PART 1 – GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish and install all materials, labor, accessories and equipment to put into service the odor control system in accordance with the Contract Drawings and these Specifications.

B. Each odor control treatment unit shall be furnished complete with all accessories, valves, wiring, motor control, local disconnects, special tools, spare parts, mountings, anchor bolts, control panels, controls, wiring, wiring connections and other appurtenances as specified that may be required for a satisfactory and complete installation.

1.02 RELATED WORK

A. Division 16, Electrical General Provisions.

B. Section 16220, Electric motors.

C. Division 15, Piping and valves

D. Section 10200 Louvers and Vents

1.03 REFERENCED STANDARDS

A. National Electric Code (NEC)

1.04 SUBMITTALS

A. Submittals shall be in accordance with Section 01330.

B. Shop Drawings shall include, but not be limited to:

1. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

2. Complete assembly, layout, installation and foundation drawings with clearly marked dimensions.

3. Motor nameplate data.

4. Assembled weight of units and approximate total shipping weight.

5. Sample equipment nameplate data sheet.

6. List of special tools and spare parts.

7. Manufacturer’s (or distributor’s) name, address, and telephone number.
C. Operation and Maintenance Manuals

1. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements of the applicable section of Division 1, within 30 days of delivery of the equipment to the Contractor.

D. Equipment Warranty

1. All equipment shall have a one (1) year warranty effective the date of acceptance by the Owner. Warranty shall cover defects in material and workmanship.

1.05 MANUFACTURER’S QUALIFICATIONS

A. The equipment covered by these Specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade and shall be operated satisfactorily when installed as shown on the contract drawings.

B. The manufacturer shall have a minimum of twenty five (25) years experience in the design, fabrication, and testing of systems that are 99.5+% efficient at removing gaseous contaminants. Only those manufacturers who manufacture and furnish media, which meets the requirements of this specification, shall be accepted.

C. The manufacturer shall be a single source provider of equipment, media, and testing services and be certified to ISO-9001:2008 standards. ISO certificate must be submitted at time of bid.

D. Manufacturer shall supply a list of 50 aluminum installations of similar capacity to the engineer and owner prior to the bid. All installations must be of dry media type.

E. Manufacturer shall carry a minimum of $2,000,000 in Additional Product Liability Insurance to cover any bodily injury or property damage to a third party due to product failure. Evidence of this policy must be submitted at the time of bid. Limited Liability Corporations will not be accepted.

F. All systems must meet “Buy American" Standards.

G. The manufacturer shall be Purafil, Inc. of Doraville, Georgia, no substitutes. Contractor shall bid job based on Purafil’s system only. Any savings after the bid shall be passed on only to the owner.

H. The manufacturer shall have local, factory-trained representatives available for start-up services and warranty work.
1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. The Contractor shall deliver, handle and store the equipment furnished under this Section in compliance with the instructions of the equipment manufacturer and as outlined in Section 01660.

PART 2 - PRODUCTS

2.01 ACCEPTABLE UNITS AND MANUFACTURERS

A. Unit(s) provided under these specifications shall be a:

1. Deep Bed Scrubber – 3,000 CFM (DBS-605) as manufactured by Purafil, Inc. Doraville, Georgia.

2. Or approved equal.

2.02 GENERAL

A. The Deep Bed Scrubber shall contain dry chemical medias as manufactured by Purafil, Inc.

B. The airflow capacity shall be 3,000 CFM at approximately 8.55 IWG including pressure drop through the media beds, mist/grease eliminator and 1 IWG external static pressure.

C. The Deep Bed Scrubber shall be designed to operate at 99.5+% gas removal efficiencies.

D. The Deep Bed Scrubber shall be arranged for horizontal airflow through vertically oriented, separate media beds. The media beds shall be arranged in series to assure maximum contaminant removal efficiency. The system shall be a draw through design with the motor and blower enclosed inside the unit.

E. The unit shall be approximately 59.2 inches (1504 mm) wide, 84.2 inches (2139 mm) high and 134.63 inches (3419 mm) ± approximately 14 inches (356mm) for 4th pass of media long (nominal dimensions) and provide gasketed side access ports for servicing of components. Dimensions do not include mist eliminator section, or sample ports or vacuum ports.

F. The unit shall contain media sampling ports located on each media bed; these shall extrude from the unit approximately 6 inches outward from the bed on both sides of the unit and extend into media bed min. 6”. The ports shall be located in the center of the media bed and shall be covered with an aluminum cap.

G. Standard 4” Vacuum ports shall be located at the bottom of each media bed. The ports shall only be located on one side of the unit and shall extend approximately 6 inches (152 mm) from one side of the unit.
H. Grating shall be located on top of unit at all locations where fill ports are not located. Fill ports shall extend a minimum of 10” above the vessel height and shall be filled with media as to prevent odor bypass.

I. OSHA approved aluminum ladder and rail shall be provided on unit. This shall be located at inlet plenum area.

J. An outlet rain louver extending across the length and width of the unit will be provided.

K. An inlet transition shall be provided by Odor control manufacturer. This shall be attached to the mist eliminator and run to a 24” circular duct provided by the contractor. The contractor is responsible for all flexible connections.

2.03 SCRUBBER HOUSING

A. The Deep Bed Scrubber housing shall be fabricated of std 3003 H-14 aluminum.

B. The unit shall be provided with side access hatches and gaskets for servicing of components. Stainless steel latches shall have a positive locking action and shall include an encapsulated standard steel shaft.

C. All hinges shall be constructed of stainless steel.

D. Housing materials shall be weatherproof and suitable for outdoor operation.

E. All latches shall be of stainless steel and rubber construction.

F. Unit shall come fully shipped on a 3 inch (76 mm) aluminum skid base All fasteners shall be of stainless steel construction.

G. Aluminum name plate shall be provided, permanently riveted to the unit. Nameplate shall be engraved with the scrubber type, order number and serial number.

2.04 MIST ELIMINATOR

A. The mist eliminator shall be designed to remove 99% of water vapor (>4 micron diameter)

B. The mist eliminator shall be located at the air inlet. Water collected shall drain into a collector pan and into the drain system. The drain system, complete with loop seal (P-trap), is required to overcome the vacuum created by the downstream blower.

C. The mist eliminator pad shall be 2 inches (51 mm) in thickness at a minimum and shall consist of six layers of Kimre 1696 general purpose polypropylene mesh or approved equal.

D. Hinged access doors with gaskets shall allow for the mist eliminator to be removed, cleaned, and/or replaced.

E. Pressure taps and gages shall be installed to permit a local read out of the pre-filter pressure drop.
F. Mist Eliminator shall be centered at inlet and designed at airflows of approximately 500 ft/min face velocity.

G. Mist eliminator shall be provided with blind flange to connect to the inlet transition.

2.05 BLOWER SECTION

A. Unit to be furnished with a 10 Hp 3-phase 230/460V, 60 Hz TEFC motor and blower with a fixed V belt drive and airfoil wheel to assure even, quiet airflow at a rate of 3,000 cfm.

B. The Deep Bed Scrubber shall contain an enclosed blower assembly for outdoor operation.

C. The blower-motor assembly shall be covered with FRP rainhood.

D. A minimum of 30” are required for service clearance at blower assembly.

E. A spare belt shall be provided.

2.06 MEDIA BED SECTION

A. The media bed section shall include three (3) 12 inch (308 mm) deep beds. The 1st and 2nd pass of media shall be Odorcarb Ultra and the 3rd pass shall be Odormix SP media.

B. Each media bed shall be contained between separate corrosion resistant support grids and perforated sheet metal to provide media support while imposing a minimum resistance to airflow.

C. The media containment sections shall be separated to assure filling and removal of individual beds as required. New media shall be poured in bulk into the top of the unit through access hatches and shall be filled a minimum of 7 inches (178 mm) above the bed to prevent airflow bypass. Spent media shall be vacuumed from the bottom of the unit through standard 4 inch (102 mm) vacuum ports.

D. A minimum of 72 inches (1829 mm) of service clearance are recommended in order to sample the media beds from the media sample ports.

2.07 INSTRUMENTATION

A. Differential Pressure: A gage shall be included with the scrubber to permit local read-out of pressure drop through the mist eliminator. The gauge shall be a 0-3” as manufactured by Dwyer. Unit shall ship separately and shall be field mounted by contractor.

B. Gage to be Magnehelic type.
2.08 MOTOR STARTER CONTROL PANEL

A. NEMA 4X, 316 stainless steel enclosure

B. Motor starter: FVNR, ATL, with overload heaters, NEMA size appropriately for 10 h.p. 208 VAC motor.

C. Control power transformer, 208/120 VAC, with fused primary and secondary.

D. Main circuit breaker, magnetic, with front-panel operating handle.

E. Operator interface and display:
   i. “Hand-Off-Auto” selector switch
   ii. Indicating lamps (all lamps are push-to-test style):
       1. “Fan Off”
       2. “Fan Running”

F. Louvers Control: The panel should include louver control for the intake louvers in the process area as per Design Plans and Spec Section 10200. Control Logic to be Odor Control On / Louver Open, Odor Control Off / Louver Closed.

2.09 CHEMICAL MEDIA

A. The DBS-605 shall contain 35 ft$^3$ (0.99 m$^3$) of Odorcarb™ Ultra Media in the 1$^{st}$ pass, 35 ft$^3$ (0.99 m$^3$) of Odorcarb™ Ultra Media in the 2$^{nd}$ pass, and 35 ft$^3$ (0.99 m$^3$) of Odornix™ SP Media in the 3$^{rd}$ pass as manufactured by Purafil, Inc.

B. The Odorcarb Ultra Media shall consist of manufactured, generally spherical porous pellets. The pellets shall be formed from a combination of powered activated carbon, alumina, and other and proprietary chemicals to enhance the capacity for removal of odorous gases. The pellets shall also chemically react to produce solid reaction products within the media.

C. Odorcarb Ultra Media shall have the following physical properties:

1. Moisture content: 35% maximum
2. Average crush strength: 35% min to 70% max.
3. Average abrasion: 4.5 maximum
4. Bulk density: 40 lbs/cubic foot +/- 5%
5. Nominal pellet diameter: 1/16 to 1/8-inch
6. H$_2$S Removal Capacity: 0.3 g/cc
7. Minimum H$_2$S Removal: 18.8 lbs/cf
D. Odorcarb Ultra Media shall be UL Class 2 listed.

E. Odorcarb Ultra Media shall be capable of absorbing and removing odorous gases throughout the entire pellet.

F. The Odornix SP Media shall consist of an equal mix (by volume) or Purafil ESD’s Odoroxidant SP Media and Odorkol Media. Odoroxidant SP Media shall be manufactured of generally spherical, porous pellets formed from a combination of powdered activated alumina and other binders, suitably impregnated with potassium permanganate to provide optimum adsorption, absorption, and oxidation of a wide variety of gaseous contaminants. The potassium permanganate shall be applied during pellet formation, such as the impregnant is uniformly distributed throughout the pellet volume and is totally available for reaction. Odorkol Media shall have the following physical properties:

G. Odornix SP Media shall have the following physical properties:

1. Odoroxidant SP Media

   a. Moisture content: 35% maximum
   b. Average crush strength: 35% min to 70% max.
   c. Average abrasion: 4.5% maximum
   d. Bulk density: 50 lbs/cubic foot
   e. Nominal pellet diameter: 1/16-inch
   f. Potassium permanganate content: 12% minimum

2. Odorkol Media

   a. Moisture content: 5.0% maximum
   b. CTC: 55 minimum
   c. Base material: activated carbon
   d. Bulk density: 30-32 lbs/cubic foot

H. Odornix Media shall be UL Class 1 listed. Purafil media only will be accepted due to the high level of capacity. No equals will be accepted.

I. Only UL certified media will be accepted in this aluminum vessel with companies that contain additional product liability on their systems. Companies lacking this liability and UL certification will not be accepted.

J. All media must have proof that is made and produced in the United States for additional verification of product performance. Written authorization from a certified lawyer in the State of New York must verify that media meets these capacities and that patents are not violated.

K. The general contractor is responsible for all design cost changes, engineer review time, and testing verification for media not listed and previously approved.
2.10 **ANALYTICAL SERVICES**

A. The manufacturer shall, after start up, analyze media samples to predict the remaining service life of the system media.

B. Such services will be provided as needed at the manufacturer’s expense. Such service shall be provided at the manufacturer’s expense for a period of at least ten years.

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**PART 3 – EXECUTION**

3.01 **INSTALLATION**

A. All equipment supplied under this Section shall be installed in conformity with manufacturers’ recommendations and in locations shown on the Contract Drawings.

B. The Contractor shall provide coordination with the Electrical Contractor to avoid any conflicts with electrical codes and regulations, which could adversely affect the installation.

C. The Contractor shall provide piping and valving as required to install a complete odor control system package.

D. Contractor is responsible for all flexible connections.

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3.02 **START-UP**

A. A qualified representative of the manufacturer shall test the odor control system(s) at start-up. A start-up report as provided by the manufacturer shall be completed before final acceptance of the odor control system.

B. Manufacturer or manufacturer’s representative shall provide a minimum of one (1) eight hour day for startup and training on all units.

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**END OF SECTION**