TECHNICAL ASPECTS

WaReg operates according to figure 1:

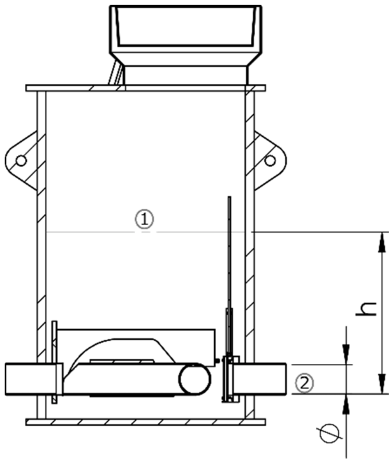

FIGURE 1 WAREG

The water level in the chamber (1) is kept constant by a float that regulates the inflow in to the chamber. Bernoulli states that:

$$p_1 + \frac{\rho V_1^2}{2} + \rho g z_1 = p_2 + \frac{\rho V_2^2}{2} + \rho g z_2$$

In our case the surrounding pressures at 1 and 2 are considered the same $p_1 = p_2$, the difference in height $z_1 - z_2 = h$, and the water level in the chamber is constant

i.e., $V_1 = 0$; results in $V_2 = \sqrt{2gh}$ known as Torricelli's law. Since $q_2 = A_2 \cdot V_2$; $A_2 = \pi \cdot \left(\frac{\emptyset}{2}\right)^2$; $\emptyset = const. and\ h = const.$ the volumetric flow q_2 is constant.

In practice the flow is slightly less due to friction, furthermore a sharp edged outlet will result in a *'vena contracta'* meaning that the diameter of the water stream is less than the diameter of the outlet. The resulting flow will be:

$q = \phi C_c A \sqrt{2gh}$

$q: Volumetric\ flow\ [m^3/s]$

$\phi: 0.95 - 1\ (Friction\ factor)$

$C_c: 0.6 - 1\ (Contraction\ coefficient)$

Key is that the volumetric flow is constant if the water level in chamber and diameter of the outlet is constant.

Comparing the WaReg to other flow regulators operating with a vortex, the main benefit is that the WaReg produces a constant flow independent of the head upstream the chamber. A vortex needs to build up a certain head before it yields the designed flow. Compare the function in the diagram below. In practice it means that the WaReg can let through the design flow during longer periods meaning a more effective evacuation of water upstream.