OPERATING INSTRUCTIONS

Simple Cut-throat Flume

520-345

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Contents

1 Introduction

This simple cut-throat flume is suitable for measuring the discharge of small streams in the range 0 – 15 litres/second.

2 Installation

The flume should be positioned in the stream bed so that the whole flow passes through the flume. It is important that the base of the flume is level. The water level gauge must be positioned at the upstream end of the flume.

3 Operation

Water enters the flume under sub-critical (non-turbulent) flow. The constriction in the flume causes critical conditions and the water enters the downstream channel as super-critical flow. The water level is measured a short distance upstream of the critical flow using the water level scale provided.

This water level is directly related to the flow through the flume using the following equation:

$$Q = b_2 g^{½} (2/3)^{3/2} (h_1 + u_1/2g^2)^{3/2}$$

Where Q = flow through flume
b_2 = width of constriction
h_1 = depth upstream of critical flow
u_1 = flow velocity upstream of critical flow
g = gravity

In most cases u_1 is small and can be ignored with little loss to accuracy.

The equation is thus simplified to:

$$Q = b_2 g^{½} (2/3)^{3/2} (h_1)^{3/2}$$

for this flume b_2 = 100 mm

$$=> Q = 0.1705(h_1)^{3/2}$$ where units are Q (m^3/s), h_1 (m)

In this way depth readings (h_1) can be used to give flow (Q).

4 Maintenance

The flume must be inspected regularly to check for sediment deposits and to ensure no flow is by-passing the flume. If sediment is allowed to build up then accuracy will be reduced.