SECTION 235113.11 - DRAFT CONTROL FANS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
   * + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
      1. SUMMARY
         1. Section Includes:

Draft inducer fans.

Venturi-draft inducer fans.

Mechanical-draft vent fans.

Vent exhaust fans.

Combustion-air fans.

* + - 1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For each type of product.
         5. Shop Drawings: For each type of product.

Include plans, elevations, sections, and attachment details.

Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Detail fabrication and assembly of hangers and seismic restraints.

Include diagrams for power, signal, and control wiring.

* + - * 1. Sample Warranty: For special warranty.
      1. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data: For draft control fans to include in emergency, operation, and maintenance manuals.
      2. WARRANTY

When warranties are required, verify with Director’s Representative counsel that special warranties stated in this article are not less than remedies available to Director’s Representative under prevailing local laws.

* + - * 1. Special Warranty: Manufacturer agrees to repair or replace components of [**draft inducer fans**] [**venturi-draft inducer fans**] [**mechanical-draft vent fans**] [**vent exhaust fans**] [**combustion-air fans**] that fail in materials or workmanship within specified warranty period.

Failure includes failure of the fan due to corrosion.

Verify available warranties and warranty periods for units and components.

Warranty Period: [**Two**] [**10**] <**Insert number**> years from date of Substantial Completion.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and Masterworks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

* + - 1. DRAFT INDUCER FANS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=6184) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[ENERVEX Inc](http://www.specagent.com/Lookup?uid=123456961613).

[Field Controls L.L.C](http://www.specagent.com/Lookup?uid=123456961559).

[Quickdraft](http://www.specagent.com/Lookup?uid=123456961553).

[Tjernlund Products, Inc](http://www.specagent.com/Lookup?uid=123456961560).

Approved equivalent.

* + - * 1. Fan Construction: [**Galvanized**] [**Aluminized**]-steel housing and radial-blade centrifugal fan.

Fan Motor: Permanent-split-capacitor type.

* + - * 1. Controls:

Draft-proving switch.

Control kit to cycle fan with gas flow to a single burner.

* + - * 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
      1. VENTURI-DRAFT INDUCER FANS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=6185) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Quickdraft](http://www.specagent.com/Lookup?uid=123456961565).

Tjernlund Products, Inc.

Field Controls L.L.C.

Approved equivalent.

* + - * 1. Fan Construction: Enameled-steel venturi tube for vents 20 inches (508 mm) in diameter and smaller and ASTM A666, Type 304, stainless-steel venturi tube for vents 22 to 48 inches (559 to 1219 mm) in diameter. [**Galvanized**] [**Enameled**]-steel fan housing with radial-blade centrifugal wheel.

Fan Motor: Permanent-split-capacitor type.

* + - * 1. Controls:

Draft-proving switch.

Control kit to cycle fan with gas flow to a single burner.

* + - * 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
      1. MECHANICAL-DRAFT VENT FANS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=6186) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Bradford White Corporation](http://www.specagent.com/Lookup?uid=123456969743).

[ENERVEX Inc](http://www.specagent.com/Lookup?uid=123456961628).

[Field Controls L.L.C](http://www.specagent.com/Lookup?uid=123456961568).

[Quickdraft](http://www.specagent.com/Lookup?uid=123456961572).

[Tjernlund Products, Inc](http://www.specagent.com/Lookup?uid=123456961566).

Approved equivalent.

* + - * 1. Fan Construction: Forward-curved centrifugal fan and scroll fabricated of [**aluminized**] [**galvanized**] steel; direct-drive, ball-bearing motor lubricated with synthetic oil; internal cooling fan; stainless-steel shaft; and integral pressure-sensing switch.

Fan Motor: Permanent-split-capacitor type.

* + - * 1. Controls:

Draft-proving switch.

Control kit to cycle fan with gas flow to [**single**] [**multiple**] burner(s).

* + - * 1. Accessories:

[**Aluminized**] [**Stainless**]-steel, wall-vent hood.

* + - * 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
      1. VENT EXHAUST FANS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=6187) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[ENERVEX Inc](http://www.specagent.com/Lookup?uid=123456961638).

[Field Controls L.L.C](http://www.specagent.com/Lookup?uid=123456961578).

[Tjernlund Products, Inc](http://www.specagent.com/Lookup?uid=123456961580).

Approved equivalent.

* + - * 1. General: Centrifugal fan with [**variable**] [**constant**]-speed control mounted at end of [**sidewall**] [**vertical**] vent.

Retain "Test Standard" Paragraph below for fans exposed to flue gases up to 640 deg F (337 deg C).

* + - * 1. Test Standard: UL 378.

Some manufacturers have cast-aluminum or stainless-steel wheels available only in certain size ranges. Verify options in "Fan Construction" Paragraph below with manufacturer selected.

* + - * 1. Fan Construction:

[**Cast-aluminum**] [**Galvanized-steel**] [**Stainless-steel**] housing [**painted manufacturer's standard color of baked enamel**].

[**Galvanized**] [**Stainless**]-steel vent.

[**Cast-aluminum**] [**Stainless-steel**] wheel.

Backward-inclined centrifugal or axial fan wheel statically and dynamically balanced.

Access panel at the discharge area.

Concentric makeup air-inlet duct surrounding the vent to allow zero clearance to combustibles.

* + - * 1. Motor: Fully enclosed,[**variable-speed duty,**] permanent-split capacitor, out of the airstream, with prelubricated and sealed ball bearings.

Retain either "Constant-Speed Controls" or "Variable-Speed Controls" Paragraph below.

* + - * 1. Constant-Speed Controls: Boiler interlock relay starts fan when burner control cycles on. Pressure switch permits burner operation via interlock with boiler. Fan-proving switch is adjustable between minus 0.07- and minus 0.15-inch wg (minus 17 and minus 37 Pa).
        2. Variable-Speed Controls: Boiler interlock relay starts fan when burner control cycles on. Pressure controller, control transformer, and miscellaneous controls for automatic modulation of fan speed to maintain preset negative pressure between zero- and minus 1.0-inch wg (zero and minus 249 Pa). Include controller with indicator lights, pressure-differential transmitter, chimney pressure-sensor probe, and fan-proving switch adjustable between minus 0.07- and minus 0.15-inch wg (minus 17 and minus 37 Pa). Include tubing.
        3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
      1. COMBUSTION-AIR FANSMODULATING COMBUSTION AIR FAN SYSTEM

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=6190) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[ENERVEX Inc](http://www.specagent.com/Lookup?uid=123456961639).

[Field Controls L.L.C](http://www.specagent.com/Lookup?uid=123456961583).

[Tjernlund Products, Inc](http://www.specagent.com/Lookup?uid=123456961582).

Approved equivalent.

* + - * 1. Provide Furnish and install a packaged Modulating Combustion Air Supply System and related equipment as shown on the drawings and as specified, complete, including the following:

Packaged ETL listed ventilator/control combination, listed to:

UL705 Standard for Power Ventilators, CAN/CSA C22.2 No. 113-12 Fans and Ventilators

ANSI/UL 60947-1 & 60947-4-1 Switches, Industrial Control

UL 378, Standard for Draft Equipment

CSA C22.2 No. 14-10, Standard for Industrial Control Equipment

UL 60947, Standard for Industrial Control Panels

CSA C22.2 No. 14-95, Standard for Industrial Control Equipment

Installation brackets for each of the ventilator, motor controller, modulating pressure controller, outdoor pressure probe and stack probe.

Electrical connections.

Duct connection.

* + - * 1. MODULATING COMBUSTION AIR SUPPLY SYSTEM DESIGN

The ventilator must be suitable for indoor and outdoor installation. The housing shall have duct connections and be designed so the entire impeller and motor assembly can be removed as a unit. Housing must be resistant to corrosion. It must have a service door that can be opened for easy cleaning and service. The housing shall support installation in multiple positions – curb mountable, inline, suspended from a ceiling, or standing on a flat surface.

The backward curved high efficiency impeller shall be made in aluminum and be completely in balance. The impeller must be balanced statically and dynamically, and balancing weights must be permanently attached.

The motor shall be an electro-commutated motor, Totally Enclosed Fan Cooled (TEFC), Class H with insulated rotor and shaft grounding system. Motor shall meet US Department of Energy 2016 Motor Efficiency Requirements.

The motor controller shall be NEMA 4X industrial-type motor controller for indoor or outdoor use and programmed specifically to control and adjust the speed of the fan.

The modulating pressure controller shall be a multi-use draft of pressure controller with integrated webserver and remote access via BACnet for use with fans and dampers to monitor and maintain a constant draft or pressure by varying the speed of fan(s) or the position of an actuator. The modulating pressure controller must be able to maintain a constant pressure in the mechanical room by modulating the ventilator speed. The control shall include an outdoor pressure probe with tubing and a transducer, to be located outside the mechanical room in open air and a stack probe. The Sensor shall be field wired to the pressure controller. The control must have set-point capability of -1.00” WC to +1.0” WC with a tolerance of 0.01” WC.

The system shall provide automatic room pressure maintenance, airflow proving and lockout, and feature:

It shall have a 12-second built-in delay function to avoid nuisance cut-outs.

LCD-panel with keypad to configure system programming and display the values. The LCD-panel must also be able to show the actual room pressure, fan speed or damper position.

Safety function to shut down boiler in case of excessive negative room pressure or ventilation failure and indicate this with a visual alarm.

* + - * 1. ELECTRICAL REQUIREMENTS

Power supply shall be:

Modulating Pressure Controller: 1x120V AC, 60 Hz.

(single-phase ventilator)

To the ventilator: 1x120V AC, 60 Hz.

(three-phase ventilator)

To the ventilator: [**3x208-240**][**3x480**].

All wiring shall be in accordance with the National Electrical Code.

* + - 1. MOTORS

Default motor characteristics are specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

* + - * 1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
      1. CAPACITIES AND CHARACTERISTICS

If Project has more than one fan, delete "Fan" Paragraph below and schedule fans on Drawings.

* + - * 1. Fan:

Manufacturer: <**Insert manufacturer**>.

Model No.: <**Insert number**>.

Rated Appliance Input: <**Insert Btu/h (kW)**>.

Airflow: <**Insert cfm (L/s)**>.

Speed: <**Insert value**> rpm.

Static Pressure: <**Insert inches wg (Pa)**>.

Electrical Characteristics:

Motor Horsepower: <**Insert value**>.

Volts: [**115**] [**208**] [**230**] [**460**] <**Insert value**>.

Phase: [**Single**] [**Three**].

Hertz: 60.

Full-Load Amperes: <**Insert value**>.

Minimum Circuit Ampacity: <**Insert value**>.

Maximum Overcurrent Protection: <**Insert amperage**>.

1. EXECUTION
   * + 1. INSTALLATION
          1. Install listed components in a manner complying with the listing.

Retain first three paragraphs below if using draft inducer fans.

* + - * 1. Install draft inducer fans in single-wall vent section that is designed to couple with other vent materials.
        2. Secure draft inducer fans to appliances, breechings, or stacks with hardware compatible with connected materials.
        3. Install draft inducer fans with clearances for service and maintenance.

Retain paragraph below for combustion-air fans.

* + - * 1. Install[**Galvanized Sheet Metal Duct PVC**] intake duct that is sized according to manufacturer's written instructions.
      1. CONNECTIONS
         1. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
         2. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 235113.11