



Make-Up Air Specifications

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XDGK Specification

Direct Gas

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Provide Accurex Make-Up Air Model XDGK as shown on plans and in accordance with the following specification:

GENERAL

Make-up air unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Accurex Model XDGK equipment is used as the basis of design. Performance to be as scheduled on plans. Makeup air unit shall be ETL listed to ANSI Z83.4 and CAN 3.7.

GAS TRAIN AND CONTROLS

Direct fired gas system shall have a draw through design and field adjustable burner baffles. Gas trains shall include a direct spark ignition system. Dual safety shutoff valves shall be industrial duty and use 24 VAC control signals. Temperature control shall incorporate a Maxitrol electronic modulation control system.

UNIT CASING AND FRAMES

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed. All components shall be easily accessible through removable doors.

INSULATION

Unit casing to be lined with 1-inch fiberglass insulation. Insulation in accordance with NFPA 90A and tested to meet UL 181 erosion requirements.

FAN SECTION

Centrifugal fans shall be double width, double inlet and forward curved. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.



MOTOR AND DRIVES

Motors shall be energy efficient, complying with EPACT standards for ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, and be supplied with an adjustable drive pulley.

ELECTRICAL

All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, transformer for 24 VAC circuit, contactors, and disconnect switch.

WEATHERHOOD

Weatherhood shall be constructed of G90 galvanized steel. Weatherhood shall include aluminum mesh filters mounted in the intake, eliminating the need for an additional filter section.

Due to continuous research Accurex reserves the right to change specifications without notice.



XDG Specification

Direct Gas

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Provide Accurex Make-Up Air Model XDG as shown on plans and in accordance with the following specification:

GENERAL

Make-up air unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Accurex Model XDG equipment is used as the basis of design. Performance to be as scheduled on plans. Make-up air unit shall be ETL listed to ANSI Z83.4 and CAN 3.7.

GAS TRAIN AND CONTROLS

Direct-gas fired system shall have a draw through design and field adjustable burner baffles. Gas trains up to 400,000 Btu/hr shall include a direct spark ignition system. Gas trains greater than 400,000 Btu/hr. shall include a pilot ignition system and shall have digital coded fault indicator capability. Fault indicator shall provide service history by storing codes for the last five faults. Dual safety shutoff valves shall be industrial duty and use 120 VAC control signals. Temperature control shall incorporate a Maxitrol electronic modulation control system.

UNIT CASING AND FRAMES

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed. All components shall be easily accessible through removable or hinged doors.

INSULATION

Unit casing to be lined with 1 inch fiberglass insulation. Insulation in accordance with NFPA 90A and tested to meet UL 181 erosion requirements and secured to unit with water proof adhesive and permanent mechanical fasteners. Double wall construction is optional.

FAN SECTION

Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or



ball bearing pillow blocks (size 120 and larger). Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

MOTORS AND DRIVES

Motors shall be energy efficient, complying with EPACT standards for ODP and TE enclosures. Motors shall be permanently lubricated, heavy-duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower.

Pulleys shall be cast and have machined surfaces, 10 horsepower and less shall be supplied with an adjustable drive pulley.

ELECTRICAL

All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 120 VAC circuit, integral door interlocking disconnect switch and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

FILTER SECTION

Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 feet per minute. Filters shall be easily accessible through a removable access panel.

WEATHER HOOD

Weather hood shall be constructed of G90 galvanized steel with birdscreen mounted at the intake.

Make-Up Air units shall be Model XDG as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.



XDGX Specification

Direct Gas

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Provide Accurex Make-Up Air Model XDGX as shown on plans and in accordance with the following specification:

GENERAL

Make-up air unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Accurex Model XDGX equipment is used as the basis of design. Performance to be as scheduled on plans. Make-up air unit shall be ETL listed to ANSI Z83.4-1999, CSA 3.7-M99 (for 100% outdoor air) or ANSI Z83.18-2000 (for recirculation).

GAS TRAIN AND CONTROLS

Direct-gas fired system shall have a draw through design and field adjustable burner baffles. Gas trains up to 400,000 Btu/hr. shall include a direct spark ignition system. Gas trains greater than 400,000 Btu/hr. shall include a pilot ignition system and shall have digital coded fault indicator capability. Fault indicator shall provide service history by storing codes for the last five faults. Dual safety shutoff valves shall be industrial duty and use 120 VAC control signals. Temperature control shall incorporate a Maxitrol electronic modulation control system.

UNIT CASING AND FRAMES

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at jobsite. All components shall be easily accessible through removable doors.

INSULATION

Unit casing to be lined with 1 inch fiberglass insulation. Insulation shall be in accordance with NFPA 90A and tested to meet UL 181 erosion requirements. Double wall shall be provided if specified.

FAN SECTION

Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks



(size 120 and larger). Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

MOTORS AND DRIVES

Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy-duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horsepower and less shall be supplied with an adjustable drive pulley.

ELECTRICAL

All internal electrical components shall be prewired for single point power connection with exception of the larger evaporative cooling sections. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 120 VAC circuit, integral disconnect switch and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

FILTER SECTION

Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 feet per minute. Filters shall be easily accessible through a removable access panel.

WEATHER HOOD

Weather hood shall be constructed of G90 galvanized steel with birdscreen mounted at the intake.

RECIRCULATION (optional)

Recirculation airflow shall be controlled by adjustment of return damper position. Input signal for return damper shall be from building pressure sensors, potentiometer or manual switch. Recirculated air shall not be permitted to pass across the burner. A self-adjusting burner bypass damper shall maintain a constant air volume across the burner to ensure proper gas combustion. Bypass damper shall operate automatically without an electrical signal.

COOLING COIL (optional)

Direct expansion (DX) or chilled water coil shall be factory tested and rated in accordance with ARI 410. Coils shall have copper tubes with permanently expanded aluminum fins, 12fpi or less. DX coils shall be equipped with distributors to receive expansion valves at the liquid connections. Drain pans shall extend at least 12 inches downstream of coil and be sloped to drain connection. Cooling coil shall meet UL 1995 specifications for non-protected coil.

EVAPORATIVE COOLING SECTION (optional)

Evaporative cooling section shall include a galvanized steel housing with louvered intake, 2 inch aluminum mesh filters and a stainless steel evaporative cooling module all provided by the make-up air unit manufacturer. The louver shall be stationary type with drainable blades, designed to withstand wind loads of 25 PSF and bear the AMCA seal. Evaporative cooling media shall be Munters CELdek with a depth of 12 inches for a cooling effectiveness of 90%. Drain and overflow connections shall be piped through the side of the evaporative cooling section



PACKAGED DX (optional)

Unit shall be equipped with a Packaged DX system to include compressor(s), evaporator and condenser coil(s), condenser fans and all appurtenant controls as specified elsewhere in this section. The Packaged DX system is to be an integral module, incorporated into the MAU. Stand-alone Packaged DX systems that are connected to the unit or systems that require hardware or equipment that is not integral to the unit are not acceptable.

Make-Up Air units shall be Model XDGX as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.



XIGK Specification

Indirect Gas

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Provide Accurex Make-Up Air Model XIGK as shown on plans and in accordance with the following specification:

GENERAL

Make-up air unit shall be as manufactured by factory or approved equal provided all specifications are met. Model XIGK is used as the basis of design. Performance shall be as scheduled on plans.

FURNACE

Indirect fired gas furnace shall be 80% efficient, ETL Listed and have a blow through fan design. Furnace shall be capable of operation with natural or LP gas and have a power venting system. The heat exchanger shall be constructed of aluminized steel or stainless steel. Standard furnace features shall include main gas pressure regulator, main gas valve, electronic staged or electronic modulating controls, direct spark ignition system, high limit and a 24 volt control transformer.

TEMPERATURE CONTROL

Furnace heat output shall be controlled based on a field adjustable discharge temperature set point. Discharge temperature sensor shall be factory mounted and wired to the unit control center. Furnace shall have electronic staged control.

UNIT CASING AND FRAMES

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to ensure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed. All components shall be easily accessible through removable doors.

INSULATION

The housing should be insulated with 1-inch foil-faced fiberglass insulation. Double-wall insulation is required in furnace section. Insulation shall be in accordance with NFPA 90A and tested to meet UL 181 erosion requirements.



FAN SECTION

Centrifugal fans shall be double-width, double-inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

WEATHERHOOD

Weatherhood shall be constructed of G90 galvanized steel and include 2-inch aluminum mesh filters to eliminate the need for an additional filter section.

MOTORS AND DRIVES

Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horsepower and less shall be supplied with an adjustable drive pulley.

ELECTRICAL

All internal electrical components shall be prewired for single-point power connection. All electrical components shall be UL Listed, Recognized or Classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 24 VAC circuit, integral disconnect switch and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

Make-Up Air units shall be Model XIGK as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.



XIG Specification

Indirect Gas

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Provide Accurex Make-Up Air Model XIG as shown on plans and in accordance with the following specification:

GENERAL

Make-Up Air unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Accurex Model XIG equipment is used as the basis of design. Performance to be as scheduled on plans.

FURNACE AND CONTROLS

Indirect-gas fired furnace shall be 80% efficient, ETL list and have a blow through fan design. Furnace shall be capable of operation with Natural or LP gas and have a power venting system. The heat exchanger shall be constructed of aluminized steel or stainless steel. Standard furnace features shall include main gas pressure regulator, main gas valve, electronic staged or electronic modulating controls, direct spark ignition system, high limit and a 24 volt control transformer. Furnace shall be insulated and have double wall construction.

TEMPERATURE CONTROL

Furnace heat output shall be controlled based on a field adjustable discharge temperature set point. Discharge temperature sensor shall be factory mounted and wired to the unit control center. Furnace(s) shall have electronic modulation or at least two stages of control.

UNIT CASING AND FRAMES

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable doors.

INSULATION

Models provided with a mixing box shall be insulated from the return section through to the supply discharge. Insulation shall be in accordance with NFPA 90A and tested to meet UL 181 erosion requirements. Double wall construction is standard.



FAN SECTION

Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

MOTORS AND DRIVES

Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horse power and less shall be supplied with an adjustable drive pulley.

ELECTRICAL

All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 24 VAC circuit, integral door interlocking disconnect switch and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

FILTER SECTION

Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 feet per minute. Filters shall be easily accessible through a removable access panel.

WEATHERHOOD

Weather hoods shall be constructed of G90 galvanized steel with birdscreen mounted at the intake.

MIXING BOX (2-Position)

Mixing box shall provide 100% make-up air during occupied hours and 100% recirculation air during unoccupied hours. Furnace(s) shall be multi-stage and operate based on discharge temperature control on occupied setting and space temperature control on unoccupied setting. The system shall allow for separate field adjustable temperature setpoints for occupied and unoccupied modes of operation.

MIXING BOX (building pressure)

Mixing box shall modulate outdoor and return air volumes to maintain desired building pressure. A remote control panel shall be provided by the make-up air unit manufacturer and include a photohelic gauge. Furnace(s) shall be multi-stage and operate based on discharge temperature control.

MIXING BOX (potentiometer)

Mixing box shall enable manual modulation of outdoor air and return air volumes from the remote potentiometer. The potentiometer shall be mounted on a control panel provided by the make-up air unit manufacturer. Furnace(s) shall be multi-stage and operate based on discharge temperature control.



EVAPORATIVE COOLING SECTION

Evaporative cooling section shall include a galvanized steel housing with louvered intake, two inch aluminum mesh filters and a stainless steel evaporative cooling module all provided by the make-up air unit manufacturer. Evaporative cooling media shall be Munters CELdek with a depth of 12 inches for a cooling effectiveness of 90%. Drain and overflow connections shall be piped through the side of the evaporative cooling section.

Make-Up Air units shall be Model XIG as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.



XIGX Specification

Indirect Gas

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Provide Accurex Make-Up Air Model XIGX as shown on plans and in accordance with the following specification:

GENERAL

Make-Up Air unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Accurex Model XIGX equipment is used as the basis of design. Performance to be as scheduled on plans.

FURNACE AND CONTROLS

Indirect-gas fired furnace shall be 80% efficient, ETL list and have a blow through fan design. Furnace shall be capable of operation with Natural or LP gas and have a power venting system. The heat exchanger shall be constructed of aluminized steel or stainless steel. Standard furnace features shall include main gas pressure regulator, main gas valve, electronic staged or electronic modulating controls, direct spark ignition system, high limit and a 24 volt control transformer. Furnace shall be insulated and have double wall construction.

TEMPERATURE CONTROL

Furnace heat output shall be controlled based on a field adjustable discharge temperature set point. Discharge temperature sensor shall be factory mounted and wired to the unit control center. Furnace(s) shall have electronic modulation or at least two stages of control.

UNIT CASING AND FRAMES

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable doors.

INSULATION

Models provided with a mixing box shall be insulated from the return section through to the supply discharge. Insulation shall be in accordance with NFPA 90A and tested to meet UL 181 erosion requirements. Double wall shall be provided if specified.



FAN SECTION

Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks (size 120 and larger). Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

MOTORS AND DRIVES

Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horse power and less shall be supplied with an adjustable drive pulley.

ELECTRICAL

All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 24 VAC circuit, integral door interlocking disconnect switch and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

FILTER SECTION

Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 feet per minute. Filters shall be easily accessible through a removable access panel.

WEATHERHOOD

Weather hoods shall be constructed of G90 galvanized steel with birdscreen mounted at the intake.

MIXING BOX (night setback)

Mixing box shall provide 100% make-up air during occupied hours and 100% recirculation air during unoccupied hours. Furnace(s) shall be multi-stage and operate based on discharge temperature control on occupied setting and space temperature control on unoccupied setting. The system shall allow for separate field adjustable temperature setpoints for occupied and unoccupied modes of operation.

MIXING BOX (building pressure)

Mixing box shall modulate outdoor and return air volumes to maintain desired building pressure. A remote control panel shall be provided by the make-up air unit manufacturer and include a photohelic gauge. Furnace(s) shall be multi-stage and operate based on discharge temperature control.

MIXING BOX (potentiometer)

Mixing box shall enable manual modulation of outdoor air and return air volumes from the remote potentiometer. The potentiometer shall be mounted on a control panel provided by the make-up air unit manufacturer. Furnace(s) shall be multi-stage and operate based on discharge temperature control.



COOLING COIL

Direct expansion (DX) or chilled water coil shall be factory tested and rated in accordance with ARI 410. Coils shall have copper tubes with permanently expanded aluminum fins, 12 fpi or less. DX coils shall be equipped with distributors to receive expansion valves at the liquid connections. Drain pans shall extend at least 12 inches downstream of coil and be sloped to drain connection.

EVAPORATIVE COOLING SECTION

Evaporative cooling section shall include a galvanized steel housing with louvered intake, two inch aluminum mesh filters and a stainless steel evaporative cooling module all provided by the make-up air unit manufacturer. Evaporative cooling media shall be Munters CELdek with a depth of 12 inches for a cooling effectiveness of 90%. Drain and overflow connections shall be piped through the side of the evaporative cooling section.

PACKAGED DX (optional)

Unit shall be equipped with a Packaged DX system to include compressor(s), evaporator and condenser coil(s), condenser fans and all appurtenant controls as specified elsewhere in this section. The Packaged DX system is to be an integral module, incorporated into the MAU. Stand-alone Packaged DX systems that are connected to the unit, or systems that require hardware or equipment that is not integral to the unit are not acceptable.

Make-Up Air units shall be Model XIGX as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.



XKSFB Specification
Belt Drive, Untempered

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Provide Accurex Make-Up Air Model XKSFB as shown on plans and in accordance with the following specification:

Make-up air unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Performance to be as scheduled on plans.

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable panels.

Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces. Units with motors of 10 HP and less shall be supplied with an adjustable drive pulley.

Filters shall be mounted in a straight or V-bank arrangement. Filters shall be UL Class 2, 2 inch aluminum mesh and easily removable.

Weatherhood shall be constructed of G90 galvanized steel and include 2 inch aluminum mesh filters at the intake.

Make-Up Air units shall be Model XKSFB as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.



XKSFD Specification

Direct Drive, Untempered

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Provide Accurex Make-Up Air Model XKSFD as shown on plans and in accordance with the following specification:

Make-up air unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Performance to be as scheduled on plans.

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable panels.

Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces. Units with motors of 10 HP and less shall be supplied with an adjustable drive pulley.

Filters shall be mounted in a straight or V-bank arrangement. Filters shall be UL Class 2, 2 inch aluminum mesh and easily removable.

Weatherhood shall be constructed of G90 galvanized steel and include 2 inch aluminum mesh filters at the intake.

Make-Up Air unit shall be Model XKSFD as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.



XMSX Specification

Belt Drive, Untempered Modular

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Provide Accurex Make-Up Air Model XMSX as shown on plans and in accordance with the following specification:

GENERAL

Make-Up Air unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Accurex Model XMSX equipment is used as the basis of design. Performance to be as scheduled on plans. All untempered and coil units shall be listed to UL 1995.

HOT WATER or STEAM COIL

Coil shall be factory tested and rated in accordance with ARI 410. Coils shall have copper tubes with permanently expanded aluminum fins, 12 fpi or less. Coil connections shall be stubbed out through the make-up air unit housing wall.

ELECTRIC HEAT

Electric heaters shall be UL listed and feature open coil heating elements. Heater control cabinets shall be installed completely within the heating section and factory wired up to 140 kW and meets all requirements of the National Electric Code.

UNIT CASING AND FRAMES

Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable doors.

INSULATION

Models provided with a mixing box shall be insulated from the return section through to the supply discharge. Insulation shall be in accordance with NFPA 90A and tested to meet UL 181 erosion requirements. Double wall shall be provided if specified.



FAN SECTION

Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks (size 120 and larger). Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.

MOTORS AND DRIVES

Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horse power and less shall be supplied with an adjustable drive pulley.

ELECTRICAL

All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 24 VAC circuit, integral door interlocking disconnect switch and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

FILTER SECTION

Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 feet per minute. Filters shall be easily accessible through a removable access panel.

WEATHERHOOD

Weather hoods shall be constructed of G90 galvanized steel with birdscreen mounted at the intake.

MIXING BOX (building pressure)

Mixing box shall modulate outdoor and return air volumes to maintain desired building pressure. A remote control panel shall be provided by the make-up air unit manufacturer and include a photohelic gauge. Heating coil shall operate based on discharge temperature control.

MIXING BOX (potentiometer)

Mixing box shall enable manual modulation of outdoor air and return air volumes from the remote potentiometer. The potentiometer shall be mounted on a control panel provided by the make-up air unit manufacturer. Furnace(s) shall be multi-stage and operate based on discharge temperature control.

COOLING COIL

Direct expansion (DX) or chilled water coil shall be factory tested and rated in accordance with ARI 410. Coils shall have copper tubes with permanently expanded aluminum fins, 12 fpi or less. DX coils shall be equipped with distributors to receive expansion valves at the liquid connections. Drain pans shall extend at least 12 inches downstream of coil and be sloped to drain connection.



PACKAGED DX (optional)

Unit shall be equipped with a Packaged DX system to include compressor(s), evaporator and condenser coil(s), condenser fans and all appurtenant controls as specified elsewhere in this section. The Packaged DX system is to be an integral module, incorporated into the MAU. Stand-alone Packaged DX systems that are connected to the unit, or systems that require hardware or equipment that is not integral to the unit are not acceptable.

EVAPORATIVE COOLING SECTION

Evaporative cooling section shall include a galvanized steel housing with louvered intake, two inch aluminum mesh filters and a stainless steel evaporative cooling module all provided by the make-up air unit manufacturer. Evaporative cooling media shall be Munters CELdek with a depth of 12 inches for a cooling effectiveness of 90%. Drain and overflow connections shall be piped through the side of the evaporative cooling section.

Make-Up Air units shall be Model XMSX as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.



XRV Specification

Packaged Rooftop Ventilator with optional heating and cooling

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Provide Accurex Rooftop Ventilator Model XRV as shown on plans and in accordance with the following specification:

GENERAL

Rooftop ventilator unit shall be as manufactured by Accurex or approved equal provided all specifications are met. Accurex Model XRV equipment is used as the basis of design. Performance to be as scheduled on plans.

Units are available with integral heating, cooling, heating and cooling or no heating or cooling for rooftop, indoor or outdoor installations.

HEATING AND COOLING

Integral heat source shall be indirect gas-fired furnace, hot water or electric heat.

Integral cooling source shall be chilled water, split system DX, or packaged DX.

Airflow arrangement shall be Outdoor Air only or Outdoor Air with Recirculation. Each unit shall be constructed in a horizontal configuration.

MANUFACTURED UNITS

Unit shall be fully assembled at the factory and consist of an insulated metal cabinet, filter assembly for intake air, supply air blower and an electrical control center. All specified components and internal accessories factory installed are tested and prepared for single-point high voltage connection except with electric post heat which has dual point power.

Unit options-

- downturn outdoor air intake with metal mesh filter assembly
- exhaust air blower
- evaporator coil
- condensate drain pan
- P trap
- chilled water
- hot water
- chilled water and hot water coils



- hot gas reheat coil
- electric post-heater
- indirect gas furnace
- packaged DX system
- phase and brownout protection
- motorized dampers
- barometric relief damper
- motorized recirculating damper
- sensors
- curb assembly
- service receptacle assembly
- exhaust/relief blower assembly
- filter assembly for exhaust air

CABINET

The cabinet shall be a formed double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance. The outside casing shall be 18 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish. Pre-painted components as supplied by the factory shall have polyester urethane paint on 18 gauge G60 galvaneal steel. Components that receive a painted finish per A/E specification shall be of 18 gauge type A60 galvaneal steel and shall be painted with a baked industrial enamel finish. The internal assemblies shall be 24 gauge, galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel.

The 2" fiberglass cabinet insulation shall comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification of a maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.

Access panels and doors shall be equipped with insulated, hinged doors or removable access panels to provide easy access to all major components. Doors and access panels shall be fabricated of 18 gauge galvanized G90 steel or painted galvanized steel.

Supply Air blower assemblies shall consist of an electric motor as specified by A / E and a direct-drive fan. Assembly shall be mounted on heavy gauge galvanized steel rails and further mounted on 1.125 inch thick neoprene vibration isolators. Blower motor shall be capable of continuous speed modulation and controlled by a VFD.

Exhaust Air blower assemblies shall consist of an electric motor as specified by A / E and a direct-drive fan. Assembly shall be mounted on heavy gauge galvanized steel rails and further mounted on 1.125 inch thick neoprene vibration isolators. Blower motor shall be capable of continuous speed modulation and controlled by a VFD.

Evaporator coil shall be AHRI Certified and shall be (silver) soldered or brazed into the compressed refrigerant system. Coil shall be constructed of copper tubing, permanently bonded to aluminum fins and enclosed in a galvanized steel frame. If two compressors are used as components of the unit, then the evaporator coil shall be of "interlaced" configuration, permitting independent operation of either compressor without conflict with the other compressor. The evaporator and condenser coils are coated with ElectroFin® coil coating.

Rooftop Ventilator units shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply



connections. RTU shall be equipped with a Unit Disconnect Switch. If an electric heater option is selected it shall have a separate electrical control center and separate high voltage power circuit as shown on the plans.

Condensate drain pan shall be an integral part of the unit whenever a cooling option is included. Pan shall be formed of welded austenitic stainless steel sheet material and provided with a welded stainless steel drain connection at the front for connection to a P trap. Drain pan shall be sloped in two directions to provide positive draining and drain connector shall be sealed at penetration through cabinet wall. Condensate drain pan is necessary whenever a cooling function is part of the unit.

If the unit is equipped with a condensate drain pan, contractor shall provide, or fabricate, and install an appropriate P trap, in accordance with all local and area codes and Best Practices.

Optional chilled water, hot water, or chilled water and hot water coil(s) shall be factory installed and meet the design requirements as above. All coils shall be coated with ElectroFin® coil coating

INDIRECT GAS FURNACE

Indirect gas furnace shall be ETL Certified as a component of the unit with an integral combustion gas blower and ETL Certified for installation downstream of a cooling coil. Furnace shall have fault sensors to provide fault conditions to optional digital controller or building controls.

Heat exchangers shall be 4-pass tubular heat exchangers, constructed of aluminized steel or type 409 stainless steel. Heat exchanger tubes shall be installed on the vest plate by means of swaged assembly, welded connections are not acceptable. Heat exchanger tubes shall be supported by a minimum of two fabricated assemblies that support the tubes and also permit expansion and contraction of the tubes.

Heat exchanger shall have a one year warranty standard or optional 5 or 10 year extended warranty. 5 year and ten year extended warranties are only for stainless steel heat exchangers.

Furnace control shall be 4:1 modulating and encased in a weather-tight metal housing with intake air vents. Large, metal lift-off door shall provide easy access to the enclosed vest plate, control circuitry, gas train, burner assembly and exhaust blower. Furnace shall have solid state controls permitting stand-alone operation or control by building controllers. Unit shall include kit for indoor mounting with separated 2 pipe, concentric or basic indoor venting.

PACKAGED DX SYSTEM

Packaged DX System shall have an integral compressor(s) and evaporator coil located within the weather-tight unit housing. The evaporator and condenser coils are coated with ElectroFin® coil coating. Condenser coils and appurtenant condenser fan assemblies shall be factory installed as integral subassemblies of the unit and mounted on the exterior of the unit. Condenser fan motors shall be three phase, type 56 frame, Open Air Over and Shaft Up. Each condenser fan motor shall have a vented frame, rated for continuous duty and be equipped with an automatic reset thermal protector. Motors shall be UL Recognized and CSA Certified. The refrigerant compressor(s) shall be hermetic scroll-type (digital optional) and shall be equipped with liquid line filter drier, thermostatic expansion valves (TXV) (s); manual reset high pressure and low pressure cutouts and all appurtenant sensors, service ports and safety devices. Compressed refrigerant system shall be fully charged with R-410A refrigerant. Each compressor shall be factory-equipped with an electric crankcase heater to boil off liquid refrigerant from the oil. Optional hot gas bypass shall be provided on the lead circuit to prevent icing of the evaporator coil under low load conditions.



Packaged DX Control and Diagnostics: The Packaged DX system shall be controlled by an onboard digital controller (DDC) that indicates both owner-supplied settings and fault conditions that may occur. The DDC shall be programmed to indicate the following faults:

1. Global alarm condition (active when there is at least one alarm)
2. Supply Air Proving alarm
3. Dirty Filter Alarm
4. Compressor Trip alarm
5. Compressor Locked Out alarm
6. Supply Air Temperature Low Limit alarm
 - a) Sensor #1 Out of Range (outside air temperature)
 - b) Sensor #2 Out of Range (supply air temperature)
 - c) Sensor #3 Out of Range (cold coil leaving air temperature)

Phase and brownout protection: RTU shall have a factory-installed phase monitor to detect electric supply phase loss and voltage brown-out conditions. Upon detection of a fault, the monitor shall disconnect supply voltage to all motors.

Motorized dampers (optional -intake air or exhaust air): Motorized damper of low leakage (optional-insulated low leakage) type shall be factory installed.

Motorized Recirculating Air Damper designed to permit 100% maximum recirculation of return air shall be factory installed.

Sensors are considered to be part of various optional operational modes or device controllers and are to be factory supplied and installed as specified by the A/E.

Curb Assembly: Accurex recommends the use of an engineered curb assembly in lieu of an owner-supplied rail system. The curb assembly provides full perimeter support of the unit and ensures proper flashing and insulation of all roof penetrations and provides adequate clearance for a P trap assembly. A curb assembly made of 14 gauge galvanized steel shall be provided by the factory for assembly and installation. The curb assembly shall provide perimeter support of the entire unit and shall have duct adapter(s) for supply air [and return air]. Curb assembly shall enclose the underside of the unit and shall be sized to fit into a recess in the bottom of the unit. Contractor shall be responsible for coordinating with roofing contractor to ensure curb unit is properly flashed to provide protection against weather/moisture penetration. Contractor shall provide and install appropriate insulation for the curb assembly. The curb shall be the height of (X).

Service receptacle (optional): 120 VAC GFCI service outlet shall be factory-provided and installed by this contractor in a location designated by the A/E. Service outlet requires a dedicated single phase electric circuit.

Hail guards (optional): Protects the condensing unit from damage due to extreme weather conditions such as hail and flying debris.



Vapor Tight Lights (optional): Provide service lights mounted in the unit to be used during times of routine maintenance. The lights must be wired by others on the jobsite, as they will not be wired through the unit control center].

24V/120V Smoke detector (optional): – Duct smoke detector is shipped loose for field mounting and wiring in the supply or return air duct. The air duct smoke detector housing shall be UL listed per UL 268A specifically for use in air handling systems. The air duct smoke detector housing shall be suitable for mounting indoors. The detector shall operate at air velocities of 100 feet per minute to 4000 feet per minute (0.5 to 20.32 meters/second). The power supply voltage shall be 20-29 VDC, 24 VAC 50-60 Hz, and 120 VAC 50-60 Hz. The detector shall consist of an alarm initiation contact & two DPDT auxiliary contact closures.

WARNING: Duct smoke detectors are NOT a substitute for open area smoke detectors; NOT a substitute for early warning detection; NOT a replacement for a building's regular fire detection system. Refer to NFPA 72 and 90A for additional information.

BLOWER

Supply Air Blower section construction: direct drive motor and blower shall be assembled on a 14 gauge galvanized steel platform and shall be equipped with 1.125 inch thick neoprene vibration isolation devices. Blower assemblies shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower. The fan shall be an airfoil plenum fan statically and dynamically balanced, AMCA certified for air and sound performance, mounted on ground and polished steel fan shafts with ball bearing pillow blocks. Bearings shall be selected for a minimum L10 life in excess of 50,000 hours at maximum catalogued speeds. Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating."

MOTORS

Blower motors greater than $\frac{3}{4}$ horsepower shall be "NEMA Premium™" unless otherwise indicated. Compliance with EPA minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower and pulleys shall be fully machined cast-type, keyed and fully secured to the fan wheel and motor shafts. Electric motors of ten horsepower or less shall be supplied with an adjustable drive pulley.

UNIT CONTROLS

The unit shall be constructed so that it can function as a stand-alone heating and cooling system controlled by factory-supplied controllers, thermostats and sensors or it can be operated as a heating and cooling system controlled by a Building Management System (BMS). This unit shall be controlled by a factory-installed microprocessor programmable controller (DDC) that is connected to various optional sensors. Unit shall incorporate a DDC controller with integral LCD screen that provides text readouts of status. DDC controller shall have a built-in keypad to permit operator to access read-out screens without the use of ancillary equipment, devices or software. DDC controllers that require the use of equipment or software that is not factory-installed in the unit are not acceptable. Alarm readouts consisting of flashing light codes are not acceptable. Owner-specified ventilating conditions can be input by means of pushbuttons.



RTU supply fan shall be configured for Constant Volume (ON / OFF), CO2 sensor by factory, duct pressure by factory or a 0 – 10 VDC by others to DDC.

Outside Air / Return Air damper control shall be field adjustable two-position or CO2 sensor by factory.

Dirty filter sensor shall be factory-installed.

Operating protocol: The DDC shall be factory-programmed for LonWorks, BACnet MSTP, BACnet IP, Modbus, Modbus RTU, or Modbus IP. **Select desired protocol above**

Variable Frequency Drive (VFD)-unit shall have factory installed variable frequency drive for modulation of the blower assembly. The VFD shall be factory-programmed for unit-specific requirements and shall not require additional field programming to operate.

FILTERS

Unit shall have permanent metal filters located in the outdoor air intake and shall be accessible from the exterior of the unit. MERV 8 disposable pleated filters shall be provided in the supply air stream and MERV 8 filters in the exhaust air stream.

Rooftop ventilator units shall be Model XRV as manufactured by Accurex.

Due to continuous research Accurex reserves the right to change specifications without notice.