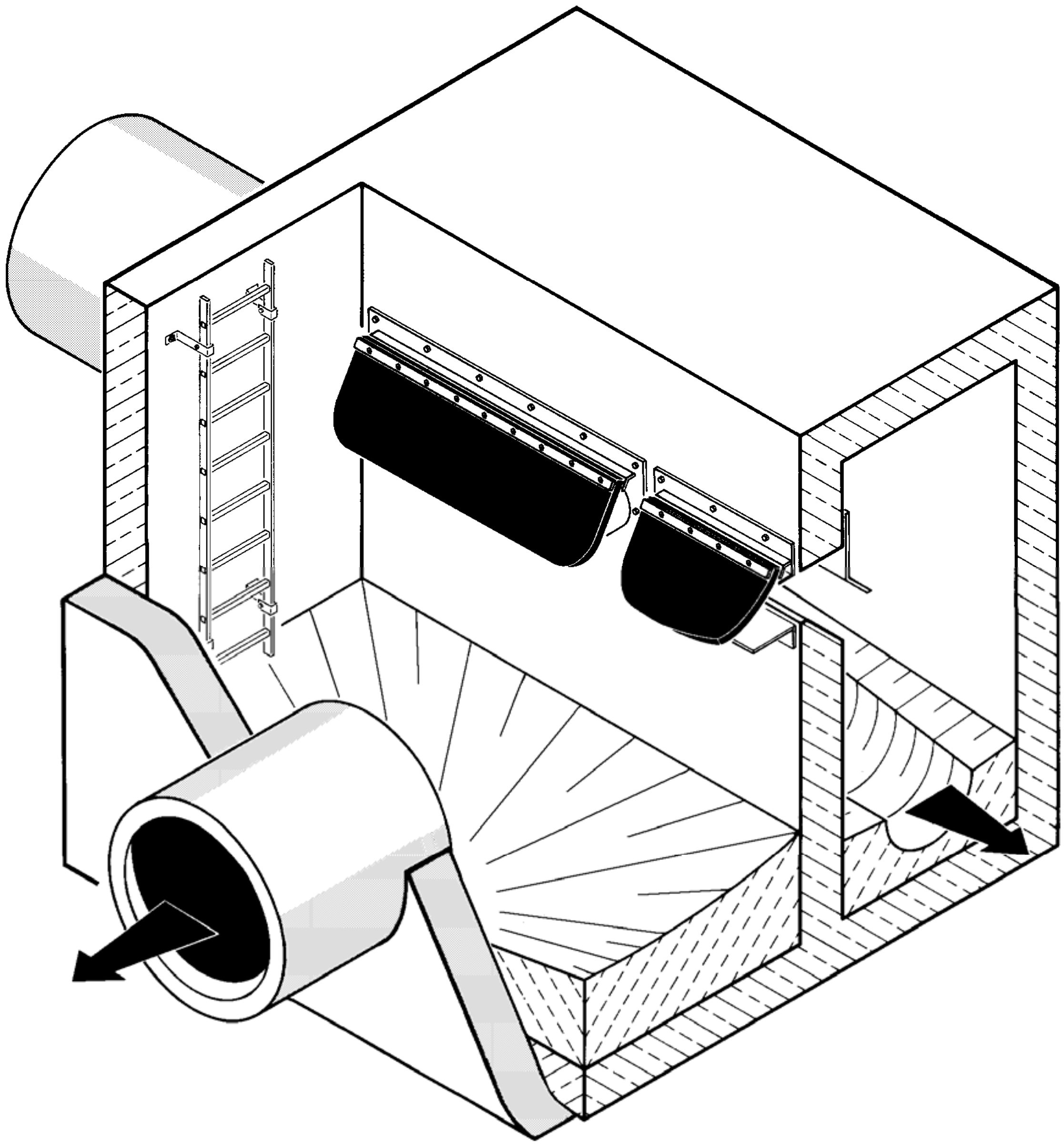
CSO/STORMWATER MANAGEMENT

HYDROVEX®
LCV Check Valve



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APPLICATIONS

Combined sewer systems typically present many retention tanks and sewer overflow points. During major storm events, combined sewer overflows often occur. Furthermore, Sanitary Sewer Systems are equipped with overflow points to prevent critical levels in the system. Generally, designers make the overflow points a long crested weir near a receiving river or creek.

When high river levels occur, or if tidal conditions exist, the weir can be flooded by water coming from the discharge stream, causing a massive intake of parasitic water in the sewer system. This extra water can affect the correct operation of the water and wastewater treatment plant. Our experience shows that close to one point out of five suffers from this problem.

To avoid it, we have developed the **HYDROVEX® LCV** Check Valve that prevents the backwater flows from the discharge point to the storm basins or the sewer networks. Also, to limit floatables discharge, the unit can be supplied with an underflow baffle installed upstream.

ADVANTAGES

- low headloss
- possible installation in existing overflow structures
- no mechanical parts (bearings, etc.)
- fast closing and seals even for small downstream backflow
- clog-free valve arrangement
- from its low profile design, the pressure loads on the LCV are lower than on a normal check valve
- corrosion resistant construction

Diagram 1 compares the **HYDROVEX® LCV** Check Valve and the traditional circular valve. With an equivalent upstream level (h=1 DN), the two valves evacuate the same flow. If the water level reaches the lower edge of the **HYDROVEX® LCV**, this one still pours its maximum flow, while the circular valve is already pouring only half. The circular check valve is much more affected by the backwater flows, and with identical downstream loads, has only about half of its hydraulic capacity remaining.

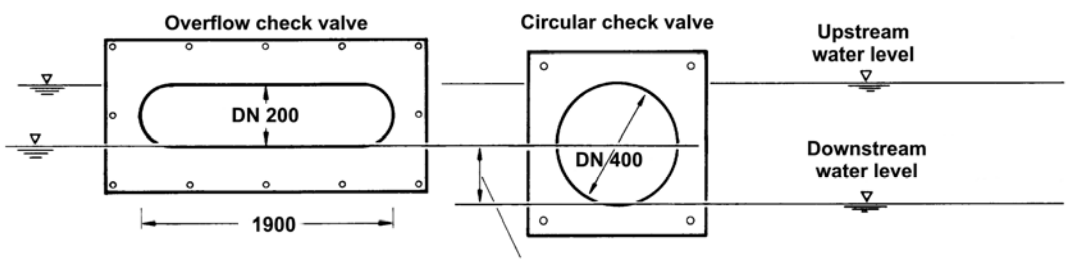


Diagram 1: Comparison between HYDROVEX® LCV overflow check valve and circular check

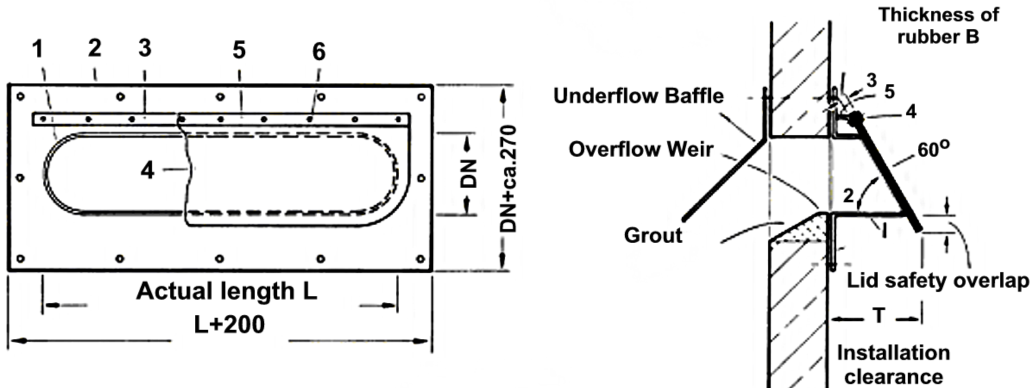
OPERATION

The **HYDROVEX® LCV** Check Valve has six principal parts, see **Diagram 2**. The body of the valve has a tubular opening, a rectangular section with circular ends. This tube is cut at an angle of 60° from the horizontal axis. A plate, allowing the anchoring of the unit to the wall, holds it. A rubber strip is attached to the steel section and rests on the angled section of the tube (see **Diagram 3a**).

This strip is rather soft and exceeds the finished section of the pipe. Low upstream head is enough to move it from its resting position, thus creating the flow area. The larger the upstream head, the more the strip will be folded up, thus increasing the flow section. (see **Diagram 3b**).

On the other hand, in the event of a backflow, the strip is pressed strongly and uniformly on the seat, thus preventing backwater flow (see **Diagram 3c**).

When the level downstream becomes more significant, the strip will tend to curve inside the pipe. To avoid a total entry of the rubber strip, it exceeds the pipe by an inch or so. The strong and uniform pressure applied to the rubber strip guarantees a perfect sealing even in the difficult sewer conditions.



1. *Unit body*
2. *Installation flange*
3. *Lid support*
4. *Rubber lid*
5. *Mounting bolts*
6. *Anchors*

Diagram 2: HYDROVEX® LCV Major Components

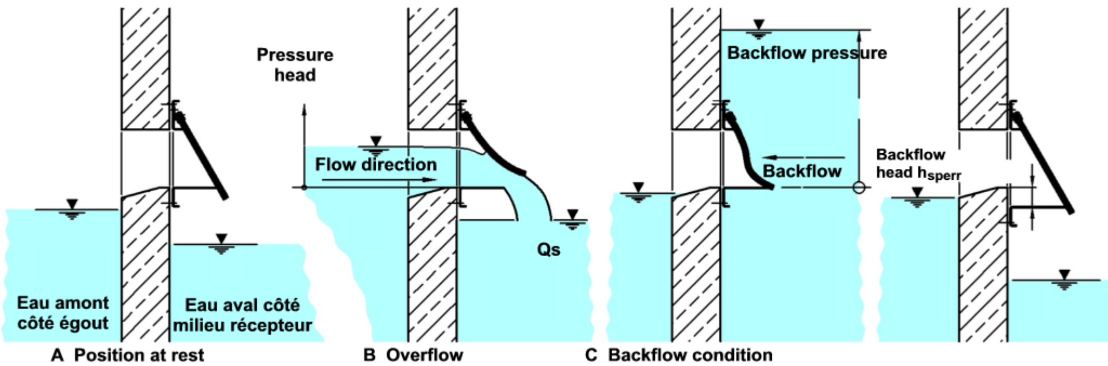


Diagram 3: HYDROVEX® LCV weir check valve operation

HEADLOSS

The thickness of the rubber strip is derived from the Shore hardness of selected rubber and the maximum pressure applied downstream from the valve. We can then deduce the resistance of the piece and consequently, the head loss induced by the valve. To open the rubber strip requires an upstream head corresponding to its actual weight. This load is equivalent to 0,3 the nominal diameter (useful height of the valve). To compensate for this fact, the valve can be installed 0,3 DN under the intended overflow crest. This way, the head loss will be negligible for upstream heads up to 1,3 DN (**Diagram 4)**.

This makes the installation of a **HYDROVEX® LCV** very simple, especially in existing systems subject to the backwater flows from the receiving body of water. The hydraulic characteristics of the overflow are not affected by the installation of a **HYDROVEX® LCV**.

Also, for backwater levels of up to 0,5 DN, no actual headloss is observed due to the reduction of the apparent weight of the strip and its diffuser effect.

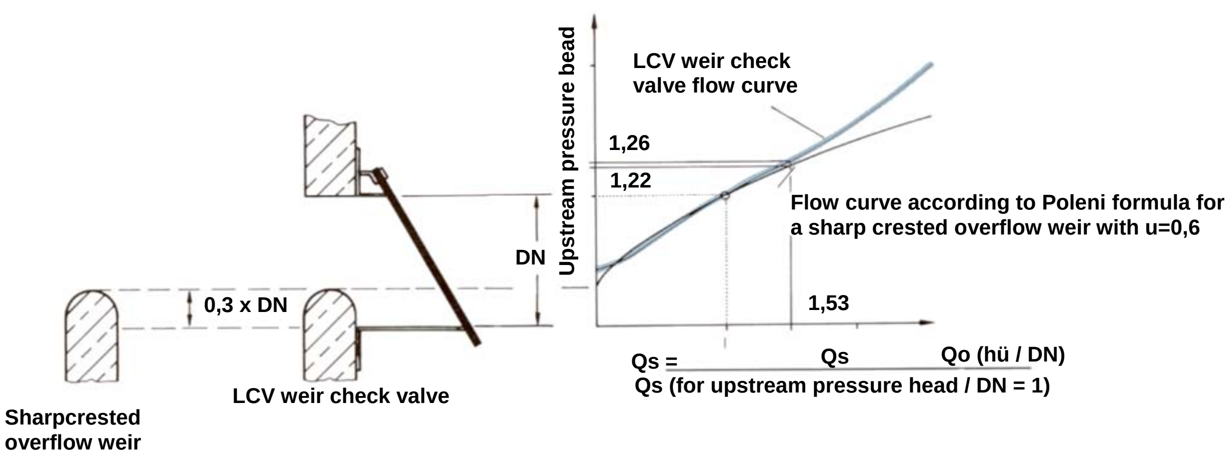


Diagram 4: Dimensionless flow curve

OBSTRUCTION

The working length of the **HYDROVEX® LCV** cannot exceed 6 feet. For longer weir lengths, please use several check valves, one beside the other.

MODEL SELECTION

Graph 5 gives the flow value for each model, in the case of a free flow. Thus, knowing the specific flow Qs (= total flow to evacuate/useful length of the peak), one calculates the nominal length of the valve.

To evaluate the flow in submerged condition, please use **Diagram 4**.

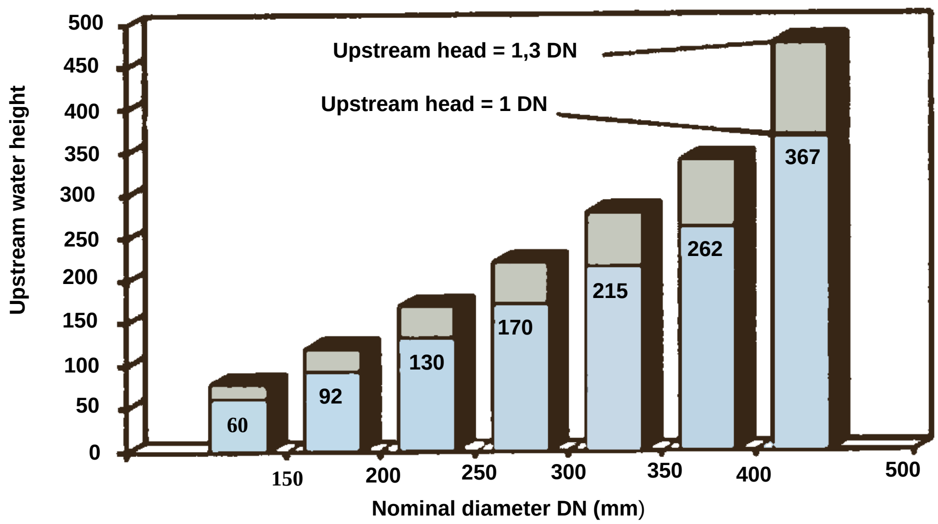


Diagram 5: Application Range of the HYDROVEX® LCV

Example:

Specific flow Qs=400l/s/m
Nominal Height DN=400m

According to graph 4:
Q_0 = Q/Qs (for a height of water of 1 DN)
Q_0=400/262=1,53

On the load curve of overflow with peak, you obtain a blade of 1,22 DN.
On the load curve of the check valve, loading upstream is of 1,26 DN

The difference in load upstream is thus:
(1,26-1,22) X DN
0,04 X 400 = 16 mm

Materials :
The body of the valve, the support plate, the rubber flap support and the hardware are made of A1S1-304stainless steel. The rubber flap is made of PERBUNAN or NEOPRENE.

Standard text for regulation :
Check valve of nominal height DN=…mm, working length L=…mm, made of A1S1-304 stainless steel with a PERBUNAN or NEOPRENE strip including hardware and anchors.

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