

SIPHONIC ROOF DRAINAGE

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Siphonic roof drainage is a controversial subject, usually cited as the great saviour of drainage or as a great evil, depending on the user's past experience. This data sheet sets out to show how siphonic drainage works, what the advantages and disadvantages are, and will explode some of the myths which have surrounded the industry in the past.

Introduction

Siphonic roof drainage is not a new concept. It was originally developed by the Finnish engineer Ovlai Ebling in the late 1960s and the first commercial installation was in a Swedish turbine factory in 1972. Since its inception, siphonic roof drainage systems have been fitted throughout the world, with the UK market having six active manufacturers.

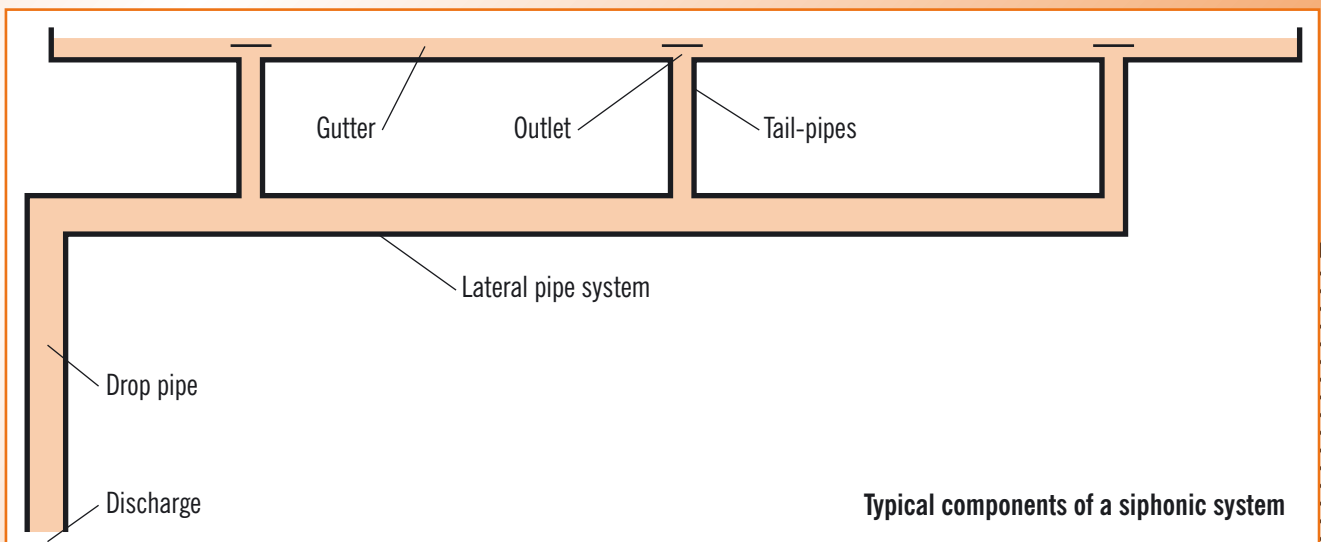
The reputation of the UK siphonic industry was greatly damaged in the 1990s by a widespread practice of installing systems to 75mm/hr rainfall intensity. This meant that it was inevitable that systems would overflow, but unfortunately it was the siphonic technique that was blamed, and not the low design rainfall levels. There were also a number of companies which have subsequently failed that did not have the technical ability

to design siphonic roof drainage, and the poor systems installed by them tended to dent the reputation of the whole industry.

In June 2004, the Siphonic Roof Drainage Association was formed with the intention of promoting best practice in the siphonic industry (www.siphonic.org). During the next couple of years, BSI will work on the long awaited Standard for siphonic roof drainage design, and so the outlook for raising the profile and image of the siphonic industry has never been better.

How it works

All siphonic roof drainage systems work in the same way. Air is excluded by a baffle plate over the outlet hole, which causes the pipes to run full of water. When the pipes are full of water the height difference between the gutter and the discharge point creates negative pressures in the pipe system, which draws water through the system. The greater the drop, the greater the potential energy available, and the greater the overall flow capacity of the outlet. However, if negative pressure becomes too large, cavitation and pipe implosion are risk factors, and so designs must be carried out by a competent person using suitable software.



Typical components of a siphonic system

In UK practice, a number of outlets are joined via small diameter tail pipes into a collector main which runs to a single discharge point. On larger buildings there may be many of these systems. A key factor is to ensure that the tail pipes are able to fill the collector pipe in a reasonable time. In UK practice, a two-minute storm is used, and so if the system takes three minutes to fill, it is effectively useless. As buildings and thus systems have got larger in the UK, some manufacturers have ignored this basic fundamental which may lead to problems in the future.

In many larger systems, drainage is divided into a primary and secondary system. The primary system drains the day to day rainfall but in heavier storms, the secondary system will cut in and remove large volumes of water. Often these secondary systems will discharge onto car parks, as underground drainage will often not have the capacity required to accept all the drainage flow. This is a sustainable approach, which reduces the shock load on the drainage system downstream.

One key point to remember is that all systems 'self-prime' and that there are no essential differences in technology between the various manufacturers.



Siphonic system running across building at high level to single discharge point

Photo Ross ADT

Advantages and disadvantages

The key advantages of a siphonic system are:

- Drainage pipework is mostly at high level, freeing space in building
- The system is installed later in the construction programme, speeding up the groundworks.
- Underground pipework in the building is virtually eliminated.

Disadvantages are:

- More susceptible to blockage if poorly maintained.
- Can be noisy

Summary

Siphonic roof drainage is the best method of draining large volumes of water from large buildings however, it is important that regular maintenance is carried out to keep the systems functioning in prime condition. All siphonic systems work in the same way, and the most important factors are how the pipework is sized, to achieve flow balance in system, and the speed with which the system will begin to operate. All siphonic companies should be able to produce calculations showing the system balance, fill time and gutter performance, and it is up to specifiers to make sure that they do.

Dr Malcolm Wearing is managing director of CRM Rainwater Drainage Consultancy Ltd, the UK's principal independent testing organisation for siphonic roof drainage equipment. He sits on both UK and American Society of Mechanical Engineers standard development groups, as well as being rainwater technical consultant to the MGMA.

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