



# GasPurification Engineering, LLC

## **TECHNICAL CHARACTERISTICS AND INTIAL PARAMETRS for an Absorption-BioChemical Units (ABCU) with 5000 m<sup>3</sup>/hour (ABCU – 5) capacity for ventilated air purification at industrial enterprises**

### **1. ABCU-5 Technical Characteristics and Overall Dimensions.**

- 1.1 Capturing efficiency for phenol and formaldehyde:
  - at least 95% given input concentration of >20 mg/m<sup>3</sup>
  - at least 85% given input concentration of 10-20 mg/m<sup>3</sup>
  - at least 80% given input concentration of 6-10 mg/m<sup>3</sup>
  - at least 70% given input concentration of 4-6 mg/m<sup>3</sup>
- 1.2 Purification efficiency against triethylamine and suspended substances between 96% - 99.9% (output triethylamine concertation is no greater than 20 mg/m<sup>3</sup>);
- 1.3 Capturing efficiency for suspended substances: at least 98%;
- 1.4 Ventilating network resistance: no greater than 1700 Pa;
- 1.5 Hydraulic resistance (ABCU's pressure loss): no greater than 2400 Pa;
- 1.6 Temperature requirements for ABCU operations: between +5 °C and +30 °C;
- 1.7 ABCU dimensions in mm if installed as a single unit (Length, Width, Height):  
3800×2200×5400

### **2. ABCU-5 Consumables and Electricity Requirements.**

- 2.1 Electricity consumption is 27 kW, including a ventilator 22 kW.
- 2.2 Depending on the temperature and humidity of the purified air, ABCU requires no greater than 2.0 m<sup>3</sup>/day of service water to compensate for the water loss during operations.
- 2.3 No greater than 40.0 Nm<sup>3</sup>/hour of compressed air is required with 0.2 – 0.7 MPa pressure. Upon request, your ABCU unit can come with an installed autonomous blower.
- 2.4 Between 20 - 30 kg per year of biogenic additives are required for ABCU operations. A variety of agricultural fertilizers containing ammonium, phosphate and potassium ions are used as biogenic additives.

### **3. ABCU-5 Maintenance.**

ABCU maintenance is limited to cleaning its sludge basket from condensed and suspended substances, as well as maintaining a required concentration of phosphorus, nitrogen and potassium in the absorbent by adding biogenic additives (BAs).

It is recommended to conduct monthly measurements of phosphorus ions, nitrogen, and potassium to determine if BAs should be added to the absorbent.

An indirect indicator (chemical oxygen consumption: COC) is used to gauge absorbent regeneration efficiency by the microorganism. It is also recommended to measure COC on a monthly basis.

## **4. ABCU-5 Initial Installation Requirements.**

### **4.1. Assembly and Premise Requirements:**

4.1.1 Provide concrete flooring at the 0.000 mark for ABCU placement. The floor should be leveled using the Level instrument. Thickness of the concrete floor will depend on the projected ABCU load. ABCU is installed on two frames.

4.1.2 The load per frame is no greater than 18 tones.

4.1.3 No floor attachments are required.

4.1.4 Provide drainage traps in the concrete floor in case of an emergency spillage. The traps should be connected to the workshop's sewerage system. An emergency spillage is defined as a leakage in the body of the tank or a leakage in the flow shut-off and control valves and related systems. No greater than 8 m<sup>3</sup> of spillage will be produced per one emergency.

Composition of an emergency spillage is as follows:

- No greater than 150 mg/litre of phosphates
- No greater than 200 mg/litre of nitrates
- pH value between 6.5 - 8.3
- Chemical Oxygen Consumption (COC) no greater than 6,000 mg O<sub>2</sub>/litre
- Contains no greater than 0.1% by volume of suspended substances with particles' size of less than 0.2 mm.

4.1.5 No hoisting mechanisms are required for ABCU maintenance.

4.1.6 Ambient room temperature for an ABCU should not be less than +5 °C during the coldest month of the year, and also should not exceed the +30 °C mark.

4.1.7 ABCU installation room should adhere to lowest fireproof and explosion proof category requirements (the room contains cold and/or incombustible substances and materials in such amounts that the fire load does not exceed 100 mJ/m<sup>2</sup> in their respective locations, and the fire load of the entire room is under 1000 mJ.)

### **4.2. Electricity Requirements:**

4.2.1 Electric Supply:

- Ventilator engine – 1pc., 380 V, 22 kW.
- Water pump engine – 1pc., 380 V, 1.5 kW.
- Sludge pump engine – 1pc., 380 V, 1.5 kW.
- ABU electric valve drivers – 9 pcs., 220 V, 100 W. (combined consumption For all 9 pcs.)
- Level sensors – 3 pcs, 6 W (combined consumption for all 3 pcs.)

4.2.2 Power cables, cable trays, and control cables are supplied with ABCU.

4.2.3 Control cabinets are also supplied with ABCU.

4.2.4 Provide power circuit wiring from workshop's transformer to ABCU's control cabinets.

4.2.5 Both the power and start-up equipment for the pump and the ventilator should be installed in accordance to the "Electrical Equipment Installation Rules" and in locations that allow for monitoring of such equipment.

4.2.6 Provide grounding busbars for all ABCU non-conducting parts.

### **4.3 Water Supply**

4.3.1 Provide service water supply to ABCU's 20 mm in diameter nozzle/connector for a one-time filling of the tanks (~20 m<sup>3</sup>) when ABCU is turned ON for the first time.

4.3.2 Water consumption is no greater than 2.0 m<sup>3</sup>/day

4.3.3 Requirements for the service water used:

- Pressure between 0.2 MPa - 0.6 MPa.
- No greater than 0.1% by volume of impurities; particles' size should

not exceed 0.2 mm.

- Temperature between +5 °C and +30 °C.

4.3.4 When ABCU's absorption system is running (i.e. both the pump and the ventilator are ON), maximum allowed operational time without water replenishment is no greater than 2 hours. When the absorption system is not running (i.e. both the pump and the ventilator are OFF), no water replenishment is required.

#### **4.4 Compressed Air**

4.4.1 Compressed air consumption per one ABCU unit does not exceed 80 Nm<sup>3</sup>/h.

4.4.2 Provide a 15 mm in diameter pipeline to supply ABCU with compressed air.

4.4.3 Compressed air requirements:

- Pressure between 2 - 7 atm.

- Should contain no greater than 10 mg/m<sup>3</sup> of suspended substances.

- Moisture content – no requirements.

4.4.4 Compressed air should be supplied 24/7. Maximum allowed time without compressed air supply is no greater than 2 hours. A situation when an ABCU unit is deprived of compressed air for longer than 2 hours is defined as abnormal. The necessary procedures for resolving abnormal situations are outlined in the ABCU's passport/documentation.

#### **4.5 Ventilation**

4.5.1 Provide air ducts to supply ventilated air from your manufacturing line to ABCU, and then from ABCU to the atmosphere.

Air ducts are class "N" (normal).

4.5.2 As a thrust actuator, ABCU is using VIR400-5-1-LG0-180M2-O-P-U1 ventilator with the following characteristics:

- Engine – 22 kW, 380/660 V, 50 Hz, 2950 rpm.

- The ventilator is made from carbon steel with a powder coating.

- Ventilator impeller rotation speed is 2950 rpm.

- VIR400-5-1-LG0-180M2-O-P-U1 ventilator's noise level is 113 dB.

An alternative thrust actuator produced by another manufacturer with different characteristics can also be used.

4.5.3 Pressure at the ABCU's ventilating air intake and exhaust points is no greater than –1200 Pa and +500 Pa, respectively.

4.5.4 ABCU room should have an installed ventilation system capable of providing 3-4 air changes per day.

### **5. ABCU-5 Service Life**

Service life is at least 10 years (made of Steel St3) and 20 years (made of stainless steel).

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