

# SECTION 23 34 00

## HVLS FANS

**\*\* NOTE TO SPECIFIER \*\*** Gearless Altra-Air HVLS Fans by Envira-North Systems; HVLS Fans. This section is based on the products of Gearless Altra-Air HVLS Fans from Envira-North Systems Ltd., which is located at:  
92 Railway Street,  
Seaforth, Ontario, Canada, N0K 1W0  
Tel: 519-527-2198  
Email: request info (bigair@enviranorth.com)  
Web: www.enviranorth.com

### **PART 1 GENERAL**

#### 1.1 SECTION INCLUDES

A. High volume low speed fans.

#### 1.2 RELATED SECTIONS

**\*\* NOTE TO SPECIFIER \*\*** Delete any sections below not relevant to this project; add others as required.

A. Section 26 05 00 - Common Work Results for Electrical.

#### 1.3 REFERENCES

**\*\* NOTE TO SPECIFIER \*\*** Delete references from the list below that are not actually required by the text of the edited section.

A. American National Standards Institute/Air Movement and Control Association (ANSI/AMCA): Standard 230 - Laboratory Methods of Testing Air Circulating Fans for Rating.

B. National Fire Protection Association (NFPA): 13 - National Fire Code for Sprinklers.

#### 1.4 SYSTEM DESCRIPTION

A. General: Fans shall be designed to circulate and/or de-stratify the air envelope. The fans shall be strategically placed to maximize the efficiency of the space. Each fan shall be designed to move the maximum amount of air within a given space while consuming minimal electrical power.

B. Design:

1. Each fan shall be complete with five extruded anodized aluminum blades positioned at 23 degrees. Each Blade shall have a width over 10" wide tapering in at the tip. The wall thickness of the extrusion must be a minimum of 3.43mm (0.135in) and include two separate interior support ribs. The overall structural height of the airfoil must be a minimum of 31.24mm (1.23in).

2. Stabilization of the fan shall be provided by four 1/8 inch (3 mm) stainless steel guy wires to avoid unnecessary sway and large movements from the fan.

#### C. Performance:

1. The Variable Frequency Drive shall be rated NEMA 4X and be factory programmed to provide a soft start/stop, variable speed control capability, current limit and motor overload protection for the fan. The VFD shall be factory installed on the fan frame.
2. Main Power Supply for Gearless Motor: 230V/460V, 3Ph, 60Hz.
3. Each fan (or group of fans) shall be provided with a LCD Color Touchscreen for remote operation. Each control shall provide individual (or group) fan control of forward/reverse, increase/decrease fan speed, on/off, temperature sensing and humidity sensing. Each control shall also provide light on/off and dimming and real-time statistics of each fan/light assembly.

#### D. FIRE PROTECTION

1. The fan shall be capable of receiving a stop command from the fire panel, or any number of smoke, flame or heat detectors.
2. The fan shall meet the requirements of NFPA 13 (National Fire Code for Sprinklers) in regards to blocking obstructions below sprinkler heads.
3. The fan shall meet the air velocity requirements of FM Global 2.0 data sheet for ESFR sprinklers.
4. If required by the local fire prevention authority, the fans shall be tied into the building's fire suppression system so that the fans shut off as soon as a fire is detected. The fan's control box shall include a variable frequency drive that facilitates this. The low voltage wire and relay needed to accomplish this shall be supplied by the Fire Alarm installer.
5. When the fan is shut off upon fire detection as described above, the fans shall come to a complete stop in less than 45 seconds.

#### 1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

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.

#### 1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Providing sole source for design, engineering, manufacturing and warranty claims handling.

B. Installer Qualifications: Trained by manufacturer.

**\*\* NOTE TO SPECIFIER \*\*** Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Install fan in area designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

## 1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

## 1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Handling: Handle materials to avoid damage.

## 1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 1.10 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

## 1.11 WARRANTY

A. Manufacture shall provide material and labor warranty for manufacturer and operation for the following warranty periods from date of substantial completion.

1. Air Foil Shaped Blade: Lifetime Warranty.
2. Aluminum Alloy Hub: Lifetime Warranty.
3. Gearless Motor: 15 Year Pro-Rated Warranty.

4. VFD Control Panel: 15 Year Pro-Rated Warranty.
5. Labor (if applicable): 1 Year Limited Warranty.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

A. Acceptable Manufacturer: Gearless Altra-Air HVLS Fans by Envira-North Systems Ltd, which is located at: 92 Railway Street, Seaforth, Ontario, Canada, N0K 1W0; Tel: (519) 527-2198; Email: bigair@enviranorth.com; Web: www.enviranorth.com

**\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs: coordinate with requirements of Division 1 section on product options and substitutions.**

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

### **2.2 FAN CONSTRUCTION**

A. Hub: 713 cast aluminum alloy and precision drilled to firmly support the blades and provide a safe connection to the Gearless Motor.

B. Blades: Each Gearless Altra-Air HVLS Fan shall be complete with five extruded anodized aluminum blades positioned at 23 degrees. Gearless Altra-Air Sailfin Blades are to be connected to the hub by means of three zinc-plated threaded bolts that are tightened to 200-ft-lbs to provide rotationally balanced blades and hub. For additional safety purposes, each blade shall include a 1/4 inch (6 mm) galvanized steel safety clips. The wall thickness of the extrusion must be a minimum of 3.43mm (0.135in) and include two separate interior support ribs. The overall structural height of the airfoil must be a minimum of 31.24mm (1.23in). Blade width should reach a measurement of 10 1/4" on the underside of the airfoil and 10 3/4" on the topside of the airfoil.

C. Frame/Housing: Gearless Motor frame from steel tubing and 1/4" steel plate, powder coated for maximum resistance to rust and corrosion shall house the gearless motor and mount directly to the adjustable mounting system.

D. Fan Support: Two-axis adjustable mounting system that is designed to prevent vibration and movement while supporting the weight of the fan. Safety cables fabricated from 3/16" stainless steel shall tie together the beam, mounting system and gearless motor to the building structure.

E. Guy Wire/Cable: Stabilization of the fan shall be provided by four 1/8 inch (3 mm) stainless steel guy wires to avoid unnecessary sway and large movements from the fan. Guy wires are to be connected to the 'Guy Wire Attachment Tabs' on the fan frame and connected back to the building structure on a 45-degree angle.

F. Gearless Motor: The fan is to be driven by high torque-to-weight ration brushless permanent magnet motor capable of 185Nm continuous torque in high ambient conditions (50°C) and include IP65 ingress protection for harsh environments/wash down capability. The Gearless motor will have

a hollow motor drive shaft and alignment bearing for use with 20mm stationary conduit to mount the included LED Light. The Gearless Motor will draw a maximum of 5.8A at 230VAC at full load.

G. Light: The LED Light shall be dimmable and accommodate input voltage between 100-277VAC, producing 21,000 lumens at full brightness. The light shall include an IP65 ingress protection and a tilted heat sink back design for harsh environments and easy wash down. The light shall provide a correlated color temperature of 5000K and color rendering index  $\geq 70$ . Light efficiency shall be 140LM/W.

H. Variable Frequency Drive shall be rated NEMA 4X and be factory programmed to provide a soft start/stop, variable speed control capability, torque sensing and over-torque shutdown, current limit, motor overload and thermal protection for the fan. The VFD shall provide integrated control of an optional high intensity LED light. The VFD will allow integration with third party control systems via built in Modbus and CANopen communication protocols with other protocols available by communication expansion modules.

I. Controller: Each fan (or group of fans) shall be provided with a 24V AC/DC LCD Color Touchscreen (320 x 240 pixels resolution) for remote operation. Each control shall provide individual (or group) fan control of forward/reverse, increase/decrease fan speed, on/off, temperature sensing and humidity sensing. Each control shall also provide light on/off and dimming and real-time statistics of each fan/light assembly.

J. Fan Mount: Each fan is to be provided with an UHM Mount to achieve the required clearance.

**\*\* NOTE TO SPECIFIER \*\* Delete lengths not required for project.**

1. UHM Mount: 1 foot (305 mm).
2. UHM Mount: 2 feet (610 mm)
3. UHM Mount: 4 feet (1220 mm).

K. Extension Tubes: Where additional clearance is required, UHM Extension shall be used in conjunction with Packaged UHM Mount. Use UHM extensions in 2 foot (610 mm) or 4 foot (1220 mm) length as applicable.

**\*\* NOTE TO SPECIFIER \*\* Recommended Fan Spacing (Fan spacing based on facility and contributing factors to optimize fan performance): 16 feet to 32 feet (5 m to 10 m). Delete if not required for project.**

## 2.3 - 8'0" (2.4m) FAN

A. HVLS Fan Model: Gearless Altra-Air Sailfin (ALT-8) supplied by Envira-North Systems Ltd.

B. Performance Specifications:

1. Fan Size: 8 feet (2.4 m).
2. Gearless Motor Power: 2 HP (1.5 kw).
3. Power Consumption: 483W.
4. Amps at 230 Volts: 2.1A.

5. Speed: 105 rpm.
6. Air Flow: 59,494 cfm (28,078 l/s).
7. Max Effective Cooling Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 56 feet (17.0 m).
8. Max Effective De-stratify Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 80 feet (24.4 m).
9. Weight (no mount): 220 lbs (99 kgs).
10. Noise Level 8 feet (2.4 m) below wing tip: 62.5 dBA.

**\*\* NOTE TO SPECIFIER \*\* Recommended Fan Spacing (Fan spacing based on facility and contributing factors to optimize fan performance): 16 feet to 32 feet (5 m to 10 m). Delete if not required for project.**

2.4 - 12'0" (3.7m) FAN

A. HVLS Fan Model: Gearless Altra-Air Sailfin (ALT-12) supplied by Envira-North Systems Ltd.

B. Performance Specifications:

1. Fan Size: 12 feet (3.7 m).
2. Gearless Motor Power: 2 HP (1.5 kw).
3. Power Consumption: 575W.
4. Amps at 230 Volts: 2.5A
5. Speed: 105 rpm.
6. Air Flow: 70,424 cfm (33,236 l/s).
7. Max Effective Cooling Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 84 feet (25.6m)
8. Max Effective De-stratify Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 142 feet (43.3 m).
9. Weight (no mount): 245 lbs (111 kgs).
10. Recommended Fan Spacing Fan spacing based on facility and contributing factors to optimize fan performance): 24 feet to 40 feet (7 m to 12 m).
11. Noise Level (2.4m below wing tip): 62.5 dBA.

**\*\* NOTE TO SPECIFIER \*\* Recommended Fan Spacing (Fan spacing based on facility and contributing factors to optimize fan performance): 16 feet to 32 feet (5 m to 10 m). Delete if not required for project.**

## 2.5 - 16'0" (4.9m) FAN

A. HVLS Fan Model: Gearless Altra-Air Sailfin (ALT-16) supplied by Envira-North Systems Ltd.

B. Performance Specifications:

1. Fan Size: 16 feet (4.9 m).
2. Gearless Motor Power: 2 HP (1.5 kw).
3. Power Consumption: 690W.
4. Amps at 230 Volts: 3.0A
5. Speed: 80 rpm.
6. Air Flow: 127,033cfm (59,953 l/s).
7. Max Effective Cooling Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 104 feet (31.7m).
8. Max Effective De-stratify Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 165 feet (50.3m).
9. Weight (no mount): 275 lbs (125 kgs).
10. Recommended Fan Spacing Fan spacing based on facility and contributing factors to optimize fan performance):: 32 feet to 48 feet (10 m to 15 m).
11. Noise Level 8 feet (2.4 m) below wing tip: 62.7 dBA.

**\*\* NOTE TO SPECIFIER \*\* Recommended Fan Spacing (Fan spacing based on facility and contributing factors to optimize fan performance): 16 feet to 32 feet (5 m to 10 m). Delete if not required for project.**

## 2.6 - 20'0" (6.1m) FAN

A. HVLS Fan Model: Gearless Altra-Air Sailfin (ALT-20) supplied by Envira-North Systems Ltd.

B. Performance Specifications:

1. Fan Size: 20 feet (6.1 m).
2. Gearless Motor Power: 2 HP (1.5kw).
3. Power Consumption: 1140W.

4. Amps at 230 Volts: 4.8A.
5. Speed: 63 rpm.
6. Air Flow: 176,200 cfm (83,157 l/s).
7. Max Effective Cooling Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 120 feet (36.6 m).
8. Max Effective De-stratify Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 222 feet (67.7 m).
9. Weight (no mount): 320 lbs (145 kgs).
10. Recommended Fan Spacing Fan spacing based on facility and contributing factors to optimize fan performance): 40 feet to 56 feet (12 m to 17 m).
11. Noise Level (2.4m below wing tip): 63.4 dBA.

**\*\* NOTE TO SPECIFIER \*\* Recommended Fan Spacing (Fan spacing based on facility and contributing factors to optimize fan performance): 16 feet to 32 feet (5 m to 10 m). Delete if not required for project.**

#### 2.7 - 24'0" FAN

A. HVLS Fan Model: Gearless Altra-Air Sailfin (ALT-24) supplied by Envira-North Systems Ltd.

#### B. Performance Specifications:

1. Fan Size: 24 feet (7.3 m).
2. Gearless Motor Power: 2 HP (1.5 kw).
3. Power Consumption: 1320W.
4. Amps at 230 Volts: 5.5A
5. Speed: 53 rpm.
6. Air Flow: 315,026 cfm (148,676 l/s).
7. Max Effective Cooling Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 144 feet (43.9 m).
8. Max Effective De-stratify Diameter (Maximum effective diameter is where horizontal air speed at 1.2 m (3.9 feet) above floor drops below 0.2 m/s (0.7 fps) in an empty room): 244 feet (74.4m).
9. Weight (no mount): 347 lbs (157 kgs)



10. Recommended Fan Spacing (Fan spacing based on facility and contributing factors to optimize fan performance): 48 feet to 64 feet (14 m to 20 m).

11. Noise Level 8 feet (2.4 m) below wing tip: 63.4 dBA.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

A. Do not begin installation until supporting structure and interior work have been properly completed.

B. Installation of miscellaneous or structural support, if required, electrical wire and wiring, conduit, fuses, and disconnect switches other than those included within the control box shall be specified in other sections.

C. Installer shall examine the substrate and conditions under which the Fan is to be installed and notify the Architect and Contractor in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.2 PREPARATION**

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.3 INSTALLATION**

A. Factory Trained Installer:

1. Where available, Envira-North Factory Trained Installation Services shall install fans. Factory trained installation includes full mechanical installation of the fan. Electrically, installations from a local power disconnect within 3 feet (1 m) of the final VFD location and full connection of the low voltage key pad controller within 100 feet (30 m) of final fan location is included. Additional Factory Trained Installation includes connection of Fire Alarm Tie In at Fan Location Only. Coordinate connection to flow switch or alarm panel with the electrical contractor.

2. Where factory trained installation services are not available, install fans in accordance with manufacturer's instructions and local regulations.

B. Install fans in accordance with NFPA 13.

C. Mounting Method: Fans shall be mounted to the building structure using the OWSJ (Open Web, Steel Joist) method. Fans shall be mounted from the top chord of the existing or new structure using

two OWSJ Mounting Brackets. Mounting Beams/Angles shall be provided by the manufacturer and shall extend beyond the OWSJ a minimum of 12 inches (305 mm) on either side. For spans up to 7 feet (2.1 m), 3 inches x 3 inches x 1/4 inch (76 mm x 76 mm x 6 mm) angle shall be used. For spans above 7 feet (2.1 m), 4 inches x 4 inches x 1/4 inch (102 mm x 102 mm x 6 mm) angle shall be required. Length of angles dependent on joist spacing.

1. Based on site conditions, acceptable alternate mounting methods include I-beam mounting, Z-purlin mount with brackets and beam; and wood/glu-lam beam mounting.

D. HVLS Fan Clearance Requirements:

1. Minimum 60 inches (1524 mm) above blades to underside of roof deck/ceiling.
2. Minimum 30 inches (762 mm) from fan blade's leading edge to obstruction above or below fan.
3. Minimum 18 inches (457 mm) from end of blade to fan obstruction.
4. Fan shall be installed at a minimum of 144 inches (3658 mm) above finished floor.

E. Safety Cable: 1/4 inch (6 mm) stainless steel safety cable shall be installed at all connection points to main building structure and at all connection points between fan, brackets, packaged UHM Mount and UHM extension.

### 3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION**