

Process Performance Standards

| | Contact/Stabilization | | Comments | | |
|---|----------------------------------|--|---|----------------------------------|--|
| | Conventional A. S. | Sludge Reaeration | Nitrification | Extended Aeration | |
| Design and Process Control Performance Standards | | | | | |
| Food to Microorganisms (F/M) Ratio <i>Use average forward flow and average BOD, mg/L to calculate ppd BOD</i> | 0.2-0.5 FM Ratio | 0.2-0.6 FM Ratio <i>use solids from both basins</i> | 0.08-0.16 FM Ratio | 0.05-0.10 FM Ratio | Range is used to Define Activated Sludge Process |
| Mixed Liquid Suspended Solids (MLSS), mg/L | 1,000-3,000 mg/L | 1,000-3,000 mg/L Contact 4,000-8,000 mg/L Stab. | 2,000-5,000 mg/L | 3,000-5,000 mg/L | Plant may have other Limitations on MLSS, mg/L |
| Process Control Performance Standards | | | | | |
| Sludge Age (SA), Days | 3.5-7.0 days | * | * | > 10 | * Operational Experience |
| Mean Cell Resident Time (MCRT), days | 4.0-15.0 days | * | * | * | * Operational Experience |
| Sludge Volume Index (SVI), ml/gm | 80 to 100 ml/gm | 80 to 100 ml/gm | 80 to 120 ml/gm | 80 to 120 ml/gm | SBR < 180 ml/gm |
| Return Sludge % of Flow | 15 - 100 % of Inf Flow | 50-150 | 50-150 | 50-150 | Not Applicable |
| Design and Performance Standards Aeration Basins | | | | | |
| Detention Time (DT) or Hydraulic Retention Time (HRT), hours <i>Forward flow only</i> <i>Average Monthly Flow or "Maximum Month Flow"</i> | 6 to 8 hours hours | add DT of both tanks Cont/Stab > 6 hrs Sl. Reaeration > 10 hrs | 12 hours min. (12 to 18 hours typical) | 18 hrs min. (24 hrs design) | Minimum for Design Also used to Define Activated Sludge Process |
| Organic Loading, ppd BOD / 1000 Cu. Ft. Operators should review on monthly basis using Average Monthly Flow then compare it to design which is based on Maximum Monthly Organic Loading. <i>Review Peak Hourly BOD ppd if Organic slug loads are suspected (Peak:Average > 4:1 which can be problematic)</i> | 40 or less ppd BOD/1000 cu ft | 50 or less ppd BOD/1000 cu ft use both basins | 20 or less ppd BOD/1000 cu ft | 15 or less ppd BOD/1000 cu ft | Maximum for Design Also used to Define Activated Sludge Process <i>Use only forward flow</i> |
| Aeration Tank Depth | 10'-30' | 10'-30' | 10'-30' | 10'-30' | 10'-30' |
| Design and Performance Standards for Secondary Clarifiers | | | | | |
| Detention Time (DT) or Hydraulic Retention Time (HRT) in hours Operators tend to use average or peak daily flows <i>Not used much anymore by Engineers to size Clarifiers</i> | 2 to 4 hours | 2 to 4 hours | 4 to 8 hours or more | 4 to 8 hours or more | Use forward flow only BNR/ENR higher DT <i>Typically flow is used</i> |
| Minimum Sidewater Depth | 12' SWD | 12' SWD | 12' SWD | 12' SWD | |
| Surface Overflow Rate (SOR), gpd/Sq. Ft. (forward flow only) | 1000 or less gpd/Sq. Ft.. | 1000 or less gpd/Sq. Ft.. | 1000 or less gpd/Sq. Ft. | 1000 or less gpd/Sq. Ft. | Monitor at "Peak Hourly Flow" |
| SOR with Chemical Feed applications for P Removal | 900 or less gpd/Sq. Ft.. | 900 or less gpd/Sq. Ft.. | 900 or less gpd/Sq. Ft. | 900 or less gpd/Sq. Ft. | @ "Peak Hour Flow" |
| Solids Loading Rate (SLR), ppd/Sq. Ft. Use Mixed Liquor mg/L Add Forward and Return (QR) Flows to calculate ppd | 40 or less ppd/Sq. Ft. | 40 or less ppd/Sq. Ft. | 35 or less ppd/Sq. Ft. | 35 or less ppd/Sq. Ft. | Remember to use "Peak Hour Flow" for both Q + R Flows |

Weir Overflow Rate (WOR), gpd/weir length ft.
Use "Peak Hour Flow"

Avg. Cap
WWTP < 1 MGD
< 20,000

Avg. Cap
WWTP > 1 MGD
< 30,000

WOR is monitored more closely with smaller plants

Sources: Recommended Standards for Wastewater Facilities (10 States Standards) 2014 Edition
For "Nitrification" BOD, MLSS, and Organic Loading - 10 States 2004 Edition as used due to Operator Preference
Operation of Wastewater Treatment Plants CSU Sac. Volume II, 7th Edition