Activated Sludge Design Considerations

Aeration Tanks and Equipment

1. Aeration tank liquid depths should be not less than 10 feet or more than 30 feet; horizontally mixed tanks shall have a depth of not less than 5.5 feet.
2. All tanks shall have a freeboard of not less than 18 inches; if mechanical surface aerators are used, minimum freeboard shall be not less than 3 feet.
3. Aeration tank volume should be divided among two or more units, capable of independent operation.
4. The hydraulic properties of the system shall permit the design peak instantaneous flow to be carried with any single aeration tank unit out of service.
5. A minimum dissolved oxygen concentration of 2.0 mg/l should be maintained in the mixed liquor at all times.
6. Design oxygen requirements are 1.1 lbs O_2/lb design peak hourly BOD. For extended aeration this should be 1.5 lbs/lb.
7. When nitrification is required, the NOD is 4.6 times the diurnal peak hourly TKN influent concentration.
8. Flow measuring devices for raw wastewater/primary effluent, return sludge and air to each unit must be provided

Diffused Air Systems

1. Normal air requirements are 1500 cubic feet per pound of BOD loading; extended aeration requires 2050 cubic feet per pound of BOD loading.
2. Multiple blowers are required to meet the maximum demand with the largest unit out of service. Equipment should be capable of maintaining solid suspension.
3. Diffuser systems shall provide 200 percent of the design average day oxygen demand.
4. Diffusers should be spaced in accordance with the oxygen requirements throughout the length of the tank.
5. Plants with less than four tanks shall have removable diffusers.

Mechanical Aeration Systems

1. Oxygen transfer rates shall not exceed 2 lbs of O_2/hp/hour. Design transfer efficiencies shall be provided.
2. Mechanical aeration systems must maintain a minimum DO of 2.0 mg/l and maintain all biological solids in suspension.

Return Sludge

1. For conventional aeration, sludge return rates shall range from 15 to 100 percent of the average daily flow, for extended aeration 50 to 100 percent and for nitrification 50 to 200 percent.
2. When sludge pumps are used, the maximum return capacity shall be met with the largest pump out of service.
3. Discharge piping shall be a minimum of 4 inches and maintain a minimum velocity of 2 fps at normal sludge return rates.

Waste sludge facilities shall have a minimum capacity of 25 percent of design average flow and must function at 0.5 percent of design average wastewater flow or 10 gpm, whichever is greater.