

5

Pressure relief device in drainage systems

This invention relates to a positive air pressure
10 attenuation device for relieving positive pressure
transients in drainage or sewage systems.

In such drainage systems, and in particular in
buildings having more than three levels, the use of air
admittance valves are required to prevent the release of
15 foul air, and to admit air under conditions of reduced
pressure (negative pressure) in the discharge pipes and
stacks. Such valves are disclosed f.i. in patent
documents GB 2.014.697, EP 0 084 303, EP 0 278 746 or EP
1 026 329.

20 However, the use of these valves prevent positive
air pressure transients, arising within the drainage
system, from escaping to the atmosphere, leading to a
reduced performance of the drainage system.

Patent documents EP 0 172 966 and EP 0 661 483
25 disclose sewer relief valves which automatically open
responsive to overpressure due to a back flow of sewage
and drain water within a plumbed drainage system.

According to these embodiments however, the
overpressure is relieved or attenuated by expelling air
30 from the sewage system into the atmospheric air.

Such positive air pressure transients should be
temporary attenuated within the system without expelling
foul air from the system into the surrounding atmosphere.

According to the present invention, there is provided a pressure relief device for use in a drainage system comprising a housing to which a flexible reservoir is secured, the flexible reservoir being operable on a positive air pressure transient within drainage system, and both the housing and the flexible reservoir are contained within an external casing.

Preferably, the housing has an inlet and an outlet, the inlet being connected to the drainage system, and the outlet is connected to a cap to enable sealing of the housing. The housing is fabricated from a rigid material to ensure adequate sealing of the complete unit. The housing is a continuous unit over which the flexible reservoir is fitted. Where the flexible reservoir covers the housing, means for ventilation are used to allow air from the drainage system to pass freely to and from the interior periphery of the reservoir. A suitable material for the housing would be PVC, for example.

The flexible reservoir is contained within the external casing, and sealed to both the inlet and outlet of the housing by means of an 'O' ring or other elastomeric fastener coupled a suitable sealant, for example, an uncured paste of butyl rubber and solvent. The 'O' ring compresses the flexible reservoir onto the inlet or outlet surface onto the butyl rubber paste to effect a complete seal. A suitable material for the flexible reservoir would be f.i. a 0.2 mm thick butyl rubber.

An external casing that has means for ventilation to the atmosphere in its base surrounds the flexible reservoir. The external casing may be constructed from rigid materials such as PVC.

In one embodiment, the pressure relief device may be used as a single or 'stand-alone' unit. In another embodiment, the outlet of the pressure relief device may be connected to the inlet of another pressure relief
5 device when extra capacity is required. In a further embodiment, the pressure relief device or devices may be used in conjunction with an air admittance valve to increase the overall performance of the drainage system.

Particularities and essential elements of the device
10 according to the present invention will be put forward in the annexed set of claims.

The present invention will now be described by way of example only, with reference to the following drawings in which:

15 Figure 1 is a cross section through a pressure relief device,

Figure 2 is a cross section through the housing,

Figure 3 is a schematic of the housing and,

Figure 4 is a cross section of two pressure relief
20 devices connected in series.

In the drawings, the pressure relief device 1 comprises an external casing 2, a housing 3, a flexible reservoir 10 and an end cap 16. Figure 1 shows the assembled pressure relief device. The flexible reservoir
25 10 covers the central portion of the housing and is secured to the housing inlet 6 and the housing inlet 4 by means of an 'O'ring 8. The flexible reservoir 10 is sealed against the housing inlet 6 and the housing outlet 4 by the 'O'ring compressing a layer of sealant (not
30 shown). This allows the flexible reservoir 10 to operate without any leakage.

The inlet 6 and the outlet 4 of the housing 3 are linked together by means of separator plates 12 leaving between them open spaces in contact with the flexible reservoir 10.

5 The external casing 2 fits partly over the housing 3 and over the flexible reservoir 10. The external casing has a plurality of means for ventilation 20, shown for example here in the base surface 22, which allows the flexible reservoir 10 to be in permanent contact with the
10 atmospheric air (pressure) whilst preventing the flexible reservoir 10 from being damaged by any external event.

 The pressure relief device 1 is attached to the drainage system by means of a graduated connector 18. The graduated connector allows the connection of at least two
15 different size pipes together in a secure manner, and may be made of an elastomeric material.

 In Figure 2, the housing 3 can be seen to comprise four distinct sections. The upper section 14 leads to the housing outlet 4 and the housing inlet 6 via the
20 separator sections or plates 12. The separator plates 12 allow airflow to continue through the pressure relief device 1 when the flexible reservoir 10 is fully collapsed.

 Figure 3 is a schematic of the housing 3 without the
25 upper section 14. It can be seen that the separator plates 12 do not extend fully round the circumference of the housing 3. The gaps between the separator plates 12 allow air from the drainage system to enter the flexible reservoir 10 and inflate it in case of positive pressure
30 within the system, thus absorbing the energy of the transient pressure wave.

Figure 4 shows two pressure relief devices 1 connected in series. The devices are connected together by means of a graduated connector 18 connecting the housing inlet 6 of the upper pressure relief device 5 into the upper section 14 of the lower pressure relief device 7.

The connection between two pressure relief devices, or a pressure relief device and the drainage system, or a pressure relief device and an air admittance valve is intended to be a push fit connection.

The ground drainage system is designed to be in accordance with BS 5572: 1978 (Code of Practice for Sanitary Pipe Work).

With the present invention, a simple and effective pressure relief device, that can be retrofitted to existing drainage systems, is provided.

While only a specific embodiment of the present invention have been described and shown, it is apparent that various alterations and modifications can be made therein. It is therefore the intention in the appended claims to cover all such modifications and alterations as may fall within the scope of the claims.

CLAIMS

1. A pressure relief device for use in drainage systems for buildings characterised in that it comprises a housing, connected to the system, to which a flexible reservoir is secured, the flexible reservoir being operable on a positive air pressure transient within drainage system, wherein both the housing and the flexible reservoir are contained within an external casing.
2. A pressure relief device as claimed in claim 1, wherein the housing has an inlet, an outlet and an upper section, the inlet area and the outlet area being linked together by separator plates.
3. A pressure relief device as claimed in claim 2, wherein the flexible reservoir covers the central portion of the housing including the separator plates and is secured to each of the inlet and the outlet by a securing means.
4. A pressure relief device as claimed in claim 3, wherein the securing means consist in at least one 'O' ring.
5. A pressure relief device as claimed in claim 3 or claim 4, wherein the securing means is used in conjunction with a sealing means.
6. A pressure relief device as claimed in claim 5, wherein the sealing means is an uncured butyl rubber and solvent paste.
7. A pressure relief device as claimed in any preceding claim wherein the flexible reservoir is made from butyl rubber.

8. A pressure relief device as claimed in any preceding claim wherein the external casing is cylindrical.
9. A pressure relief device as claimed in any preceding claim wherein
5 the upper section of the housing is sealed with an end cap.
10. A pressure relief device for use in drainage systems for buildings, said device being substantially as hereinbefore described with reference to Figure 1 or with reference to Figures 1 to 4 of the accompanying
10 drawings.
11. A drainage system comprising at least one pressure relief device as claimed in any preceding claim.
- 15 12. A drainage system as claimed in claim 11 also comprising, in combination, at least one air admittance valve responding to conditions of reduced or negative pressure in the system.