

Vertical shaft low-speed surface aerator

Part 1 – Scope

1.1 This specifications covers the requirements of materials, design, fabrication, inspection and testing of low-speed mechanical vertical shaft surface aerators for waste water treatment plants.

1.2 Each mechanical surface aerator shall be furnished as a complete unit, inclusive of the following items as a minimum:

- aerator impeller with shaft and coupling
- foundation plate
- gearbox
- electric motor
- general arrangement drawings
- erection instructions
- operation and maintenance manuals

and with all other appurtenances necessary for the efficient operation of the unit in the given basin geometry.

1.3 All equipment specified under these specifications shall be provided by a single selected Manufacturer to ensure a properly designed and functional system.

Part 2 – Application

2.1 The mechanical surface aerators are provided to maintain the contents of the aeration tank in a uniformly mixed state while transferring the specified amount of oxygen to the system. In addition, the mechanical surface aerators shall be designed to have a sufficient power/liquid volume ratio to maintain the solids concentration in suspension for the specified tank geometry.

Part 3 - Equipment requirement

3.1 **Mechanical surface aerators**

3.1.1 **General**

- All equipment furnished for the mechanical surface aerators shall be new and guaranteed free from defects in materials, design and workmanship. All parts of the equipment shall be amply proportioned for all stresses that may occur during fabrication, erection and intermittent or continuous operation.

- The aerator supplier must submit with his quotation a reference list showing comparable installations over at least 10 years of experience.
- The aerator supplier must submit with his quotation a certificate/statement showing that his company and his sub-suppliers are working under a quality check system according ISO 9001.

3.2 **Aerator impeller and shaft**

- The aerator impeller shall be of low speed, non-clogging and open type.
- The aerator shall be of a heavy mild steel construction to withstand stresses created by mixed liquor motion and shall be adequately anchored and supported to the bridge of the aeration tanks.
- The impeller shall consist of a flat plate with 12 blades beneath the plate. The blades may not protrude above the flat plate and shall be integral shop fabricated that shall not require any field welding or assembly.
- The 12 blades shall each be slightly bended like turbine blades in order to obtain maximum efficiency and to suffer minimum friction losses between blades and water.
- The blades shall be formed in such way that no rags or long fibres can build up on the blades.
- It is not allowed to have holes behind the blade in the flat plate because of clogging problems and dirt-build-up which may cause imbalance.
- The maximum tip speed of the impeller shall not exceed 6.5 m/sec so that the possibility of sludge floc break-up is kept to a minimum.
- The entire weight of the impeller and shaft shall be suspended from and supported by the reducer drive shaft. Outboard support and steady bearings shall not be acceptable.
- The maximum hydraulic up trust of the aerator at maximum performance may not exceed the total weight of the aerator impeller.
- The shaft shall be sized to withstand operating and static stresses. Each end of the shaft shall have a bolting flange welded to it.
- Each aerator shall be provided with lifting eyes on the upper side and steel hooks cast into the platform so that the aerator may be held in position when the gear unit is removed or is being serviced.

3.3 **Foundation plate**

- Each aerator unit shall be furnished with a foundation plate for mounting of the drive on the support structure.
- The foundation plate shall be connected to the support structure with at least 4 steel jacking studs with jacks and lock nuts. The jacking studs shall be designed to be embedded in the concrete platform.
- The foundation plate shall be furnished with vertically adjustment bolts for easy levelling the aerator unit during erection.
- After erection of the aerator unit the foundation plate has to be grouted and the adjustment bolts have to be removed.

3.4 **Efficiency**

- The Standard Aeration Efficiency of the aerator when measured in a square tank under standard conditions shall be $> 2 \text{ kg O}_2/\text{kWhr}$.