Operation and Maintenance Requirements – Attenuation Storage Tank and Flow Control Chambers

Schedule	Required Action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually or as required
Remedial actions	Repair / rehabilitate inlets, outlet, overflows and vents	Annually, or as require
Monitoring	Inspect. Check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build up and remove if necessary	Every 5 year or as required
	Neoprene Seal / Rubber Gasket	Annually

Notes:

1. Regular inspection and maintenance is required to ensure the effective long-term operation of below-ground storage systems.

2. The inspection and maintenance of the attenuation tank is the responsibility of the developer or the developer's agent until such a time the tank is fully adopted by the overseeing authority.

Aquaspira Maintenance

As a structured wall pipe certificated in accordance with WIS 4-35-01 aquaspira CSR has been tested* for its ability to withstand common cleaning practices.

Access for maintenance;
Access to the system for cleaning should be provided by conventional methods.

The system can be rodded using flexible drain rods. In common with other structured-wall drainage systems, toothed root cutters and rods with metal ferrules could damage the pipe wall and should not be used.

The system can be cleansed using low pressure, high volume flushing in accordance with WIS 4-35-01.

The test requirements are based on the recommendations for jetting practice developed by WRc and in accordance with WIS 4-35-01:2008 (October Issue 2).

WRc Jetting Code of Practice:

- Plastic sewers in Grade 1 and 2 condition can be jetted at pressures up to 2600psi
- All Grade 3 sewers, irrespective of material, should be jetted at a maximum pressure of 1900psi
- All Grade 4 and 5 sewers, irrespective of material, should be jetted at a maximum pressure of 1200psi

If the pipe material of the blocked sewer is unknown, the maximum pressure to be used is 1900psi

Factors of safety (FoS);

- The WIS require pipes to withstand a jetting pressure of 2600psi
    - The WRc COP, however, recommends a standard maximum pressure of 1900psi
    - This represents a factor of safety of almost 40%
- Test pressure is measured behind the nozzle.
    - In practice the test pressure would be measured at the pump
    - There is a pressure drop between the jetting pump and nozzle
    - On a 100m hose this pressure drop could be as much as 200psi
- The test nozzle is held rigidly within the pipe.
    - In practice the only time a jetting nozzle is stationary is if it becomes trapped

  - Even a nozzle on a tied hose would not be stationary due to the pulsing action of the pump

- The test is 120 seconds
  - WRc research determined that, if a nozzle were to become stationary or trapped, the average reaction time of a contractor would be 1 minute
  - For test purposes of the WIS, this was doubled

***Jetting of large diameter aquaspira CSR systems - WRc Test Report ref UC10815** (attached to foot of report)

HydroBrake Maintenance

Normally, little maintenance is required as there are no moving parts within the Flow Control. Experience has shown that if blockages occur they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size. The Flow Control (where applicable) is fitted with a pivoting bypass door, which allows the manhole chamber to be drained down should blockage occur. The smaller conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.

Following installation of the Flow Control it is vitally important that any extraneous material i.e. building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced, please do not hesitate to contact the company so that an investigation may be made.

All Flow Control units are typically manufactured from grade 304 Stainless Steel, and if required they can also be manufactured in grade 316 Stainless Steel. Both materials have an estimated life span in excess of the design life of drainage systems.

Neoprene Seal / Rubber Gasket Maintenance

The hydrobrake unit is sealed to the concrete wall of the manhole by the use of a rubber gasket or neoprene seal.

The condition of the seal shall be inspected annually for signs of damage and deterioration and repaired or replaced as required in accordance with the manufacturer's recommendations.

Ham Baker Adams Penstock and Lifting Bar Maintenance

Every 3 Months:

1. It is recommended that all units are operated through a full cycle.

2. Check any operating gear for damage, wear and freedom of movement. Clean the spindle threads by hosing down with clean water. Apply grease to the spindle, and to any grease nipples present in accordance with the recommended lubricant below.

3. Check any lifting beam hooks for freedom of movement. Check the disengagement ropes for wear and tear and replace with the same specification rope as necessary. Moving parts should be lightly oiled/greased. (Note that it is advisable to hose down lifting beams after every time used, especially around the hook pivots and disengagement rope assembly). Note also the requirement in the Health and Safety Recommendations (Section 2), with regard to the requirement for a thorough examination prior to use by a competent person. Customers/end users are reminded that it is their responsibility to ensure that the lifting beams and associated slings are re-tested in accordance with legal requirements at the required frequency.

4. Check that guarding originally supplied with the unit remains in position and is securely fixed, including any fixed guards or protection tubes.

5. All other moving parts should be lightly oiled or greased as appropriate.

Every 12 Months:

1. Clean the unit by hosing down with clean water to remove any grit or debris.

2. Check for any leakage between the unit and concrete wall (or pipe) and the general soundness of the surrounding civil structure. Make good any faults.

3. Check tightness of all fixing bolts/nuts including foundation bolts.

4. Whilst in the fully open/extended position check that there is no damage or excessive wear to the sealing surfaces. Consult Ham Baker Ltd for advice on repair to damaged seals.

5. Normal wear on the seals on penstock units may be overcome by adjustment of the wedges or adjusters. Seek advice from Ham Baker Ltd on the adjustment of the factory set wedges or adjusters.

6. Metal sealing surfaces and metal wedge faces should be greased, (ensuring where necessary for potable water applications that the grease has WRC/DWI approval as required).

7. Check all components for corrosion damage. Painted units should be checked for signs of corrosion or damage to the paint system and repaired in accordance with the repair scheme for the original paint system (in accordance with the paint manufacturer's instructions). Seek advice from Ham Baker Ltd regarding any components which show any signs of excessive corrosion.

8. Remove the door threaded door nut (for non-rising spindles) or threaded yoke sleeve (for rising spindles) and thoroughly check for signs of wear. These components must be replaced if excessive wear is evident (because if threads shear the door may fall/unit may fail without warning).

9. Non-rising spindles require special consideration for maintenance, particularly if the liquid level creates regular grit and debris contamination of the threads and nut.

Client:	AquaSpira Ltd.	Report Ref:	UC 10815
Report Date:	March 2015	Contract No:	16397-0
Author:	Kevin Adams		

Jetting Test Report: AquaSpira Pipe

CUSTOMER: AquaSpira

PRODUCT: AquaSpira Pipe

TEST DATE: 26th March 2015

SPECIFICATION: WIS 4-35-01: October 2008 Issue 2

REQUIREMENT: The jetting resistance of the pipe is to be established. Resistance is the pressure that can be applied without damage as defined in clause WIS 4-35-01: October 2008 Issue 2.

TEST METHOD: As detailed in WIS 4-35-01:2008 October Issue 2.

1. Introduction

AquaSpira Ltd. requested WRc to undertake the high-pressure water jetting test in accordance with WIS 4-35-01: October 2008 on their AquaSpira Pipe. AquaSpira Ltd requested that the pipe was tested to check it meets the requirements of WIS 4-35-01, and also to determine the maximum pressure at which the pipe will pass the WIS 4-35-01 test procedure.

WIS 4-35-01: October 2008 states that the pipe shall withstand a jetting pressure of 180 bar (2600 psi) without unacceptable damage. WIS 4-35-01 provides the test method and requirement for assessing the resistance of structured wall pipes to pressure jetting. The jetting resistance of a material is defined as the maximum pressure at which five consecutive successful 120 second duration tests are achieved.

Unacceptable damage is defined as a puncture or crack of the wall for a solid wall or multi-layer pipe where all the layers are of a solid construction. Ductile bending or “whitening” is not considered to be damage.

2. Equipment

The following equipment was used:

- A single jet nozzle (marked WRc 06) manufactured to the dimensions given in Figure C.1 of WIS 4-35-01: October 2008.
- Calibrated pressure gauge (PG1/PG170). Daco calibration certificate N-19983, date 24-01-14
- A modified commercial trailer-jetting unit, fitted with a Spec piston pump capable of a maximum pressure of 280 bar (4000 psi) and capable of a flow rate of 36 litres per minute.
- Test rig capable of operating at a maximum pressure of 280 bar (4000 psi).

3. Test Pieces

AquaSpira supplied a selection of test pieces, from which WRc selected a section 300mm in length (hoop direction) and included the overlap of the profile where it was wound. The section was selected so that the jetting could accurately be applied between the steel ribs of

the pipe which is the thinnest. This section would also allow the test to be repeated on the profiles overlap.

4. Testing Results and Conclusions

Testing was undertaken by Kevin Adams and Tom Keelan of WRc. The water temperature for the test was 7.5°C and the ambient air temperature was 8.5°C.

Table 1 Test Results: jetting between the ribs

Segment number	Test pressure (bar / psi)	Comments/type of failure
1	180 / 2600	Minor damage to pipe surface
2	240 / 3480	Puncture 2 seconds
3	220 / 3190	Puncture 30 seconds
4	200 / 2900	Puncture 90 seconds
5	**190 / 2755**	**Minor pitting on inner wall**
6	**190 / 2755**	**Minor pitting on inner wall, dimple on outer wall but wall not punctured**
7	**190 / 2755**	**Minor pitting on inner wall**
8	**190 / 2755**	**Minor pitting on inner wall**
9	**190 / 2755**	**Minor pitting on inner wall**

Conclusion: The Aquaspira Pipe supplied by Aquaspira Ltd. was tested and met the requirement of WIS 4-35-01: Issue 2 for resistance to jetting pressure of 180 bar (2600 psi).

The maximum resistance to pressure was 190 bar (2755 psi).

Testing was also repeated at the maximum resistance to pressure (190bar / 2755psi) with the jetting nozzle directly onto the seam of the wound profile. Testing to greater pressure was not undertaken as the declared jetting resistance pressure for the system would be the lowest value.

Table 2 Test Results : Jetting directly onto the visible weld of the profile

Segment number	Test pressure (bar / psi)	Comments/type of failure
8	**190 / 2755**	**Minor pitting on inner wall**
2	**190 / 2755**	**Minor pitting on inner wall**
3	**190 / 2755**	**Minor pitting on inner wall**
4	**190 / 2755**	**Minor pitting on inner wall**
5	**190 / 2755**	**Minor pitting on inner wall**

Conclusion: The seam between the wound profile had a jetting resistance equal to that of the pipe.

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KAA

26/03/2015

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