NOTE TO USERS OF THIS DOCUMENT: Document is intended as generic format for specification. Use of catalog data and an understanding of Titan Air product line are required to prepare a specification for a specific unit. Items that require the user to select the appropriate data are highlighted drop down menus. Text boxes require the user to enter appropriate data and any initial text can be deleted from the text boxes.

Specification for Model TA | Recirculating Direct-Fired Make-Up Air Unit (Rev 5)

Section 15Click or tap here to enter text.

**Part 1- General**

1.1 Administrative

* 1. General
		1. This section includes AHU-Click or tap here to enter text., recirculating direct gas-fired air-handling unit, as well as, other options described herein.
	2. Quality Assurance
		1. Manufacturer’s Qualifications: Firms regularly engaged in the manufacture of recirculating direct gas-fired air-handling equipment of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years. Manufacturer equipment must be listed by an NRTL in compliance with ANSI Z83.18, Standard for Recirculating Direct Gas-Fired Industrial Air Heaters.
	3. Delivery, Storage and Handling
		1. Handle units and components carefully to prevent damage, breaking, denting and scoring. Store units in dry place with particular care given to ensure burner is covered from water entering and damaging gas train. Do not install damaged units. Comply with manufacturer’s rigging and installation instructions.
	4. Summary
		1. The contractor shall furnish and install air handling unit(s) as shown and scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform to the specified conditions as scheduled. Handle units and components carefully to prevent damage, breaking, denting and scoring.

**Part 2- Products**

2.1 Manufactures:

* 1. Titan Air base bid. Represented by Click representative’s company name & address.

2.2 General Unit Description

1. General
	1. Air handling unit AHU-Click or tap here to enter text as manufactured by Titan Air model TA – selection required – selection required – selection required. AR. Packaged units shall have an ETL Laboratories, Inc. label certifying compliance with ANSI Z83.18, Standard for Recirculating Direct Gas-Fired Industrial Air Heaters.
	2. All units shall be manufactured with control panels, motors and blower drives within unit.
	3. Manufacturer shall offer a 24 month parts warranty from date of shipment.
	4. Unit shall be factory wired, tested and assembled to the extent that shipping will allow.
	5. Remote control panel to be field wired to unit control panel.
2. Unit Construction
	1. Base and frame shall be fabricated from heavy duty welded structural steel channel, tubing, and or angle. Heavy duty lifting provisions shall be included on all units. Floor shall be fabricated from 16 ga sheet steel (14 ga and 18 ga available if specified) galvanealled- paintlock. Each sheet shall have a base structural support centered under all seams and additional supports for adequate support of the unit material and components. Base and floor weldment shall be cleaned and primed before assembly of unit.

(*Formed sheet steel bases are not acceptable on units over 10,000 CFM*.)

* 1. Formed sheet metal base floor shall be fabricated from 16 ga sheet steel (14 ga and 18 ga available if specified) galvanealled- paintlock for painted exterior or G-90 galvanized for un-painted exterior. Each sheet shall have a base structural support centered under all seams and additional supports for adequate support of the unit material and components. All sheets shall be fastened to the base structure and each other using driller screws. Base and floor structure shall be cleaned and primed before assembly for painted units.
	2. Floor liner on welded base shall be fabricated from 16 ga sheet metal (14 ga available if specified) galvanealled- paintlock for painted interior or G-90 galvanized for un-painted interior. Each sheet shall have a base structural support centered under all seams and additional supports for adequate support of the unit material and components. All sheets shall be fastened to the base structure using rivets or self-drilling screws.
	3. Welded base floor shall have selection required insulation selection required.
	4. Formed base floor shall have selection required insulation with liner.
	5. Casing walls and roof panels to be 18 ga sheet metal (16 ga available if specified) galvanealled- paintlock steel for painted units or G-90 galvanized for un-painted units. Panels shall be attached to each other using driller screws on internal and exterior seams. Each seam shall be sealed with an acrylic latex caulk before and after assembling the panels.
	6. Casing walls and roof shall have selection required insulation selection required. All additional shipped loose accessories shall have the same interior construction and finish.
	7. Casing exterior finish shall be selection required. All additional shipped loose accessories shall have the same interior construction and finish.
	8. Access door will be selection required construction made with the same material as the rest of the air handler with a continuous bulb type weather-strip seal. Handles shall feature tool access locking mechanism independent of latch operation. Once unlocked and prior to locking with a tool, subsequent latching or unlatching will not require a tool or key. Access doors opening with positive pressure shall be in-swing to prevent injury.

1. Direct-Fired Burner Section
	1. Burner to be natural gas direct-fired line burner type as manufactured by Midco International. Stainless steel air baffles on the burner will ensure proper gas-air mixture at varying gas input levels. Gas manifold casting shall be corrosion resistant – aluminum, cast iron is not acceptable. Burner to be designed to provide 100% thermal efficiency throughout the life of the burner. Burner shall be of a design that produces less than 5 PPM CO and 0.5 PPM nitrogen dioxide throughout its modulating range. Burner manufacturer’s published turn down ratio shall be a minimum of 25:1. All air moving across the burner shall come from an outdoor source. Recirculating room air across the burner shall not be permitted.
	2. AR air recirculation system shall allow outside air to modulate from 20 to 100% of unit full rated CFM. Return air shall not cross the direct fired burner and shall vary inversely, 0 to 80%, to make up remaining balance of unit CFM. Unit temperature shall be controlled by a Carel room air temperature control with discharge temperature high and low limits. Outside air dampers shall be controlled by a selection required. Recirculation equipment shall be ETL listed certifying compliance to ANSI Z83.18.
	3. Gas train shall be constructed to selection required requirements. All gas train components shall be selected to operate at a selection required gas pressure.
	4. Air flow switch(s), high temperature limit, ignition transformer, main and pilot pressure regulators, control voltage transformer, electronic flame supervision, manual main and pilot gas shut off valve, main gas automatic safety shut-off valves, and modulating gas valve with discharge air temperature controls shall be provided. If room temperature control is desired, control system shall reset discharge temperature set-point based upon room temperature deviation from room temperature set-point.
	5. Interrupted ignition system and flame supervision will be provided. Diagnostic lights on flame safeguard with fault mode information for troubleshooting.
	6. High manifold gas pressure switch shall be provided.
2. Blower/Motors/Drives/Base:
	1. Blower(s) shall be selection required diameter, DWDI centrifugal forward curved type mounted on a solid turned, ground and polished steel shaft with self-aligning bearings. Pillow block or flange mount bearings mounted on welded, structural steel supports will be standard on all welded bases. Formed sheet metal base shall have formed 16 Ga sheet steel, blower cheeks with pillow block or self-aligning bearings. Fan wheel shall be statically and dynamically balanced. Fans to be capable of moving Click or tap here to enter text. CFM against Click or tap here to enter text.“w.c. E.S.P. with a Click or tap here to enter text. H.P. motor. Variable pitch blower drive shall be included up to 30 HP without VFD. Units furnished with a VFD will typically not have a variable pitch blower drive. Motors shall comply with NEMA premium efficiency rating. Motors shall have a NEMA frame with a 1.15 service factor.
3. Controls:
	1. All controls shall be factory mounted inside the equipment. Components to include motors, disconnects, fuses, circuit breakers, actuators, temperature controls, flame safeties, thermostats, sensors, safeties, alarms, and all other electrical components.
		1. All electrical wiring shall be completed to NEC electrical codes. Local electrical code requirements are the responsibility of the installing contractor.
		2. All electrical wiring shall terminate at a marked terminal strip and shall be separated for high voltage, control voltage, and signals. Wire duct, wire wrap, and tie wraps shall also be used to organize the wiring and provide a tidy electrical vestibule.
		3. All exposed high voltage terminals shall have a protective cover to provide additional safety for service personal.
		4. Control vestibule, remote panel, and shipped loose electrical components shall be tagged with installation instructions and wiring diagrams if applicable.
		5. Air pressure tubing shall include additional ports for taking measurements.
	2. Temperature control shall be accomplished by (select one of the following):
		1. [ ] Carel (DDC) components with digital user interface and optional selection required compatibility for future interoperability with multiple types of equipment and building management systems. Status and alarm lights shall be provided on the remote control panel.
			1. Low temperature limit w/ bypass timer to shutdown unit if cold discharge temperature is sensed for selected duration (typically 3 minutes) shall be provided.
			2. Inlet ductstat function to disable the burner when warm inlet air temperature is sensed shall be provided.
			3. Time clock shall be provided.
			4. Unoccupied setpoint shall be provided.
			5. Audible alarm shall be provided and sound on critical operation alarms.
	3. Additional safety or operation controls shall include (Check desired controls):
		1. [ ] Clogged filter switch with remote panel alarm indication.
		2. [ ] Low inlet gas pressure switch shall be provided.
		3. [ ] Selection required disconnect shall be provided.
		4. [ ] UV scanner in place of standard rectification sensor shall be provided.
		5. [ ] Duct mounted smoke detector shall be provided and will ship loose for remote ductwork installation.
		6. [ ] Space CO detector shall be provided and will ship loose for remote space installation.
		7. [ ] Space CO2 detector shall be provided and will ship loose for remote space installation.
		8. [ ] Fire thermostat shall be provided and will ship loose for remote space installation.
		9. [ ] Blower door switch shall be provided and will shut down the AHU when the blower access door is opened.
		10. [ ] Control relay will be energized selection required then the relay contact shall selection required.
		11. [ ] Proof of supply and exhaust (exhaust blower by others) airflow shall be provided to ensure that both airflows are present. Canadian or local code requirement.
		12. [ ] (Additional controls required to accomplish sequence of operation) insert appropriate specification(s).

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1. [ ] Variable Frequency Drive:
	1. Mitsubishi drive
		1. Gradually increase or decrease speed during the starting and stopping of the blower motor to ensure a balanced start and stop.
2. Options and Accessories:
	1. All accessories shipped loose or attached to the equipment shall match the exterior material and finish. Unless otherwise stated, all birdscreen shall be steel wire mesh with a square 1” x 1” opening with a wire diameter of .07”.
	2. Options and accessories shall include (Check desired options and accessories):

(Accessories are shipped loose unless otherwise specified)

* + 1. [ ] Outside air V-bank pre-filter section with selection required filters mounted in a slide-in rack accessed on the side of the unit.
		2. [ ] 45 degree outside air hood with birdscreen.
		3. [ ] 45 degree outside air hood with birdscreen and built-in flat face selection required filter section. Filter face velocity shall be less than 750 fpm.
		4. [ ] Full turndown outside air hood with birdscreen.
		5. [ ] Weather proof louvered intake air hood with birdscreen.
		6. [ ] Standard selection required air damper with motorized actuator. Frame shall be formed 14ga. G-90 galvanized steel with welded corners. Blades shall be 16ga. G-90 galvanized with press formed reinforcements, 1/2” diameter plated steel rods, 1/2” self- lubricating porous bronze bearings, plated steel center brackets, and 1/4“ or 5/16“ plated steel linkage rods. *Based on Vent Products 5100 series*.
		7. [ ] Low leak selection required air damper with motorized actuator. Frame shall be formed 14ga. G-90 galvanized steel with welded corners. Blades shall be 0.081 extruded aluminum with 1/2” diameter plated steel rods, 1/2” self-lubricating porous bronze bearings, thermoplastic rubber edge seals, spring stainless steel side seals, plated steel center brackets, and 1/4“ or 5/16“ plated steel linkage rods. *Based on Vent Products 5900 series*.
		8. [ ] Vibration isolation selection required type for selection required isolation.
		9. [ ] Roof curb, selection required high for selection required roof.
		10. [ ] Discharge selection required air diffuser.
		11. [ ] Service lights shall be provided for each component sections with the switch mounted selection required.
		12. [ ] Service Platform- Horizontal units, platform shall be provided with base and handrails to bolt to make up air unit in field. Blower, burner and filter section shall be accessible from platform. Vertical unit platforms shall provide access to blower section only. Platform base shall be 11 gauge ¾” expanded metal with 1” x 1” 14 Ga handrails. Service platform door shall swing into platform and return to close position once door is released.
		13. [ ] Service GFI outlet shall be mounted on the outside of unit with power provided by others.
		14. [ ] Gas pressure gauges for input and manifold gas pressure shall be provided. Gages shall be installed in Gas Train/ Electrical vestibule.
1. [ ] (Optional) Factory start-up shall be provided with AHU including operation, maintenance, and service training. A minimum of two-week notice is required for scheduling and a start-up authorization form is required to ensure jobsite is ready for start-up.

**Part 3- Execution**

3.1 Examination:

* 1. Contractor shall verify that site is ready to receive work and opening dimensions are as indicated on shop drawings.
	2. Contractor shall verify that proper power supply, gas pressure and other utilities are available.

3.2 Installation:

* 1. Contractor shall install in accordance with manufacturer’s instructions.
	2. Refer to Division 16 for following, not work of this section.
		1. Power supply wiring from power source to power connection on make-up air units including required electrical devices. Unit disconnect and starter is included with make-up air unit. Control wiring between field installed controls and remote control station shall also comply with Division 16.