Delta Cooling Towers, Inc.
185 US Highway 206
Roxbury Twp., New Jersey 07836
Telephone 973.586.2201
Fax 973.586.2243
www.deltacooling.com
sales@deltacooling.com

VANGUARD® Packed Column Air Stripping Tower Specifications

VANGUARD® air stripping towers are forced draft air stripping towers with single unit capacities from 60 to 4,000 gallons per minute. Delta air strippers are designed to remove volatile organic chemicals and certain other substances from water. These towers are a unique design that Delta Cooling Towers has been manufacturing since 1981 and have been very well received in both commercial and industrial applications.

The towers operate on a countercurrent forced draft design. A blower, ducted into the sump plenum provides air at a slight positive pressure and forces it to flow upward against the water trickling downward through the packing. As the air passes over the water, spread over the packing surface as a thin film, the molecules of contamination cross the air to water interface and enter the air stream. The air then exits the column either to atmosphere or to some means of vapor phase offgas treatment.

Delta VANGUARD® air stripping towers are available in most accepted materials of construction; aluminum, stainless steel, or FRP. Random packed medias are offered as well as our own Delta-Pak® structured packing.

Delta VANGUARD® Air Strippers possess known, predetermined stripping performance and operational characteristics based upon field and pilot test data obtained from certified test laboratories. The quality and performance of these systems is evidenced by our more than 500 installations worldwide.

VANGUARD® PACKED COULUMN AIR STRIPPING TOWER
(ALUMINUM MATERIALS OF CONSTRUCTION)

1 GENERAL INFORMATION

1.01 Scope of Work Included

Design, fabrication, and delivery of one (1) aluminum packed column air stripping tower in accordance with the below design criteria and all applicable codes and standards. Scope of supply shall at a minimum include the specified air stripping towers, all associated internals, packing media and influent piping, the air blowers and intake ductwork, filters and louvers, and installation supervision and startup services.

1.02 Related Work Not Included in Scope

a. Concrete work is by others and is specified in Section _____.

b. Control Systems and Field Wiring is by others and is specified in Section _____.

1.03 Materials and Workmanship

All equipment and materials shall be furnished in new condition suitable for the conditions of service to which they will be subjected. Items must meet the applicable specifications and standards for grade and quality. Welding of the vessel and internals shall be completed by welders certified to either ASME Section IX or AWS Code Standards.

1.04 Submittals

Six (6) copies of the Engineering Review Submittal shall be submitted to the engineer, and approved, prior to release of any items for manufacturing, fabrication, or delivery. Submittals, at a minimum, shall contain the following items:

a. Detailed shop drawings and equipment layout drawings.

b. Blower and air handling equipment drawings including blower curves.

c. Anchor bolt details and support pad loading calculations.

d. Tower shell structural calculations.

e. Data sheets and cut sheets detailing any auxiliary equipment to be supplied.

f. Data sheets on any instruments or gauges to be supplied.

1.05 Operation and Maintenance Manuals

Six (6) copies of the Operational and Maintenance Manual shall be supplied to the engineer prior to delivery of the equipment to the jobsite. The manual shall contain record copies of all drawings, installation instructions, start-up instructions, safety instructions, and all information required for the proper operation and upkeep of all items supplied.

1.06 Experience Qualifications

The supplier of this equipment must be regularly engaged in the manufacture and delivery of Packed Column Air Stripping Towers and shall have such equipment of similar size and performance in successful and continuous operation. At a minimum the air stripping tower manufacturer shall have 5 years of experience in the manufacture and supply of air stripping tower systems of similar size and capacity.

1.07 Alternate Layouts or Equipment Manufacturers

If the contractor should choose to pursue the use of an alternate manufacturer to that which is stipulated in this specification, all changes to the current design both within this section and on the overall project shall be the sole responsibility of the contractor. This responsibility is inclusive of all costs associated with this change in suppliers from both an engineering and construction standpoint. Approval of this alternate and its associated changes must be obtained from the engineer prior to the bid.

2 PRODUCTS

2.01 Packed Tower Air Stripper

The air stripping column shall be **Model No. ΔS8-200DAC** as manufactured by **DELTA COOLING TOWERS, INC, 185 US Highway 206, Roxbury Township, New Jersey 07836, phone (973)586-2201.** No alternate manufacturers will be accepted without submittal to the engineer fourteen (14) days prior to the bid, and approval by the engineer via specification addendum.

2.02 Performance Requirements

The air stripping system shall be designed to meet the following performance requirements:

Contaminant	Design Influent Concentrations	Maximum Effluent Concentration	Minimum Removal Efficiency
PCE	10.0	0.1	99%
RADON	1200	60	95%

2.03 Operating Parameters (per tower)

Parameter	Value
Design Flow Rate	1,200gpm
Minimum Flow Rate	600gpm
Water Temperature	50°F
Tower Diameter	96”
Maximum Overall Tower Height	31’-0”
Packing Type	DeltaPAK
Packing Bed Depth	20’-0”
Minimum Air to Water Ratio	40:1
Maximum Liquid Loading Rate	23.9 gpm/sqft

Note: It is the responsibility of the column manufacturer to select and size all components of the column to meet the removal criteria. The component sizes shall meet or exceed those given herein.

2.04 Tower Design Criteria

2.04.1 Tower Shell

a. The air stripping tower column is to be constructed entirely of 5000 series structural grade aluminum designed, manufactured, and inspected in accordance with the requirements of the Aluminum Association and applicable ANSI/BOCA Codes for wind and seismic loading. The tower shell shall have a minimum thickness of 3/16-inch throughout. The design must allow for the addition of 10 feet of packed bed depth for future needs. All welds shall be continuous and shall seal both sides of structural members. No undercut will be permitted.

b. The tower shall be supplied with a base ring around the tower base. The base ring shall have a minimum thickness of ¾” and will have a sufficient number of anchor bolt holes to safely transmit the maximum overturning moment loads imposed by the design wind or earthquake loads specified above from the shell to the foundation.

c. The tower shall be provided with all necessary connections, inspection ports, lifting lugs and pipe support brackets.

d. The tower shell and influent pipe shall be flanged at or near the top of the packing bed to allow for the extension of the packing bed by a minimum of 10’-0” in the future.

e. Several equally sized air outlet screens shall be provided on the tower shell above the mist eliminator. A minimum of three (3) windows shall be utilized.

f. The roof of the air discharge section of the tower shall be coned or pitched to prevent the accumulation of snow and/or rainwater.

g. Prior to internal lining and final assembly, the tower shall be air tested at a minimum of (3) three times the blower rated static pressure and soap tested to identify any weld defects. Any defects identified shall be repaired and re-tested.

2.04.2 Influent Pipe

a. The air stripping tower shall be supplied with a Schedule 80 PVC influent pipe. The pipe shall terminate with a Van Stone flange at approximately 5'-0" above grade.

b. The pipe shall be attached to the tower shell via pipe support brackets and u-bolts.

c. The influent pipe shall be flanged at or near the top of the packing bed to simplify tower extension should future performance requirements warrant.

2.04.3 Manways

a. A minimum of three (3) manways shall be provided for inspection and access to tower internals.

b. Manways shall be positioned in the sump, at the bottom of the packing bed, and in the distribution section.

c. The manway at the bottom of the packed bed shall be provided with an expanded metal screen to prevent the escape of packing media during inspection.

d. All manways shall be provided with bolted covers which shall be gasketed and water/air tight.

2.04.4 Internal Components

a. The design packing depth shall be provided utilizing DeltaPAK® high efficiency structured packing media. The packing media must be NSF Certified. Packing material must be Type 1 PVC. Minimum packing surface area is 90 sqft/cuft. The packing media shall be factory installed prior to shipping to the jobsite.

b. Due to the large variation in performance characteristics and efficiencies from alternate packing medias, no alternate medias shall be considered.

c. The packing shall be supported by an FRP grating structure. This structure shall be supported by an internal continuous ring welded to the tower shell. Independent support beams shall also be used when required to minimize deflection.

d. Air inlet connections from the blower to the tower shall be flanged externally and shall be shrouded internally to prevent entry of water from the packing above.

e. A mist eliminator shall be located above the distribution system. This mist eliminator shall be the Delta AB design, constructed of Type 1 PVC material. Minimum mist eliminator pad depth is 6".

2.04.5 Distribution System

a. The distribution system shall be an orifice plate style system capable of 1,200gpm to 600gpm.

b. The distribution system shall be entirely constructed of 304 stainless steel material.

2.04.6 Internal Lining

a. Surface Preparation: The entire interior of the shell shall be prepared in accordance with SSPC-SP 6 Commercial Blast Cleaning.

b. Coating Systems: All interior wetted surfaces of the tower shall be coated with a painting system suitable for potable water (NSF 61 Approved). The final Dry Film Thickness (DFT) is to be 8 to 12 mils, applied in a minimum of two (2) coats.

2.04.7 Miscellaneous

a. Bolting and Hardware: All hardware used to assemble the tower, its internals, and all associated ductwork and piping shall be 304 stainless steel.

b. Anchor Bolts: Design of the anchor bolt system for attachment of the tower to the concrete foundation is the responsibility of the tower manufacturer. The design of the tower foundation is the responsibility of others. Supply and installation of the anchor bolts is the responsibility of the contractor.

c. Gasketing: The tower body flange, manway connections, and ductwork connections shall be sealed with a 1" wide closed cell neoprene sponge gasket. All piping connections shall be sealed with a 1/8" thick full faced red rubber gasket.

2.05 Air Handling Equipment

2.05.1 Air Blower

The tower manufacturer shall furnish One (1) air supply blower in accordance with the below listed auxiliaries, options, and specifications listed below. The equipment shall be supplied by American Fan or engineer approved equal.

a. The blower supplied shall be belt driven, single width, single inlet, and shall be capable of providing 6,420scfm of air at 3.5" static pressure.

b. The blower is to constructed and tested in accordance with AMCA standards.

c. The blower and wheel shall be constructed of heavy gauge carbon steel and be continuously welded.

d. The bearings shall be visible and accessible for inspection and maintenance. Bearing life shall have a minimum of 20,000 hours at a L10 rating.

e. The sound levels generated by the blower during normal operation shall not exceed 85 dBA – weighted, slow response, under free field condition, at a horizontal distance of 10 feet from the surface of sound generation.

f. The blower shall be dynamically balanced at the factory prior to shipping.

g. The blower shall be finish painted by the General Contractor after installation at the jobsite.

h. The blower motor shall be a 7.5hp designed for 230/460 volt, 3 phase, 60 Hz service. The motor shall be high efficiency TEFC with a service factor of not less than 1.15.

i. Lifting lugs shall be provided for ease of handling.

j. The blower assembly shall include as a minimum, a weather cover/drive guard, a drain connection, an adjustable motor baseplate, and inlet/outlet flanges.

2.05.2 Ductwork

a. All required ductwork to connect the blower discharge to the Air Stripping Tower and to connect the blower inlet to the filter assembly shall be provided by the tower manufacturer.

b. The ductwork shall be constructed of structural gauge aluminum of a minimum thickness of 1/8".

c. The ductwork must be of welded construction. Rivet or lock seam ductwork is not acceptable.

d. All welds must be continuous and smooth. All splatter and heat marks shall be removed.

2.05.3 Accessories

a. Flex Boots: The inlet and discharge of the blower shall have flex boot assemblies installed to isolate vibration and ease installation. The flex boot dimensions shall be identical to the blower inlet and discharge flanges. The flex boot flanges shall be aluminum and the boot material shall be fiber reinforced neoprene with all seams sewn. Rubber materials and slip fit boots shall not be acceptable.

b. Discharge Pressure Switch: A pressure switch shall be installed on the blower discharge ductwork to verify blower operation. The pressure switch shall be Dwyer Series 1950 or approved equal.

c. Backdraft Damper: The blower shall be supplied with one (1) counter-balanced backdraft damper. The damper shall be American Warming and Ventilating model BD-51.

d. Filter Housing: Blower inlet air filters and housing shall be supplied. The filters shall be Farr 30/30 extended area, 4” deep, and shall be installed in a Farr glide pack holding frame.

e. Intake Louver: The filter housing shall be supplied with a properly sized intake louver to prevent the entry of rain and snow into the filters. The intake louver shall be an American Warming and Ventilating model AW-21 fixed blade.

3 Execution

3.01 Installation

a. Prior to the pouring of the foundation, the tower manufacturer will supply an anchor bolt template for use by the General Contractor in setting the anchor bolts. This template must be a direct transfer of the hole locations from the actual tower base ring.

b. Installation shall be in strict accordance with the manufacturer’s recommendations and instructions as supplied in the O&M manuals and shop drawings.

c. The General Contractor shall provide all field labor and equipment for installation of the tower.

3.02 Disinfection

Disinfection of the newly installed air stripping tower, and supply/disposal of all disinfection chemical is the sole responsibility of the general contractor.

4 Optional Accessories

4.01 Air Flow Measuring Station

a. Provide (1) Air Flow Measuring Station, located on the discharge of each blower, to accurately display the system air flow rate.

b. Air measuring stations shall be FAN-Evaluator as manufactured by Air Monitor Corporation, Santa Rosa, CA or approved equal.

c. The airflow measuring station shall be fabricated of a 1/16" thick minimum galvanized steel, welded casing 8" in depth. The housing shall of identical size to the ductwork it is to me mounted into, and is of a flanged design.

d. The maximum pressure drop through each station shall not exceed 0.015" w.c.

e. The monitor shall be capable of measuring the airflow rate within an accuracy of 2% as determined by USGSA certification tests.

4.02 Manway Access Ladders and Platforms

An OSHA compliant caged ladder and platform assembly shall be provided by the tower manufacturer as shown on the contract drawings for access and inspection of the tower internals. The ladder and platform shall be supported directly from the tower shell via support clips welded to the tower shell.

a. Ladder: The ladder shall be composed of ¾" diameter rungs. The ladder shall have a minimum space of 16" between the vertical runners. The vertical distance between rungs shall be uniform and shall not exceed 12". The minimum distance between the rungs and the tower shell is 7".

b. Cage: The ladder assembly shall include a continuous safety cage from no more than 7'-6" above grade and running to 3 feet 6 inches above the upper platform. The cage shall be permanently welded to the ladder and be connected to the platform handrail via bolted clips. At the cage base, a locking door shall be installed to prevent unwanted entry.

c. Platform: An inspection platform shall be provided at an elevation several inches below the upper manway. The platform shall be supplied with the necessary handrails, toe plates, and safety gates. The walking surface shall either be non slip grating or diamond plate. Per OSHA standards, platform shall be a minimum of 3

feet wide and the step across distance from the ladder to the platform shall be between 3 and 12 inches.

d. The ladder and platform assembly shall be fabricated from structural grade aluminum.