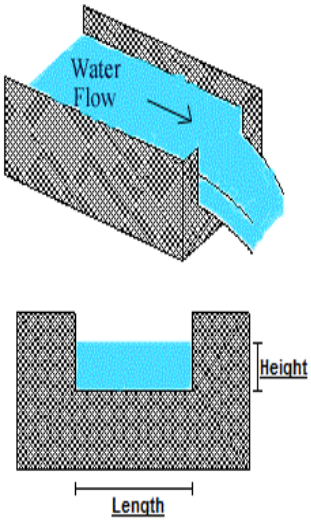
Rectangular Notch

Name of Experiment:- To determine the coefficient of discharge of Rectangular notch.
Apparatus Required:- Rectangular Notch, V- notch, hook gauge, measuring scale etc.

Theory:- A Notch is a device used for measuring the rate of flow of a liquid through a small channel or a tank. It may be defined as an opening in the side of a tank or vessel such as liquid surface in the tank is below the level of opening.

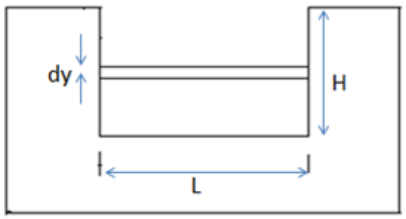
Notches can be of different shapes such as triangular, rectangular, trapezoidal, stepped notch, etc. the bottom of the notch over which the water flows is known as crest or sill and the thin sheet of water flowing through the notch is known as nappe or vein. The edges of the notch are bevelled on the downstream side so as to have a sharp-edged sides and crest resulting in minimum contact with the flowing fluid.



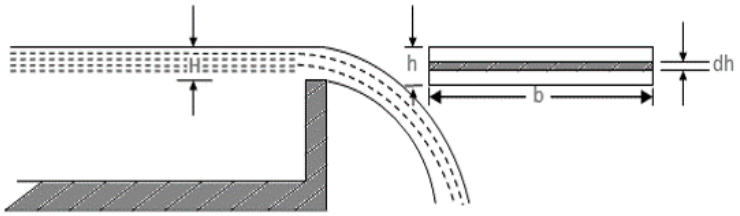
Classifications of notch:

Rectangular notch:

It takes its name from the shape of its notch. The discharge through a weir or notch is directly related to the water depth or head (H). This head is affected by the condition of the crest, the contraction, the velocity of approaching stream and the elevation of the water surface downstream from the weir.



Let us consider a horizontal strip of water of thickness dh at a depth of h from the water level as shown in figure.



Let,
H = Height of water above sill of notch
b = Width or length of the notch
Cd = Coefficient of discharge

$\therefore$ Area of the strip $= b \cdot dh$

The theoretical velocity of water through the strip $= \sqrt{2gh}$

Discharge through the strip,

$dq = C_d \times \text{Area of strip} \times \text{Theoretical velocity}$

$\Rightarrow dq = C_d \times b \cdot dh \times \sqrt{2gh}$

the total discharge over the whole notch may be found out by integrating the above equation within the limits 0 and H.

$Q = \int_0^H C_d \times b \cdot dh\sqrt{2gh}$

$\Rightarrow Q = C_d \times b\sqrt{2g} \int_0^H h^{1/2} \cdot dh$

$\therefore Q = \frac{2}{3} \times C_d \times b \cdot \sqrt{2g}\, H^{3/2}$

Procedure:-

1. Start the pump by pressing start button.
2. Open the inlet valve and allow the water to fill in the channel till crest level.
3. Note the theoretical discharge of the Rectangular Notch.
4. Note actual discharge reading of the V- notch from the collecting tank.
5. Stop the pump by pressing the stop button.

Observation

Length of the collecting tank = …….

Breadth of the collecting tank = ……..

Length of rectangular notch, L = ……

Number of end contractions, n =…

Angle of v notch =

Co- efficient of discharge for v-notch =

Theoretical discharge, Q_{th}= ……

Actual discharge, Q_{act} = …….

Results :-