Climate by Design INTERNATIONAL

TYPICAL SPECIFICATION: Critical Process Roof Top Unit

7/14/15

UNIT CONSTRUCTION:

Casing:

A. 2.5" NTM (No Thru Metal Casing)

1. Base frame fabrication utilizes a single frame construction for supporting the casing and internal component.

2. The casing walls and roof assemblies shall be constructed as a 2.5" NTM (No Thru Metal) design. The exterior and interior components shall be completely independent of one another, free from thermal bridges or metal fastener connections of any kind, and shall make up the insulated self-supporting casing.

3. All casing penetrations shall be provided with a thermal break between the exterior and interior panels. I.e.-all conduit penetrations shall be of a thermally broken consisting of steel fittings at the interior and exterior of the unit and PVC conduit within the insulated wall cavity.

B. BASE FRAME CONSTRUCTION

1. Units to have an 8" high electrically welded structurally formed 12 gauge G-90 galvanized steel or structural steel C-channel, depending on size and components in the unit. All frames to be suitably reinforced and braced to permit the loading, shipping, unloading and rigging to the installation location. All frames are suitable for general handling of the completed sections without damage or misalignment to the external and internal components.

2. Lifting lugs sets shall be provided on the base. Lifting lug distance shall not exceed a distance of 100" on center.

3. The floor assembly shall be 16 gauge and 20 gauge G-90 galvanized sheet steel (optional stainless steel or aluminum) for the top and bottom of the floor deck, respectively. Urethane foam insulation 4" minimum nominal thickness shall be used to insulate the base. Minimum 4" deep 12 gauge formed channels shall be used in the floor for support. This floor shall sustain the equipment loading and normal maintenance loading for the unit.

C. CASING CONSTRUCTION

1. Exterior wall panels shall be a minimum of 16 gauge G-90 galvanized steel (optional stainless steel or aluminum) and shall be fabricated into self-framing seam type construction. Interior wall panels shall be a minimum of 20 Gauge G-90 galvanized steel (optional stainless steel or 16 gauge aluminum) and shall be fabricated into self-framing seam type construction. The exterior and interior panels combined, caulked and sealed, shall form a thermal barrier wall casing capable of having no other additional structural supports required.

2. Exterior roof deck panels shall be a minimum of 16 Gauge G-90 galvanized steel (optional stainless steel or 14 gauge aluminum)and shall have a minimum of 1 ½" standing seams. Each standing seam of the roof deck shall be securely fastened at intervals not exceeding 12 inches, caulked and sealed. Interior roof liners shall be a minimum of 16 Gauge G-90 galvanized steel (optional stainless steel or 14 gauge aluminum) and shall be designed to provide the roof structure and support. The roof liner deck shall be securely fastened at intervals not exceeding 12 inches, caulked and sealed.

3. All wall and roof assemblies shall be insulated with closed cell polyurethane expandable foam insulation. The foam insulation shall have an R-Value not less than R-6 per inch, and shall conform to UL STD 94 HF1 flame spread and combustibility requirements. Minimum total R-value for the casing and walls to be 15.

4. All joints shall be caulked airtight with a food grade sealant that is suitable for temperatures in the range of -50°F to 450°F.

5. The exterior of the unit shall be made of G90 galvanized. (Optional stainless steel or aluminum)

6. Closures around all components, such as coils, dampers and filters, shall be provided and made airtight with silicone caulk. Closures shall be a minimum of 16 Gauge G-90 galvanized steel (optional stainless steel or aluminum) and shall provide solid close-off inside of the unit housing walls.

7. The interior of the unit shall be constructed so that all casing fasteners are either internal to the casing or on the exterior of the unit.

D. NTM ACCESS DOOR CONSTRUCTION

1. All process air access doors shall have a no thru metal design including both the door frame and main door panel assembly.

2. Access doors in the unit housing shall be provided to permit ready access to internal components. The access doors shall be provided with an inner sheet of a minimum of 20 gauge, G-90 galvanized steel (optional stainless steel or aluminum) to protect the insulation. The exterior of the access doors shall be a minimum of 16 gauge galvanized steel (optional stainless steel or aluminum). The doors shall be designed, to swing against the fan static (outward on suction side, inward on discharge side).
3. The doors shall be provided with heavy-duty stainless steel hinges and heavy-duty keyed latches, operable from both the exterior and interior of the unit. Door latches are linked on units that are over 68 inches tall when the door is over 46 inches tall so the doors can be opened without the use of a ladder. This also ensures complete sealing of the door.

4. Extruded aluminum frames around the doors are an option. Santoprene® gasket is press-fitted into the frame for maximum air and water seal and is field replaceable.

5. When access panels are furnished in lieu of access doors, NTM access panels shall be fabricated of 16 gauge, G-90 galvanized steel (optional stainless steel or aluminum). One access panel shall be mechanically fastened to the exterior casing and the other shall be mechanically fastened to the interior casing maintaining the thermal break.
   Optional – the doors shall be complete with an 8” x 8” plastic window.

E. *Drain Pans:*

1. Each section of the unit shall be complete with drain pans, which shall be a minimum of 16 gauge, G90 galvanized steel (optional - 16 gauge, stainless steel). Each drain pan shall be fully welded and individually tested to ensure they are leak free. Pans are mechanically fastened to the unit base frame.

2. On all units with a cooling coil section, the drain pan under the cooling coil shall be constructed of stainless steel.

3. The drain connection for the drain pans shall be designed so the pans drain out the bottom of the drain pan for full drain pan drainage with the drain connection then extending out the side of the unit. No standing water shall be allowed.
   Optional - Drain pans shall be fully welded to the unit base frame

creating a one piece pan/base construction.

F. Outside and Return Air Dampers:

1. The dampers shall be opposed blade, with bronze bearings and stainless steel spring loaded side closures.

2. The construction shall be a minimum of 16 gauge galvanized steel blades (optional - stainless steel) with a 16-gauge casing.

3. The dampers shall have a low leak rating of less than 6.5 CFM per square foot at 4" of differential static pressure.

G. *Blowers:*

1. Standard CPRT: The blowers shall consist of a centrifugal backward curved or airfoil plenum type blower with an aluminum wheel.

2. The blower shall have a standard inlet screen.

3. The wheel shall be supported by two (2) self-aligning outboard bearings, which shall be self-aligning, ball bearing, pillow block and shall be designed for at least 200,000 hours of average life.

4. The blower shaft shall be ground and polished.

5. The blower wheel, inlet funnel and support shall be of a steel construction, completely coated with an enamel coating (optional air dry, FDA approved incidental food contact coating).

6. The overload service factor used for the V-belt drive section shall not be less than 1.50.

7. Adjustable sheaves shall be supplied on 7 ½ HP or smaller as standard. Adjustable sheaves have plus or minus 7% adjustability).

8. Fixed sheaves shall be supplied on 10 HP or larger and shall be of a cast iron type.

9. The V-belt drives shall be of a standard capacity and furnished with reinforced rubber belts.

10. The blower will be in the draw through position (optional – blow through position depending on the application).

    Optional – the belt drive blower, motor and drive shall be spring isolated and be complete with a flexible connection.

Optional - the drive shall be complete with a belt

guard.

Optional – the blower shall be complete with a discharge screen.

Optional – The bearings shall have plastic extended grease lines run to the outside of the unit casing.

Optional – The shaft shall be stainless steel.

Optional - Blower shall be direct drive with an all-aluminum wheel. Wheel shall be mounted directly on the motor. Blower/motor shall be mounted to the unit floor.

H. *Motors:*

1. The motors shall be premium efficient, TEFC duty. Motors are mounted on an adjustable motor base for belt drive units.

2. The drives shall be V-belt and sized for a minimum of a 1.5 service factor.

HEATING OPTIONS:

A. Steam Coils:

1. The steam coil shall have____rows and_____fins per inch.

2. The steam coil shall be in the reheat position (optional - pre-heat position). The steam coil shall be constructed with 035" wall copper tubes and 0.0095" thick aluminum fins (optional – heavier tubes and fins or stainless steel tubes and aluminum fins or cupro nickel tubes and aluminum fins).

3. The coil shall be designed for a maximum operating pressure of 74 psi (optional - 200 psi steam – note operating pressures over 75 psi require cupro nickel or stainless tubes).

4. The capacity of the coil shall be_____BTUH using____PSIG steam at the steam coil.

5. The steam coil shall be designed for a_____••F design entering air temperature. The coil shall be designed for a maximum face velocity of 750 feet per minute.

Optional: Face and bypass dampers on the steam coil. The dampers shall be the same construction as the other dampers in the unit.

B. Hot Water or Glycol Heating Coils:

1. The hot water coil (optional - glycol coil) shall have_____rows and_____fins per inch.

2. The coil shall be supplied in the reheat position (optional - pre-heat position).

3. The coil shall be constructed with 0.020" wall copper tubes and 0.095" thick aluminum fins (optional – heavier wall tubes and fins or stainless steel tubes and aluminum fins).

4. The coil shall have_____BTUH capacity using_____··F hot water (optional - ____% glycol).

5. The coil shall require_____GPM of hot water (optional - _____% propylene glycol).

6. The water (or glycol) coil pressure drop shall be feet.

7. The coil shall be designed for a____··F design entering air temperature.

8. The coil shall be designed for a maximum face velocity of 750 feet per minute.

C. Hot Gas Ammonia Heating Coil:

1. The hot gas ammonia coil shall have rows and_____fins per inch.

2. The hot gas coil shall be supplied in the reheat position (optional - pre-heat position).

3. The hot gas ammonia coil shall be constructed with stainless steel tubes and aluminum fins (optional: hot dipped galvanized steel construction, Headers shall be stainless steel.

4. The capacity of the coil shall be_____BTUH using_____··F hot gas ammonia condensing temperature.

5. The hot gas ammonia coil shall be designed for a_____··F design entering air temperature.

6. The coil shall be designed for a maximum face velocity of 800 feet per minute.

D. Direct Fired Heating Section:

1. The unit shall be designed with a direct fired burner located in the outside air section of the unit. The direct fired burner shall have a cast header (optional aluminum) with stainless steel baffle plates.

2. The burner shall have a____BTUH capacity.

3. The burner shall be designed for 1-5 PSI natural gas pressure (optional - 8-14" or high pressure systems above 5 PSI) and be fully modulating with a 25 to 1 turndown ratio. Burner shall have adjustable profile plates.

4. The controls shall be full modulating and be designed in accordance with Factory Mutual (FM) insurance guidelines.

5. The gas train shall be complete with all safety devices and controls.

E. Indirect Fired Heating Section:

1. The unit shall be designed with an indirect fired heating section. The indirect fired burner shall be fully modulating. The heat exchanger, primary and secondary, shall be 400 series stainless steel and be complete with drain connection piped to the outside of the unit (Optional 304 stainless steel). Note: Proper disposal of any condensate shall be by the installation contractor.

2. The burner shall have a____BTUH input capacity and a___BTUH output.

3. The burner shall be designed for 8-14" natural gas pressure. Note: gas pressures above 14" requires a pressure reducing valve.

4. The controls shall be full modulating and be designed in accordance with UL.

5. The gas train shall be complete with all safety devices and controls. Burners are available with fully modulating control. Turndown shall be a minimum of 4 to 1 (optional 10 to 1 and 20 to 1).

6. Heat exchanger shall be complete with flue stack and rain cap (shipped loose for field mounting).

COOLING OPTIONS:

A. Recirculating/ Direct Expansion/ Flooded Cooling Coils:

1. The cooling coil shall have___rows and_____fins per inch.

2. The coil shall be designed for recirculating ammonia (minimum 3 to 1 feed rate) (optional - direct expansion or flooded).

3. The coil shall have a_____ton capacity using a_▪F saturated suction temperature.

4. The capacity of the coil shall be based on a mixed air entering temperature of _____▪▪F dry bulb/_____▪▪F wet bulb.

5. The coil(s) for ammonia use shall be constructed using minimum 0.028" wall stainless tubes and 0.012 thick flat aluminum fins. (maximum of 8 FPI) (Optional: aluminum coil with 0.064" thick aluminum tubes and 0.012" thick aluminum fins or hot dip galvanized steel coils or all stainless steel tubes and fins). Coil shall meet strength requirements of ASME/ANSI B31.5. All coils shall be charged with nitrogen prior to shipment.

   Option - The coil(s) for R-22, R-404a, or any of the similar refrigerants shall be constructed using 0.020" wall copper tubes and 0.095" thick aluminum fins. Headers shall be stainless steel. All coils shall be charged with nitrogen prior to shipment. Coil shall meet strength requirements of ASME/ANSI B31.5. (Optional: stainless steel tubes and aluminum fins, all aluminum coils, and all stainless steel coils).

6. The coil shall be designed for a maximum face velocity of 550 feet per minute.

B. Chilled Water or Glycol Cooling Coils:

1. The cooling coil shall have_rows and_____fins per inch.

2. The coil shall have a_____ton capacity using____GPM of_____▪F chilled water (optional -____% propylene glycol).

3. The water (or glycol) pressure drop through the coil shall be_____feet.

4. The coil capacities are based on a_____▪▪F dry bulb /▪▪F wet bulb mixed air entering temperature.

5. The coil shall be constructed with copper tubes and aluminum fins (optional - hot dipped galvanized steel, all aluminum construction, stainless steel tube and aluminum fins, or all stainless steel). Coil shall meet strength requirements of ASME/ANSI B31.5.

FILTRATION:

A. Pre-filters:

1. Pre-filters shall have an average efficiency of 25- 30%, MERV 8, pleated filters, with synthetic media (optional - aluminum or stainless steel washable filters).

2. The unit shall be supplied with one initial set of filters (option – the unit shall be supplied with two sets of filters).

3. The pre-filters shall be held in individual holding frames for upstream service. The filter frames shall be constructed of hot dipped galvanized steel (stainless steel if the interior is also of stainless steel).

   Optional – prefilter differential pressure gauge to indicate when the filters should be changed or differential pressure transducer to provide filter pressure drop indication on the PLC.

4. The filter bank shall be designed for a maximum face velocity of 500 feet per minute.

B. Final Filters:

1. The final filters shall be a 95%. MERV 14, efficient, micro fine glass wet laid paper with aluminum separators (the same material used in HEPA, absolute filters – optional synthetic type material). The filters shall be of a cartridge type. The final filter shall have a rating of 95% efficient on a 1 micron particle size.
   Option – 99.97% DOP absolute HEPA filter. The media on the HEPA filter shall be a micro fine glass. The HEPA filter shall have a rating of 99.97% on a 0.3 micron particle size. Option: An intermediate 65% filter is available with the HEPA filtration system.

2. Each of the filters shall have their own individual holding frames for upstream service. The holding frame shall be constructed of galvanized steel (optional stainless steel).

3. The final filters are complete with a differential pressure gauge. Optional: filter pressure drop transducer to provide a pressure drop indication on the PLC.

4. The unit is supplied with one set of final filters (optional - unit supplied with two sets of final filters).

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ACCESSORIES

A. Outside Air Inlet Hood:

The unit includes an outside air inlet hood constructed of G90 galvanized steel. The hood shall be complete with a bird screen (optional - insect screen).The hood shall be shipped separate from the unit.

Integral Exhaust Section:

1. The integral exhaust section shall be complete with (qty of fans) " diameter direct drive exhaust fans located within the casing of the CPRT unit.

2. Each of the fans shall be constructed of a cast aluminum hub and blades. Fans are direct drive.

3. Service for the integral exhaust fans shall be accomplished through full sized walk-in access doors (no internal hatches or confined spaces shall be allowed).

4. Each fan shall be driven by a_____H.P., TEFC or TEAO fan direct drive motor. Motors shall be VFD ready if used for pressure or economizer control.

5. Each fan shall have a double low leakage gravity backdraft damper. Material to match inner liner and exterior casing material.

Desiccant Dehumidification Section:

1. The dehumidification section shall consist of a rotor (wheel) of media impregnated with a silica gel desiccant. The wheel shall consist of a process section (where the moisture is removed from the air stream) and a regeneration section (where the moisture is removed from the air stream).

2. The section will include a heated regeneration section with a heat source to drive the moisture from the wheel. The heat source shall be direct fired natural gas (optional steam, electric).

UVC Light Systems:

1. The CPA units can be supplied with a UVC light system for either just the cooling coil(s) or coil pan(s) or can be supplied to provide UVC lighting for the whole unit. Light systems are complete with individual ballasts, on the outside of the unit in a separate control panel. Bulbs are complete with a protective sleeve.

2. The system includes an access door observation window and an access door safety switch so the light(s) will go off if the door is opened.

ELECTRIC CONTROLS:

Each unit shall be supplied with a Carel DDC controller. (Optional Allen Bradley PLC control system).

The following are some of the many options which are available for control systems.

- Main control panel, control transformer and terminal blocks with UL label.
- Allen Bradley Compact Logix and Micro Logix systems. Control Logix available as an option. Systems are complete with a 600 panel view (optional large panels available) in the door of the main panel.
- Outside air and recirculated air controls which use outside air on an economizer.
- Outside air and recirculated air controls providing a fixed amount of outside air.
- Outside air damper controls for systems with100% makeup air.
- Room thermostats or RTD's (typically mounted in the return air of the unit).
- Return air thermostat or RTD's
- Outside air thermostat or RTD's
- Motorized steam valve (field mounted). Trap by others.
- Magnetic motor starters mounted in the control panel.
- Disconnect switches mounted in the control panel.
- Arc flash disconnects
- Remote stainless steel control panels which can include (just a few of the possible options):
  - blower on/off switch
  - blower indicating light
  - cleanup switch
  - cleanup indicating light
  - dirty filter light
  - burner Indicator light
  - PLC panel view
- Steam coil freeze stats.
- Hot water or glycol 3-way control valves (shipped loose for field mounting)
- Chilled water or glycol 3-way control valves (shipped loose for field mounting)
- Room de-humidistat located in the remote control panel (or return air).
- Natural gas heating controls – either direct or indirect fired.
- Discharge air ammonia detector.
- Smoke detectors.
- CO2 detectors

- O2 detectors
- Interior service lights.
- Service receptacles
- Room pressurization control.
- Heating coil face and bypass dampers and damper controls.
- VFD motor control
- Exhaust motor starters and or VFD drives
- Cleanup cycle system and controls
- UVC coil/drain pan light systems.
- Complete unit UVC light systems.
- Blower door interlock switches (standard or CAT 3)
- Dirty filter lights/contacts.
- Unit mounted surge drum support channels.
- ASME surge drums shipped lose for field mounting by others.
- PLC controls with customer specified alarms, interface, and data collection.

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