Base-Efficiency Light Commercial Rooftop DB

MECHANICAL GUIDE SPECIFICATIONS FOR DR SERIES COMMERCIAL PACKAGED UNITS 3-25-TON AC, GAS ELECTRIC, AND 3-12.5-TON HEAT PUMP.

RELATED SECTIONS (As Specified by the Construction Specification Institute)

- Section 23 06 80 Schedules for Decentralized HVAC Equipment
  - 23 06 80.13 Decentralized Unitary HVAC Equipment Schedule:
  - 23 06 80.13.A. Rooftop unit (RTU) schedule:
    Schedule is per the project specification requirements.
- Section 23 07 16 HVAC equipment insulation
  - 23 07 16.13 Decentralized, Rooftop Units
  - 23 07 16.13.A. Evaporator fan compartment
  - 23 07 16.13.B. Gas Heat Compartment
- Section 23 09 13 Instrumentation and control devices for HVAC
  - 23 09 13.23 Sensors and Transmitters
  - 23 09 13.23.A. Thermostats
- Section 23 09 33 Electric and Electronic Control System for HVAC
  - 23 09 33.13 Decentralized, Rooftop Units
  - 23 09 33.13.A. General
  - 23 09 33.13.B. Safeties
- Section 23 09 93 Sequence of Operations for HVAC Controls
  - 23 09 93.13 Decentralized, Rooftop Units:
  - 23 09 93.13.A. INSERT SEQUENCE OF OPERATION
- Section 23 40 13 Panel Air Filters
  - 23 40 13.13 Decentralized, Rooftop Units:
  - 23 40 13.13.A. Standard filter section
- Section 23 81 19 Self-Contained Air Conditioners
  - 23 81 19.13 Small-Capacity Self-Contained Air Conditioners:
  - 23 81 19.13.A. General
  - 23 81 19.13.B. Quality Assurance
  - 23 81 19.13.C. Delivery, Storage, and Handling
  - 23 81 19.13.D. Project Conditions
  - 23 81 19.13.E. Operating Characteristics
  - 23 81 19.13.F. Electrical Requirement
  - 23 81 19.13.G. Unit Cabinet
  - 23 81 19.13.H. Gas Heat
  - 23 81 19.13.I. Coils
  - 23 81 19.13.J. Refrigerant Components
  - 23 81 19.13.K. Filter Section
  - 23 81 19.13.L. Evaporator Fan and Motor
  - 23 81 19.13.M. Condenser Fans and Motors
  - 23 81 19.13.N. Special Features Options and Accessories

GENERAL

- All 3 - 12 1/2-ton units are designed for convertible airflow orientation to serve downflow or horizontal applications.
- All units are charged with R-410A refrigerant and run-tested at the factory to check modes of operation and proper fan rotation.

- Unit meets ASHRAE 90.1 minimum efficiency requirements.
- Unit shall be designed to conform to ASHRAE 15.
- All units are rated in accordance with AHRI Standards 210/240 or 340/360.
- Units are ETL listed and certified under US and Canadian standards of safety requirements per UL1995 (all units) and ANSI Z21.47 (Gas/Electric units only).
- Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
- Unit shall be designed in accordance with ISO 9001, and shall be manufactured in a facility registered by ISO 9001:2015.
- Roof curb shall be designed to conform to NRCA Standards.
- Unit shall be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory and must be available upon request.
- Unit shall be designed to prevent water intrusion up to max rated external static pressure.
- Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.

VOLTAGES

- All units are available in 208/240V 3-phase 60 Hz, 460V 3-phase 60 Hz, and 575 3-phase 60 Hz. Additionally, 3 - 5-ton sizes are available in 208/240 1-phase 60 Hz.
- Main power supply voltage, phase, and frequency must match those required by the manufacturer.

WARRANTY

- Units feature a 5-year parts and compressor warranty. Gas heat exchangers in gas/electric units include a 20-year warranty.
- *Complete warranty details are available from your local dealer/contractor or at www.daikinac.com.*

CABINET

- Unit cabinets are made with galvanized steel as follows, top panel 0.046” ~19-gauge, access doors 0.034” ~21-gauge, side rails 0.058” 16 gauge with a powder-paint finish on all the external surfaces. Service panels provide access to refrigeration, heating, blower, controls, and filter sections.
- Interior surfaces in the indoor air section are single wall insulated with a minimum 1/2-in. thick, minimum 1-1/2 lb./ft^3 density, flexible fiberglass insulation bonded with a phenolic binder, Aluminum foil-faced on the air side.
- Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 210/240 minimum exterior sweat criteria.
- Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- Cabinet finish panel is tested for 500 hours in a salt spray test in accordance with ASTM B117 standard for salt spray resistance.
- Base rails are a minimum 3-1/2” tall and include holes to allow for overhead rigging and lifting with forklifts.
- Unit includes a condensate drain pan with both vertical and horizontal drain connections.
- Unit must have ¾”-14 NPT drain connection, possible either through the bottom or side of the drain pan. Connection shall be made per manufacturer’s recommendations.
- Shall be a sloped condensate drain pan made of a corrosion resistant material.
- Unit must comply with ASHRAE Standard 62.1
- Unit shall be field convertible from vertical to horizontal airflow on all models. No special kit required.
- Base of unit shall have a thru-the-base gas and electrical connections (factory installed or field installed), standard.

ACCESS PANELS

- All Cabinet panels are designed to be easily removable for servicing Unit, and shall have one factory installed, tool-less, removable, filter access panel up to 12-½ tons. Option for hinged access panel for controls and blower section shall be available from the factory, hinges shall be of stainless-steel material for corrosion resistance.

Controls

- Units are factory-wired with color-coded wires with low-voltage control circuit protected by a resettable circuit breaker on the 24-v transformer side. Transformer shall have 75VA capability.
- Units have single-point power entry either with the unit or with the electrical heat kits on a central control terminal board to provide connection points conveniently and safely for essential control functions such as: smoke detectors, phase monitor, economizer, thermostat, and low- and high-pressure switches.
- Unit to be provided with a terminal block for connection and control wiring.
- Units come with a grounding lug as standard.
- Units come standard with 5kA SCCR.

Compressors

- Compressors are hermetically sealed scroll compressors and are factory mounted on rubber grommets. On units with two refrigeration circuits ($7^1/_2$ – 25 ton), one scroll compressor is used on each circuit.
- Compressors shall be protected from an over-temperature and over-amperage conditions by an internal, motor overload device.
- Compressors shall be internally protected from high discharge pressure through internal pressure relief valve and externally protected via pressure switch in the discharge line.

Drainpan

- Unit includes a sloped condensate drain pan made of a non-corrosive material compliant with ASHRAE Standard 62.1. Shall use a 3/4” -14 NPT drain connection, possible either through the bottom or end of the drain pan.
- Connection shall be made per manufacturer’s recommendations. No base pan penetration, other than those authorized by the manufacturer, is permitted.

Filtration

- Unit includes a factory-installed throwaway filter 2” thick, with dimensions selected based on commercial availability and low face velocity.
- Option to include higher filtration rating MERV8 or MERV13 filters.
- Filters are accessible through a tool-less access panel for fast and easy removal and maintenance.
- Filters shall be held in place by a pivoting filter tray, facilitating easy removal and installation.
- 15 - 25-ton units have filter racks to accommodate 2- or 4-inch filters.

Coils

- Coils are made of internally finned copper tube mechanically bonded to aluminum plate fins and are pressure tested at the factory to ensure pressure and leak integrity. The evaporator coil and condenser coil are leak-tested to 575 psig and pressure-tested to 450 psig.
- $7^1/_2$ – 25-ton units have two refrigerant circuits. 3 - 6-ton units have a single refrigerant circuit.
- On 3-12-½-ton AC or Gas Electric units and 3-4-ton heat pumps, each refrigerant circuit has a fixed orifice metering device for indoor and outdoor (heat pumps) coils.
- On all 15-25-ton AC or Gas Electric units and 5-10-ton heat pumps, each refrigerant circuit has a TXV metering device for indoor and outdoor (heat pumps only) coils.
- On all 12.5-ton heat pumps, each refrigerant circuit has a fixed orifice metering device for indoor and a TXV metering device for outdoor coils.
- Evaporator and condenser coils are qualified to UL 1995 burst test. Units include high- and low-pressure switches, service ports, and factory-installed filter driers. All heat pump units (DBH units) use a refrigerant accumulator.

Heating Section

- Gas/Electric units (DBG units) include a corrosion-resistant, indirect fire, aluminized tubular steel heat exchanger with formed wrinkle bends at the inner diameter of each radius.

- Type 409 stainless steel heat exchangers are available as a factory-installed option.
- The gas heating section uses an induced draft combustion blower and a direct spark ignition system. Units are suitable for use with natural gas or propane with a field-installed kit.
- The unit heating section must include the following, high temperature limit switches, induced draft motor speed sensors, flame out rollout switch and flame proving controls.
- All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit (horizontal plane).
- Low NOx reduction shall be provided as an option to reduce nitrous oxide emissions to meet California's Air Quality Management District (SCAQMD and SJVAPCD) low-NOx emissions requirement of $14 ng/J$ or less.
- Primary tubes and vestibule plates on low NOx units shall be 409 stainless steel. Other components shall be aluminized steel.

Heat Pump Heating

- Heat Pump units (DBH units). Evaporator coil, condenser coil, compressors and refrigerant circuit are designed for heat pump operation. The refrigerant circuit contains a 4-way reversing valve to provide heat. Hybrid heating option is provided for auxiliary heating.

Fans

- General: Follow manufacturer guidelines for fan motor brake horsepower. Specifier to select from available motor options per current manufacturer catalog / software.
- Types: Belt Drive - motors shall be open 3-5-ton single-speed, 6-25-ton two speed, 3 phase, 208, 230, 460 or 575 volts (60 Hz). Direct Drive – motors shall be 3-5-ton 5-speed, 1 or 3 phase, 208 or 230 volts (60 Hz).
- Belt-Drive motor mounted on base with tension adjustment feature.
- Motor bearings will be permanently lubricated type.
- Outdoor condenser fans are direct drive, permanently lubricated, and contain overload protection.

Cooling Operation Range of Outdoor Ambient Temperature

- The cooling operating range is between 35°F and 115°F outdoor ambient temperature for $7^1/_2$ – 25-ton units and between 60°F and 115°F outdoor ambient temperature for 3- to 6-ton units as standard from the factory.

Storage and Handling

- Unit to be stored and handled per manufacturer's recommendations.
- Unit to be lifted by crane using spread bars.
- Unit to be stored in the upright position.

ACCESSORIES and OPTIONS — Not all accessories and options are available for all units.

FACTORY-INSTALLED OPTIONS

- Non-Powered Convenience Outlet: A 120V, 15A, GFCI outlet can be installed in the unit making it easy for technicians to service other units once an electrician runs power to the outlet. Outlet shall be factory-installed and internally mounted with easily accessible 115-v female receptacle. Transformer not included for this option. Outlet shall include a field-installed “Wet in Use” cover.
- Powered Convenience Outlet: A 120V, 15A, GFCI outlet can be powered with a step-transformer built into the unit. For use when the unit is not running. When a factory-installed powered convenience outlet is installed in the equipment, the unit MCA (Min. Circuit Ampacity) will increase by 7.5A for 208/230V units; increase by 3.75A for 460V units; and by 3A for 575V units. The MOP (Max. Overcurrent Protection) device must be sized accordingly. Outlet shall be powered from main line power to the rooftop unit. Outlet shall include a field-installed “Wet in Use” cover.
- Stainless-Steel Heat Exchanger (DBG units only): A tubular heat exchanger made of 409-type stainless steel can be installed in the unit.
- Return Air and/or Supply Air Smoke Detectors: Return air and/or supply air smoke detectors can be installed in the unit. To safely identify the presence of smoke inside the air conditioning system and shutdown the blower to prevent the smoke from dispersing into different zones.
- Disconnect Switch (non-fused): A disconnect switch can be installed in the unit with factory wiring complete from the switch to the unit. Please note that for air conditioners (DBC units) and heat pumps (DBH units), the appropriate electric heat kit must be ordered along with the disconnect switch (non-fused) to be factory-installed. For models with a powered convenience outlet option and a disconnect switch (non-fused) option, the power to the powered convenience outlet will be shut off when the disconnect switch (non-fused) is in the “off” position. National Electric Code (NEC) and UL approved non-fused switch shall provide unit power shutoff. Disconnect shall be accessible from outside of the unit and provide local shutdown and lockout capability.
- Hinged Access Panels: Allows access to unit’s major components. Combined with latches for easy access to control box and blower motor. Available on 3 – 25-ton units.
- Through-the-base electrical connection: Allows an easy and fast field installation through the unit base pan.
- Through-the-base gas utility connection: Allows an easy and fast field installation through the unit base pan. (3-6-tons only)
- Single Point Power Connection for Power Exhaust: Factory-installed, single-point power connection for field installed power exhaust.
- Electromechanical Controllers: Basic controls that include terminal block for unit connectivity to T-Stat.
- DDC Controller: DDC communicating controller, available for 15 – 25-ton DB series models with on-board BACnet™ communication interface.
- High-Static Kit: Allows for operation in higher static applications.

FIELD-INSTALLED OPTIONS

- Manual Fresh Air Damper: Manual damper package shall consist of damper, air inlet screen, and rain hood which can be preset to admit up to 25% outdoor air for year-round ventilation.
- Motorized Fresh Air Damper: A two-position damper with rain hood and screen provides 25% outside air when the indoor fan starts and closes when the indoor fan shuts down. Consists of actuator, damper, air inlet screen, and rain hood. Damper shall close upon indoor (evaporator) fan shutoff and/or loss of power. The damper actuator shall plug into the rooftop unit's wiring harness plug. No hard wiring shall be required.
- Horizontal Economizer: Fully modulating between 0 and 100%, contains seals that meet ASHRAE 90.1 requirements. Includes controls, motor, dampers, minimum position settings, a preset linkage, a wiring harness with plug, a mixed-air temperature sensor, enthalpy or dry bulb control, and a barometric relief damper. An optional duct-mounted barometric relief damper is available. An optional return enthalpy sensor is available to provide comparative or differential enthalpy control. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable. The economizer damper type has been tested using the AMCA 511 guidelines under Section 14 "Volume Control Damper". The dampers used on these economizers are MicroMetl NS1 series and have been tested and are listed by AMCA as Class 1A dampers. Class 1A dampers have a leakage rate of no more than 3 cfm per square foot at 1" static pressure. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor. Economizer controller shall accept a 2-10 Vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
- Economizer controller on shall be the Honeywell® JADE® W7220 that provides:
    - 2-line LCD interface screen for setup, configuration, and troubleshooting.
    - On-board Fault Detection and Diagnostics (FDD) that senses and alerts when the economizer is not operating properly, per California Title 24.
    - Sensor failure loss of communication identification
    - Automatic sensor detection
    - Capabilities for use with multiple-speed indoor fan systems
    - Utilize digital sensors: Dry bulb and Enthalpy
    - Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.
- Power Exhaust: Power exhaust shall be used in conjunction with an integrated economizer. This accessory exhausts return air and may be used in either downflow or horizontal (duct-mounted) applications. Horizontal power exhaust shall be mounted in return ductwork. Power exhaust shall be controlled by economizer controller operation. Exhaust fans shall be energized when dampers open past the 0-100% adjustable setpoint on the economizer control. (Damper to be field installed, all wiring and accessory set-up is factory installed)
- High Altitude Kit (DBG units): Can be used in gas/electric units operating at higher altitudes.
- LP Conversion Kit (DBG units): Allows DBG gas/electric package units to use propane fuel.
- Roof curbs: Full perimeter roof curb. Two different heights 14" and 24", allows proper installation and structure stability. Formed galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
- Concentric duct kits: designed to provide a single-point, air distribution system with the added benefit of having directional air control.
- Restraint mounting clips: Allows for installation reinforcement for Hurricane and/or seismic events.
- CO_2 sensor: Sensor designed to alarm the system when the CO_2 levels are outside safe parameters.
- Flue extension: Allows the exhaust gas produced by the gas heater to be redirected.
- Burglar Bar Sleeves: Designed to prevent the access thru the return or supply ducting inside the unit.
- Downflow square to round adaptor 18": Installed into a recessed portion of the roof curb, the concentric duct adaptor changes the orientation of the ductwork from square to round for applications utilizing that type of ducting system.
- Side discharge concentric diffuser system: The Concentric diffuser system is an all-in-one supply and return duct free arrangement for RTU systems. This system comes with two separate duct connections, one for a supply and another for a return.

- Remote indoor sensor: Remote sensor to monitor the temperature on zones away from the main thermostat.
- Freeze stat: Temperature sensing device that monitors the heat exchange to prevent the coil from freezing.
- Filtration: 2” MERV8 and MERV13 filters available for high air filtration requirements.

FACTORY- OR FIELD-INSTALLED OPTIONS

- Downflow Economizer: Fully modulating between 0 and 100%, contains seals that meet ASHRAE 90.1 requirements. Includes controls, motor, dampers, minimum position settings, a preset linkage, a wiring harness with plug, a mixed air temperature sensor, enthalpy or dry bulb control, and a barometric relief damper. An optional return enthalpy sensor is available to provide comparative or differential enthalpy control. Damper blades shall be galvanized steel with composite gears. Plastic or composite blades on intake or return shall not be acceptable. The economizer damper type has been tested using the AMCA 511 guidelines under Section 14 “Volume Control Damper”. The dampers used on these economizers are MicroMetl NS1 series and have tested and are listed by AMCA as Class 1A dampers. Class 1A dampers have a leakage rate of no more than 3 cfm per square foot at 1” static pressure. Shall be designed to close damper(s) during loss-of-power situations with spring return built into motor. Economizer controller shall accept a 2-10 Vdc CO_2 sensor input for IAQ/DCV control. In this mode, dampers shall modulate the outdoor air damper to provide ventilation based on the sensor input.
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    - Sensor failure loss of communication identification
    - Automatic sensor detection
    - Capabilities for use with multiple-speed indoor fan systems
    - Utilize digital sensors: Dry bulb and Enthalpy
    - Economizer controller shall provide indications when in free cooling mode, in the DCV mode, or the exhaust fan contact is closed.
- Electric Heat Kits (DBC and DBH units): Heater elements are constructed of rust-resistant nickel chromium and are available in 240V-1-phase-60Hz, 240V-3-phase-60Hz, 480V-3-phase-60Hz and 575V-3-phase-60Hz. All heaters have overcurrent protection and high-temperature limit control. A single-point wiring connection is provided through a terminal block. Electric heaters are provided with staged heating as standard and option to upgrade to SCR controls.
- Phase Monitor: Phase monitor (3-phase only), available for 3-25-ton DB series models. Phase monitor shall provide protection for motors and compressors against problems caused by phase loss, phase reversal and phase unbalance. Phase monitor is equipped with an LED that provides an ON or FAULT indicator.
- Drain pan overflow switch: Allows the controls to detect and send an alarm when there is an overflow on the drain pan.
- Condenser Hail Guards: Louvered metal guards help protect the condenser coil from hail and debris; available as a field-installed options on 3 – 12-1/2-ton units. Hail guards are standard on 15 – 25-ton units.