

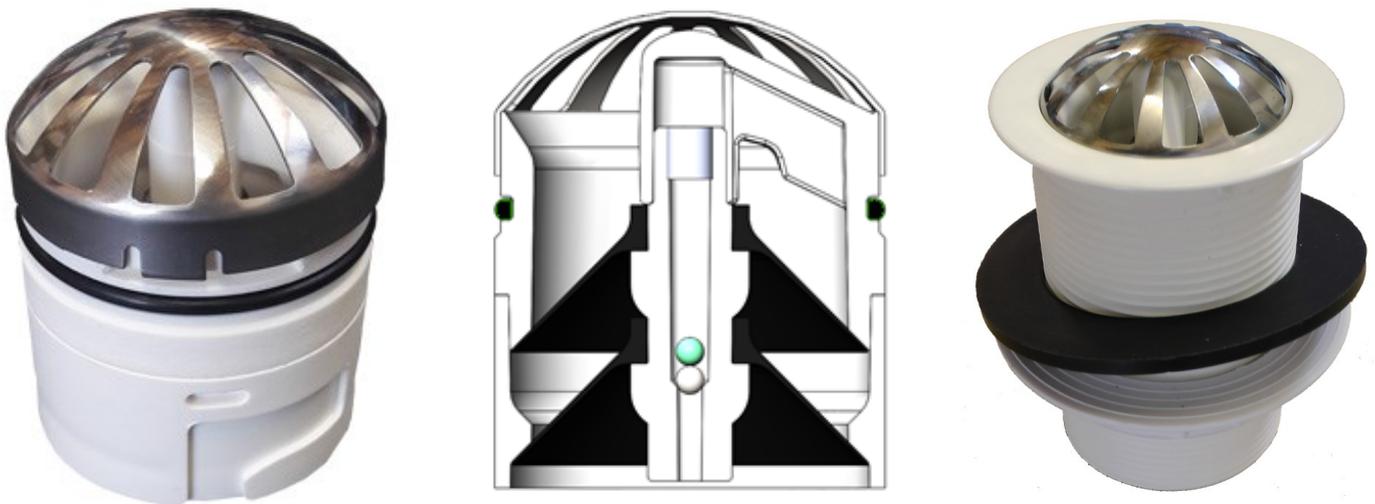
GW6-15 HYBRID CARTRIDGE (2019)

Background, Features and Test Results

PRIMARY APPLICATIONS:

Waterless and flushed urinals: reliable and long-lasting odour prevention, without the use of a trap.

Sinks: allows for fast drainage and odour prevention, without the use of a trap.



CONTENTS OF THIS DOCUMENT:

- Background to Product Development
- Design Objectives Achieved
- Application Examples
- Cleaning and Maintenance Guidance
- Waterless Urinal Bowl Bundled with GW6-15
- Certificate of Silicone Compound Resistance to Chemicals from SITEC
- Technical Report by LABSON UPC

PATENT STATUS:

USA:	US 9 915 364 B2	13th March 2018
MEXICO:	MX/A/2016/013892	8th August 2018
EUROPE:	Pending publication	
INDIA:	Pending publication	
AUSTRALIA:	AU 2015250017 B2	2nd May 2019

Others also in progress

BACKGROUND TO PRODUCT DEVELOPMENT

The **GW6-15** has been designed, and extensively tested, as a hybrid valve that meets the challenges found in the real washroom environment. It is the latest in a line of innovative products.

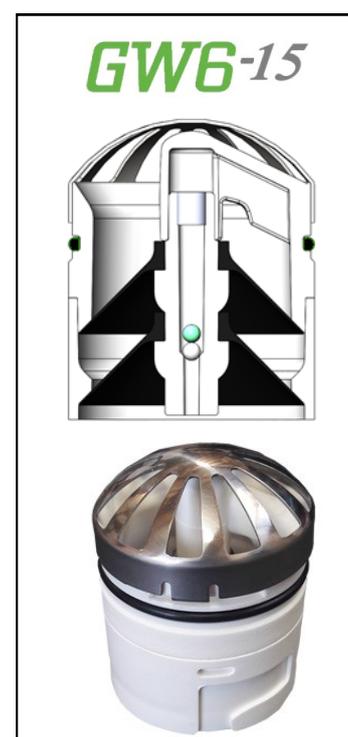
The original predecessor of the **GW6-15** is the **GW6V** cartridge which, since 2013, has been used in purpose-designed, as opposed to retrofit, waterless urinals such as the Aridian from Ideal Standard, the Arica from Vitra as well as the Patagonian and other models from Gentworks. More than 16,000 **GW6V** have been sold, mainly in the UK but also in mainland Europe, Australia and Latin America.

In December 2016, a new version of the **GW6V** was launched which employed the new “snorkel valve” technology, reducing the potential for positive pressure in waste pipes and improving flow. The latest **GW6V** also has other enhancements to improve drainage rate and can be flushed. However, as the **GW6V** is mainly deployed in purpose-designed waterless urinals, the higher flow rate gave no significant benefits, but did inform the design of smaller cartridges that would fit traditional flushed urinals.

In March 2015, the **GW15** waterless urinal cartridge for urinals with 1.5” BSP wastes was introduced. This cartridge was a smaller version of the original **GW6V**, without the snorkel valve technology. More than 2,000 **GW15** were sold, through Gentworks and OEMs, but the product was not actively promoted. A significant proportion of units sold directly by Gentworks were monitored and maintained by our own engineers, providing valuable feedback to the team responsible for designing the ultimate version, namely the **GW6-15**.

Over a period of 2 years, mechanical engineers and designers based in the USA, UK and Spain developed the 1.5” BSP compatible cartridge known as the **GW6-15**, which now includes the snorkel valve technology. The flow rate of over 9 litres per minute has been extensively tested by LABSON UPC. (*The LABSON report is included in this document.*) The **GW6-15** is a true hybrid, operating waterless or flushed, with the dual “skirt” valves providing superior odour prevention, not least due to the presence of 2 valves rather than 1.

The most important challenge for those maintaining waterless urinals is odour prevention, and the dual skirt valves accomplish this task perfectly. However, whether a valve or fluid-barrier method of odour prevention is used, the main cause of failure for waterless urinals is the use of cleaning chemicals that degrade the system. This is why the **GW6-15** uses skirt valves made from a specially formulated and treated silicone that resists cleaning chemicals, including bleach. (*The SITEC test certificate is included in this document.*)



GW6-15 HYBRID CARTRIDGE - DESIGN OBJECTIVES ACHIEVED

DESIGN BRIEF: Maximise life and reliability of the hybrid cartridge, completely disregarding the impact this has on revenue streams from cartridge replacement cycles. Build the best valve for the client organisation, reducing their costs of maintenance, including exchanging cartridges.

- Incorporates 2 reliable self closing one-way valves to ensure against foul air being emitted from the drain.
- Flow rate of at least 9 litres per minute, to allow for “worst case” environment where a 9 litre cistern is attached to a single urinal, the normal flush being 3 to 4.5 litres. Also allows for the cartridge to be fitted into sinks. In both cases, no trap is required.
- Implementation of snorkel valve technology to protect against valve distortion in the rare event of positive pressure in the drain.
- Incorporation of silicone skirt valves which have high resistance to cleaning chemicals, including bleach. Bleach was a particular focus as it reacts with normal silicone.
- Allow customer organisations, and their service partners, flexibility in cleaning practices by allowing for a wide range of standard cleaning products to be used without degrading the cartridge function. No reliance on an incorporated biological or chemical block which significantly restrict the use of standard cleaning chemicals.
- Appearance of cartridge when fitted into the waste should be discreet, not detracting from the design of the sanitary ware.
- Make maintenance easy and inexpensive by removing the need for a trap and allowing quick access for drain rods by removing the cartridge, if a blockage occurs in the waste pipes. The high flow rate also allows for effective sluicing of the waste pipes for preventative maintenance.

GW6-15 HYBRID CARTRIDGE - EXAMPLES OF APPLICATIONS

Call-centre in Manchester, UK, having problems following the cleaning regime required by traditional micro-biological waterless urinals, with resulting odour problems due to cartridge degradation. Replaced cartridges used in the waterless urinals with the GW6-15, resulting in a dramatic reduction in problems experienced and lower costs of maintenance due to the chemical resistant properties of the GW6-15.

A major urinal manufacturer had problems with another type of cartridge being originally bundled with a waterless urinal product. The GW6-15 was adopted instead due to better reliability, availability plus packaging and documentation with the manufacturer’s own brand.

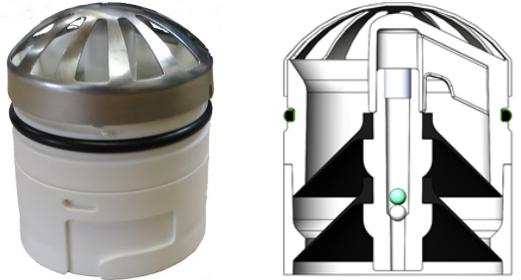
“Off grid” washroom manufacturer incorporated urinals fitted with the GW6-15 into their wooden cabins designed for use in areas where there was no electricity, mains drainage or water supply. The GW6-15’s reliability, longevity and tolerance when operating in high and low temperatures were seen as particularly important for such sites.

Cleaning and Maintaining *GW6-15* Waterless Urinal Cartridges

The GW6-15 waterless urinal cartridge is fitted in a wide range of ceramic urinal bowls, including the Tanami and certain models from well known brands. It is an upgrade of, and has the same fitting as, the GW15 cartridge. **Strong chemicals with a pH of less than 4, or greater than 10, should be avoided in order to maximise the life of the cartridge.**

Regular Cleaning

- Follow the normal cleaning procedure applied to urinals. The use of Gentworks Bactericidal cleaner is recommended to maximise cartridge longevity.
- (optional) After cleaning, pour the equivalent of a cup of water or cleaning solution into the bowl to check free flow and ensure the valves in the cartridge are clean.
- The GW6-15 is tolerant of most standard cleaning products, including bleach. However, products containing strong acids and strong alkalis (pH < 4 or pH > 10) should be avoided as they can shorten the life of the silicone valves in the



DO NOT FIT A TRAP OR U-BEND

Recommended Maintenance

- Because hair and dirt particles can enter the drain, and uric acid salts can build up around them over a long time, it is recommended that a mixture of warm water and mild cleaning chemical is poured into the drain every 2 to 4 weeks, if the urinal is waterless, or monthly if it is flushed.
- **DO NOT use a plunger** with the GW6-15 cartridge fitted. Extract it first.
- **DO NOT use a sharp tool** such as a screwdriver blade to try and dislodge any debris caught in the skirts of the valve. This can cause irreversible damage to the valves.
- Always dislodge debris by sluicing, removing the valve for cleaning under a tap or by replacement of the cartridge.



Replacing the GW6-15 cartridge

After 6 to 12 months, or when odour is noticeable, the GW6-15 cartridge should be replaced. A small metal tool is provided.

- Clean the valve by pouring warm water mixed with some cleaning chemical into the urinal waste. Gentworks Bactericidal Cleaner is recommended.
- Slot the tool into the stainless steel grill and twist anti-clockwise (left) to unlock the cartridge, then gradually pull out the used cartridge and dispose of it.
- Insert the new cartridge into the waste outlet, then twist and push until the cartridge drops into place and the gaps in the grill are level with the surface of the urinal bowl. This will prevent the pooling of fluid.
- Lock the cartridge into place by slotting the metal tool into the grill and twisting clockwise (right).



Troubleshooting

If there are odours coming from the urinal:

1. Pour a solution of warm water and mild cleaning chemical into the drain to clear the valve of any debris.
2. *If odours still noticeable*, change the GW6-15 cartridge.

NOTE: If a plunger or drain cleaning acids have been used with the cartridge fitted, it will need replacing because the valves will have been seriously damaged.

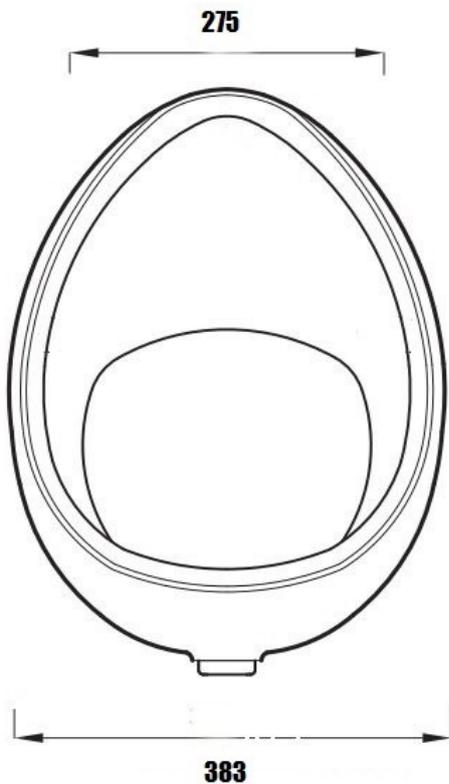
Gentworks

GW6-15 Tanami Ceramic Waterless Urinal

Waterless urinal bowl manufactured in ceramic. Supplied with the reliable and easy to maintain GW6-15 waterless urinal system

Key Benefits

- *Manufactured in ceramic*
- *Unique double-skirt silicone valve system that drains quickly and effectively*
- *Waterless valve core typically lasts 6 to 12 months*
- *Unique dual valve technology for added protection against odours*
- *Simple bayonet fitting into special housing and easily extracted using the tool provided*
- *Suitable for exposed waste pipes*



Replaceable dual valve cartridge



CERTIFICATE OF SILICONE COMPOUND RESISTANCE TO CHEMICALS.
FOR SKIRT VALVES USED IN GW6 AND GW6-15 PRODUCTS

Vitoria, 9th of November of 2017.

The purpose of this document is to address chemical resistance information on the silicone compound material used for the manufacture of the skirt valves.

This material is suitable to be used at a work temperature range of: - 10 to +40°C

Chlorine Bleach (5%) 7days/24°C: -5ShA change points and 50% volume change

Sulphuric acid (10%) 1day/83°C: -5ShA change points and 10% volume change

Hydrochloric acid (5%) 1day/24°C: -30ShA change points and 50% volume change.

Citric acid: (15%): nil effect.

Urea: minor effects.

Overall good resistance to pH range of: 4 to 10.

Remark: The information provided is based on the current state of knowledge of Silicone Technology, SITEC, and refers only to the material mentioned above and may not be valid if combined with other materials or in any process and / or poor handling of it.

Best regards,

Cristina Giménez



Technical Department

www.sitec.com.es



SITEC



LABSON
Ref 275/18-1 (181211)

TECHNICAL REPORT

Snorkel Valve GW6-15



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UPC-Campus de Terrassa

Terrassa, November 11, 2018

Test report No. 275/18-1 / -EX/MF

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0-Identification of components tested

The GW6-15 valve core cartridge incorporates two membranes (silicone skirt) as closure elements, as shown in figure nº 1. For identification purposes the reference GW6-15 is used.

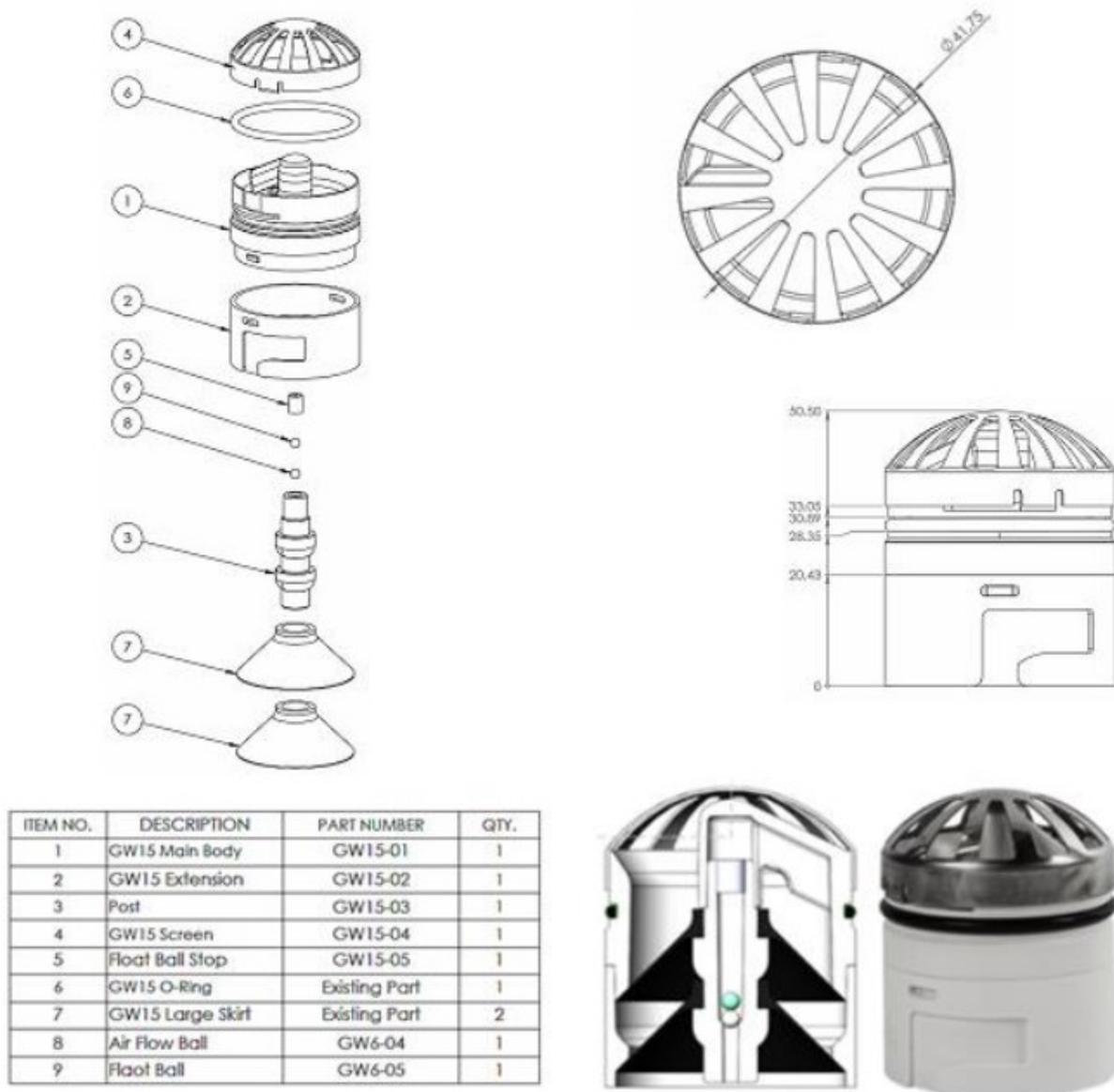


Fig nº 1 - Device-reference: GW6-15

1- Experimental characterisation of drainage capacity

In order to characterise the drainage capacity of the GW6-15 device, a small installation has been designed and constructed. This evaluates the flow rate through the, depending on the height of water in the test vessel.

As shown in figure nº 2, the experimental equipment consists of the following components:

- tank/transparent vessel (methacrylate) to facilitate the measurement of the height of the free surface of the water inside
- system contribution of adjustable flow, to maintain constant height of the free surface of the water
- system to measure the flow of drained water

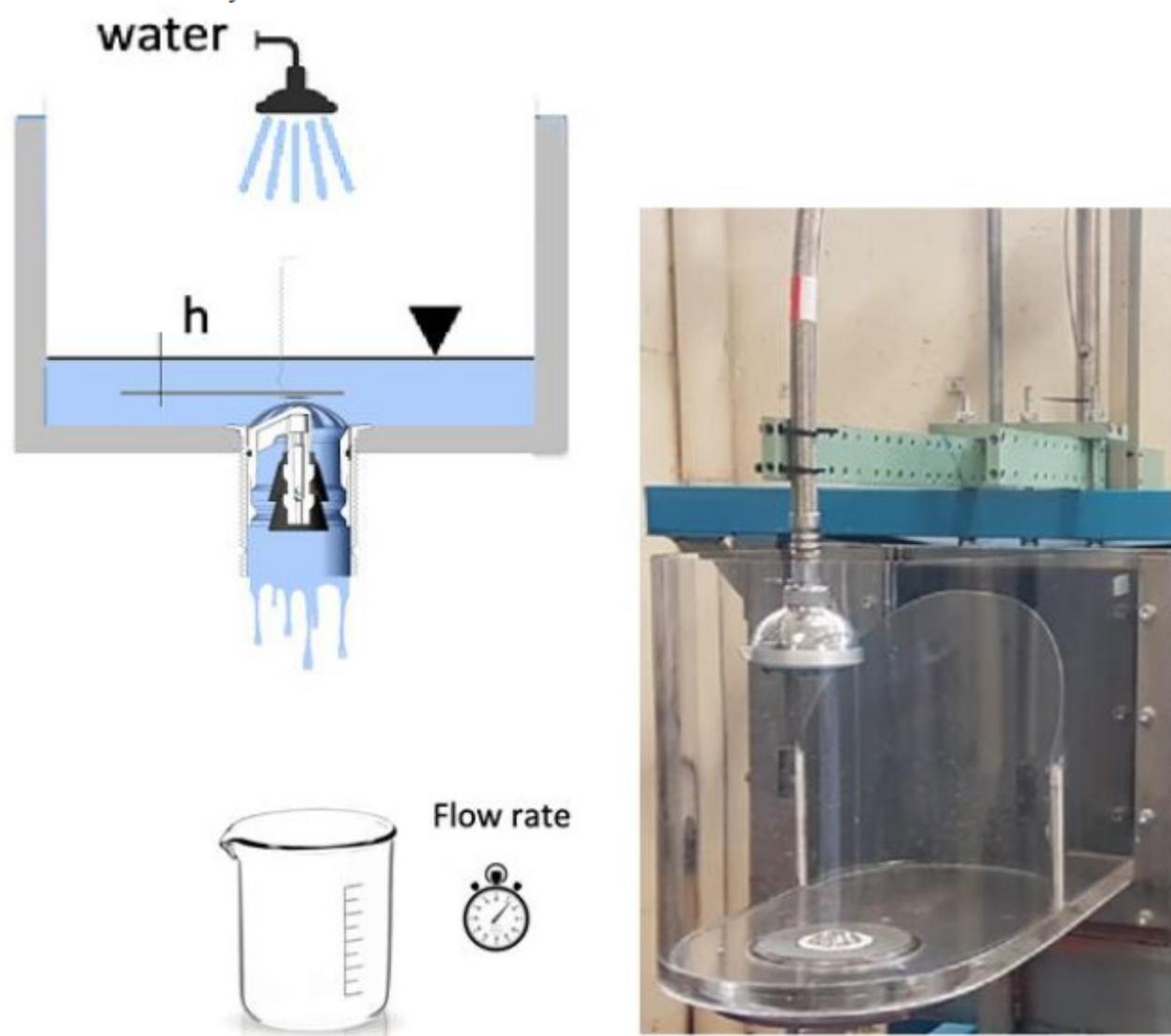


Fig nº 2- Experimental bench for drainage capacity measurement

2- Experimental results of drainage capacity

In figure 3, the results obtained in the test of the GW6-15 device have been summarised.

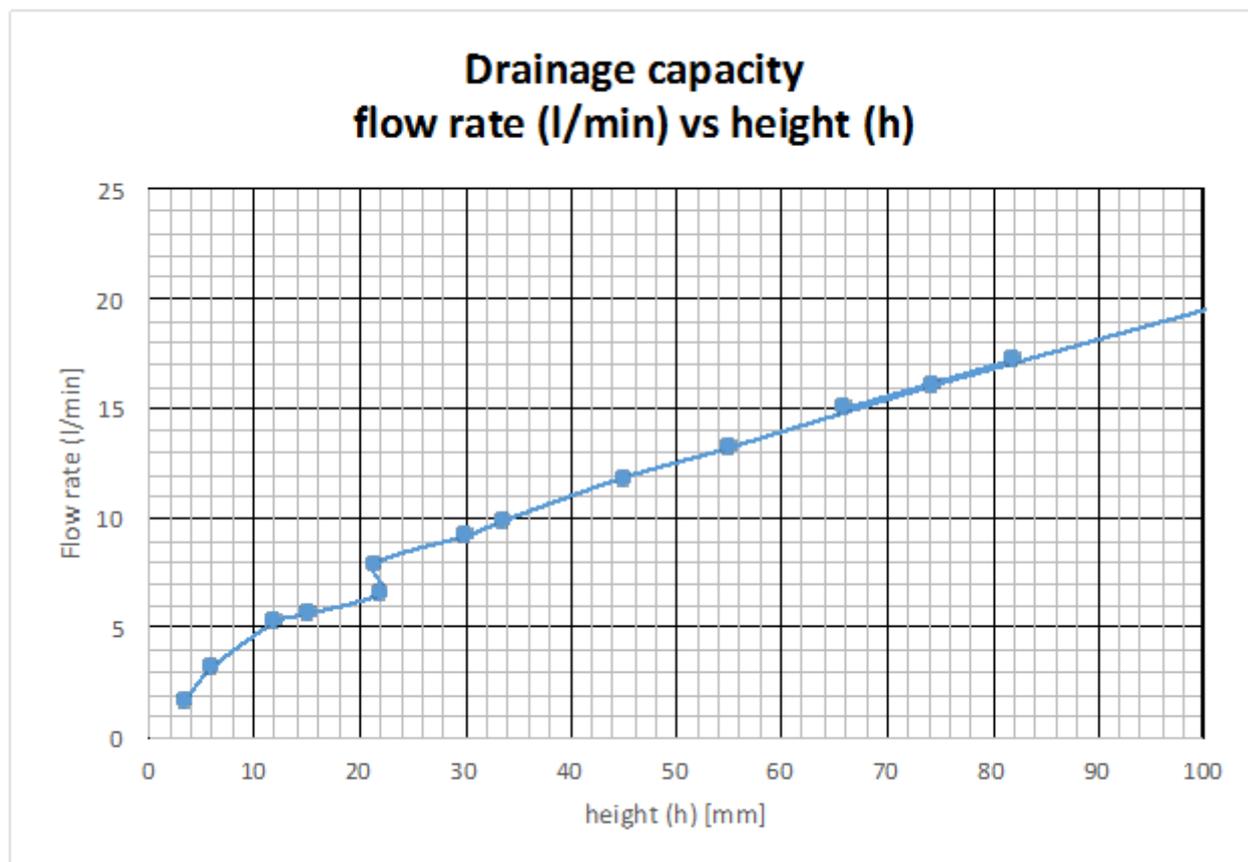


Fig nº 3- Experimental bench for drainage capacity measurement

3- Experimental characterisation of skirts sealing capacity

In order to evaluate the skirts sealing capacity of the GW6-15 device, a of the experimental installation is shown in figure 4-a. In figure 4-b, a picture of experimental installation is shown.

The principle of operation is based on the pressurisation of a certain volume of air. This volume of air is defined by the sealing system of the device GW6-15 and the free surface of the water contained in the tubular column A.

The pressurisation of the air is a consequence of the height difference between h_B-h_A . The air leakage through the GW6-15 is determined by the time variation of the height of the h_A column .

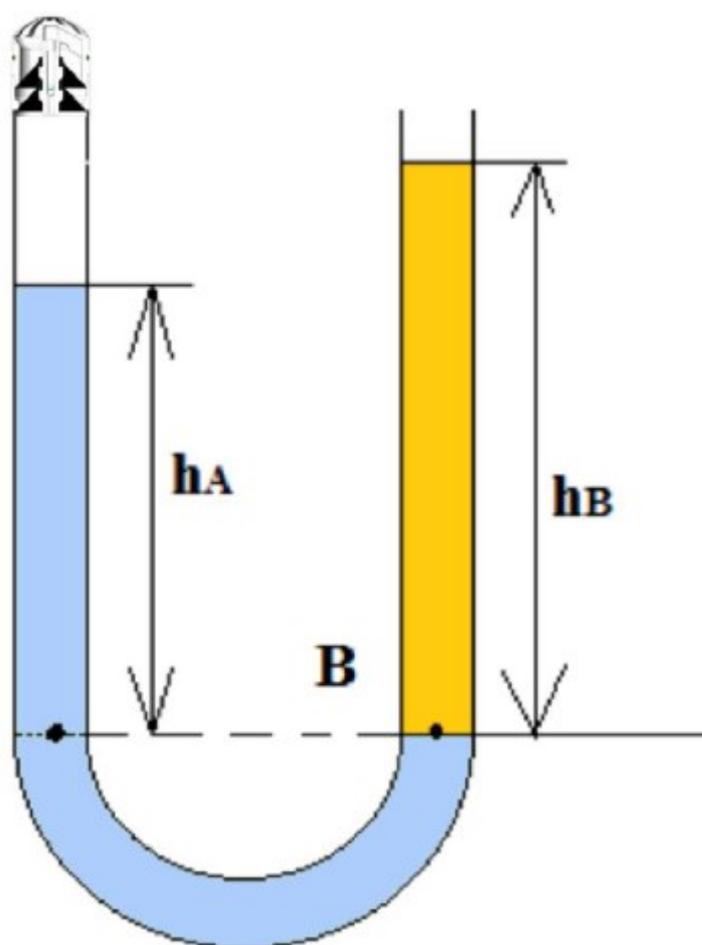


Fig 4-a



Fig 4-b

Fig nº 4- Experimental bench for measuring skirts sealing capacity

4- Experimental results of skirts sealing capacity

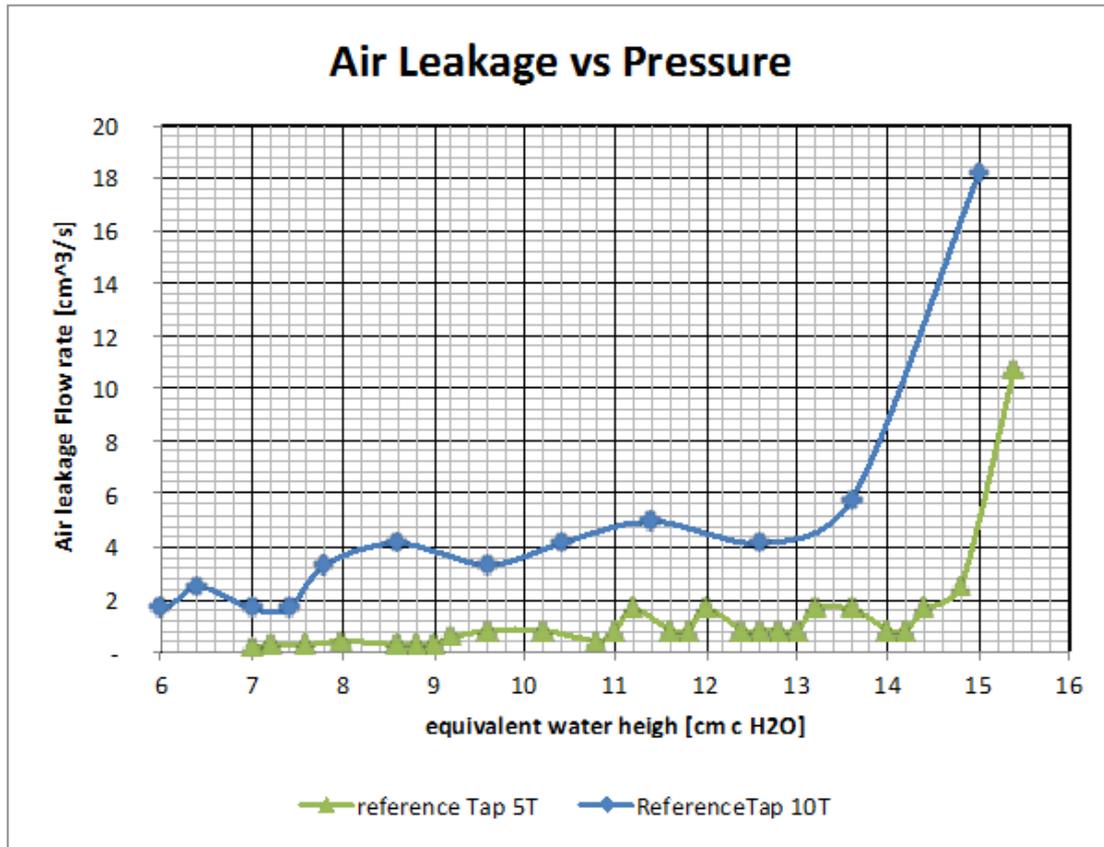


Fig nº 5- Experimental bench for measuring skirts sealing capacity
 $h = h_B - h_A$.

Figure nº 5 shows the values of the air leaks for the two units that can represent the variability of the GW6-15 units tested (extreme cases).

In all the tests, it was concluded that at a pressure equivalent to 270 mm c H2O (water height*), the silicone skirts adopt an inverted position as shown in the diagram of figure nº 6.

(* 1256mm² of water)

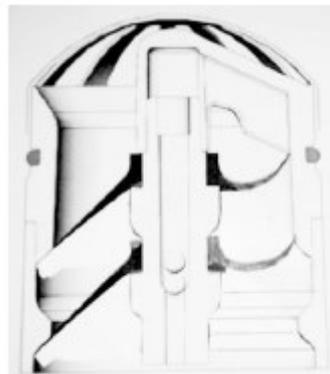


Figure nº 6.- the silicon skirts in an inverted position (deformation)

5- Experimental fatigue life test

Figure nº 7 shows an assembly that allows the opening/closing (cycle) of the membranes (silicone skirts) of the GW6-15 device in order to evaluate its integrity after a certain number of cycles. The equipment allows simultaneous testing of four GW6-15 units. The opening is achieved by a pulsating air flow.

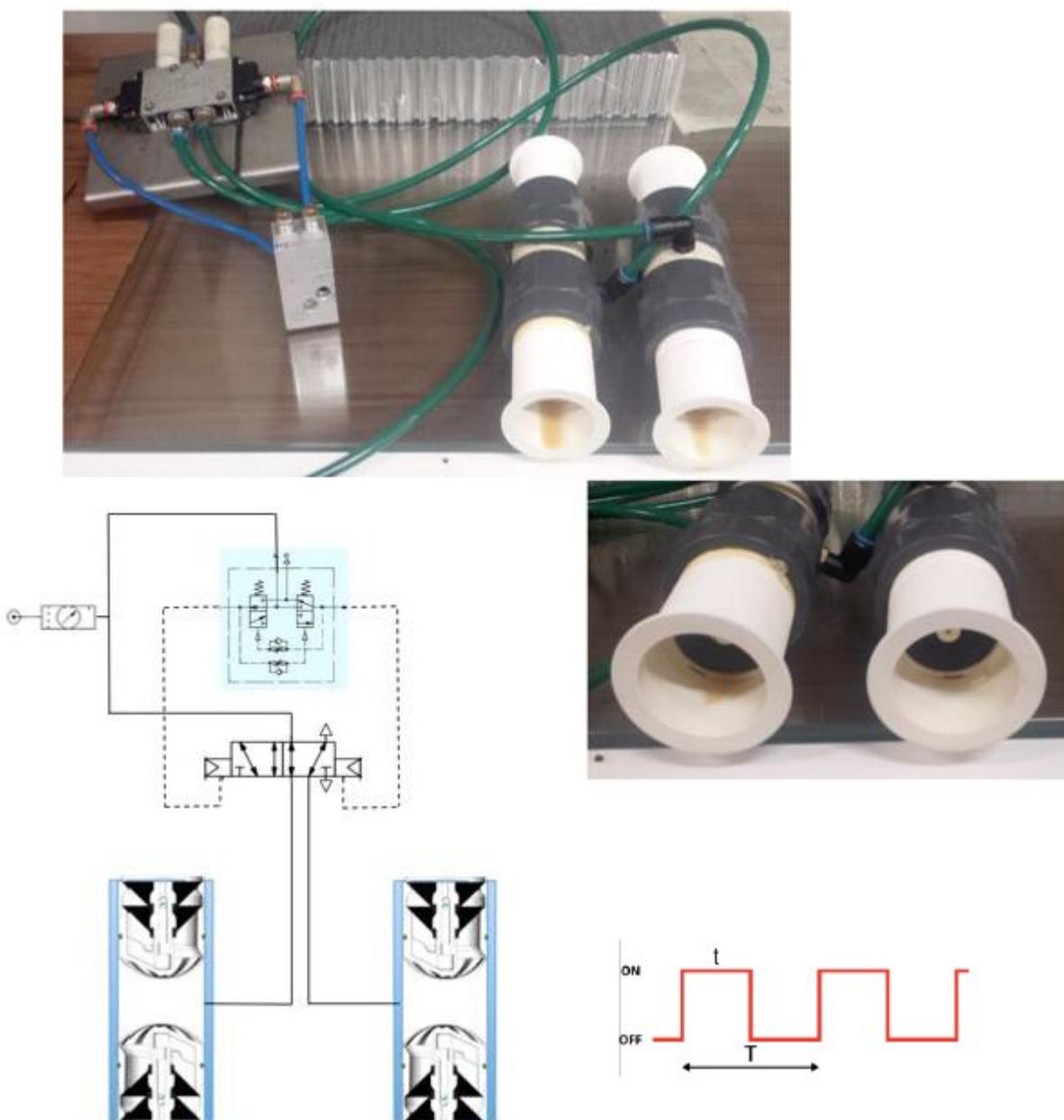


Fig nº 7- Experimental bench for skirts fatigue life test

6- Experimental fatigue life results

The fatigue tests to which 4 units of GW6-15 have been subjected according to item nº 5, have shown that these units withstand more than 2,000,000 cycles without showing any irregularity, or permanent deformation that can be detected by a visual inspection.

7- Certification

LABSON-UPC certifies that 4 snorkel valves, GW6-15, were subjected to different tests.

The results of these tests apply only to the units identified in this Engineering Report by the model/part identifier GW6-15.

The test units have passed all the tests successfully.

The results obtained have been summarised in figures 3, 5 and paragraph nº 6.

Signature

A handwritten signature in black ink, appearing to read 'Esteban Codina Macia', written in a cursive style.

Esteban Codina Macia
Director LABSON-UPC

Terrassa, November 2018