

*Weather-Rite*TM

PREMIUM,
INDUSTRIAL-GRADE
DIRECT-FIRED,
MAKE-UP AIR UNITS

EQUIPMENT
SPECIFICATIONS

TT SERIES

1.616.784.0500

www.weather-rite.com

AIR HANDLER GUIDE SPECIFICATION

GENERAL

Please Note: Brackets indicate required choices to be made.

Provide self contained industrial air handlers with gas-fired heating and ventilating sections, designed and manufactured for indoor or outdoor installation. Units shall be packaged air handlers which include casing, modulating burner, non-overloading fan, mixing chamber (AM and VAV Models only), positive position modulating return air dampers (AM and VAV Models only), and automated DDC-based controls for temperature control, pressure control and system monitoring.

1.1 SECTION INCLUDES

- A. Air Handler
- B. Controls

1.2 REFERENCES

- A. American National Standards Institute (ANSI)/Canadian Standards Association (CSA): Establishes requirements applicable to certifying direct gas-fired heaters.
 - 1. MUA Model: Standard Z83.4: Non-Recirculating Direct Gas-Fired Industrial Air Heaters
 - 2. AM, VAV, FR Models: Standard Z83.18: Recirculating Direct Gas-Fired Industrial Air Heaters
- B. American Society for Testing Materials (ASTM): Establishes standards for materials, products, systems and services.
 - 1. ASTM A463/A463M-15 Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
- C. 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.
- D. Factory Mutual Insurance (FM): Ensure compliance of gas manifold to owner's insurance carrier.
- E. XL Insurance (formerly IRI): Ensure compliance of gas manifold to owner's insurance carrier.
- F. National Electrical Manufacturers Association (NEMA): Establishes technical standards for the electroindustry.
 - 1. Standard 250: Enclosures for Electrical Equipment (1000 V Maximum)
- G. National Fire Protection Association (NFPA): Establishes fire prevention standards.
 - 1. Article 54: National Fuel Gas Code (latest edition)
 - 2. Article 70: National Electric Code (latest edition)
 - 3. Article 90A: Installation of Air Conditioning and Ventilating Systems
- H. National Roofing Contractors Association (NRCA): Establishes best practices for the roofing industry.
 - 1. The NRCA Roofing and Waterproofing Manual, Second Edition

- I. Occupational Safety and Health Administration (OSHA): Enforces air quality standards and safety in the workplace.
- J. Underwriters Laboratories, Inc. (UL): Nationally recognized testing laboratory certifies code conformance, product labeling and listing.
 - 1. Standard UL916: Energy Management Equipment
 - 2. Standard UL873: Temperature Indicating & Regulating Equipment

1.3 SUBMITTALS FOR REVIEW

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

1.4 SUBMITTALS FOR INFORMATION

- A. Manufacturer's Instructions: Indicate rigging, caulking, 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 (building pressure controlling, modulating direct-fired air handler) with a minimum of 25 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 air handlers must be performed by a contractor qualified in the installation and service of said products with proof of a minimum of five years documented experience.
- C. Factory Testing: Each air handler shall be factory-tested. Testing shall consist of checking all circuits for continuity, operability of all valves, control motors, fan speed, linkages, switches and burner. Each air handler shall be test-fired for low and high fire conditions. See "Fan and Motor" for additional fan testing requirements.

1.7 REGULATORY REQUIREMENTS

- A. Conform to ANSI Standards Z83.18 or Z83.4 (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 NFPA 90A.
- C. Conform to the National Fuel Gas Code (NFPA 54 / ANSI Z223.1).
- D. Conform to required or specified insurance specifications (FM, XL Insurance (formerly know as IRI), etc) for the gas manifold construction.

1.8 WARRANTY

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

PRODUCTS

2.1 MANUFACTURERS

- A. WEATHER-RITE™ TT-Series, incorporating one of the following outdoor air control schemes, as specified herein or shown on the plans:

- 20% - 100% outdoor air (Air Management [AM] Model)
- 100% outdoor air (Make-up Air [MUA] Model)
- 20% outdoor air (Fixed Recirculation [FR] Model)
- 20% - 100% variable air volume (VAV Model)

2.2 MANUFACTURED UNITS

- A. Unit: [Constant] [variable] volume [outdoor] [indoor] air handler.

2.3 FABRICATION

- A. Casing and Components: 16-gauge minimum aluminized steel enclosure, welded to a steel angle frame. The panels for outdoor units shall be stitch welded and caulked at the seams to provide a watertight enclosure. For static pressure applications above 5" wc, gauge thickness is increased to between 14ga-10ga.
- B. Fan Support: The fan and bearings shall be supported by a reinforced steel framework independent of the cabinet.
- C. Access Doors: Neoprene-gasketed doors shall be provided to allow easy service of all critical components, controls and fan.
- D. Outdoor Installation: Units installed outdoors shall utilize weatherproof construction with intake hood or plenum.
- E. Lifting Points: Internal members shall be properly sized to allow rigging and handling of the unit from the top.
- F. Finish: All cabinet surfaces are to be thoroughly washed using aero-green high pressure cleaner/degreaser. Cleaning agent is applied using a high pressure, high temperature, power washer. After a thorough cleaning, surfaces are rinsed using a high pressure, high temperature, power washer. Excess water remaining inside equipment shall be removed utilizing a vacuum. Each piece of equipment is then placed inside a dry-off oven. Desired dry time is a minimum of 45-minutes at 125 °F, or until all residual

trapped water within metal joints and structural members is eliminated. Each exterior surface and any uncoated interior surfaces accept a prime coat of solvent borne industrial modified alkyd primer. Once cured, a satin sheen solvent borne acrylic modified alkyd enamel of [basalt gray, RAL 7012] [traffic white, RAL 9016][custom color] is applied. After manufacturing process is completed, a final coat is applied to ensure all surfaces and fasteners are corrosion resistant.

- G. Observation Port: Provide on burner section for observing main and pilot flames.
- H. Mixing Section (Optional): The air handler shall incorporate a separate compartment containing two 16-gauge galvanized dampers interlinked to work opposite each other. Each damper shall control up to 80% of the total air handler fan volume of either outdoor air or the return air from the building. These dampers shall be controlled so as to provide an outdoor air turndown ratio of 5:1 based on the fan total flow rate. For cooling applications, up to 100% return air is available.

2.4 BURNER AND GAS TRAIN

- A. Burner: Type [NP-LE] [HMA-2], specially designed to burn natural or LPG at or below the non-contaminating levels required by ANSI and OSHA. The burner shall have an aluminum manifold and heat resistant Type 430 stainless steel burner plates. The burner shall have a nominal 30:1 turndown ratio and be designed for 100% combustion efficiency for the life of the equipment.
- B. Burner Profile: The outdoor air velocity across the burner shall be controlled by fixed burner profile plates. The design of the unit profile plates shall maintain manufacturer's specified air velocity over the burner during operation. No air from the occupied space shall be allowed to recirculate across the burner at any time.
- C. Burner Assembly / Gas Train: The burner assembly and fuel piping arrangement shall include automatic ignition controls, flame rod (optional- ultraviolet (UV) scanner) flame failure system, 5 psig pressure regulator, fully modulating gas control valve, primary and secondary automatic shutoff valves and manual shutoff valve. Pilot gas controls shall include a pilot regulator, normally-closed solenoid shutoff valve, needle valve, high gas pressure switch and manual shutoff valve. Gas train shall be sized to provide full unit capacity at specified inlet pressure to the gas train. Provide and install a supplementary pressure regulator at each unit as necessary to maintain unit inlet pressure at less than 5 psig.
- D. Pilot: Electric spark ignition through a high voltage ignition transformer.

2.5 FAN AND MOTOR

- A. Fan: Single width, single inlet (SWSI), backward-incline airfoil fan, v-belt driven for specified air capacity with an efficient silent plenum. A precision inlet cone shall be provided for streamlined airflow into

AIR HANDLER GUIDE SPECIFICATION

- A. Fan Bearings: Self-aligning, pillow block or flange type and shall have (for external static pressure less than 1" wc [2.5 mbar]) an American Bearing Manufacturers Association (ABMA) L10 rated life of 100,000 hours and be equipped with optional extended lubrication lines. Extended lubrication lines shall be terminated at the unit's outer skin so that all lubrication can be performed without shutting down the system.
- B. Motor: The motor shall be an [open drip proof (ODP)] [totally enclosed fan cooled (TEFC)] premium efficiency design with minimum service factor of 1.15, wired for [208 V, 3Ø][230 V, 3Ø][460 V, 3Ø][575 V, 3Ø], 1750 rpm, standard NEMA frame and mounted on an adjustable slide base.
- C. Sound Power: The fan sound power shall not exceed 75 dBA at a distance of 10' (304 cm) from the air handler discharge opening.
- D. Exhaust Mode (Optional): Incorporate controls and additional dampers in the fan section for discharge and exhaust functions.

2.6 CONTROL SYSTEM

- A. Factory Testing: The complete control system and all burner and gas manifold functions shall be factory tested for proper operation and to simplify field commissioning.
- B. Control Enclosure: The unit control enclosure shall be constructed to NEMA 3R specifications with a hinged door. The control enclosure shall contain the gas train and all principal electrical components, such as motor, motor starter, fused disconnect switch, 120 V and 24 V transformers, control circuit fuses, control relay(s), [circuit check lights], [DDC microprocessor, I/O modules], [pressure transducer], flame relay and full number-coded touch-safe terminal strip.
- C. Flame Relay: The air handler control panel shall have a burner flame relay to lock out the flame in abnormal conditions.
- D. Safety Controls:
 - 1. High Gas Pressure Switch: The high gas pressure switch, located on the burner end of the manifold, shall turn the burner off when the gas pressure is above its setpoint. The maximum gas pressure shall be selectable between 3" wc [7.5 mbar] and 21" wc [52.3 mbar].
 - 2. Low Gas Pressure Switch: The low gas pressure switch, located on the inlet end of the manifold, shall turn the burner off when the gas pressure is below its setpoint. The minimum gas pressure shall be set at 3" wc.
 - 3. Air Flow Switches: The air flow switches measure air pressure differential across the burner to assure proper air flow during burner operation and prior to ignition. It shall be factory set at 0.2" wc [.4 mbar] for the low setting and 1.35" wc [3.4 mbar] for the high setting. Pressure switches shall not be field adjustable.
 - 4. High Temperature Limit Switch: A manual reset high temperature switch shall turn the burner off

when air is discharged above its set point. The high temperature limit switch shall be factory set at 150 °F (65.6 °C).

- E. Control Options (Optional):
 - Detectors: Smoke Detector, Carbon Monoxide, and/or Carbon Dioxide
 - Remote Reset
 - 120V Duplex GFCI Outlet
 - Signal Conditioner
 - Interlocking Relay or Control Relay
 - Outdoor Air Stat (Mild Weather)
 - Circuit Check Lights
 - Access Door Interlock
 - Three-Phase Power Monitor
 - Honeywell RM7800 Flame Relay with Self-Check UV Scanner
 - Variable Frequency Drive (VFD)
 - Control Enclosure Heater (Recommended when a variable frequency drive is selected)
 - Propane Switch Kit
 - Miscellaneous: DC Relay, Timers, Burner Alarm Horn
- F. Sequence of Operation (All control types):

With the main fused disconnect in the "ON" position: The Time Clock settings determine whether the air handler operates in the Occupied or Unoccupied Modes. (Time clock is software-based for DDC controls.)

COOLING / SUMMER SEQUENCE (Occupied Mode):

- The burner is off completely whenever the room temperature exceeds the [Cooling] [Outdoor Air Stat] Setpoint.
- The damper control operates the dampers as follows (AM & VAV units only):
 - a. The "MANUAL" mode allows manual positioning of the outside air (OA) damper and return air (RA) damper by changing the damper position setpoint. This setting overrides the pressure control and economizer operation.
 - b. The "AUTO PRESSURE" mode provides automatic building pressure control by modulating the OA damper and RA damper to maintain the indoor building pressure setpoint (normally .01" wc [.02 mbar]).
 - c. While in auto pressure mode, the air handler will bring in additional outdoor air to cool the building to the Cooling Setpoint if the Economizer is enabled.

HEATING / WINTER SEQUENCE (Occupied Mode):

- The burner is energized whenever the room temperature falls below the "Occupied Heating Setting".
- The burner is modulated to maintain the applicable "Occupied Heating Setting" and also so that the discharge air does not exceed the "Supply Air Max

Temp" (recommended setpoint 95 °F [35 °C]) or fall below the "Supply Air Min Temp" (recommended 55 °F [13 °C]).

- Depending on the time and day, the burner will be controlled to satisfy:
 - a. The "Occupied Heating" setpoint, or
 - b. The "Unoccupied Setback Temp" setpoint.
- The "Fan Off If Supply Air Temp Below" setting will shut down the unit when the discharge air temperature goes below the "Fan Off If Supply Air Temp Below" setting for longer than 5 minutes.
- Optional "Energy Alert" building underpressure control (patented).
 - a. During the Occupied Mode:
 1. The "Energy Alert" building pressure override control shall be activated if the pressure drops .01" wc [.02 mbar] below the setting of the Building Pressure Control.
 2. An on-delay timer will be activated and start a ten minute time-out period.
 3. After the time-out, an alarm will sound and an indicator light will be activated indicating "LOW BUILDING PRESSURE".
An Alarm Silence Switch shall be provided which automatically resets with the Energy Alert controls.
 4. The OA damper will close and the RA damper will go to full open.
 5. The Control System shall go to the "Unoccupied Setback Temp" setpoint.
 6. After a 20 minute period, or immediately when the pressure returns to the pressure setpoint, the damper control and building temperature will return to the normal Occupied setpoints.

UNOCCUPIED PERIOD (SETBACK) CONTROL:

- a. COOLING SEQUENCE (Unoccupied Mode):
 1. The fan is shut down.
 2. The burner is shut off.
- c. HEATING SEQUENCE (Unoccupied Mode):
 1. While the space temperature is above the "Unoccupied Setback Temp" setpoint, the fan and burner controls shut down and the dampers return to their normal positions.
 2. When the space temperature falls below the "Unoccupied Setback Temp" setpoint, the fan starts, burner ignites and modulates to maintain the "Unoccupied Setback Temp" setpoint, and the dampers operate in the same manner as for the Occupied Period.

FLUSH MODE CONTROL (OPTIONAL) (Sensor Locations as Indicated on Drawing):

- When the carbon monoxide (CO) (or other sensor) level reaches its Level I setpoint, a five minute time delay will energize. This occurs whether the air handler is in the Off, On or Auto Modes.

- Upon a continued alarm after the time delay, the RA damper will modulate to 0% and the OA damper will position to 100%.

EXHAUST MODE CONTROL (OPTIONAL):

- When the CO (or other sensor) level reaches its Level II setpoint, another five minute time delay will energize. This occurs whether the air handler is in the Off, On or Auto Modes.
- Upon a continued alarm after the Level II time delay, the burner shuts off, RA damper modulates to 100% open, exhaust damper modulates to 100% open, discharge damper modulates to 0% open, and OA damper modulates to 0% open.
- After the CO (or other sensor) indicates a return to normal, the controls will reset the air handler to normal operation.

HUMIDITY CONTROL (OPTIONAL):

- The sensors measure space air temperature and humidity.
- If the space air humidity is greater than the user-selectable set point, the burner ignition sequence is initiated and the burner modulates to maintain the room temperature at a temperature which reduces the humidity to the selected level.
- When the space air humidity is less than the user-selectable set point, the burner is de-energized.
- This monitoring and control sequence is maintained at all times during air handler's Occupied Mode.

G. Conventional Electronic Controls System:

1. Temperature Controller: Provide amplifier with room temperature control, room temperature sensor and discharge air temperature sensor.
2. Pressure switch: Provide a null position pressure switch for controlling the mixing dampers.
3. Pilot (Indicating) Lights (Optional): Install UL labeled lights in panel door (for indoor air handlers) or inside panel door (for outdoor air handlers) to indicate operation of control components as follows:
 - Power on
 - Low temperature limit switch
 - Power to fan starter
 - Fan on
 - High temperature limit switch
 - High gas pressure switch
 - Low gas pressure switch
 - Fan airflow switch
 - Ignition
 - Pilot valve
 - Power to valves
 - Power to temperature control
4. Remote Control Panel (one for each unit): Mount unit operating switches and pilot lights, as follows:
 - Solid state temperature control system, including occupied and unoccupied switches and room temperature thermostats.
 - Programmable electronic 7 day time clock with minimum of 4 on/off schedules per day and

AIR HANDLER GUIDE SPECIFICATION

EXECUTION

3.1 INSTALLATION

- A. Install equipment in strict accordance with manufacturer's instructions and in accordance with applicable governmental regulations buy a contractor qualified in the installation of the manufacturer's product.
- B. Install per NFPA 90A.
- C. Install per NFPA 54 (ANSI Z223.1) by providing connection to fuel gas system.
- D. Units which are shipped in multiple sections shall be assembled on the job site by the installing contractor. Assembly includes caulking all seams weather tight and extending electrical power and network control wires to the terminals provided, reconnecting the motor and control wiring between sections to create a complete and operable installation (per air handler manufacturer's recommendations).
- E. Contractor shall extend pressure sensing tubes to inside and to outside of building as recommended by the air handler manufacturer.
- F. Contractor shall provide a proper gas service drip leg and a lockable, lever handle manual shutoff valve. A high pressure regulator shall be installed if manifold pressure exceeds 5 psig.
- G. Furnish Contractor with field wiring diagram and electrical data to permit power wiring connections to the unit.
- H. Installation contractor is to provide equipment check, test and commissioning in strict accordance with manufacturer's instructions. Provide a copy of start-up records to the engineer. Copies provided by factory authorized personnel, not by installing contractor

unless factory certified personnel are employed by the installing contractor.

- I. Provide the owner's operating personnel with instruction on proper use of the air handler and controls.
- J. Contractor shall supply all necessary hanger rods and install the discharge head or plate (if provided) in accordance with manufacturer's instructions.
- K. Contractor shall level the roof curb and install a cant strip and wood nailer per applicable details on the plans.
- L. Install [carbon monoxide][carbon dioxide][smoke detector] sensors in the vicinity of the source contaminant (e.g., an operating vehicle), preferable at the breathing level of the occupants. Do not install sensors in confined ("dead") spaces.

3.2 SCHEDULES

- A. See plans.

This product is not for residential use.

This document is intended to assist licensed professionals in the exercise of their professional judgment.

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**Z83.4 100% OUTSIDE AIR (US & CANADA)
Z83.18 - RECIRCULATION (US)**



GAS HEATING ONLY

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