

Sludge Dewatering

Performance Data

September 2016

Table 3.14 Operating Performance of Dewatering Solid Bowl Centrifuges

| | | Polymer Dosage | | | |
|------------------------------------|-------------------------------|-----------------|-------------------|-----------------|---------------------|
| Type of Sludge | Feed Solids Concentration (%) | g/kg dry solids | lb/ton dry solids | Cake Solids (%) | Solids Recovery (%) |
| Raw Primary (PRI) | 3 to 7 | 1 to 3 | 2 to 6 | 26 to 36 | 90 to 97 |
| Raw WAS | 0.5 to 2.5 | 4 to 8 | 8 to 16 | 8 to 20 | 85 to 94 |
| Raw (PRI + WAS) | 3 to 5 | 2 to 5 | 4 to 10 | 18 to 25 | 90 to 96 |
| Anaerobically Digested PRI | 4 to 6 | 2.0 to 7.5 | 2 to 15 | 25 to 35 | 92 to 96 |
| Anaerobically Digested (PRI + WAS) | 2 to 6 | 3 to 10 | 6 to 20 | 15 to 27 | 85 to 98 |
| Aerobically Digested WAS | 1 to 3 | 1.5 to 5.0 | 3 to 10 | 8 to 12 | 88 to 91 |
| Aerobically Digested (PRI + WAS) | 1.7 to 4.5 | 3.0 to 5.5 | 6 to 11 | 11 to 18 | 92 to 98 |

Source: Turovskiy, Izrail S. and P.K. Mathai. "Wastewater Sludge Processing." Hoboken, New Jersey: John Wiley & Sons, Inc. 2006.

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Table 3.16 Results of Dewatering on a Belt Filter Press in Russia

| | | Polymer Dosage | | | | |
|--------------------------------|-----------------|-----------------|-------------------|--------------------|-----------------|--------------------|
| Type of Sludge | Feed Solids (%) | g/kg dry solids | lb/ton dry solids | Belt Speed (m/min) | Cake Solids (%) | Solids Capture (%) |
| Primary (PRI) | 4 to 7 | 2.0 to 7.0 | 4.4 to 14.0 | 1.7 to 2.2 | 25 to 30 | 99 to 99.6 |
| WAS, thickened | 2 to 3 | 8 to 12 | 16 to 24 | 2 | 18 to 24 | 92 to 96 |
| PRI + WAS (50:50) | 2.6 to 6.0 | 4 to 8 | 8 to 16 | 1.7 to 2.8 | 18 to 27 | 91 to 98 |
| Aerobically Digested WAS | 2.0 to 4.4 | 3 to 8 | 6 to 16 | 2.6 to 3.0 | 18 to 20 | 96 to 97.5 |
| Aerobically Digested PRI + WAS | 4 to 6 | 3.8 to 6.4 | 7.6 to 12.8 | 2.0 to 2.6 | 20 to 22 | 96 to 99.5 |

Source: Turovskiy, Izrail S. and P.K. Mathai. "Wastewater Sludge Processing." Hoboken, New Jersey: John Wiley & Sons, Inc. 2006.

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| Type of Sludge | Belt Filter Press Dry polymer, lb/ton dry solids | Solid-bowl Centrifuge Dry polymer, lb/ton dry solids | Vacuum Filter Dry polymer, lb/ton dry solids |
|--|--|---|--|
| Raw Sludges | | | |
| Primary | 2 to 9 | 2 to 7 | 0.5 to 1 |
| Primary + Trickling Filter | 3 to 15 | | 2.5 to 5 |
| Primary + Waste Activated | 2 to 20 | 4 to 15 | 4 to 10 |
| Waste Activated | 2 to 20 | | 8 to 15 |
| Aerobically Digested | | | |
| Primary | | 6 to 10 | 1.5 to 4 |
| Primary + Waste Activated | 4 to 15 | 7 to 15 | 5 to 12 |
| Anaerobically Digested | | | |
| Primary | 2 to 10 | | |
| Primary + Waste Activated | 3 to 15 | 3 to 5 | |
| Primary + Trickling Filter | | 7 to 15 | |
| Source: Water Environment Federation. "Operation of Municipal Wastewater Treatment Plants." 5 th ed. Manual of Practice—MOP 11. Alexandria, VA: WEF, 1996. | | | |
| www.thewastewaterblog.com | | | |

Table 33.8 Centrifuge Performance Characteristics

| Type of Sludge | Cake Total Solids, % | Solids Recovery, % | Polymer, lb/ton dry solids |
|--|-------------------------|--------------------|-------------------------------|
| Raw Primary | 28 to 34 | 95 | 4 to 6 |
| Anaerobically Digested Primary | 35 to 40 | 95 | 4 to 6 |
| Raw WAS | 14 to 18 | 95 | 12 to 20 |
| Anaerobically Digested WAS | 14 to 18 | 95 | 12 to 20 |
| Ras (Primary + WAS) | 28 to 32 | 95 | 8 to 12 |
| Anaerobically Digested (Primary + WAS) | 26 to 30 | 95 | 10 to 18 |
| Extended Aeration or Aerobically Digested | 18 to 22 | 95 | 12 to 20 |

Source: Water Environment Federation. "Operation of Municipal Wastewater Treatment Plants." 5th ed.

Table 33.10 Typical Performance Data for Pressure Filters

| Type of Sludge | Conditioning | Cycle Time, hours | Solids, % |
|---|-----------------------------------|-------------------|-----------|
| Primary | 5% FeCl ₃ , 10% Lime | 2.0 | 45 |
| | 100% Ash | 1.5 | 50 |
| | Polymer | 4.0 | 45 |
| Primary + WAS | 5% FeCl ₃ , 10% Lime | 2.5 | 45 |
| | 150% Ash | 2.0 | 50 |
| | Polymer | | 35 |
| WAS | 7.5% FeCl ₃ , 15% Lime | 2.5 | 45 |
| | 250% Ash | 2.0 | 50 |
| Anaerobically Digested Primary | 8% FeCl ₃ , 35% Lime | 2.0 | 36 |
| Anaerobically Digested (Primary + WAS) | 8% FeCl ₃ , 35% Lime | 2.0 | 45 |
| | 100% Ash | 1.5 | 50 |
| | Polymer | | 32 |

FeCl₃: Ferric Chloride

WAS: Waste Activated Sludge

Source: Water Environment Federation. "Operation of Municipal Wastewater Treatment Plants." 5th ed.www.thewastewaterblog.com