

Parshall Flumes consist of a converging upstream section, a downward sloping throat and an upward sloping, and a diverging downstream section. It is usually constructed of concrete, but may be constructed of wood. Stainless steel and fiberglass reinforced plastic liners have been used for metering corrosive solutions. Parshall flumes have been constructed in sizes with throat widths ranging from 3 in. to 40 ft. for measuring flows up to 1500 mgd.

FREE-FLOW CONDITION

Free flow discharge, the condition under which the rate of discharge is dependent only on the width of the throat and the depth of water at gage point H_a in the converging section, can occur at two different stages:

1. Where the liquid moves at high velocity in a thin sheet conforming closely to the dip at the lower end of the throat
2. Where the back water raises the water surface to elevation H_b , causing a ripple or standing wave to form at or just downstream from the end of the throat.

Under the latter condition, the flume operates under partial submergence, but the free flow rate of discharge is not impeded as long as the ratio of H_b to H_a does not exceed the values given below.

SUBMERGED FLOW

When the ratio of H_b to H_a exceeds the values given below, the flume is operating under submerged flow and the rate of discharge is reduced. Operation of flumes under submerged flow conditions is not recommended since two gage points are required to determine the negative correction factor to apply to the free flow calibration data. There are no instruments available for direct and accurate measurement of submerged flow.

FLUME THROAT	H_b / H_a
3 – 9 in.	0.6
1 – 8 ft.	0.7
10 –50 ft.	0.8

SECONDARY ELEMENTS

Float operated devices are widely used with cables or rigid rods to convert vertical float motion into rotation in the transducer.

Bubbler or purge systems are also popular as secondary elements in open channel flowmeters. A constant regulated flow of air or water is forced through a dip tube. The back pressure on the tube is monitored. This is