

## Process Performance Standards

### Conventional A. S. Contact/Stabilization

	Conventional A. S.		Contact/Stabilization		Nitrification		Extended Aeration	Comments
			Sludge Reaeration					
<b>Design and Process Control Performance Standards</b>								
Food to Microorganisms (F/M) Ratio Use average <i>forward flow</i> and average BOD, mg/L to calculate ppd BOD	0.2-0.5		0.2-0.6 use solids from both tanks		0.08-0.16		0.05-0.10	Range is used to Define Activated Sludge Process
Mixed Liquid Suspended Solids (MLSS), mg/L	1,000-3,000		1,000-3,000 Contact 4,000-8,000 Stab.		2,000-5,000		3,000-5,000	Plant may have other Limitations on MLSS, mg/L
<b>Process Control Performance Standards</b>								
Sludge Age (SA), Days	3.5-7.0		*		*		> 10	* Operational Experience
Mean Cell Resident Time (MCRT), days	4.0-15.0		*		*		*	* Operational Experience
Sludge Volume Index (SVI), ml/gm	80 to 100		80 to 100		80 to 120		80 to 120	SBR < 180
Return Sludge % of Flow	15 - 100		50-150		50-150		50-150	
<b>Design Standards Aeration Basins</b>								
Detention Time (DT) or Hydraulic Retention Time (HRT), hours <i>Forward flow only</i> Average Monthly Flow or "Maximum Month Flow"	6 to 8		add DT of both tanks Cont/Stab 6 hrs Sl. Reaeration > 8 hours		12		18 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 &gt; 4:1 which can be problematic)</i> Aeration Tank Depth	40 or less		50 or less use both tanks		20 or less		15 or less	Maximum for Design Also used to Define Activated Sludge Process <i>Use only forward flow</i>
<b>Design Standards for Secondary or Final Clarifiers</b>								
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		2 to 4		4 to 8 or more		4 to 8 or more	Use forward flow only BNR/ENR higher DT <i>Typically flow is used</i>
Minimum Sidewater Depth	12'		12'		12'		12'	
Surface Overflow Rate (SOR), gpd/Sq. Ft. (forward flow only)	1000 or less		1000 or less		1000 or less		1000 or less	@ "Peak Hour Flow"
SOR with Chemical Feed applications for P Removal	900 or less		900 or less		900 or less		900 or less	@ "Peak Hour Flow"
Solids Loading Rate (SLR), ppd/Sq. Ft. Use Mixed Liquor mg/L Use both Forward and Return (QR) Flows to calculate	40 or less		40 or less		35 or less		35 or less	Remember to use "Peak Hour Flow" for both Q + R Flows

**Avg. Cap**  
WWTP < 1 MGD  
< 20,000

**Avg. Cap**  
WWTP > 1 MGD  
< 30,000

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

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