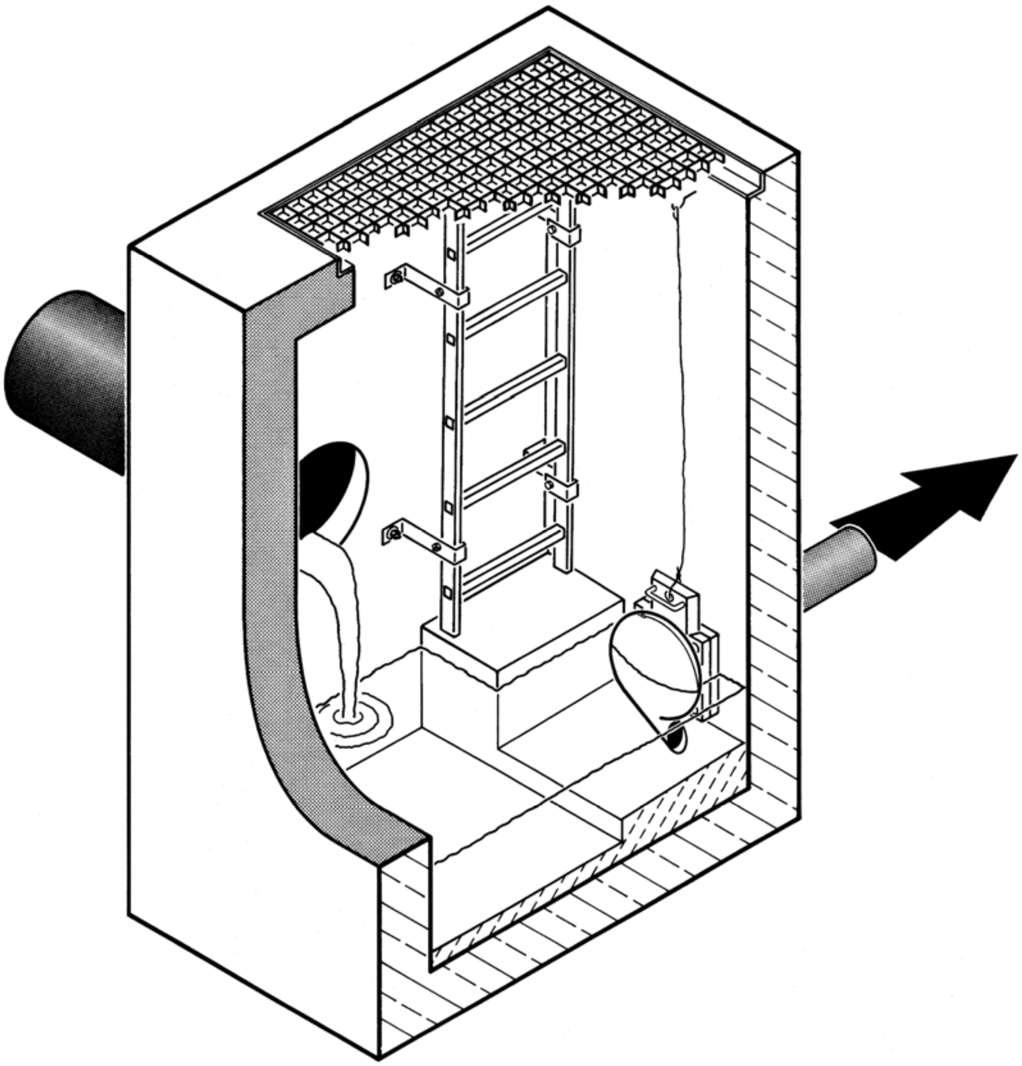
CSO/STORMWATER MANAGEMENT

HYDROVEX®

*Fluid*Vertic Vertical Vortex Valve



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APPLICATION

The **HYDROVEX® *Fluid*Vertic** Vertical Vortex Valves is a special form of the previously tried and tested vortex flow regulators SVHV. They operate without any moving parts and do not require any auxiliary power. The throttling effect is produced solely by fluid dynamics. For such large open cross sectional areas, vortex valves develop very high flow resistances.

The **HYDROVEX® *Fluid*Vertic** Vertical Vortex Valves are especially applicable in Stormwater and Storm Drain flow control. Some examples of applications are; control of street and car park drainage, control of fluid flow in Stormwater retention basin, etc.

ADVANTAGES

- Large open cross sections
- No moving parts
- No wear
- No auxiliary power required
- High operational reliability
- Corrosion free construction
- Accurate flow control
- Simple variation of flowrate
- Simple and quick installation
- No adjustment necessary

CONSTRUCTION AND OPERATION

The vortex chamber (**a**) is positioned vertically (see **Figure 1**). The inlet pipe (**b**) is arranged tangentially to the vortex chamber. The outlet (**c**) is positioned horizontally in the center of the vortex chamber. An interchangeable outlet aperture (**d**) allows some alteration of the specified flowrate.

The **HYDROVEX® *Fluid*Vertic** Vertical Vortex Valves are installed in a "wet" chamber, (i.e. they are permanently immersed in water during operation) and can be mounted onto the inner wall of the water tank. The valve inlet of the **HYDROVEX® *Fluid*Vertic** Vertical Vortex Valve is permanently submerged because the liquid level never falls below the lower edge of the aperture (**d**). As a consequence, the valve also acts as a trap, catching low-density fluids such as gas and oil.

As the water level rises in the valve chamber, the air escapes through the venting hole (**e**), allowing the chamber to become partially filled. At this point, the flow resistance is low and the flowrate high. However, if the water level rises above the apex of the vortex chamber, the flow forms a vortex with an air-filled vortex core. The valve is now in throttle mode, where the flow resistance is large and the flowrate comparatively small.

There are currently two types of **HYDROVEX® *Fluid*Vertic** Vertical Vortex Valves:

Type VSU

Model VSU, shaped like a doughnut, has a large flow resistance and is especially applicable when extremely small flowrates are desired and there is a certain risk of obstructions clogging the inlet or outlet (see **Figure 1**).

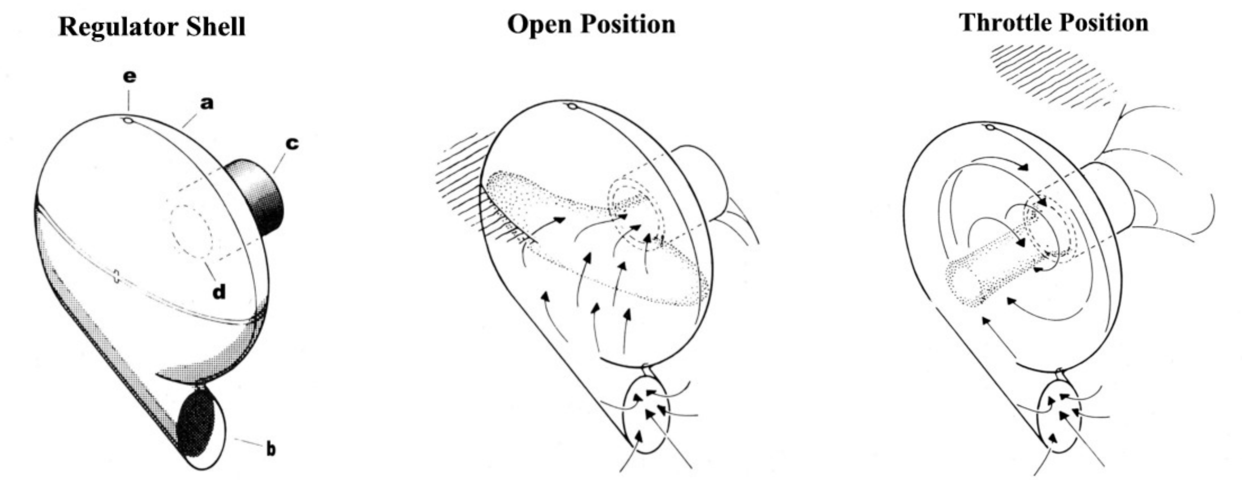


Figure 1: HYDROVEX® FluidVertic Vertical Vortex Valve and flow patterns

Type VSL

The chamber of model VLS has level sides and is in the shape of a logarithmic spiral (**a**), with a square inlet.

As a rule, the valves are supplied with a wall-mounting bracket, which interlocks with another plate on the back of the valve. The valve can easily be slid out of the wall-mounting bracket and winched up for inspection or removal of blockages.

Devices that use small nominal diameters can be slipped directly into the outlet pipe by using an adaptor.

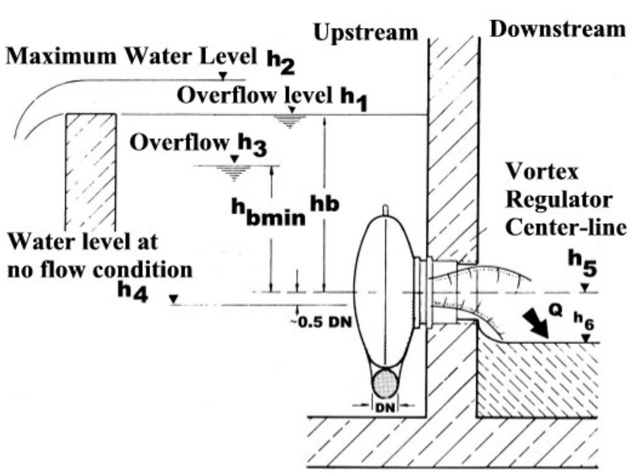


Figure 3: Dimensioning elements of the HYDROVEX® FluidVertic Vertical Vortex Valve

FLOW CHARACTERISTICS

Vortex valves have s-shaped flow curves (see **Figure 2**). The lower leg indicates the flow regime when the vortex chamber is partially filled. The upper section shows the increased hydraulic resistance caused by the vortex flow.

The valve discharge can be regulated in the ratio 1:1.8 by changing the outlet aperture (**d**).

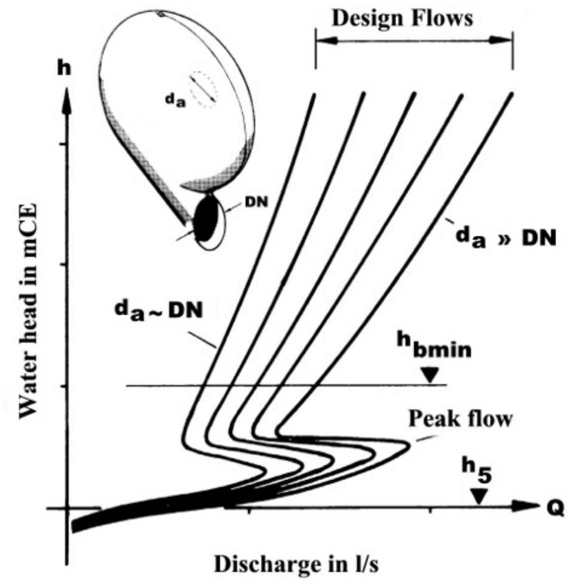


Figure 2: Typical flow curve of a HYDROVEX® FluidVertic Vertical Vortex Valve

HYDRAULIC DIMENSIONS

The design pressure head h_b is defined as the water level difference between the high liquid level, (ex: the upper edge of the tank overflow weir) and the axis of the valve. The flowrate can be adjusted between Q_{min} and Q_{max} (see **Table 1**). The design pressure head should be greater than h_{hmin} in order to obtain an optimum throttle action.

Nominal Diameter DN	**40**		**50**		**65**		**80**		**100**		**125**		**150**	
Operational range of h = 2m														
Type of regulator	Q en l/s		Q en l/s		Q en l/s		Q en l/s		Q en l/s		Q en l/s		Q en l/s	
	min	max	min	max	min	max	min	max	min	max	min	max	min	max
VLS 1:4	2,0	3,7	3,1	5,6	5,1	9,1	7,6	13,6	11,6	20,8	18,0	32,4	25,7	46,2
VLS 1:6	1,4	2,5	2,1	3,8	3,4	6,2	5,1	9,2	7,9	14,2	12,2	22,0	17,5	31,5
VSU 1:4	1,3	2,4	2,0	3,7	3,3	6,0	5,0	9,0	7,7	13,8	11,9	21,4	17,2	30,9
VSU 1:6	1,1	2,0	1,7	3,1	2,8	5,1	4,2	7,6	6,5	11,8	10,1	18,3	14,5	26,1
Minimum water level h_{bmin} (m)														
Type 1:4	0,16		0,20		0,26		0,32		0,40		0,50		0,60	
Type 1:6	0,20		0,25		0,32		0,40		0,50		0,62		0,75	

Table 1: Operating range and minimum pressure head

The valves are delivered ready to be installed. We guarantee an accuracy of ±5% of the design flowrate for the corresponding design pressure head. Installation adjustments are not necessary.

DIMENSIONS AND MATERIAL

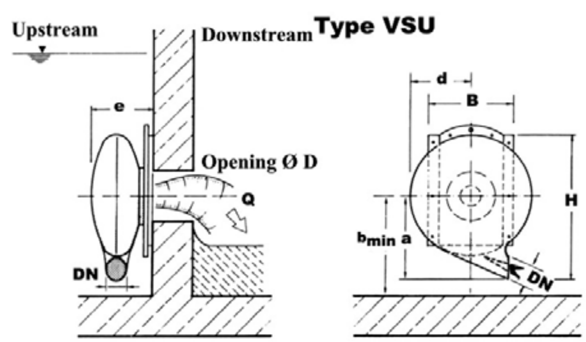
Table 2 contains the most important dimensions for all models and nominal bore. It is standard for the valve housing to be manufactured in stainless steel. Both the back plate and pipe bracket are made of PVC.

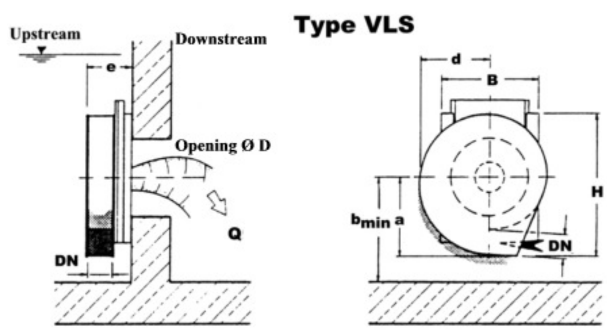
Type VSU 1:4							
DN	**40**	**50**	**65**	**80**	**100**	**125**	**150**
A	132	173	214	260	322	402	482
d	125	125	135	162	200	250	300
e	129	146	175	197	231	291	331
D	100	125	150	200	250	300	300
B	250	250	270	324	400	500	600
H	277	338	409	490	587	717	847
b min	172	223	279	340	422	527	632

Type VLS 1:4							
DN	**40**	**50**	**65**	**80**	**100**	**125**	**150**
A	95	115	141	173	225	268	322
d	125	125	135	150	175	214	257
e	106	116	131	146	166	211	236
D	100	125	150	200	250	300	300
B	250	250	270	300	350	419	492
H	240	280	316	373	445	523	607
b min	135	165	206	253	325	393	472

Type VSU 1:6							
DN	**40**	**50**	**65**	**80**	**100**	**125**	**150**
A	167	206	272	339	410	513	615
d	125	150	200	250	300	375	450
e	154	175	213	251	289	365	422
D	100	125	150	200	250	300	300
B	250	300	400	500	600	750	900
H	342	416	532	649	771	948	1125
b min	207	256	337	419	510	638	765

Type VLS 1:6							
DN	**40**	**50**	**65**	**80**	**100**	**125**	**150**
A	126	156	202	248	310	387	463
d	125	139	180	220	275	343	410
e	106	116	131	146	166	211	236
D	100	125	150	200	250	300	300
B	250	264	327	401	499	623	746
H	286	341	427	513	625	761	903
b min	166	206	267	328	410	512	613





INSTALLATION AND MAINTENANCE

Installation of the **HYDROVEX®** ***Fluid*****Vertic** Vertical Vortex Valve is very simple. The appliance is delivered ready for operation with all seals and fastenings. The wall bracket must be bolted into the vertical tank wall, such that it is aligned both vertically and horizontally with the axis of the outlet.

Vertical vortex valves operate without any moving parts and require little or no maintenance, as they have no wear. Nevertheless, we recommend that a visual inspection be carried out to ensure that the inlet is not blocked. We also recommend that, from time to time, the housing should be winched off its wall bracket and the inner chamber be inspected.

SPECIFICATIONS

HYDROVEX® ***Fluid*****Vertic** Vertical Vortex Valve**,** type VSU/VLS

nominal diameter	DN:	....	mm	set-point rate:	Q:	....	l/s
water level	h_b:	....	mCE	material: stainless steel to nickel chrome and PVC			

Device regulated at set-point rate, including sealing and fastening elements, steel remote disassembling rope, descriptive and dimensional notes, start-up manual.

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