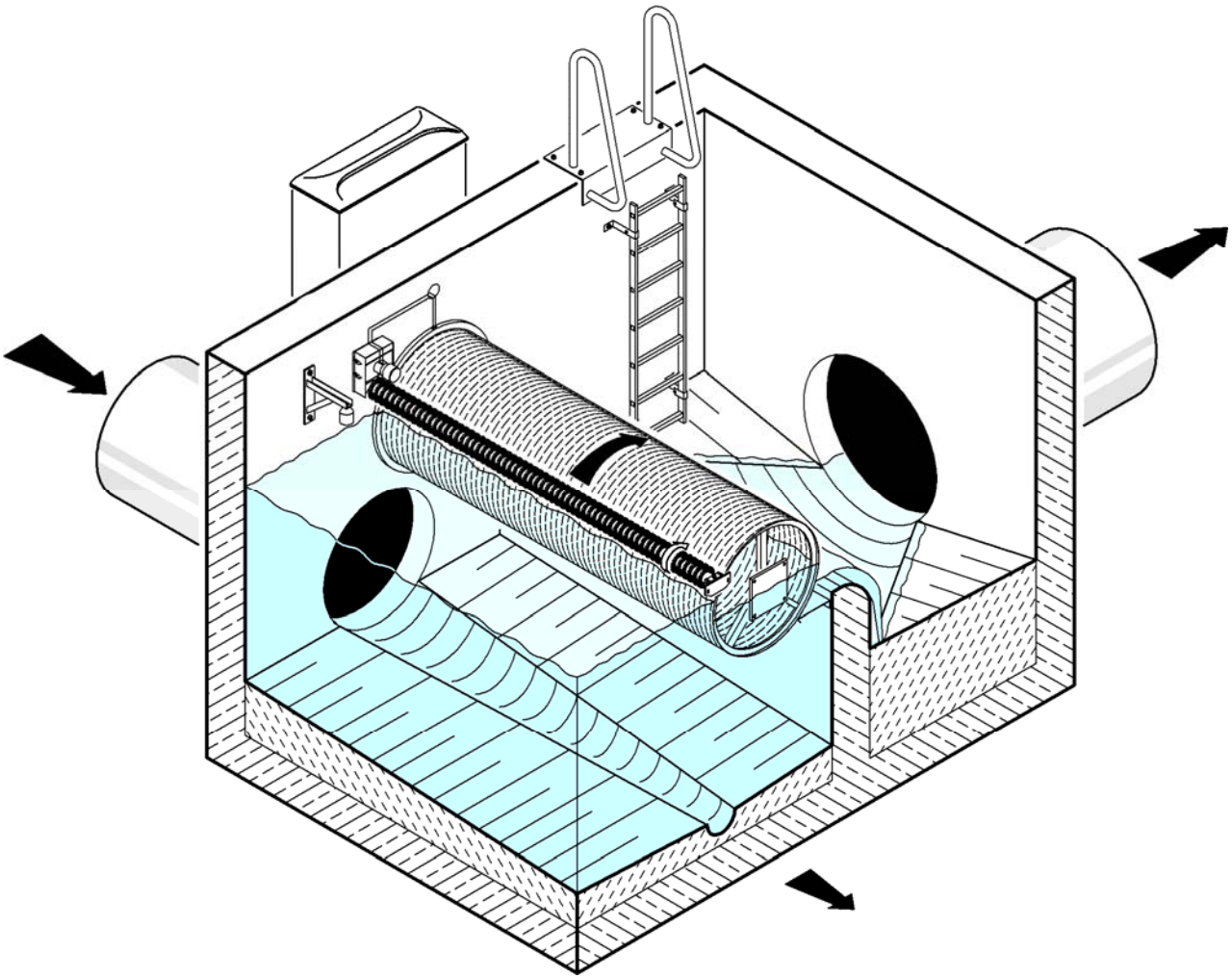
CSO/STORMWATER MANAGEMENT

HYDROVEX®

RDS Rotary Drum Sieve



JOHN MEUNIER

HYDROVEX® RDS ROTARY DRUM SIEVE

APPLICATION

In spite of substantial successes in the treatment of stormwater in combined and storm drains, there are frequent complaints about the unsightly pollution of downstream shorelines by toilet paper, sanitary napkins, disposable syringes, diapers, kitchen wipes, plastic wrap, etc. These items often float in the effluent and cannot be effectively removed by sedimentation or trapped by baffles.

To address this problem, static screens are sometimes used. Such screens block easily, as they cannot be cleaned under load and become useless. Trashracks with small bar spacing and forced mechanical cleaning can only be applied on very wide sewer overflows to reduce superficial loads.

The **HYDROVEX® RDS** Rotary Drum Sieve we have developed is especially designed to retain floatables in sewer overflows and sewer treatment facilities. We made a careful study of old effluent screening technology, which was common at the start of the century, before the development of biological wastewater treatment. We also tested sieves and cleaning systems of all kinds with real effluent.

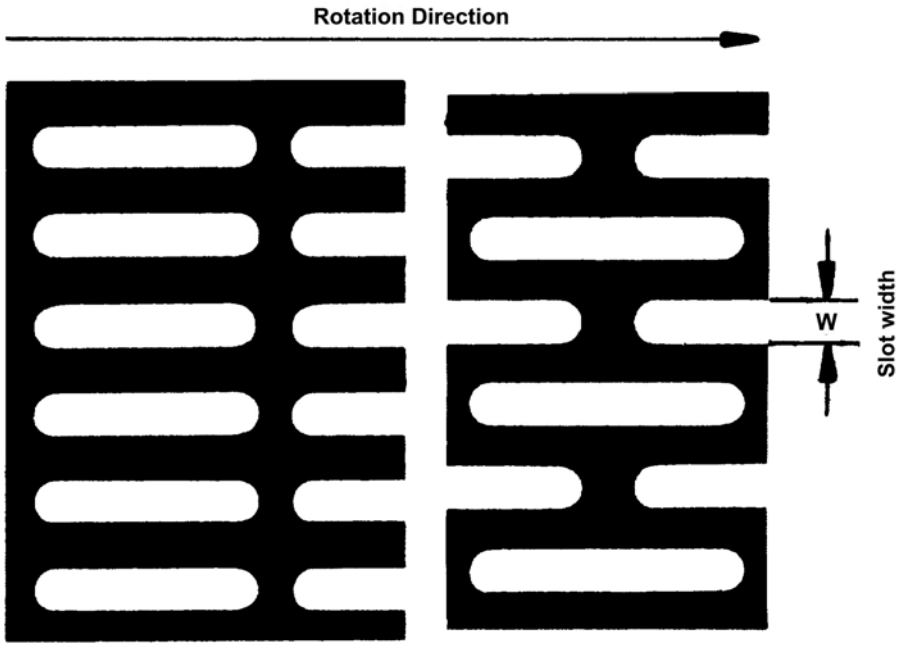


Figure 1: Stainless steel slotted drum, slot width W

ADVANTAGES OF THE ROTARY DRUM SIEVE

- Reliable retention of floatables and solids
- Very large filtering surface in the smallest possible space by using a rotating cylindrical sieve
- Large capacity with small footprint
- Choice of three slot sizes
- Extended widths available
- Positive, above-water, mechanical cleaning by brushes
- Sieved material discharged into the waste effluent
- Low energy requirements, no aerosols, no noise
- Filtration effect and fine particle retention by controlled growth of filter matting
- Robust stainless steel construction.

DESIGN AND OPERATION

The core of the **HYDROVEX® RDS** Rotary Drum Sieve is a large, smooth cylinder (**1**) (see **Figure 1**) made of welded stainless steel. The rotating filter is placed between two end plates (**2**). The cylinder is turned slowly by a hydraulic motor (**3**) on a gear wheel.

A brush rotating arranged above the highest water level (**4**) and driven by a second motor (**5**) rotates in the opposite direction from the sieve. The brush bristles fit readily into the long slots of the sieve and provide reliable cleaning.

During dry weather, the rotary sieve hangs in the air. With rising water levels, the drum is submerged and the effluent enters the sieve from the outside in. When water-level sensors, in the flushwater and the effluent, report excessive load on the sieve, the brush rollers and the sieve begin to turn. The sieved material is lifted out of the water and then returned to the water by the brushes. On the other side, the clean sieve surface is re-immersed in the water. The direction in which the roller turns is selected so that the clean side is facing the on-coming water.

CONFIGURATIONS

In free flow and storm settling tanks, the treatment conditions are generally favorable. In such case, the rotary sieve can be connected directly to the stainless steel trough of the sewer overflow. See the picture on the cover and **Figure 2**, Configuration A.

The surface load in this configuration, with a small slot width of W = 2 mm, is quite low, only 57 to 93 L/s/m2, so that generally, a layer of matting is formed on the sieve and even very fine particles can be retained. The head loss in the sieve will vary with its size (see **Table 1**). The internal trough guarantees very even surface load. With larger flows, an overflow trough discharging on both sides may be necessary.

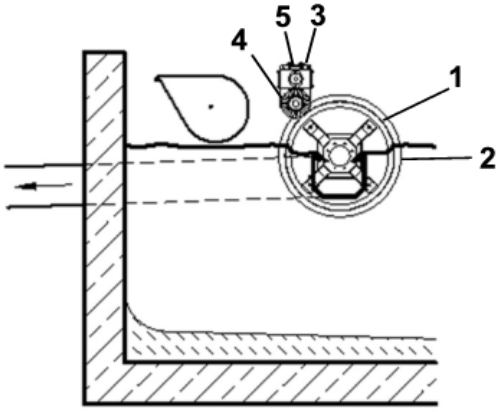
With tank overflows, a large span must be covered. The whole interior diameter of the sieve is required for discharging the water and often it has to be discharged from both ends of the sieve. So that the overflow is not triggered prematurely, the overflow weir (**6**) is located either ahead of the sieve or behind it (see Configuration B and C, **Figure 2**). To provide sufficient large outlet capacity, **HYDROVEX® RDS** Rotary Drum Sieves of this type have a slot width of 3 mm and a surface load of 148 to 241 L/s/m2. To keep the height losses from the required overflow weirs as small as possible, we recommend attaching our **HYDROVEX® BW** Bending Weir (**7**).

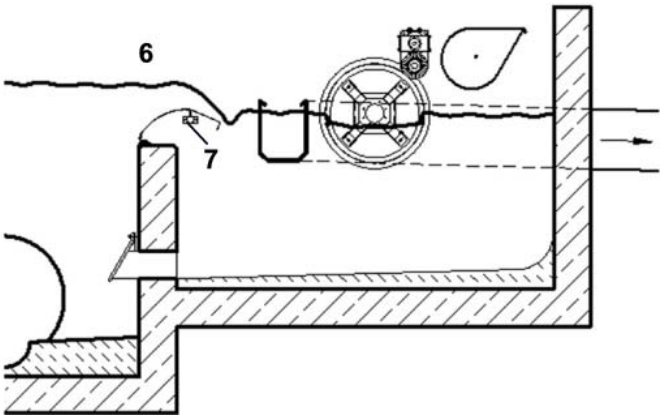
Storm overflows of combined sewer systems must discharge very large volumes of water into the system without causing excessive backup. Transverse-flow sieves usually have slot diameters of 4 mm. The water flows through the sieve twice, but flows directly and over its full length, as in Configuration D. This type, which has the highest capacity, can nevertheless still retain fine materials due to its variable rotation speed. This type of sieve is very compact and fits in nicely with traditional storm overflow design.

PERFORMANCE

It is not economical to design filters for occasional peak flows, which may occur only a few minutes per year. In our experience, a design flow of 50% of Qd (n = 1) is effective. Occasional overflows are discharged through an emergency overflow, which is in any case included in any sieve system in sewer and tank overflows.

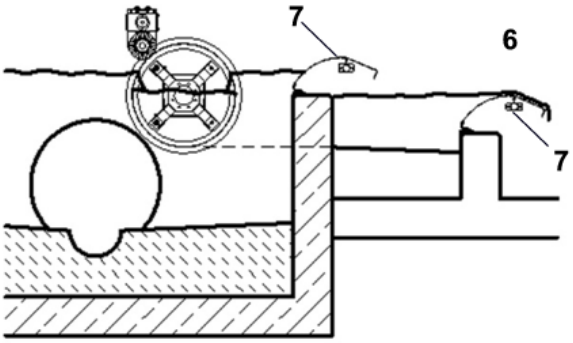
The surface loads shown in **Tables 1 to 3** refer each to 1 m^2 of submerged sieve area, assuming a ⅓ coating and maximum load. For each **HYDROVEX® RDS** Rotary Drum Sieve installation, hydraulic measurement should be made of the head loss in the sieve, inlet and outlet ratios and the backpressure from the main outfall.

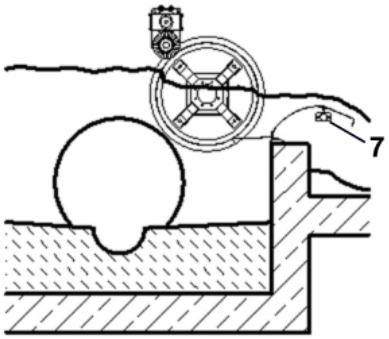




CONFIGURATION A
HYDROVEX® RDS Rotary Drum Sieve with axial flow, one two-sided and internal trough as substitute for effluent overflow in the flow tank or storm tank.

CONFIGURATION B (emergency overflow)
HYDROVEX® RDS Rotary Drum Sieve with axial flow, one two-sided. Behind overflow of a storm overflow tank.





CONFIGURATION C (emergency overflow)
HYDROVEX® RDS Rotary Drum Sieve with axial flow, one or two-sided. Ahead of overflow of a storm overflow tank.

CONFIGURATION D
Transverse flow **HYDROVEX® RDS** Rotary Drum Sieve ahead of a sewer overflow.

Figure 2: Possible configurations of HYDROVEX® RDS Rotary Drum Sieves

TABLE 1: HYDROVEX® RDS Rotary Drum Sieve with internal trough slot width w = 2 mm, Configuration A

Diameter	Surface load	Maximum design capacity Qd in l/s Sieve length L					
D	q	1	2	3	4	5	6
m	L/sm²	m	m	m	m	m	m
0,75	57	89	178	267	-	-	-
1,00	66	137	274	412	-	-	-
1,25	73	192	383	575	787	-	-
1,50	80	252	504	786	1008	1260	-
2,00	93	388	776	1164	1552	1940	2328

TABLE 2: HYDROVEX® RDS Rotary Drum Sieve with axial discharge in the sieve, slot width w = 3 mm, Configuration B and C

Diameter	Surface load	Maximum sieve design capacity Qd in l/s Sieve length L					
D	q	1	2	3	4	5	6
m	L/s/m²	m	m	m	m	m	m
0,75	148	232	463	695	-	-	-
1,00	170	357	713	1070	1426	-	-
1,25	190	498	997	1495	1993	2492	-
1,50	209	655	1310	1965	2620	3278	3931
2,00	241	1009	2017	3026	4034	5043	6062

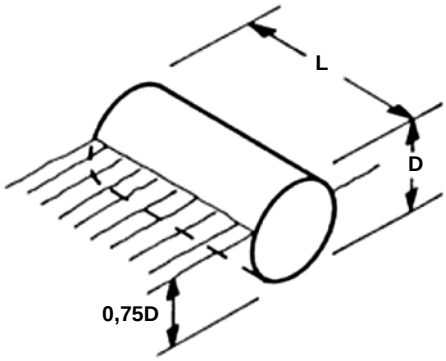
TABLE 3: Transverse Flow HYDROVEX® RDS Rotary Drum Sieve, Aperture width W = 4 mm, Configuration D

Diameter	Surface Load	Maximum sieve design capacity Qd in l/s Sieve length L					
D	q	1	2	3	4	5	6
m	L/s/m²	m	m	m	m	m	m
0,75	251	395	790	1185	-	-	-
1,00	290	608	1216	1824	2432	-	-
1,25	325	850	1699	2549	3399	4248	-
1,50	356	1117	2234	3351	4468	5585	-
2,00	411	1720	3439	5159	6878	8598	-

SPECIFICATIONS

HYDROVEX® RDS Rotary Drum Sieve, D = 1500 mm, L = 4000 mm, W = 3 mm, Qd = 2620 L/s, two-sided axial discharge into the drum. Self-supporting welded construction with support rings and inset slot apertures, welded gear wheel, all stainless steel material, cleaning brushes with nylon bristles, with bearings on both sides. Sieve and brush driven by flameproof AC motors, power take-up 7 kW. Side plates with bearings for attaching to a vertical wall, stainless steel casing for motors and gears, SPS controls and water level probes in flush and tail water, operating, display and recording equipment.

One-sided discharge
Two-sided discharge



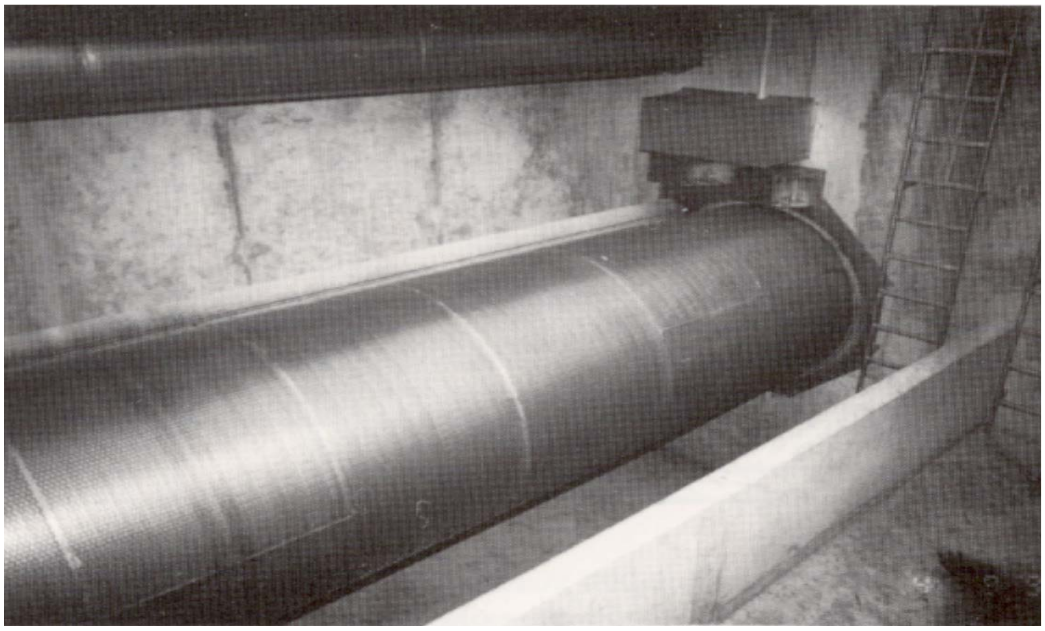


*Figure 3: **HYDROVEX® RDS Rotary Drum Sieve with internal water evacuation according to configuration A. D = 1.5 m, L = 5.5 m, Qb = 1800 e/s. The unit is currently in operation in Germany.***

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