

## **Part 1            General**

### **1.1               RELATED REQUIREMENTS**

- .1       Section 01 52 00 - Construction Facilities.
- .2       Section 26 29 03 - Control Devices.
- .3       Section 26 32 13.01 - Power Generation - Diesel.

### **1.2               REFERENCES**

- .1       Air Conditioning and Mechanical Contractors (AMCA)
  - .1       AMCA Publication 99-2003, Standards Handbook.
  - .2       AMCA 300-1996, Reverberant Room Method for Sound Testing of Fans.
  - .3       AMCA 301-1990, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
- .2       American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
  - .1       ANSI/AMCA 210-1999, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
- .3       Canadian General Standards Board (CGSB)
  - .1       CAN/CGSB 1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .4       Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1       Material Safety Data Sheets (MSDS).

### **1.3               SYSTEM DESCRIPTION**

- .1       Performance Requirements:
  - .1       Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.
  - .2       Capacity values of fans selected: sized based on the dimensions of the buildings, the required interior temperature and the heat load of the installed electrical equipment.
  - .3       Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.
  - .4       Sound ratings: comply with AMCA 301, tested to AMCA 300. Supply unit with AMCA certified sound rating seal.
  - .5       Performance ratings: based on tests performed in accordance with ANSI/AMCA 210. Supply unit with AMCA certified rating seal, except for propeller fans smaller than 300-mm diameter.

## **1.4 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
    - .1 Submit two copies of WHMIS MSDS in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
  - .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
    - .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .3 Provide:
  - .1 Fan performance curves showing point of operation, kilowatts and efficiency.
  - .2 Sound rating data at point of operation.
- .4 Indicate:
  - .1 Motors, sheaves, bearings, shaft details, frame.
  - .2 Minimum performance achievable with variable speed controllers.
- .5 Quality Assurance Submittals: submit the following in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
    - .1 Contractor Representative to make available one copy of systems supplier's installation instructions.
- .6 Closeout Submittals:
  - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **1.5 MAINTENANCE**

- .1 Extra Materials:
  - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Furnish list of individual manufacturer's recommended spare parts for equipment, include:
    - .1 Bearings and seals.
    - .2 Addresses of suppliers.
    - .3 List of specialized tools necessary for adjusting, repairing or replacing.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- .1 Packing, Shipping, Handling and Unloading:
  - .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
  - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 FANS - GENERAL**

- .1 Motors:
  - .1 120 volt, constant horsepower of 1/12 hp, single speed of 1350 rpm, approximately 1000 cfm.
- .2 Accessories and Hardware: adjustable slide rail motor bases, coupling guards, fan inlet safety screens and inlet and outlet dampers as required.
- .3 Factory primed before assembly in colour standard to manufacturer.
- .4 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

### **2.2 PROPELLER FANS**

- .1 Fabricate multibladed propellers of aluminum of airfoil shape within bell mouth entrance on integral mounts, with grease-lubricated ball bearings, with extended lubrication fittings, suited for operating in any position, direct driven, complete with motor as indicated.
- .2 Provide blade guards, bird screen and automatic back draft dampers on discharge, with gasketed edges.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 FAN INSTALLATION**

- .1 Install fans as per manufacturer's instructions.
- .2 Bearings and extension tubes to be easily accessible.
- .3 Access doors and access panels to be easily accessible.

- .4 See electrical drawings for control details.

### **3.3 ANCHOR BOLTS AND TEMPLATES**

- .1 Size anchor bolts to withstand seismic acceleration and velocity forces as specified.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 23 34 00 - HVAC Fans.
- .2 Section 26 29 03 - Control Devices.
- .3 Section 26 32 13.01 - Power Generation - Diesel.

**1.2 REFERENCES**

- .1 American National Standards Institute (ANSI)/National Fire Protection Association (NFPA)
  - .1 ANSI/NFPA 96-2004, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- .2 American Society for Testing and Materials International (ASTM)
  - .1 ASTM E90-2004, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.3 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
    - .1 Submit two copies of WHMIS MSDS in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Indicate following:
    - .1 Pressure drop.
    - .2 Face area.
    - .3 Free area.
- .2 Quality Assurance Submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
    - .1 Contractor Representative to make available one copy of systems supplier's installation instructions.

## **Part 2            Products**

### **2.1                ROOF RIDGE VENT**

- .1    Factory-Manufactured Aluminum:
  - .1       Complete with integral bird screen of 2.7-mm diameter aluminum.
  - .2       Horizontal backdraft dampers on two faces.
  - .3       Maximum throat velocity: 3.3-m/s intake.
  - .4       Maximum loss through unit: 15-Pa exhaust static pressure.
  - .5       Maximum velocity through damper area: 1.5 m/s.
- .2    Bird Screens:
  - .1       Complete with integral bird screen of 2.7-mm diameter aluminum. Use 12-mm mesh on exhaust and 19-mm mesh on intake.

### **2.2                GRAVITY CLOSE LOUVRES - ALUMINUM**

- .1    Construction: welded with exposed joints ground flush and smooth.
- .2    Material: extruded aluminum alloy 6063-T5.
- .3    Blade: storm-proof pattern with center watershed in blade, reinforcing bosses and maximum blade length of 1500 mm.
- .4    Frame, Head, Sill and Jamb: 100 or 150-mm deep one piece extruded aluminum, minimum 3 mm thick with approved caulking slot, integral to unit.
- .5    Mullions: at 1500-mm maximum centers.
- .6    Fastenings: stainless steel SAE-194-8F with SAE-194-SFB nuts and resilient neoprene washers between aluminum and head of bolt, or between nut, stainless steel washer and aluminum body.
- .7    Screen: 12-mm exhaust mesh, 2-mm diameter wire aluminum bird screen on inside face of louvres in formed U-frame.
- .8    Louvres to open and close as a result of static pressure changes caused by fan operation.
- .9    Finish: factory-applied enamel.
- .10   Colour: any.

## **Part 3            Execution**

### **3.1                MANUFACTURER'S INSTRUCTIONS**

- .1    Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2                INSTALLATION**

- .1    In accordance with manufacturer's and SMACNA recommendations.
- .2    Reinforce and brace as indicated.

- .3 Anchor securely into opening. Seal with caulking to ensure weather tightness.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 23 34 00 - HVAC Fans.
- .2 Section 26 27 16 - Electrical Cabinets and Enclosures.
- .3 Section 26 29 03 - Control Devices.
- .4 Section 26 32 13.01 - Power Generation - Diesel.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.2 No. 46-M1988(R2001), Electric Air-Heaters.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.3 SUBMITTALS**

- .1 Product Data:
  - .1 Submit product data sheets for baseboard heaters. Include:
    - .1 Product characteristics.
    - .2 Performance criteria.
    - .3 Mounting methods.
    - .4 Physical size.
    - .5 Kilowatt rating, voltage, phase.
    - .6 Cabinet material thicknesses.
    - .7 Limitations.
    - .8 Colour and finish.
- .2 Quality Assurance Submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
    - .1 Contractor to make available one copy of systems supplier's installation instructions.
- .3 Closeout Submittals:
  - .1 Submit operation and maintenance data for baseboard heaters in accordance with Section 01 78 00 - Closeout Submittals.



**Part 2 Products**

**2.1 BASEBOARD HEATERS**

- .1 Wall-Mounted Cabinet: to CSA C22.2 No. 46, pre-drilled back for securing to wall:
  - .1 Front inlet/front outlet.
  - .2 Front panel: 1.2 mm thick, steel.
  - .3 Finish: phosphatized and finished with two coats of powder-coated finish, air-dry colour.
- .2 Elements: mineral insulated with steel sheath and pressed-on fins, secured and free-floating for expansion.

**2.2 CONTROLS**

- .1 Wall-Mounted Thermostats: type electronic.
- .2 See electrical drawings for controls schematics and details.

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2 INSTALLATION**

- .1 Install baseboard heaters as indicated.
- .2 Install wall-mounted thermostats in locations indicated.
- .3 Make power and control connections.

**3.3 FIELD QUALITY CONTROL**

- .1 Tests: in accordance with Section 26 05 00 - Common Work Results for Electrical.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 23 34 00 - HVAC Fans.
- .2 Section 26 27 16 - Electrical Cabinets and Enclosures.
- .3 Section 26 29 03 - Control Devices.
- .4 Section 26 32 13.01 - Power Generation - Diesel.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA C22.2 No. 46-M1988 (R2006), Electric Air-Heaters.
- .2 National Electrical Manufacturers Association (NEMA)
  - .1 NEMA 250-08, Enclosures for Electrical Equipment (1000 V Maximum).

**1.3 SUBMITTALS**

- .1 Submit manufacturer's instructions, printed product literature and data sheets for unit heaters and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, cleaning procedures and maintenance.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Operation and Maintenance Data: submit operation and maintenance data for unit heaters for incorporation into manual.

**Part 2 Products**

**2.1 UNIT HEATERS**

- .1 Unit Heater: to CSA C22.2 No. 46, horizontal discharge complete with adjustable louvres finished to match cabinet, explosion-proof, radial type.
- .2 Fan type unit heaters with built-in high-heat limit protection, fan-delay switches.
- .3 Fan Motor: totally enclosed, permanently lubricated ball bearing with resilient mount explosion-proof.
  - .1 Built-in fan motor thermal overload protection.
- .4 Hangers: as required by installation location.
- .5 Elements: mineral steel sheath with continuous helical brazed fins.
- .6 Cabinet: aluminum, 5 mm thick, fitted with brackets for rod or wall mounting.
  - .1 Phosphatized and finished with two coats baked enamel in colour.

## **2.2 CONTROLS**

- .1 Wall-Mounted Thermostats: type electronic.
- .2 See electrical drawings for control schematics and details.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections are acceptable for unit heaters installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 INSTALLATION**

- .1 Suspend unit heaters to be installed from ceiling or mount on wall as required.
- .2 Install thermostats in locations close to entry/exit points.
- .3 Make power and control connections.

### **3.3 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Test cut-out protection when air movement is obstructed.
- .3 Test fan-delay switch to assure dissipation of heat after element shut down.
- .4 Test unit cutoff when fan motor overload protection has operated.
- .5 Ensure heaters and controls operate correctly.

### **3.4 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by unit heaters installation.

**END OF SECTION**