

PRODUCT INFORMATION

Tipping Flusher
UFT-FluidFlush

SPÜ
0211

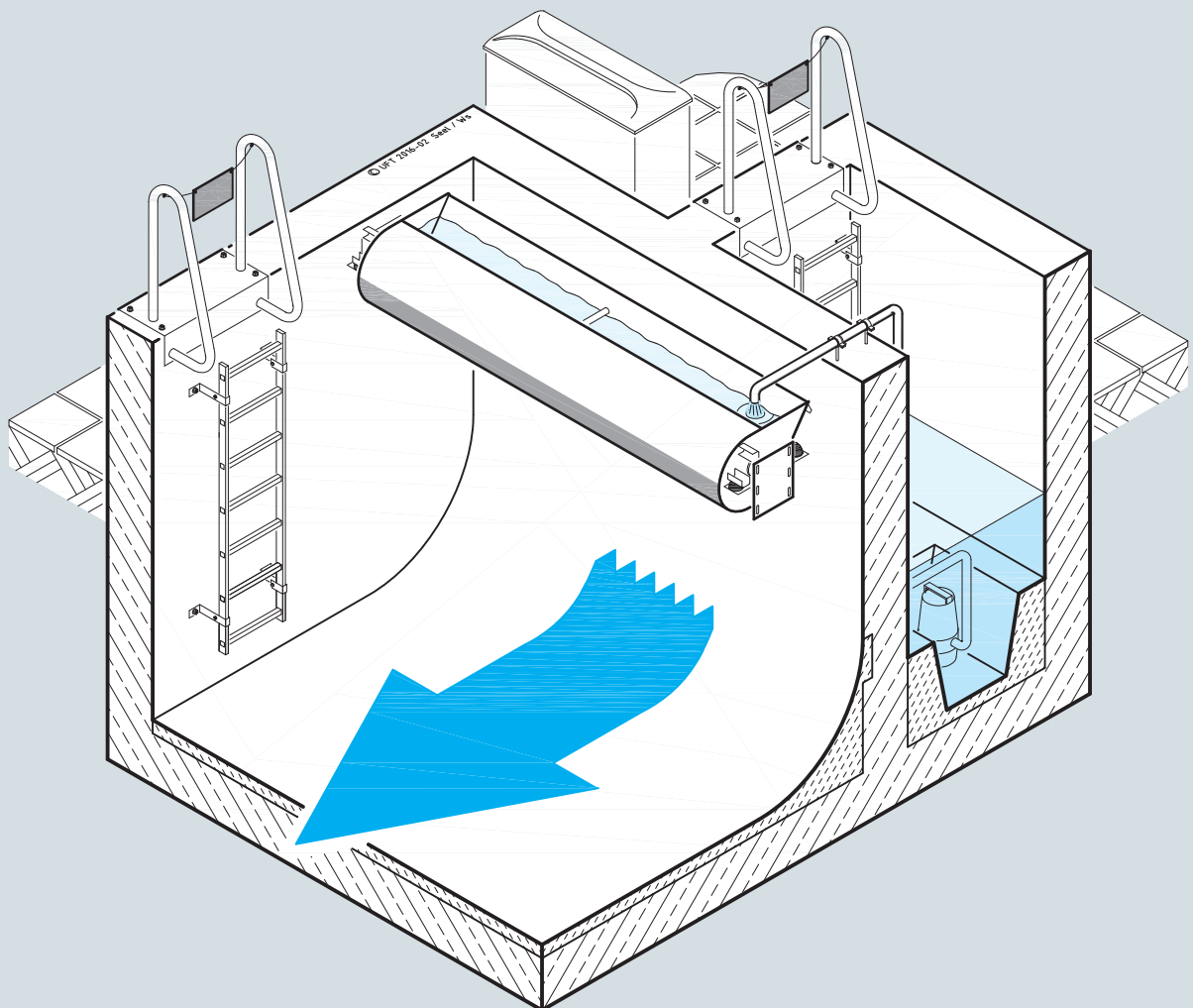
HYDRO-MECHANICS

ELECTRICAL ENGINEERING

PROCESS CONTROL

SERVICE & MAINTENANCE

SCIENTIFIC SERVICES



1 Intended use

Combined sewer overflow tanks (CSO tanks) are filled about 50 times per year during rain events. The sedimented sludge must then be removed as soon as possible to prevent it from rotting. Experience has shown that the self-cleaning effect hoped for with some types of tanks does not generally work. On the contrary: Heavy sludge deposits in a storm water tank indicate that it is working effectively. The sludge deposited in the tanks has not reached the receiving waters.

The DWA worksheet A 128 therefore recommends regular cleaning of the CSO tanks. The manual removal of the sludge is a very time-consuming and costly and not harmless task. An automation of the tank cleaning is urgently recommended for tanks according to DWA worksheet A 166.

A very effective option for automatic tank cleaning is energetic rinsing with the aid of tipping flushers after the tank has been drained. Cleaning a tank after emptying has the advantage of lower risk of sludge release via any downstream overflow because the rain has long since subsided.

Tipping flushers require a small volume of flushing water and almost no external energy for cleaning the tank, but some meters of head of drop.

Figure 2: Typical arrangement of tipping flushers in a clarifier overflow tank in an off-line connection

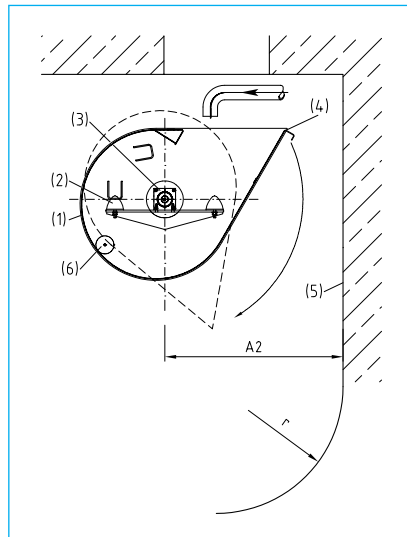
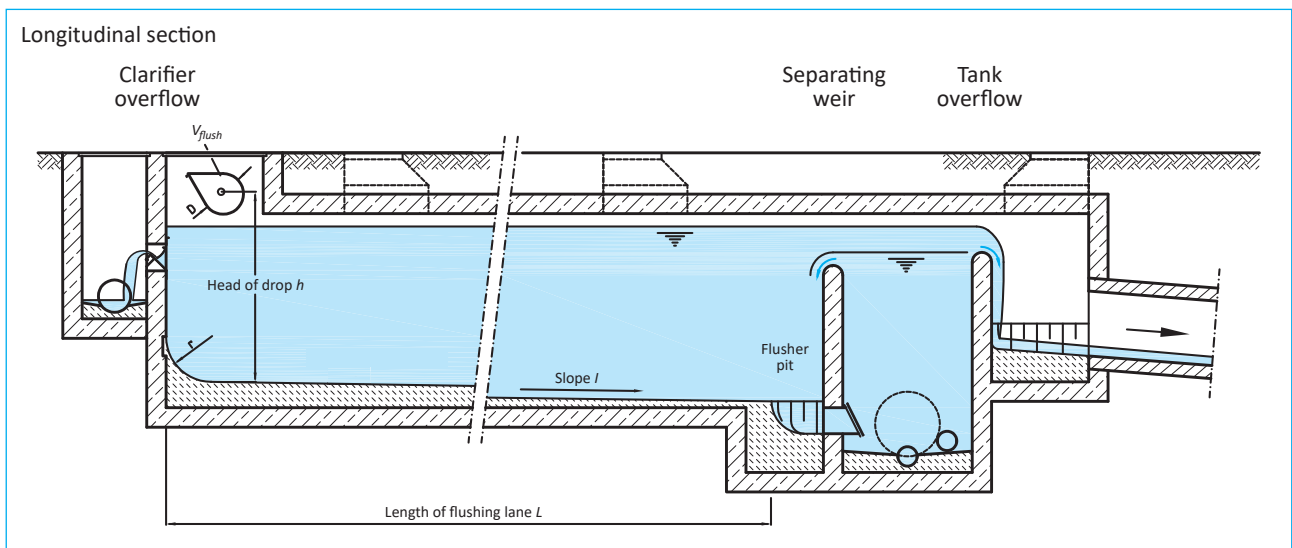


Figure 1: Optimized flusher trough geometry FF10

2 Function

The eccentrically pivoted empty flusher trough (1) leans backwards loosely against the rubber buffer (2) in the rest position. If the flusher trough is gradually filled with water, the centre of gravity of the water filling first moves back behind the bearing (3) and presses the dump bucket onto the buffer (2). Shortly before overflowing, however, the centre of gravity moves over the axis of rotation in the direction of the tilting nose (4). The trough tips over spontaneously and pours out the entire water content within one second against the rear wall (5). The water surge generates enormous pressures of up to 50 kN/m² and drag forces of up to 150 N/m², so that the sediments on the back wall and bottom of the tank are safely flushed away. By a tare weight (6), the flusher trough is balanced in such a way that it starts safely at maximum water filling.

3 Design of storm water tanks with tipping flushers

Effective cleaning with tipping flushers requires a special structural design of the storm water tanks. The ground plans of the volumes should be rectangular. In the case of wide tanks, the ground plan must be subdivided into parallel flushing fields.

The flushing lanes should be produced with care, with a smooth surface and without height offset at joints and with a slope of between 1% and 5%. Larger slopes should be avoided due to the risk of slipping. On slopes below 1% puddles tend to form. Tipping flushers should be suspended as high as possible and preferably above the highest water level in order to achieve a good head of drop and to protect the tipping flusher from dirt.

Flushing sumps at the end of the flushing lanes prevent flushing waves from being reflected and sloshing back into the tank.

Storage channels and backed-up collectors with circular profiles can be kept free of deposits for lengths of up to 200 m with tipping flushers.

4 Water supply for tipping flushers

It is advisable to fill the tipping flushers with fresh water. The water consumption is low compared to the storage volume of the storm water tanks. Filling with a pump from a well or storage tank has proved to be a good method. Filling can also be carried out from the drinking water network if appropriate pipe separators and solenoid valves

are installed. The water supply pipe should have a nominal diameter of at least DN 50 so that filling does not take too long. An alternative is water from a well or collected rain water from a cistern. Waste water can also be used for filling. In this case, the flusher is optionally locked by a solenoid-operated hook in its empty position until the CSO tank is emptied after end of the storm event and then released. The interior of the flusher should be cleaned from time to time to prevent deposits.

There is a proximity sensor on each tipping bucket. It signals when the bucket falls over. The water supply is stopped when the preselected number of rinsing cycles has been reached. We also supply and install the complete water supply and electrical control for tipping flushers.

5 Suspension variants

Four suspension variants are available:

- a) Brackets
for suspension on the side walls (preferred variant)
- b) Wall cantilevers
for the suspension on the front wall
- c) Suspended ceiling trapezes
for the suspension under the ceiling
- d) Setting up trestles
for mounting on the crown of open tanks.

The suspension variants can be combined with each other.

6 Mounting

The assembly is carried out by our own assembly team. The tipping flushers are

ADVANTAGES OF TIPPING FLUSHER UFT-FluidFlush

The UFT-FluidFlush tipping flusher has a circular cross-section with an isosceles pouring triangle. This very simple geometry minimizes the material requirement. The cross-section has the best static load-bearing behaviour, so that spans of up to 12 m are possible without intermediate bearings. The weight of the water filling can be up to 10 times greater than the tare weight of the stainless steel construction.

The UFT-FluidFlush type tipping flusher, which has been optimised after many tests in our laboratory and in practice, is characterised by the following advantages:

- » low external energy requirement
- » strong, short, singular rinsing wave
- » small rinse water requirement
- » low noise emission
- » large flushing length with flat tank bottom up to 100 m
- » large span up to 12 m
- » balanced, gentle movements
- » re-erect from any position
- » maintenance-free lightweight construction made of stainless steel
- » reliable design method
- » more than 1700 references worldwide

tared in the factory and are delivered ready for operation. The preparations for the installation of the tipping flushers, such as the concreting of anchor rails for the bearings on site, the provision of recesses for the laying of pipelines and underground cables should be agreed with us beforehand.

7 Maintenance

The monitoring is limited to visual inspections and occasional sample fillings of the tilts. The spherical roller bearings are permanently greased and maintenance-free.

8 Accident prevention

As long as a flushing process is running, nobody is allowed to stay in the storm water tank for safety reasons. We supply warning signs with every tipping flusher, which should be attached at all entrances to the storm water tank. If the tank is entered, the control unit must first be switched off.

The tipping flushers have to be empty while no flushing program is running. Each tipping flusher has two small holes through which rain water or residual water from interrupted processes automatically drains off. The holes must not be closed for safety reasons. (dabbling noise as a warning).

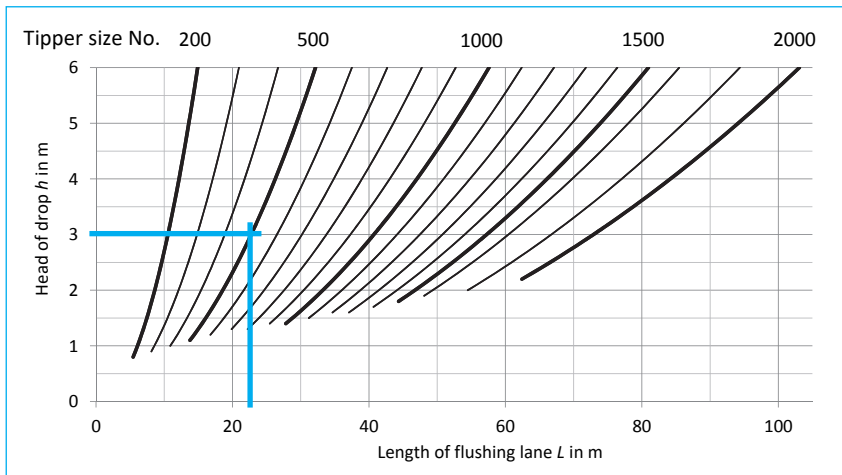
9 Dimensioning and selection

Tipping flushers are designed and manufactured for specific projects. A design program helps us to calculate the required volumes, dimensions, centres of gravity, counterweights, torques, deflections and bearing forces. A pre-selection can be made for a common flushing field slope of 2% using the graphic in **Figure 3**.

The coefficients, diagrams and formulae used have been developed by us and only apply to UFT-FluidFlush type tipping buckets. They cannot be transferred to other types.



Figure 3: Flushing tipping flusher (test run)



READING EXAMPLE

Data given
 Slope of flushing lane l : 2 %
 Head of drop h : 3 m
 Length of flushing lane L : 22 m

Chosen
 UFT-FluidFlush type SPÜ 500
 Specific volume V_{flush} : 483 in l per m
 Diameter cylinder D : 738 mm

Figure 4: Selection diagram for backward tipping flushers UFT-FluidFlush, valid for flat flushing fields with a slope of $l = 2 \%$

Tipper size No.	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000
Specific volume V_{flush} in l per m	205	309	392	483	596	694	792	885	980	1079	1174	1274	1371	1495	1559	1763	1923
Diameter cylinder D in mm	480	590	665	738	820	885	940	1000	1052	1104	1152	1200	1245	1300	1328	1412	1475

Table 1: Specific volume und diameter of tipping flushers UFT-FluidFlush

TYPICAL SPECIFICATION TEXT

Pos. Number Article

1 x Tipping Flusher UFT-FluidFlush

Low-noise tipping trough, light weight construction with circular cross-section and straight beak. For cleaning of all types of empty rectangular retention tanks with a flush of water. Optimal tip geometry FF10 and dynamic movement produces a short flushing wave. Wide spans possible. Drainage holes to prevent frost damage and to warn the operating personnel by a dabbling noise. Stiff mounting on sidewall or back wall supports or ceiling supports. Welded construction from stainless steel (AISI 304), pickled surface, maintenance-free spherical roller bearings in bearing housing made from anodised aluminium, neoprene buffers, fixation rails for embedding in concrete and mounting parts from stainless steel (AISI 304).

Type UFT-FluidFlush	SPÜ ...
Head of drop h :	... m
Length of flushing lane L :	... m
Slope of flushing lane l :	... %
Tipper size No.:	...
Specific volume V_{flush} :	... in l per m
Diameter cylinder D :	... mm
Lenth of flusher trough T6:	... m

Delivery of the pre-finished device ex works including hydraulic dimensioning, torque characteristics, information about deflection and bearing load, data sheet and installation, operation and maintenance manual.

BIBLIOGRAPHY

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