

Pipe Air Testing Guide

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LAST UPDATED APRIL 2025

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Document Owner	Technical Director
Document Reference	Air Testing Guide
Revision Number	1.0
Date	07/04/25

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Acronyms

ASL	Aquaspira Limited
CSR	Composite Steel Reinforced
HDPE	High Density Polyethylene

1. Introduction

This air testing guide will provide information and step-by-step guidance for air testing Aquaspira composite steel reinforced (CSR) pipes. It will assist construction teams through all stages of the air testing process whilst assuming the pipe installer has good general knowledge in construction practices and experience of installing large diameter pipes.

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2. Testing & Commissioning

It is essential that pipes are checked thoroughly for leaks. It is obvious that sewerage, for example, is not permitted to contaminate the adjacent soil. What is not so apparent is that in the vicinity of trees, openings, however small, can be penetrated by the roots which in time could further damage the pipe and increase the severity of the leak.

When a CSR pipeline is sealed for a tightness test, there is always a reduction in pressure known as pressure decay, even in a leak free system, due to the visco-elastic (creep) response of the material. This pressure decay is non-linear in an unconstrained pipe. CSR pipelines may require testing in sections.

Reference should be made to SSG D&C Guidance E7.2 to E7.8, or Sewers for Scotland 4.7.2 to 4.7.8:

- E7.2 / 4.7.2 Precautions Prior to Testing Rising Mains
- E7.3 / 4.7.3 Testing of Gravity Sewers
- E7.4 / 4.7.4 Air Test for Gravity Sewers
- E7.5 / 4.7.5 Water Test for Gravity Sewers
- E7.6 / 4.7.6 Visual Inspection of Gravity Sewers
- E7.7 / 4.7.7 Infiltration
- E7.8 / 4.7.8 Watertightness of Manholes, Inspection Chambers and Wet Wells

3. Air Testing

Air testing is to be carried out in accordance with Sewers for Adoption 7th Edition (Water UK, 2012).

4. Test Stoppers and Kit

There are several stoppers that are usually used for air testing pipes on site. They vary in shape and size depending on the type of air test and pipe being tested. ASL suggest the use of the “Milltest” or Air Top Off (ATO) test stopper, which are used for low-pressure air-tests. An example of the Milltest inflatable stopper is provided in Figure 1.



Figure 1 picture of a Milltest inflatable stopper

The full testing equipment set can be seen in Figure 2 which shows; two Milltest inflatable stoppers, u-gauge manometer, soapy water applicator, and airline regulator.



Figure 2 This picture shows two Milltest inflatable stoppers, u-gauge manometer, soapy water applicator, and airline regulator

It is important to note that the stopper chosen is appropriate for the pipe diameter being tested.

It is important to check both the stoppers and the accessories before and after each use making sure the surface of the stoppers is clean and free from damage. Figure 3 shows two pictures of the stopper surface that will be in contact with the internal surface of the CSR pipe. The picture on the left shows an undamaged stopper surface. The picture on the right shows a damaged surface which could affect the air test.



Figure 3 Picture showing the stopper surface that will be in contact with the internal surface of the CSR pipe. The picture on the left shows an undamaged stopper surface where the picture on the right shows a damaged surface

The inflation equipment and connecting hose should also be clean and undamaged.

5. Preparation

Identify pipe runs and number all joints so that a methodical testing process can be applied. Ensure that the team carrying out the testing is familiar with the joint numbering system you have implemented and understand the testing process. A testing record sheet should be produced for recording the results of each test along the pipeline.

“Sewers shall be tested after they are jointed and before any concreting or backfilling is commenced, other than such as may be necessary for structural stability whilst under test.” (Water UK, 2012, p. 112)

And then

“An air test shall be carried out after the backfilling is complete.” (Water UK, 2012, p. 112)

A quick visual check of the joint should be completed to ensure that it is ready for testing.

The surface area around the joint where the bung will be installed should be clean. Any material that could create a leak path should be removed. This may mean that the operator will need to wipe the internal surface of the pipe clean. This should be completed with a clean rag and/or brush with some water to dislodge any material that has dried onto the pipe wall (see Figure 4).



Figure 4 Cleaning pipe end with rag (left) and brush (right)

6. Installation of Stoppers

Fully insert the partially inflated stopper into the cleaned area of the pipe. When installing the inflatable stopper into the socket or spigot, the bung should be position up against the “T”-Section. The “T”-section of the joint is pointed out in Figure 5.

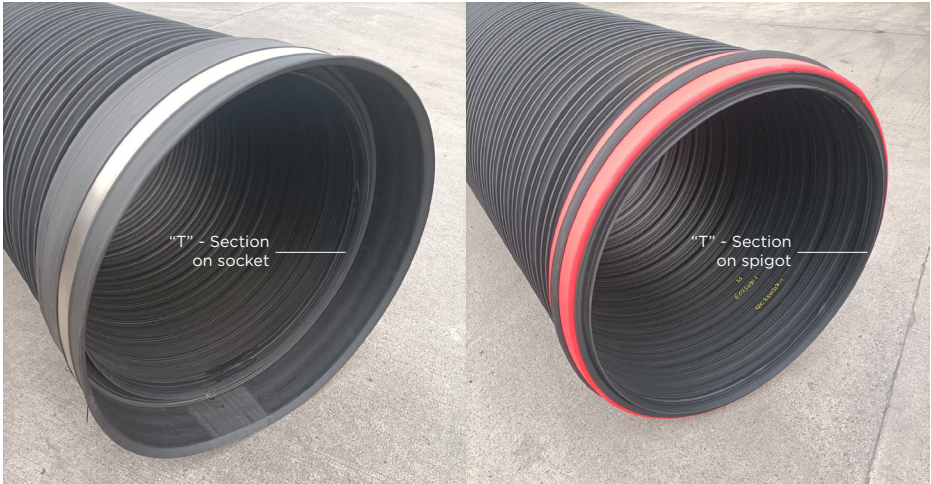


Figure 5 Picture pointing out the “T”-section of the joint Socket (left) and Spigot (right)

Figure 6 provides a picture showing the inflatable stopper sitting in the Spigot and Socket of the CSR pipe.



Figure 6 Picture of the inflatable stoppers sitting in the Socket (left) and Spigot (right)

If a length of CSR pipe has been cut so that the pipe run can enter a concrete structure, there will be no “T”-section for the test bung to sit against. In this instance mark the lock weld with a coloured marker (see Figure 7). Draw a line following the lock weld around the inner circumference of the pipe until the lines overlap parallel to each other.



Figure 7 Picture of the lock weld being marked on the inside of the pipe (left) completed line in white (right)

The bung is then inserted between these lines and inflated (see Figure 8). Once in position the stopper should be inflated, with the outer surface of the Milltest stopper achieving a continuous pressure fit with the waterway wall of the pipe. The stopper must be fitted at a slight angle within the pipe so that the stopper does not bridge the lock weld. If this is not possible the lock weld may need to be welded over or filled using silicone or re-usable putty as it can sometimes cause a leak path around the outside of the inflatable bung.



Figure 8 Picture of inflatable stopper being inflated between the marked lines in the plain ended pipe

Connect the air supply, either a hand pump or compressor adapter, to the inflation valve located on the outer rim of the stopper. To help connect the hand pump hose to this valve the screw attachment located at the end of the hand pump hose may be adjusted. The stopper should be inflated to between 10 and 15 psi for a tight seal. The working pressure of the stopper should not be exceeded, if in doubt contact the stopper supplier for advice. Once inflated, disconnect the air supply and use soapy water to check the valve does not leak air. Repeat on the non-air testing end of the pipe.

7. Pressurisation of Void between Stoppers

Using rubber tubing, connect the u-gauge manometer to the test nipple or air valve, the air out valve located in the centre of the stopper. Ensure all other stoppers involved in the test are blanked off and all other air valves are closed. Connect the air supply to the air in valve also located in the centre of the stopper. Pressurise the pipe to 100mm water over air then turn off the air supply and disconnect at this valve (see Figure 9).

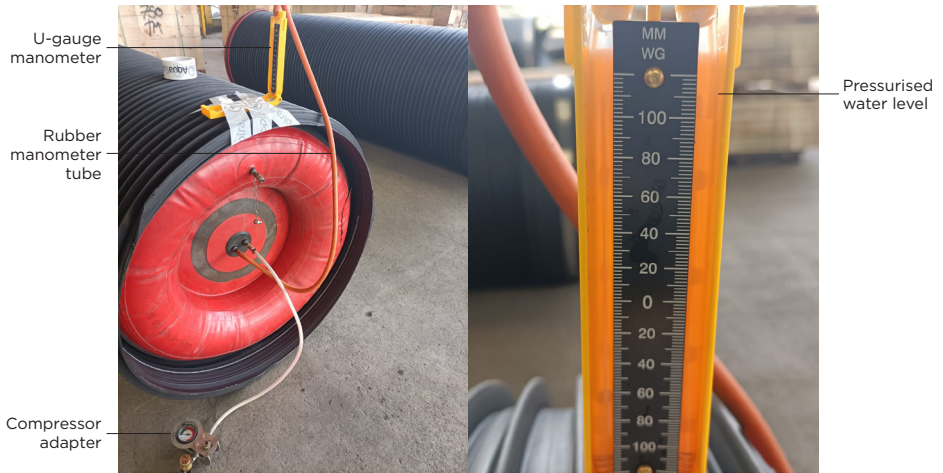


Figure 9 Picture of air testing set up showing pressurised pipe complete with inflated test stopper, U-gauge manometer, and air supply (left) and close up picture of U-gauge manometer showing 100mm water pressure (right)

Use soapy water to check the valves and the surface between the inflatable bung and stoppers are not leaking (i.e. at both ends of the volume being tested). Allow the air pressure in the pipeline to stabilise for a minute and then commence the 5-minute test period. If the air pressure in the stabilisation period has dropped with no visible signs of leaks top up the air pressure between the two bungs and commence the test.



Figure 10 Picture of soapy water being applied to the inflatable bung to check for air leaks

Start the stopwatch or similar and record the time. After the allotted test time has been completed record the manometer reading. The joint will have deemed to have passed if the manometer reading is greater than 75mm head of water.

If there is no visible leak at the bungs but the air pressure is not stabilising, the air in between the two bungs may need to be topped up and the test run repeated.

Following a successful test remove the rubber hose from the central valve and allow the pressure within the pipe to escape. Deflate the outer rim by either pulling the deflation tag which is only available on the ATO stopper or unscrewing the inflator valve on the Milltest stopper, also located on the outer rim of the stopper. There may also be an exhaust / pressure release valve on the airline regulator that can be used to deflate the stopper.

Once the stopper has deflated enough to become loose, replace the valve and remove the stopper from the pipe. The blank stoppers may then also be removed.

8. Air Test Failure

In the event of the 75mm not being achieved it is necessary to test the equipment. Check the valves on the stoppers to make sure that there is no escaping air.

Once the stoppers are checked attention should be paid to the external seal of the inflatable stopper. If necessary, increase the pressure in the void again to 120mm head. Check that the pressure is continuing to drop. Starting with the near side stopper. Initially apply the soapy water to the point at which the waterway wall emerges from the underside of the stopper. Watch for bubbles being produced. These will indicate escaping air. If a leak is found the stopper may need to be repositioned or changed.

If there is no evidence of air passing the inflatable bung, but there is still a pressure drop, remove the bung and complete a visual inspection of the pipe. Look for any pipe damage and if any damage is found take a picture and contact ASL site service team for further guidance.

References

Water UK. (2012). *Sewers for Adoption 7th Edition - A Design & Construction Guide for Developers*. Swindon: WRc.



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