

10.0 SPECIFICATION FOR ACTIVATED SLUDGE PROCESS WITH EXTENDED AERATION MODE

The secondary treatment shall be an activated sludge treatment process with nitrification and de-nitrification. The secondary activated sludge process (ASP) units with extended aeration mode shall be installed and equipped for average flow of 40 MLD.

10.1 Anoxic Tanks for Di-nitrification

The Aeration Tanks shall be preceded by Anoxic Tanks to ensure de-nitrification of the effluent through internal sludge recycle from the aeration tank. This system is specified to ensure good settling in the secondary clarifier tanks especially during warmer months, and to minimize energy requirements for aeration. The anoxic mode gives the flexibility to run nitrification and partial de-nitrification when needed. This reduces the possibility of rising sludge in the secondary clarifier tanks during warm periods. There shall be minimum 2 numbers of Anoxic Tanks. Total hydraulic retention time in anoxic tanks shall be minimum one hour. The entire construction shall be in **M35** grade reinforced cement concrete and as per IS 3370. RCC Platform/Walkway, minimum 1.20 m wide with Hand Railing as per specifications shall be provided. RCC Staircase, minimum 1.20 m wide with Hand Railing as per specifications shall be provided for access from Finished Ground Level to the top of the unit & to the operating Platform/Walkway. Plinth protection along periphery shall be provided.

The Anoxic Tanks shall be provided with adequate number of Screw Mixers for tank agitation. The minimum mixing power required to be considered shall be 15 W/ m³. Mixers shall be in SS-316L. The flow shall be equally distributed through a distribution chamber and shall be conveyed to each of the Anoxic tank. Internal pumped recycle pumps shall be provided from the Aeration Tank Outlet Chamber to the Anoxic Tanks so as to enable the required extent of de - nitrification to take place. Internal recycle rate should be minimum 300% of the average flow.

10.2 Aeration Tanks

The Anoxic Tanks shall be followed by Aeration Tanks. There shall be about minimum 2 numbers of Aeration Tanks. The Aeration Tanks shall be oxygenated using fine air bubble diffused aeration and shall effectively bio-degrade the organic matter. The entire construction shall be in **M35** grade reinforced cement concrete and as per IS 3370. RCC Platform/Walkway, minimum 1.20 m wide with Hand Railing as per specifications shall be provided. RCC Staircase, minimum 1.20 m wide with Hand Railing as per specifications shall be provided for access from Finished Ground Level to the top of the Unit & to the Operating Platform/Walkway. Plinth protection along periphery shall be provided. Following design parameters should be followed while designing the aeration tanks.

F/M- Maximum 0.15

MLSS – Maximum 4000 mg/lit

MLSS to MLVSS ratio – maximum 0.8

Hydraulic retention time – minimum 18 hrs

Sludge retention time – minimum 25 days to ensure digested sludge

Oxygen required / Kg BOD - Minimum 1.2 Kg Oxygen/ Kg BOD removed

Oxygen required/ Kg of TKN – Minimum 4.56 Kg Oxygen/Kg TKN

10.3 Aeration system

Specifications given in tender for SBR to be followed.

10.4 Secondary Clarifier

The effluent from the outlet of aeration tanks shall flow by gravity to Secondary Clarifier. There shall be minimum 2 numbers of Secondary Clarifiers. The flow shall be equally distributed through a distribution chamber and shall be conveyed to each Secondary Clarifier. Each Secondary Clarifiers shall be sized for 50% of the design flow and checked for solids loading rate. The Secondary Clarifier shall be operational at all times. These shall be capable of accepting temporary additional load during closure for maintenance without deterioration in

the outlet parameters. Following basic design parameters should be considered while designing the secondary clarifier tank.

Surface overflow rate – Maximum 15 m³/m²/day

Solid loading rate – Maximum 70 kg/day/m²

Weir loading rate – 185 m³/m/day

Side water depth – minimum 3.5 m

The entire construction shall be in **M35** grade reinforced cement concrete and as per IS 3370. RCC Platform/Walkway, minimum 1.20 m wide with Hand Railing as per specifications shall be provided. RCC Staircase, minimum 1.20 m wide with Hand Railing as per specifications shall be provided for access from Finished Ground Level to the top of the Unit & to the Operating Platform/Walkway. Plinth protection along periphery shall be provided.

Clarifier mechanism shall be in **SS-316 L**. Centre column supported, centrally driven. Clarifier walkway platform can be in SS-304.

10.5 Internal Recirculation Pumping Station

A separate pump house to recycle aerated effluent to Anoxic Tank shall be provided. Aerated effluents to be recycled shall be collected in Recirculation effluent Sump. Recirculation Horizontal Pumps of adequate capacity and head (minimum 2W + 1 standby) shall be provided to recycle aerated effluent back to the inlet of distribution chamber before Anoxic Tanks. MOC of pumps shall be SS-316L internals and CI casing.

Internal Recirculation Pumping Station shall consist of sludge sump, pump room. Tanks shall be in RCC M-35 in line with the specifications provided for other RCC water retaining tanks.

10.6 Secondary Sludge Pumping Station

Secondary Sludge Pumping Station is provided to collect and transfer the sludge from Secondary Clarifier. Secondary sludge from the Secondary Clarifiers shall be collected in sludge sump. Secondary sludge pumps shall be provided to recycle settled secondary sludge back to the inlet of aeration tank Distribution Chamber. Minimum two operating + one stand by pumps

should be provided. Pumps can be horizontal or submersible. In case of submersible pumps material of construction should be SS-316 L including casing. In case of horizontal pumps, all internals shall be in SS-316L and casting can be in CI. The sludge withdrawal lines from each of the secondary Clarifiers to the secondary Sludge pump suction common header shall be provided with a sluice valve. Excess Sludge wastage pumps shall also be provided to waste the excess sludge and transfer it to sludge dewatering. Minimum two operating + one stand by pumps should be provided. Pumps can be horizontal or submersible. In case of submersible pumps material of construction should be SS-316 L including casing. In case of horizontal pumps, all internals shall be in SS-316L and casting can be in CI. The Secondary sludge pumping Station shall consist of sludge sump, pump room, etc.

10.7 Automation and control:

Automation and control system should be as per tender specifications provided for SBR process. PLC SCADA based automation system to monitor the following parameters continuously in each aeration tank.

- DO level
- Temperature
- Oxygen Uptake Rate
- Air blower speed, etc.

All necessary automation to control ASP system including all gates, air blowers, pumps, valves, etc. as per bidder's design including I/Os with 20% spares and UPS shall be provided. All operations at anoxic and aeration tanks should be operated through PLC /SCADA controls.

Note: In case bidder wishes to given any additional treatment to achieve the outlet parameters can be offered by bidder. However, complete plant should be accommodated within the area allotted for CETP.