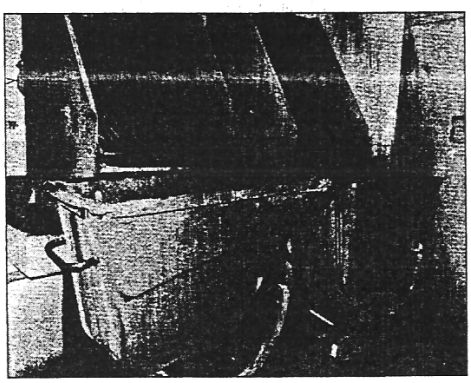
on the upstream side of the bar rack to make it easier to dislodge materials trapped between the bars. The alternative shapes also reduce headloss through the rack.

Screenings from the rake mechanism are usually discharged directly into a hopper or container or into a screenings press. For installations with multiple units, the screenings may be discharged onto a conveyor or into a pneumatic ejector system and transported to a common screenings storage hopper. As an alternative, screenings grinders may be used to grind and shred the screenings. Ground screenings are then returned to the wastewater; however, ground screenings may adversely affect operation and maintenance of downstream equipment such as clogging weir openings on sedimentation tanks or wrapping around air diffusers. Application of screenings grinders is discussed in Sec. 5–3.

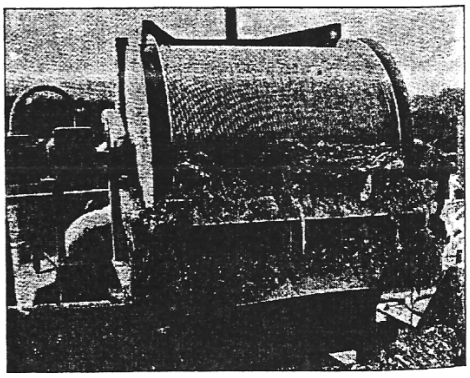
Fine Screens

The applications for fine screens range over a broad spectrum; uses include preliminary treatment (following coarse bar screens), primary treatment (as a substitute for primary clarifiers), and treatment of combined sewer overflows. Fine screens can also be used to remove solids from primary effluent that could cause clogging problems in trickling filters.

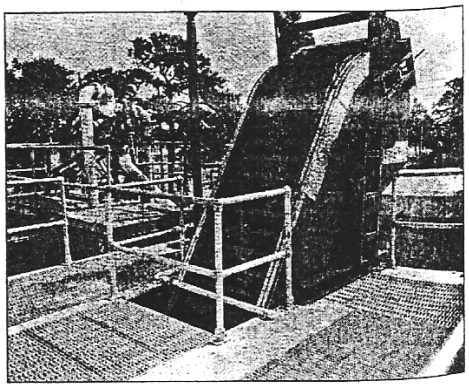
Screens for Preliminary and Primary Treatment. Fine screens used for preliminary treatment are of the (1) static (fixed), (2) rotary drum, or (3) step type. Typically, the openings vary from 0.2 to 6 mm (0.01 to 0.25 in). Examples of fine screens are illustrated on Fig. 5–4, descriptive information is provided in Table 5–4, and addi-



(a)



(b)



(c)

Figure 5–4

Typical fine screens: (*a*) static wedgewire, (*b*) drum, and (*c*) step. In step screens, screenings are moved up the screen by means of movable and fixed vertical plates.

Table 5–4
Description of screening devices used in wastewater treatment

Type of screening device	Screening surface: Size classification	Size range: in	Size range: mm[a]	Screen medium	Application	See fig.
Inclined (fixed)	Medium	0.01–0.1	0.25–2.5	Stainless-steel wedgewire screen	Primary treatment	5–4*a*
Drum (rotary)	Coarse	0.1–0.2	2.5–5	Stainless-steel wedgewire screen	Preliminary treatment	5–4*b*
	Medium	0.01–0.1	0.25–2.5	Stainless-steel wedgewire screen	Primary treatment	
	Fine		6–35 μm	Stainless-steel and polyester screen cloths	Removal of residual secondary suspended solids	5–6
Horizontal reciprocating	Medium	0.06–0.17	1.6–4	Stainless-steel bars	Combined sewer overflows/ stormwater	5–5*a*
Tangential	Fine	0.0475	1200 μm	Stainless-steel mesh	Combined sewer overflows	5–5*b*

[a]Unless otherwise noted.

Table 5–5
Typical data on the removal of BOD and TSS with fine screens used to replace primary sedimentation[a]

Type of screen	Size of openings: in	Size of openings: mm	Percent removed: BOD	Percent removed: TSS
Fixed parabolic	0.0625	1.6	5–20	5–30
Rotary drum	0.01	0.25	25–50	25–45

[a]The actual removal achieved will depend on the nature of the wastewater-collection system and the wastewater travel time.

tional information is given below. In many cases, application of fine screens is limited to plants where headloss through the screens is not a problem.

Fine screens may be used to replace primary treatment at small wastewater-treatment plants, up to 0.13 to m^3/s (3 Mgal/d) in design capacity. Typical removal rates of BOD and TSS are reported in Table 5–5. Stainless-steel mesh or special wedge-shaped bars are used as the screening medium. Provision is made for the continuous removal of the collected solids, supplemented by water sprays to keep the screening medium clean. Headloss through the screens may range from about 0.8 to 1.4 m (2.5 to 4.5 ft).