

Addendum 1



Technical Report

Date	28/06/2016	Pages	7	Controlling Officer	Joash Naidoo
Department	Technical Department			Signature	
Purpose		This document provides Proof of Concept Analysis and Test results			
Scope		Documented proof of test procedure and test results of the Pressure Distribution Module and venturi to determine; Nozzle Size efficiency Venturi Testing and efficiency Optimal Tank Water Usage Duration of Fill			
Audience		Aj Singh			
Confidentiality Level		High - Internal Senior Management Only - Not for Public Distribution			

PDM Testing with 1,5 mm nozzle - 28th June 2016.						Free Flow Test			
Procedure 1. Flush the system by draining out water in the pipes using valve 6. 2. Close valve 1 and set pressure to desired level 3. Monitor pressure gauge in order to verify that the pump is exerting pressure as required. 4. Close valve 2 and fill the tank with 1 litre of water. 5. Free-flow pipe is placed higher than container of water. 6. Shut valve 4 and 6 and leave open valve 3 and valve 5. 7. Open valve 1 first and set timer simultaneously. 8. Open valve 2 second and monitor the water level in tank to shut valve as soon as tank is empty. 9. After the 1 litre of tank water is used shut valve 1 off 10. Record the total amount of water in the system / the 1 litre Record						Definitions			
						Free Flow		No restriction on water flow from venturi	
						Cistern Flow		Using Wirquin Cistern mechanism with high pressure valve restricting flow on venturi by 0,5 bar	
						Flushed System		No water in pipes	
						Unflushed		Water in pipes	

Readings:	Nozzle (mm)	Pressure (Bar)	Municipal Water (ml)	Tank Water (ml)	Time (secs)	Test Type	Conclusion		
1	1,5	3	400	1000	8	1,5mm Venturi Nozzle utilised	An average of 400ml of potable water is used for every 1 litre of tank water suctioned.		
2	1,5	3	400	1000	8				
3	1,5	3	400	1000	8				
4	1,5	3	400	1000	9	Pressure set to 3 Bar	Fill Time Average = 8,2 Sec		
5	1,5	3	400	1000	9		Flow Rate = 170,73ml/sec		
6	1,5	3	400	1000	8	Flushed			
7	1,5	3	400	1000	8	Free Flow	Expected Cistern Fill		
8	1,5	3	400	1000	8		Potable Water	Tank	6 l Cistern
9	1,5	3	400	1000	8		1715	4285	6000
10	1,5	3	400	1000	8		29%	71%	35 sec
Average	1,5	3	400	1000	8,2				

PDM Testing with 1,5 mm nozzle - 28th June 2016.						Cistern Flow Test				
Procedure 1. Close valve 1 and set pump pressure as required. 2. Monitor pressure gauge in order to verify that the pump is exerting pressure as required. 3. Close valve 2 and fill the tank with 1 litre of water. 4. Shut valve 5 and 6 and leave valve 3 and valve 4 open. 5. Stop the float until test run starts. 6. Open valves 1 and 2. 7. Open valve 1 first and set timer simultaneously. 8. Shut toilet cistern float and record the readings.						Definitions				
						Free Flow		No restriction on water flow from venturi		
						Cistern Flow		Using Wirquin Cistern mechanism with high pressure valve restricting flow on venturi by 0,5 bar		
						Flushed System		No water in pipes		
						Unflushed		Water in pipes		

Readings:	Nozzle (mm)	Pressure (Bar)	Municipal Water (ml)	Tank Water (ml)	Time (secs)	Test Type	Conclusion		
1	1,5	3	900	1000	16	1,5mm Venturi Nozzle utilised	An average of 920ml of potable water will be used for every 1000ml of tank water suctioned. Fill Time Average = 16,2 Sec Flow Rate = 118,52ml/sec		
2	1,5	3	950	1000	16				
3	1,5	3	950	1000	17	Pressure set to 3 Bar			
4	1,5	3	950	1000	16				
5	1,5	3	900	1000	17	Flushed			
6	1,5	3	900	1000	16				
7	1,5	3	900	1000	16	Free Flow	Expected Cistern Fill		
8	1,5	3	900	1000	16		Potable Water	Tank	6 l Cistern
9	1,5	3	950	1000	16		2875	3125	6000
10	1,5	3	900	1000	16		48%	52%	51 sec
Average	1,5	3	920	1000	16,2				

PDM Testing with 2 mm nozzle - 28th June 2016.						Free Flow Test			
Procedure 1. Flush the system by draining out water in the pipes using valve 6. 2. Close valve 1 and set pressure to desired level 3. Monitor pressure gauge in order to verify that the pump is exerting pressure as required. 4. Close valve 2 and fill the tank with 1 litre of water. 5. Free-flow pipe is placed higher than container of water. 6. Shut valve 4 and 6 and leave open valve 3 and valve 5. 7. Open valve 1 first and set timer simultaneously. 8. Open valve 2 second and monitor the water level in tank to shut valve as soon as tank is empty. 9. After the 1 litre of tank water is used shut valve 1 off 10. Record the total amount of water in the system / the 1 litre Record						Definitions			
						Free Flow		No restriction on water flow from venturi	
						Cistern Flow		Using Wirquin Cistern mechanism with high pressure valve restricting flow on venturi by 0,5 bar	
						Flushed System		No water in pipes	
						Unflushed		Water in pipes	

Readings:	Nozzle (mm)	Pressure (Bar)	Municipal Water (ml)	Tank Water (ml)	Time (secs)	Test Type	Conclusion		
1	2	3	650	1000	6,6	2 mm Venturi Nozzle utilised	An average of 637ml of potable water is used for every 1 litre of tank water suctioned.		
2	2	3	650	1000	6,7				
3	2	3	640	1000	6,4	Pressure set to 3 Bar	Fill Time Average = 6,38 Sec		
4	2	3	620	1000	6,2				
5	2	3	640	1000	6,3	Unflushed	Flow Rate = 256,58ml/sec		
6	2	3	640	1000	6,5				
7	2	3	620	1000	6,1	Free Flow	Expected Cistern Fill		
8	2	3	640	1000	6,3		Potable Water	Tank	6 l Cistern
9	2	3	650	1000	6,3		2335	3665	6000
10	2	3	620	1000	6,4		39%	61%	23 sec
Average	2	3	637	1000	6,38				

PDM Testing with 2 mm nozzle - 28th June 2016.						Cistern Flow Test				
Procedure 1. Close valve 1 and set pump pressure as required. 2. Monitor pressure gauge in order to verify that the pump is exerting pressure as required. 3. Close valve 2 and fill the tank with 1 litre of water. 4. Shut valve 5 and 6 and leave valve 3 and valve 4 open. 5. Stop the float until test run starts. 6. Open valves 1 and 2. 7. Open valve 1 first and set timer simultaneously. 8. Shut toilet cistern float and record the readings.						Definitions				
						Free Flow		No restriction on water flow from venturi		
						Cistern Flow		Using Wirquin Cistern mechanism with high pressure valve restricting flow on venturi by 0,5 bar		
						Flushed System		No water in pipes		
						Unflushed		Water in pipes		

Readings:	Nozzle (mm)	Pressure (Bar)	Municipal Water (ml)	Tank Water (ml)	Time (secs)	Test Type	Conclusion		
1	2	3	1300	1000	16,6	2 mm Venturi Nozzle utilised	An average of 1510ml of potable water will be used for every 1000ml of tank water suctioned. Fill Time Average = 16,84 Sec Flow Rate = 149,05ml/sec		
2	2	3	1500	1000	17,1				
3	2	3	1400	1000	16,8	Pressure set to 3 Bar			
4	2	3	1600	1000	16,5				
5	2	3	1500	1000	17,1	Unflushed			
6	2	3	1500	1000	16,3				
7	2	3	1600	1000	17,3	Free Flow	Expected Cistern Fill		
8	2	3	1600	1000	17,1		Potable Water	Tank	6 l Cistern
9	2	3	1500	1000	16,8		3610	2390	6000
10	2	3	1600	1000	16,8		60%	40%	40 sec
Average	2	3	1510	1000	16,84				