

Testing of 75mm diameter Siphonic Outlet to the requirements of EN1253:2003

For Aquadraat Engineering bvba

By Dr Malcolm Wearing BEng PhD CEng MICE MCIWEM

Report AQE_10_1_1.01

18 October 2010



1. Introduction

A series of tests were carried out to comply with the test procedures set out in EN1253:2003 Gullies for Buildings. Testing involved measuring:

- The single resistance value of the outlet
- Fitness for purpose (ie the outlet will pass not less than 14 l/s at 55mm water depth, when connected to pipework arrangement shown in standard)

In addition to these tests, a water depth/discharge curve was collected to allow gutter and flat roof calculations to be undertaken for the outlet at other water depths.

2.0 Test procedure

The outlet was placed in the centre of a circular test tank with peripheral feed, with a flat area surrounding the outlet of minimum diameter 1.75m. Water was supplied to the tank by the laboratory recirculation system and the flow rate was measured using an electromagnetic flow meter permanently installed in the laboratory pipework accurate to $\pm 0.5\%$. Water depths were measured in a stable area of flow, with water surface followers accurate to $\pm 0.3\text{mm}$.

2.1 Single resistance value test

The outlet was set up as shown in Figure 1 and tested in the following manner:

Flow rate was slowly increased until full bore flow was established in the downpipe. Once a stable water level was obtained, a pressure measurement was taken. This procedure was then repeated at 5 minute intervals, the results of these tests forming an average.

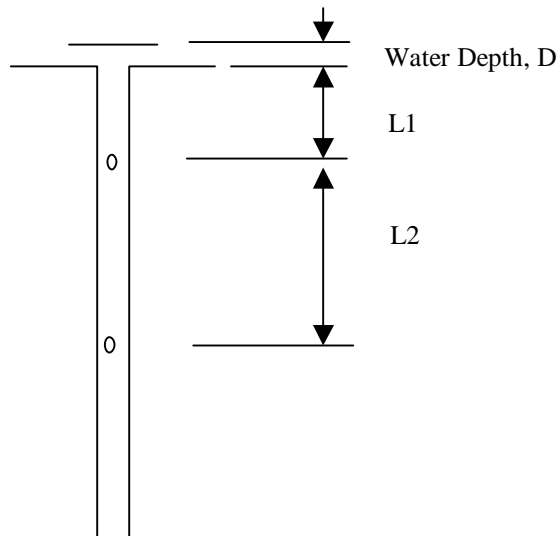


Figure 1, Test set up for measuring single resistance value

2.2 Fitness for Purpose and Water depth measurement

The outlet was connected to pipework as shown in Figure 2. A water depth/discharge curve was obtained for all flow rates between 0 and the maximum flow rate for the pipe configuration used.

Water level was maintained at a steady level of 55mm for 10 minutes, and the minimum flow rate recorded.

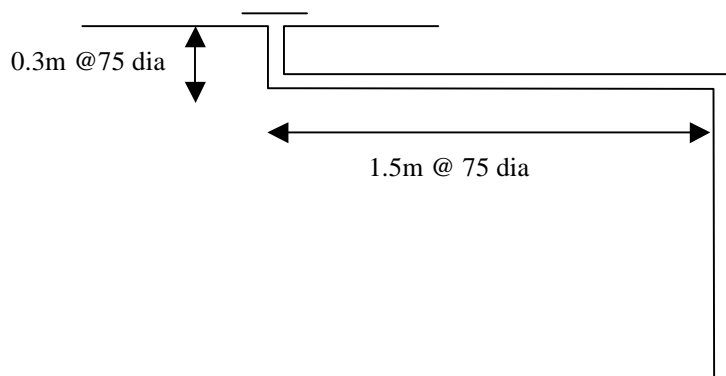


Figure 2, Test set up for measuring water depth at various flow rates



Photograph 1 – Outlet under test at 55mm water depth

3.0 Results

3.1 Single resistance value test

Flow rate during test,	20.6 l/s
Steady water level, d,	0.051 m
Pipe roughness,	0.003 mm
Distance to tapping 1	1.0m
Distance to tapping 2	2.0m
Pipe ID	70mm

Pressure head in the pipe is given in the table below.

Reading	Pressure head at tapping1 (m)	Pressure head at tapping2 (m)
1	-0.963	-0.306
2	-0.961	-0.305
3	-0.962	-0.307
4	-0.960	-0.304
5	-0.961	-0.306
Ave	-0.961	-0.306

3.2 Water depth at various flow rates

Drop from outlet to horizontal = 0.3m
Maximum vertical tailpipe size = 75mm
Maximum horizontal tailpipe size = 75mm

The static water depths for various flow rates are shown in the table below. Water depths are measured with respect to the outlet ring.

Water Depth (mm)	Flow Rate (l/s)
0.0	0.0
17.0	1.8
22.6	3.3
27.7	4.6
31.1	5.8
33.6	6.8
36.3	8.4

38.1	9.6
39.9	11.3
41.1	12.3
43.0	13.7
45.4	16.0
47.9	17.9
51.2	20.6
55.3	23.6

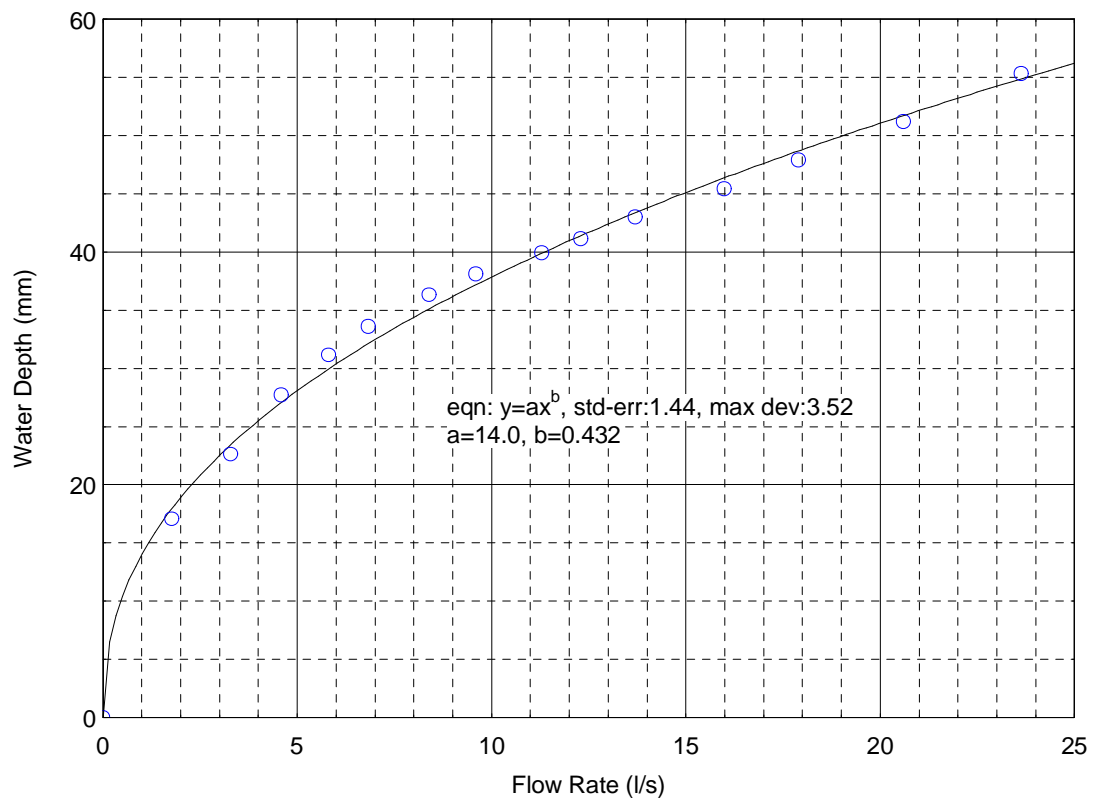


Figure 3, Graph of flow against water depth

4.0 Comments

The pressure measurement results from the tests give a resistance value of 0.15 for the 75mm diameter outlet tested, using the measured pipe friction factor of 0.003mm.

The outlet significantly exceeded the fitness for purposes requirement, passing 23.4 l/s at 55mm water depth

The outlet head performance can be expressed as

$$\text{Water depth eqn: Water depth, } h = 14.0 \times Q^{0.432}$$

The outlet tested complies with all the testing requirements of EN1253-2003



Dr. Malcolm Wearing BEng PhD CEng MICE MCIWEM

For and on behalf of CRM Rainwater Drainage Consultancy Ltd

18 October 2010