浪花 Newsletter 會員簡訊

香港給排水學會
The Hong Kong Institution of Plumbing and Drainage

Aug-2022

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會長的話

不經不覺本人接任會長一職已經一年，因為疫情關係這年來經歷了疫情的高峰期，令人心惶惶各人都不可聚集，亦令會議改為網上會議、持續進修課程亦改為網上進行，大家都感到一些隔膜，現在疫情好轉，雖然各人都要打幾針，但都可以重返會議室開會，或者一些交際活動。

在過去一年本會都不間斷地推出一系列持續進修課程，今年還推出會員免費報讀優惠，凡在本年度已繳交會費的合資格會員或業界會員均可以獲得優惠，日後將會有更多會員優惠推出。本會為方便大家報名，已將報名型式改為網上及 WhatsApp 報名，再加上經銀行入數，希望方便到大家踴躍報名。

在過去一年的會務工作實有賴各委員付出的努力，推動會務繼續向前發展。來年為了不負各委員所托，本人定當竭盡全力與各委員共同努力，為各會員業界提供更多的交流合作。讓我們在未來的日子一起為業界發展而努力，希望各會員能繼續支持學會，與我們攜手努力，增加會員凝聚力，在此再一次多謝各位的支持和參與。
祝大家身體健康、事事如意！多謝大家。

學會資訊

本學會為了答謝各委員，在疫情下保持學會正常運作，定期工作匯報，如常舉辦技術交流會，於 7 月 18 日(星期一)，在康得思酒店，款待各委員享受自助晚餐。

當晚未能抽空參與的委員，下次再聚首一堂，增加氣氛!

We Work for a Better Community

Newsletter
2022 年 8 月號
香港給排水學會
HKIPD
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CPD課程

疫情下，無阻礙我們的學習機會。
水務署認可之持牌水喉匠自願持續進修計劃，CPD，透過網路學習模式，讓業界人士在減少人群聚集的情況下，仍可參加研討會。

水務署編號：
C03-007-20220318

日期：3 月 18 日
課題：深入討論 UPVC 供水喉管和其材料特性
講師：張錦雄先生
譚子霖工程師 (現任本會副會長)

水務署編號：
C03-007-20220422

日期：4 月 22 日
課題：清洗喉管的有效方案
講師：石珈而小姐
(現任本會公關組組長)

水務署編號：
C03-007-20220520

日期：5 月 20 日
課題：不銹鋼水管的化學特性
應用在香港樓宇水管翻新工程
講師：鄭成光博士/黃德成先生

水務署編號：
C01-007-20220617

日期：6 月 17 日
課題：介紹水系統中的電力
講師：劉家安工程師
(現任本會秘書)

水務署編號：
C01-007-20220624

日期：6 月 24 日
課題：水科學
講師：譚子霖工程師
(現任本會副會長)

在此，謹多謝各講師百忙抽空協助，同時感謝所有參加者的支持，希望不久將來，我們可以回復實體學習。

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業界抗疫活動

第五波疫情下， 社會上人士大量需求抗疫物資，如快速檢測棒，口罩，消毒液等。
本會贊助及出席支持業內於 4 月 15 日及 16 日，發起的 <建築業界抗疫關懷聯盟行動>。

水務署的TCP

2 月 28 日：
Technical Committee on Plumbing (TCP)
本會馬育英永遠榮譽會長，代表本會，參與由水務署，與業界多名專業人士，定期舉辦的技術交流會
當日已是第 12 次會議。由於疫情關係，交流會採用網上進行。

業界技術研討會

由五會合辦的註冊水喉承建商工作坊，
1 月 5 日於元朗大會堂綜合大樓禮堂舉行。

歡迎新會員

我們熱烈地歡迎，
成為香港給排水學會的新會員
鄭志偉： 26/01/2022
黃然偉： 26/01/2022
謝進泰： 12/05/2022

Welcome

We Work for a Better Community

以下技術文章，由本會技術組組長陳永祥先生 (Carlos CHAN) 提供，與大家分享。

Technical paper

Air Admittance Valves (A.A.V.'s)

Active trap seal protection for high-rise drainage

Steve White

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Aliaxis High-Rise Building Solutions
United Kingdom

10/2017

Abstract

Air Admittance Valves (A.A.V.s) are one way valves which allow air to enter the drainage system but do not allow air to escape through the valves. Their purpose is to limit the pressure fluctuations within the drainage system and to protect water trap seals. A.A.V.s are commonly used in multi-storey buildings as Group / Branch / Stack vents. The A.A.V.s are often preferred for this use as they are easy to install, use less space and provide ready access for maintenance cleaning of the waste pipe should a blockage occur. A.A.V.s provide better protection to the branch fixtures than an open vent as they sense the pressure fluctuation at the source (Point of Need (P.O.N.)) and equalize the system in less than 0.3 seconds, whereas the open vent method could take 1 second to equalize the system in a large building with a single flush. If there are multiple flushes, then the conventional passive system may never catch up with the demands of the system and lead to the depletion of the trap seals. When A.A.V.'s are used in a branch vent situation, the height of the building is not relevant as the A.A.V. is only venting the group of fixtures.

Context of this paper

This technical paper is part of a library op technical papers. Refer to the below overview of all our technical papers and click on the title for a digital link.

Research | Relevance | Design | **Solutions** | Materials | Installation | Terminology | Standards

High-rise building solutions

aliaxis

Introduction

The traditional method, to protect water trap seals (for example P-traps) is to use pipe network (passive drainage venting) that will reach to atmosphere, usually at the top of the building.

One of the key purposes of the vents to atmosphere is to allow air to enter the pipes to reduce the pressure fluctuations within the network, so that water trap seals are maintained.

The issue with this practice, in high-rise and complex buildings, is the time that it takes for a system to respond due to the pipe period, from the P.O.N. to the vent at the top of the buildings.

The issue is even greater when there are multiple discharges on the same system within a very short period - 3-15 seconds.

A pipe period is defined as, the time taken t_p, for a transient travelling at acoustic velocity c, generated by a change of flow conditions to reach the system boundary (roof penetration) and return to its source 2L.

$$t_p = \frac{2L}{c}$$

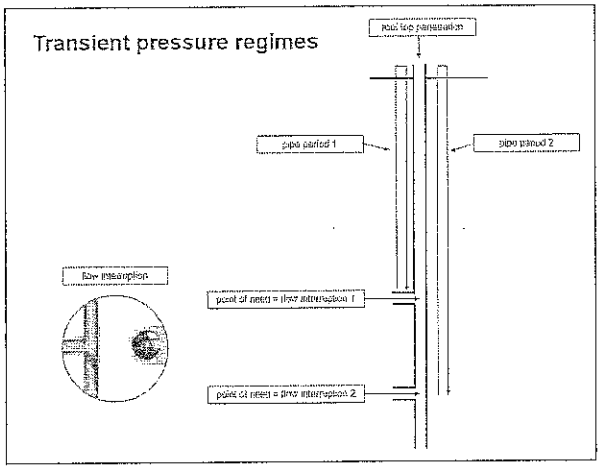

Figure 1.
Transient pressure regimes

One solution is the use of A.A.V.'s, to bring the air into the drainage system at the Point of Need (P.O.N). They provide the same function as the vent to atmosphere without the time delay, and are proven to provide better protection for the water traps seals than a vent pipe network, because of the faster reaction time.

Why is there a need to vent the drainage system?

If we do not protect the water trap seals smells and disease can enter into our living or surrounding spaces. Protection may be provided by using the passive venting but the requirements in codes have been based on research for lower buildings.

In high-rise and more complex buildings the vent lengths are greater by providing relief with A.A.V's at the P.O.N.; this reduces the response time and provides faster protection for the water trap seals.

The conventional thinking in drainage venting is to deal with the negative pressure. The established thinking is water trap seals are depleted due to siphonic action. The most common causes are "self siphonage" and "induced siphonage".

Self siphonage

A negative pressure transient occurs when there is a discharge of fixtures to which the trap seal is connected. This can have the effect of reducing the trap seal (or pulling the trap). This occurs ats the momentum acquired by the waste passes through the fixture and down the trap seal. This momentum is transferred directly into the trap seal and trap seal loss occurs. This is commonly known as 'self siphonage' and is not specifically related to high-rise.

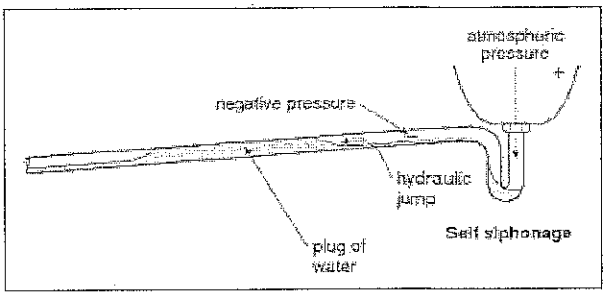

Figure 2.
Self siphonage

Induced siphonage

The most common, critical and also unknown aspects about trap seal depletion in multi-storey and high-rise buildings occurs when there is a pressure fluctuation caused by a discharge of another fixture in the system other than the fixture to which the trap is connected. This is called "induced siphonage". As the water falls down the pipe and passes the branch pipe connected to it, it draws air from it, thus creating a partial vacuum and sub-sequently siphonage of the trap can take place.

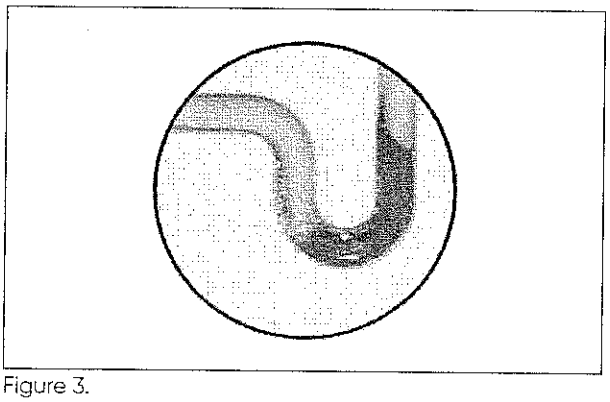

Figure 3.
Trap seal breach

How Air Admittance Valves work

The A.A.V.'s should open before -75 Pa, allowing air into the system and relieving the negative transient pressure.

This keeps the pressures in the system for discharges between 0 and -250 Pa. If the system goes above these pressures, this can lead to the depletion of the trap seals.

A.A.V.'s work by utilizing a reverse lift membrane. When there is water movement in the system the valve will open; when the movement of water stops, the A.A.V. will seal airtight by gravity.

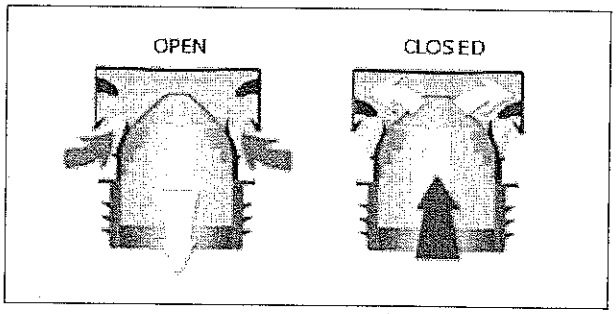

Figure 4.
A.A.V. operation

The valves open and admit fresh air when negative pressure occurs from the fixture discharge. This equalizes pressure within the system and so protects the trap seals. When the flow stops, the valve closes and seals airtight by gravity, preventing any transmission of foul air out through the A.A.V. or the fixture. A.A.V.s are tested for product approvals from -30Pa (lowest point a testing institute can accurately measure) through to -10KPa, so that the valves can be placed up to one meter below the flood level of the appliance.

Minium requirements for A.A.V.'s used in high-rise buildings

As there are many types of A.A.V.s on the market it should be noted that not each product is suited for use in high-rise building drainage. The criteria for A.A.V.s in high-rise buildings are stricter as the correct system operation to prevent any trap seal from breaching depends on the lifetime operational quality of all the A.A.V.s installed. The lifetime operational quality depends on the following 4 factors:

1. **Opening reaction time: the quicker the better**
   a. High-rise building drainage systems are subject to ongoing multi flushes, i.e. the continuously unsteady nature makes the system to constantly react to negative transients, as fast as possible.
   b. Reverse cone of the cap allows to neutralise any internal condensation that might affect the membrane opening ability.

2. **Zero maintenance**
   a. In high-rise buildings, the A.A.V.'s are often hidden in difficult accessible locations, therefore the less maintenance the better.
   b. Compact overall dimension.
   c. Double screen protection (internally and externally) against foreign material or insects.

3. **100% closing ability:**
   a. Dry membrane for consistent life time functioning, not depending on lubrication.
   b. 500K cycle endurance testing.
   c. Sealed design.

4. **Life time product warranty**
   a. ABS plastic + 100% silicone: the best material for durability.
   b. UV protection and anti mould protection.
   c. Meet most international product standards.
   d. External use and up to -40C (for stack A.A.V.'s).
   e. Full connection flexibility to any type of pipe material.

Conclusion

A.A.V.s have been available for use in the world market since the 1970s. They are included in many plumbing codes around the world. The definition within the EN 12056-2 for the purpose of vent pipes and air admittance valves is the same.

In more complex drainage systems with longer pipe networks and higher loadings, the ability to place an A.A.V. at the P.O.N means that the negative transients are reduced faster than the time a passive pipe network can respond and therefore the A.A.V.s as part of an active drainage venting solution provide greater protection to water trap seals and maintaining the barrier between the drainage system and the living space within the building.

It is also that the A.A.V. does not just open quickly, but it must be robust enough to withstand the greater loading pressures in high-rise and complex buildings. Therefore for A.A.V.s used in taller buildings should be tested up to a pressure of 10KPa, the upper tightness test within the EN 12380, the ASSE 1050 and the ASSE 1051, which are the main A.A.V. products standards in the world. It is also recommended that the A.A.V.s are third party tested and have third party approvals.

Steve White
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Aliaxis High-Rise Building Solutions

MSc (Ir.) Marc Buitenhuis MTD
Research Engineer Hydro-Dynamics
Aliaxis

1. Swaffield JA (2010). Transient Airflow in Building Drainage Systems, published by Spon Press
2. EN 12056:2000 *'Gravity Drainage Systems inside buildings Part 2: Sanitary Pipework, layout and calculations'*, British Standards Institute, London
3. Studor design guide 2012

Read more technical papers related to this subject

- Design - Limiting roof penetrations in high-rise buildings
- Design - Offsets in Building Drainage systems
- Materials - DWV systems and fire safety
- Solution - Stack-aerator system principles
- Technical Paper - Solution - Active Ventilation Single Stack Drainage

19/04/032