

Indirect-Fired Make Up Air

Equipment
Specifications

8500D Series



Rapid[®]
Engineering LLC

Part 1: GENERAL Fired

Please note: Brackets indicate required choices to be made in preparation of the final specification.

A. Provide units with heating and ventilating sections, designed and manufactured for indoor or outdoor installation. Units shall be packaged air handlers which include casing, modulating burner, primary and secondary heat exchangers, and high efficiency centrifugal fan. Units shall be designed such that the heat exchanger is upstream of the fan/blower in a draw-through configuration. Units that blow air at / across the heat exchanger are unacceptable.

1.1 SECTION INCLUDES

- A. Indirect-fired air handler
- B. Controls

1.2 REFERENCES

- A. American Society for Testing Materials (ASTM):
 - 1. Standard A653/653M; Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process
- B. ETL Testing Laboratories, Inc. (ETL):
(Nationally recognized testing laboratory certifies code conformance.)
 - 1. Requirements applicable to product labeling and listing in the Directory of ETL Listed Products.
- C. Factory Mutual Insurance (FM):
(Ensures compliance of gas manifold to owner's insurance carrier.)
- D. XL Insurance (Formerly known as IRI):
(Ensures compliance of gas manifold to owner's insurance carrier.)
- E. National Electrical Manufacturers Association (NEMA):
 - 1. Standard 250; Enclosures for Electrical Equipment (1000 V Maximum)
- F. National Fire Protection Association (NFPA):
(Establishes fire prevention standards.)
 - 1. Article 54; National Fuel Gas Code
 - 2. Article 70; National Electric Code
 - 3. Article 31; Standard for Installation of Oil-Burning Equipment
 - 4. Article 33; Standard for Spray Application Using Flammable or Combustible Materials
 - 5. Article 90A Standard for the Installation of Air Conditioning and Ventilation Systems.
- G. National Roofing Contractors Association (NRCA):
 - 1. The NRCA Roofing and Waterproofing Manual, Second Edition

H. Occupational Safety and Health Administration (OSHA): (Enforces air quality standards and safety in the workplace.)

I. ETL (Intertek):

- 1. ANSI Z83.8 / CSA 2.6 Gas Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters and Gas Fired Duct Furnaces.

1.3 SUBMITTALS FOR REVIEW

- A. Product Data: Provide data with dimensions, duct and service connections, accessories, controls, electrical nameplate data and wiring diagrams.
- B. Submittal Drawings: Indicate dimensions, duct and service connections, accessories, controls, electrical nameplate data and wiring diagrams.

1.4 SUBMITTALS FOR INFORMATION

- A. Manufacturer's Instructions: Indicate rigging, assembly and installation instructions.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Project Record Documents: Record actual locations of remote sensors, control panels and other components.
- B. Operation and Maintenance Data: Include manufacturer's Installation, Operation and Service Manual.
- C. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in owner's name and registered with the manufacturer.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section (proportional, building pressure controlling, modulating indirect-fired air handler) with a minimum of ten years documented experience. Equipment shall be the standard product of the manufacturer and shall have complete cataloged data.
- B. Installer Qualifications: All installation and service of indirect-fired air handlers must be performed by a contractor qualified in the installation and service of said products with proof of a minimum of three years documented experience.
- C. Factory Testing: Each air handler shall be factory-tested. Testing shall consist of checking circuits for continuity, operability of valves, control motors, fan speed, linkages, switches and burner. Each air handler shall be test-fired for minimum and high fire conditions. See "Fan and Motor" for additional fan testing requirements.

1.7 REGULATORY REQUIREMENTS

- A. Conform to ANSI standard Z83.8 (latest revision) and provide evidence that the air handler and its control

system have been found in compliance as a system with these standards by a nationally recognized testing laboratory.

- B. Conform to the National Fuel Gas Code (NFPA 54/ANSI Z223.1).
- C. Conform to required or specified insurance specifications (FM, XL Insurance (formerly known as IRI), etc.) for the gas manifold construction.

2.8 WARRANTY

- A. The product shall have a manufacturer's limited warranty of at least 24 months, subject to the manufacturer's standard warranty limitations.

Part 2: PRODUCTS

2.1 MANUFACTURERS

- A. RAPID 8500D-Series which can incorporate one of the following air control schemes:
 - 1. 100% outdoor air (MUA Style).
 - 2. Automatic modulation of 0% - 100% outdoor air (AM Style).

2.2 MANUFACTURED UNITS

- A. Unit: Constant or variable volume outdoor or indoor indirect-fired air handler, designed such that the heat exchanger is upstream of the fan/blower in a draw-through configuration. Units that blow air at / across the heat exchanger are unacceptable.

2.3 FABRICATION

- A. Casing and Components: Units to have a welded steel frame. The casing shall be constructed of a minimum of 16 gauge, cold rolled steel and the panels shall be fabricated into self-framing, standing seam type construction. The panels shall be properly supported with welded structural angle, channel and tubular steel framework. The exterior roof panels shall be a minimum of 16 gauge, cold rolled steel. The top wearing surface of the floor of each section shall be a minimum of 16 gauge, cold-rolled steel. The cabinetry of the heat exchanger section shall be double wall construction.
- B. Fan Support: Fan housing(s) shall be bolted to the casing and reinforced with structural angle or tubing to reduce vibration and sound.
- C. Access Doors: Doors in the unit housing shall be provided to permit ready access to internal components. The access doors shall be of 16 gauge cold rolled steel. The doors shall be designed to swing out with a hinge.
- D. Outdoor Installation: Units installed outdoors shall utilize weatherproof construction. All joints and seams are to be caulked and weather proofed. All access doors

to be fully gasketed.

- E. Lifting Points: Internal members shall be properly sized to allow rigging and handling of the unit from the top.
- F. Finish: All welds are to be thoroughly painted with cold galvanizing compound.

2.4 POWER BURNER AND GAS TRAIN

- A. Burner: Furnish and install one gas burner. The burner shall incorporate a stainless steel flame retention type combustion head. Combustion head shall be symmetrically round with internal gas pilot. Primary-secondary air control shall be a design function of the combustion head.
- B. Burner Assembly/Gas Train: The gas train piping shall include a 1/4" NPT pressure tapping with 1/4" pipe plug upstream and downstream of valve and regulator in the gas train, one manually operated ball valve upstream of valves, one main gas pressure regulator with vent, one safety shutoff valve which shall be proven closed during pre-ignition by proof of valve closure interlock switch on valve on FM gas trains over 5 million Btu/h input, primary and secondary automatic gas safety shutoff valves to operate simultaneously, manually operated gas valve which shall be located downstream of both automatic gas valves to permit leakage testing of the valves and optional- [a normally open, fully ported, electrically operated valve shall be provided in a vent line connected between the two safety shut off valves.] The vent pipe shall be run outside to atmosphere. Electronic safety combustion controls shall be supplied complete with ultra-violet flame scanner to monitor the pilot and main flame. A programming relay shall be furnished. It shall be so utilized as to provide intermittent type gas electric ignition and pre-ignition purge timer.
- C. Pilot: Automatic electronic ignition system.
- D. Damper (Optional): Motorized with end switch to prove position before burner operation.

2.5 INDIRECT-FIRED HEAT EXCHANGER

- A. Heat Exchanger: Heat exchanger shall be a multi-pass design with a primary firing drum and tubular secondary. Materials for primary and secondary heat exchanger are 409SS. The primary heat exchanger, collector boxes and headers are constructed of 16 gauge (.057) minimum thickness. Secondary heat exchanger is constructed of 18 gauge (.047) minimum material. Tubing used for the heat exchanger shall comply with (ASTM A268 for 409SS, ASTM 249 for 304SS). Secondary tubes shall be swaged into panels and welded to provide an air tight assembly.

2.6 FANS AND MOTORS

- A. Fan: The fan(s) shall consist of centrifugal, forward curved double-width, double-inlet (DWDI) blower

wheels and scrolls or direct-drive plenum fans. The blower assembly shall be dynamically balanced. The shafts shall not pass through their first critical speed when the unit comes up to the rated RPM.

- B. Drive: V-belt drives shall be standard capacity, with reinforced rubber belts. The sheaves shall be of a cast iron type. The service factor used for V-belt drives shall be not less than 1.25. An adjustable motor base shall provide variation in center distance and shall be readily adjustable by means of screw adjustments. A locking nut, or similar device, shall be provided to secure the base in proper position.
- C. Fan Bearings: Blower wheels shall be supported by two pillow block bearings (models with FC fans only).
- D. Motor: Motor shall be (ODP) (TEFC), (high efficiency) 1800 RPM, (1 Ø) (3 Ø), 60 Hz, wired for the selected voltage. Motor horsepower shall be as indicated on the schedule. All 3 Ø motors shall be controlled and protected by an automatic starter with thermal overload protection. Starter shall be interlocked to prevent burner operation when overload relays are tripped.

2.7 CONTROL SYSTEM

- A. Factory Testing: The complete control system, all burner and gas manifold functions shall be factory tested for proper operation and to simplify field commissioning.
- B. Control Enclosure: A factory pre-wired control cabinet shall be supplied with the burner. Cabinet to house the flame safeguard control, programming purge timer, burner motor starter, fuses, control switches and relays. The unit shall be provided with an integral weatherproof control panel with 115 volt control transformer, fuses, terminal strip, and motor starter with overload protection. Fan/blower motor(s) will be wired to the motor starter(s). High-voltage components and conductors (in excess of 120 VAC and 24 VDC) are to be housed in a separate enclosure from low-voltage components.
- C. Disconnect Switch: A unit disconnect switch shall be provided on the exterior of the unit for single point wiring connection.
- D. Flame Relay: A manual restart of the burner shall be necessary in the event of shutdown due to flame failure.
- E. Safety Controls:
 - 1. High Gas Pressure: The high gas pressure switch shall turn the burner off when the gas pressure is above its setpoint. The maximum gas pressure shall be set at 1" wc above the maximum gas pressure at high fire.
 - 2. Low Gas Pressure: The low gas pressure switch shall turn the burner off when the gas pressure is below its setpoint. The minimum gas pressure shall be set at 6" wc.
- 3. High Temperature Limit Switch: A high temperature switch shall turn the burner off when air is discharged above its setpoint. The high temperature limit switch shall be factory set at 180°F (82.2°C). The switch shall be auto-reset.
- 4. Carbon monoxide (CO) detector: A CO detector shall be factory mounted and wired to as to automatically shut down the unit when CO is detected in excess of 50 ppm in the air handler airstream.

2.8 AIR HANDLER OPTIONS AVAILABLE (SELECT APPLICABLE OPTIONS)

- A. Roof Curb: The roof curb shall be 19" (48.2 cm) full perimeter, formed of minimum 14-gauge galvanized steel as required to support the unit. Roof curb to be used on horizontal air handlers only.
- B. Inlet Hood: Hood shall be manufactured of a minimum of 16 gauge steel. A galvanized birdscreen is to be supplied. Air velocities at wind resistant angled intake are not to exceed velocities which would approach water carry-over.
- C. Insulation: The roof and walls of the cabinet shall be completely lined with 1" (2.5 cm), 1.5 lb/ft² (7.3 kg/m²) density, neoprene coated, glass fiber insulation, which complies with UL181 for erosion and NFPA 90A for fire resistivity. The insulation shall be secured via adhesive and mechanical pin fasteners per SMACNA standards. All exposed edges shall be coated.
- D. Discharge Device: Provide a [splash plate - intended for suspension below the discharge opening of a horizontal mounted air handler, plate shall be constructed of 16 gauge galvanized steel] [[three way discharge head] [four way discharge head] equipped with manually adjustable locking horizontal and vertical deflection blades].
- E. Filter Section: Standard filter section constructed shall be V-bank style, [permanent aluminum mesh], [fiberglass throw-away], [pleated-panel polyester rated at 30% filtration efficiency].
- F. Service Platform: Each air handler shall be furnished with a minimum 48" (121.9 cm) deep service platform running the full width of the air handler. The platform shall be constructed with a minimum 1" (2.5 cm) thick galvanized grating (for outdoor mounted units) / 10ga. slip resistant check plate (for indoor mounted units), a hand rail on three sides and steel safety chains on the remaining sides. Ladder access to be provided by others.
- G. Smoke Detector: A smoke detector shall be provided to shut off air handler if smoke is detected.

- H. Carbon Dioxide (CO₂) Detector: A room-mounted carbon dioxide sensor shall be provided for initiating additional outdoor ventilation.
- I. Mixing Section: The mixing box shall be provided with parallel-blade return air and fresh air dampers with modulating actuator(s). The mixing box shall be capable of 0-100% fresh air to return air ratio. Standard damper control shall be controlled by factory mounted DDC control system or field installed DDC control system.
- J. Painted exterior: Exterior surfaces of air handler shall be finished with a high gloss solvent borne acrylic modified alkyd enamel.

2.9 PERFORMANCE

- A. See Schedule on plans.

Part 3: EXECUTION

3.1 INSTALLATION

- A. The unit shall be started per the instructions in the Installation, Operation, and Service Manual by the installing contractor. A factory provided field start up form shall be filled out by the contractor and mailed to the manufacturer. The start-up shall include, but not be limited to:
 - Verification of proper supply power and fuel.
 - Verification that electrical terminals are secure.
 - Proper air flow balance.
 - Verification of combustion efficiency and proper burner adjustments
 - Testing of all safety and operating controls.
 - Setting of burner fire.
- B. One copy of the Installation, Operation, and Service Manual shall be enclosed in the unit control panel. The manual shall consist of recommended installation procedures and guidelines, inspection, initial start-up, operating, maintenance and troubleshooting sections.

3.2 SCHEDULES

- A. See plans.

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