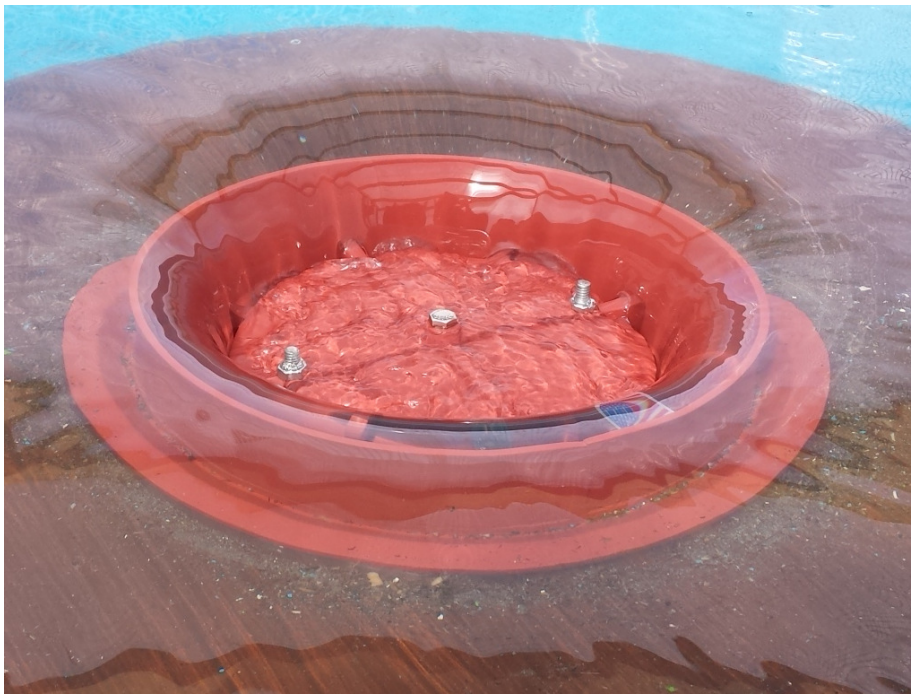
CRM Rainwater Drainage Consultancy Ltd

Test of MIFAB HydroMax MH-301 3” Overflow Siphonic Roof Drain to ASME 112.6.9-2005



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Report Number:

CRM-MIFAB-HydroMax-3inch-OF Revision 1.02

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Document History

Rev	Date	Approving Engineer	Reason
1.00	28/06/16	M Wearing	Report issue
1.01	17/07/16	M Wearing	GPM Figures added
1.02	19/09/16	M Wearing	ID References added

1.0 Introduction

A series of test were carried out to comply with the test procedures set out in of ASME 112.6.9-2005. The test program in ASME 112.6.9-2005 is designed:

- To determine the relationship between the flow rate entering the drain and the depth of water at the approach to the drain (i.e. the flow rating cure for the product);

- To determine the head loss coefficient (i.e. single resistance value) for the drain for use by the designer for designing the piping system in which the drain will be installed.

- To check the effectiveness of the drain at preventing entry of air and for the speed of response to sudden changes in flow rate.

Tests were undertaken on a 3 inch MIFAB HydroMax MH-301 overflow drain, which was supplied to CRM 19/02/2016. There is no requirement in ASME 112.6.9-2005 to sample for the testing, as all units manufactured to normal engineering tolerances will have a similar flow performance.

2.0 Test Facility

The drain was placed in the centre of a circular test tank with the following specification, matching the requirements of ASME 112.6.9-2005:

- Test tank 39.4 inch (1m) radius

- Peripheral feed (fed by four inlets at quadrant points)

- Approach to drain of radius 35.4 inches (0.9m) which does not deviate by more ±3/32 inch (4mm) from the horizontal.

- Freeboard of more than 6 inches (0.15m)

- Incoming flow rate was measured using a Badger Magnetoflow M2000 DN 20 electromagnetic flow meter permanently installed in the laboratory pipework accurate to ±0.5%.

- Water depths were measured 19.7 inches (0.5m) from center of the drain using a water surface follower accurate to ±0.001 inch (0.3mm).

- Pressure measurements were taken using two Sensor Technics CTEM9N350GYO ± 0.35 bar, 0-10v output pressure transducers connected to an Amplicon PCI 260 12 bit DAC with maximum sampling rate 312kS/s.

3.0 Tests

3.1 Pipework

The drain was connected to a 118 inch (3m) length of 2.77 inch (70.4mm) ID clear pipework using a proprietary flexible coupling. The lower end of the standpipe had a free discharge.

3.2 Flow Rating Curve

A datum point at the lip of the drain with zero flow was established using the water surface follower. Water depths were then collected at various flow rates using the methodology set out in ASME 112.6.9-2005, section 3.5.6

3.3 Single resistance value of the drain

Two pressure transducers were installed, a minimum of 10 pipe diameters from the drain outlet, and 10 pipe diameters apart. There were no pipe joints or couplings between the pressure transducer tappings. Pressures were measured at full bore conditions using calibrated pressure transducers, capable of reading to an accuracy of ±0.1 in. w.c. (±2.5 mm w.c.).

3.4 Water patterns and sudden inflow into the drain

With the drain operating at full bore conditions, flow patterns were noted, specifically any vortices and air entrainment. The water flow was switched off, and once it had fully drained, increased to full bore conditions over a period of 15 second, and peak water depth measured using methodology set out in ASME 112.6.9-2005, section 3.5.5

4.0 Results

4.1 Rating Curve

The static water depths for various flow rates are shown in the table below. Water depths are measured with respect to the drain lip, 20inches (0.5m) from the drain center.

Water Depth (inches)	Flow Rate (ft^3/s)	Flow Rate (GPM)
1.97	0.000	0.0
2.20	0.046	20.8
2.26	0.066	29.8
2.34	0.095	42.6
2.39	0.106	47.4
2.45	0.135	60.4
2.56	0.171	76.7
2.70	0.209	93.7
2.76	0.233	104.8
2.81	0.254	114.1
2.89	0.293	131.6
2.98	0.318	142.8
3.05	0.349	156.8
3.12	0.402	180.5
3.22	0.458	205.6
3.29	0.499	223.8
3.38	0.549	246.3
3.46	0.587	263.3
3.54	0.619	278.0
3.66	0.671	301.2
3.89	0.773	347.1

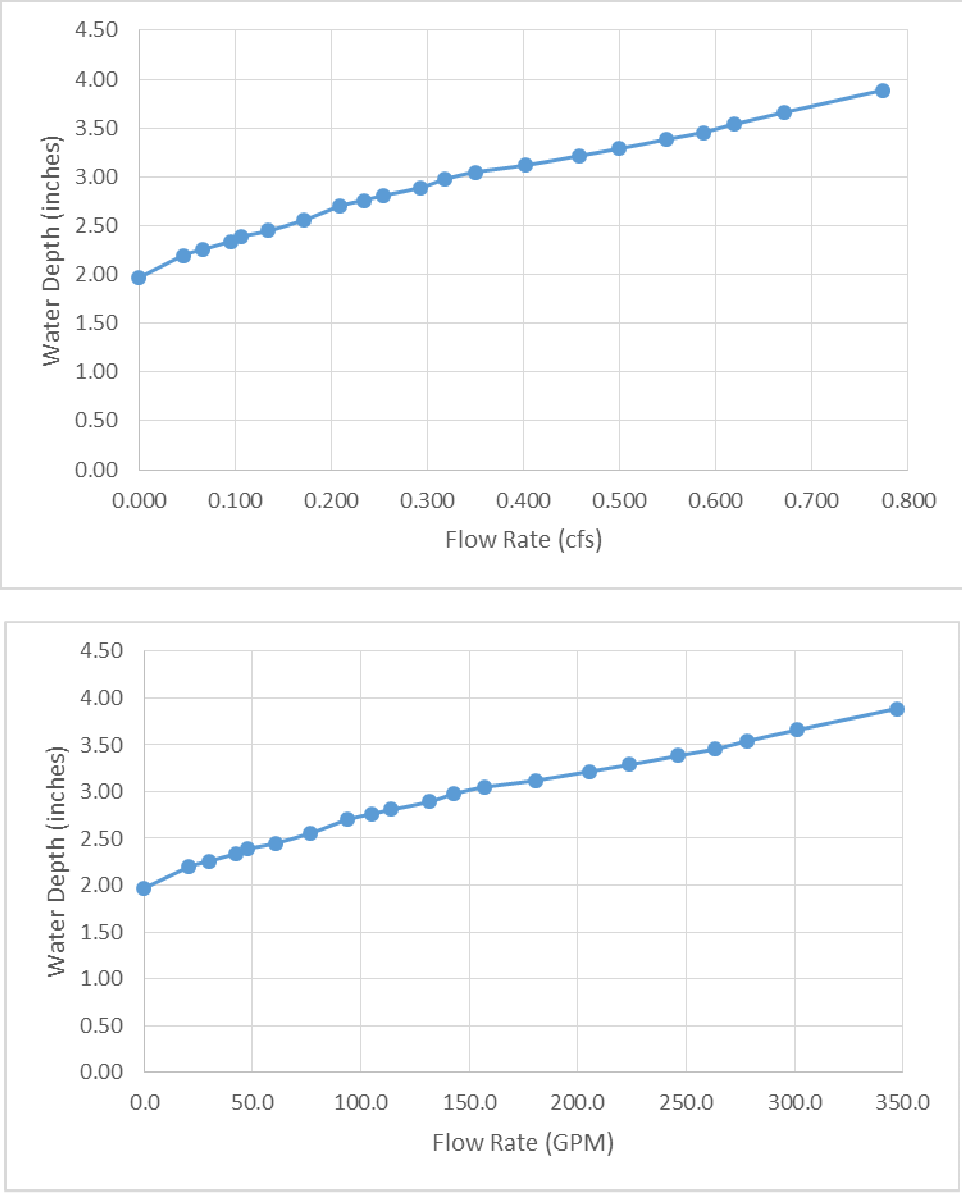

Figure 1, Rating curve

4.2 Single Resistance Testing

Flow rate during test,	0.773 cfs (21.9 l/s)
Steady water level, d,	2.11 inches (0.054 m)
Pipe roughness,	0.0012 inches (0.03 mm)
Pipe diameter (ID)	2.77 inches (70.4mm)
Drain diameter(ID)	2.83 inches (72mm)
Average pressure at upper gauge (PH)	-44.53 inches (-1.131m)
Average pressure at upper gauge (PJ)	-21.58 inches (-0.548m)

By Calculation

Single resistance calculated from Gauge H and Gauge J are both 0.095

4.2 Water patterns and sudden inflow into the drain

The drain was run its steady operating level of 0.773 ft^3/s (21.9 l/s) and observations made of any air entrainment or vorticity. In both regards the drain performed well, with very little air entrainment, and no visible signs of vorticity.

During the sudden inflow test the drain filled the pipe within the 15 second period, and so there was no overshoot recorded. The priming of the pipe was regular, smooth and progressive.

I hereby certify that the above report accurately details tests undertaken on the specified product, and that the results show that the MIFAB HydroMax MH-301 3 inch overflow drain conforms to the testing requirements of ASME 112.6.9-2005.

Signed

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19 September 2016