outlet Screens: Galvanized steel welded grid (Removable).
 2. Access Doors: Shaped to conform to scroll, with quick opening latches and gaskets.
 3. Scroll Drain: 3/4 inch steel pipe coupling welded to low point of fan scroll.
 4. Backdraft Dampers
 5. Special Coatings: Provide air dried "Heresite" protective coatings on fans handling corrosive fumes. Heresite #P-403 base coating and #L-66 top coating on all surfaces in contact with the air stream.

2.02 DOWNBLAST CENTRIFUGAL ROOF FANS

- A. Manufacturers:
1. Acme Engineering.
 2. Greenheck Corp.
 3. Loren Cook Company.
 4. Substitutions: Division 01 - Product Requirements.
- B. Fan Unit: Downblast type. V-belt drive, with spun aluminum with baked-on enamel housing; resilient mounted motor; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets.
- C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- D. Motor: Open drip proof totally enclosed fan cooled.
- E. Accessories:
1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked.

2.03 UPBLAST CENTRIFUGAL ROOF FANS

- A. Manufacturers:
1. Acme Engineering.
 2. Greenheck Corp.
 3. Loren Cook Company.
 4. Substitutions: Division 01 - Product Requirements.

- B. Fan Unit: Upblast type. V-belt drive, spun aluminum housing with grease tray; resilient mounted motor; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets.
- C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- D. Motor: Totally enclosed fan cooled.
- E. Accessories:
 - 1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked.

2.04 DUCT BLOWER OR CABINET FANS

- A. Manufacturers:
 - 1. Acme Engineering.
 - 2. Greenheck Corp.
 - 3. Loren Cook Company.
 - 4. Substitutions: Division 01 - Product Requirements.
- B. Product Description: V-belt drive with galvanized steel housing lined with 1 inch removable side panel for access, inlet and outlet duct collar, gravity backdraft damper in discharge, horizontal hanging brackets.
- C. Fan Wheel: Double width-double inlet backward inclined centrifugal type.
- D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- E. Motor and Drive Mounting: Out of air stream.
- F. Motor: Totally enclosed fan cooled type mounted on vibration isolators.
- G. Bearings: ABMA 9 life at 200,000 hours.
- H. Accessories:
 - 1. Belt guard.
 - 2. Slide out filter box with throwaway type filter.

2.05 CENTRIFUGAL SQUARE INLINE FANS

- A. Manufacturers:
 - 1. Acme Engineering.
 - 2. Greenheck Corp.
 - 3. Loren Cook Company.
 - 4. Substitutions: Division 01 - Product Requirements.
- B. Product Description: V-belt Direct drive with galvanized steel housing lined with 1 inch acoustic glass fiber insulation, integral inlet cone, removable access doors on 3 sides, inlet and outlet duct collar, gravity backdraft damper in discharge, horizontal hanging brackets.
- C. Fan Wheel: Backward inclined centrifugal type, aluminum construction.

- D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- E. Motor and Drive Mounting: Out of air stream.
- F. Motor: Open drip proof.
- G. Bearings: ABMA 9 life at 200,000 hours.
- H. Accessories:
 - 1. Belt guard.
 - 2. Motor cover.
 - 3. Inlet safety screen.
 - 4. Outlet safety screen.
 - 5. Flexible duct connector.
 - 6. Flanged inlet and outlet.
 - 7. Inlet Outlet ductwork companion flange.

2.06 GRAVITY ROOF VENTILATORS

- A. Manufacturers:
 - 1. Acme Engineering.
 - 2. Greenheck Corp.
 - 3. Loren Cook Company.
 - 4. Substitutions: Division 01 - Product Requirements.
- B. Product Description: Round type, with aluminum with baked-on enamel housing; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets.
- C. Roof Curb: 12 inch high self-flashing aluminum construction with continuously welded seams, built-in cant strips, 1 inch insulation and curb bottom, hinged curb adapter, and factory installed nailer strip.
- D. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked drive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.
- B. Verify roof curbs are installed and dimensions are as shown on shop drawings.

3.02 PREPARATION

- A. Furnish roof curbs for installation.

3.03 INSTALLATION

- A. Suspended Fans: Install flexible connections specified in Division 23 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

- B. Install backdraft dampers on inlet to roof and wall exhaust fans and gravity ventilators used in relief air applications.
- C. Provide backdraft dampers on outlet from cabinet and ceiling fans.
- D. Install safety screen where inlet or outlet is exposed.
- E. Pipe scroll drains to nearest floor drain.
- F. Install backdraft dampers on discharge of exhaust fans Refer to Division 23.
- G. Provide sheaves required for final air balance.

3.04 FANS USED FOR KITCHEN

- A. Range hoods shall be constructed as per codes and UL labeled for grease ducts extraction. Motor shall be sealed off from air stream. Complete with grease trough.

3.05 MANUFACTURER'S FIELD SERVICES

- A. Division 01 - Quality Requirements: Requirements for manufacturer's field services.
- B. Furnish services of factory trained representative for minimum of one day to start-up, calibrate controls, and instruct County Personnel on operation and maintenance.

3.06 CLEANING

- A. Division 01 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Vacuum clean coils and inside of fan cabinet.

3.07 DEMONSTRATION

- A. Division 01 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate fan operation.

3.08 PROTECTION OF FINISHED WORK

- A. Division 01 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Do not operate fans for until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION