OUTDOOR ENCLOSURES for BACKFLOW PREVENTION ASSEMBLIES and ELECRICAL HAZARDS

Most of us would probably agree that the most important benefit of above ground backflow preventer enclosures is the elimination of underground vaults or pits which are defined by OSHA as confined spaces. In the case of the reduced pressure principle backflow preventer, adequate drainage is provided so that the public water supply is protected. Worker safety is greatly improved because the above ground enclosure is not a confined space as defined by OSHA. There are, however, still some safety issues that have not been addressed until recently.

Heaters used for freeze protection in enclosures are powered by electricity. Because electricity is so common in our everyday lives, it is often not treated with the respect that it deserves. Current flow of 1/10 of an amp or 100 milliamps is enough to stop the heart and cause fibrillation. To put this in perspective, one 12 watt light bulb draws 1/10 amp on a 120 volt circuit. It's easy to understand that a small amount of electricity through the heart can kill.

As dangerous as electricity is in dry locations, damp and wet locations dramatically increase the danger. We have all heard the saying that water and electricity do not mix. The American Society of Sanitary Engineering (ASSE) has recently made the decision that the interiors of backflow preventer enclosures are damp locations as defined in Article 100 of the National Electrical Code. The reason for this ruling is that water and other liquids can accumulate in the interior of an enclosure from several sources. Some of these are listed below:

1. Sprays of water from test cocks during testing and/or maintenance.

2. Leaks in the piping or backflow assembly.

3. Discharge from a reduced pressure principle backflow preventer caused by line pressure fluctuations, foreign material in the check valves, a ruptured diaphragm in the relief valve assembly or normal relief operation.

4. Condensation caused by the piping and backflow assembly surface temperature being below the dew point temperature of the surrounding air.

5. Intrusion of rain water between the concrete slab and the walls of the enclosure and under and through drain openings.

6. Dampness inherent in a concrete slab placed on the ground.

Therefore, to meet the requirements of the National Electrical Code for damp locations, heaters used in backflow preventer enclosures must be constructed and installed according to Article 424-12(b) of the National Electrical Code.

Article 424-12(b) of the 1999 and 2002 Editions of the National Electrical Code states that: "Heaters and related equipment installed in damp or wet locations shall be approved for such locations and shall be constructed and installed so that water or other liquids cannot enter or accumulate in or on wired sections, electrical components or ductwork."

Drainage systems for backflow preventer enclosures are designed to meet the requirements of ASSE Standard #1060, *Outdoor Enclosures for Backflow Prevention Assemblies.* This Standard states that: "The depth of water within the enclosure shall not exceed 150 mm (6 inches) during full flow of the backflow preventer relief discharge, nor shall the depth of water exceed 8 mm (0.25 inches) after completion of full flow." See Figure 1 below.

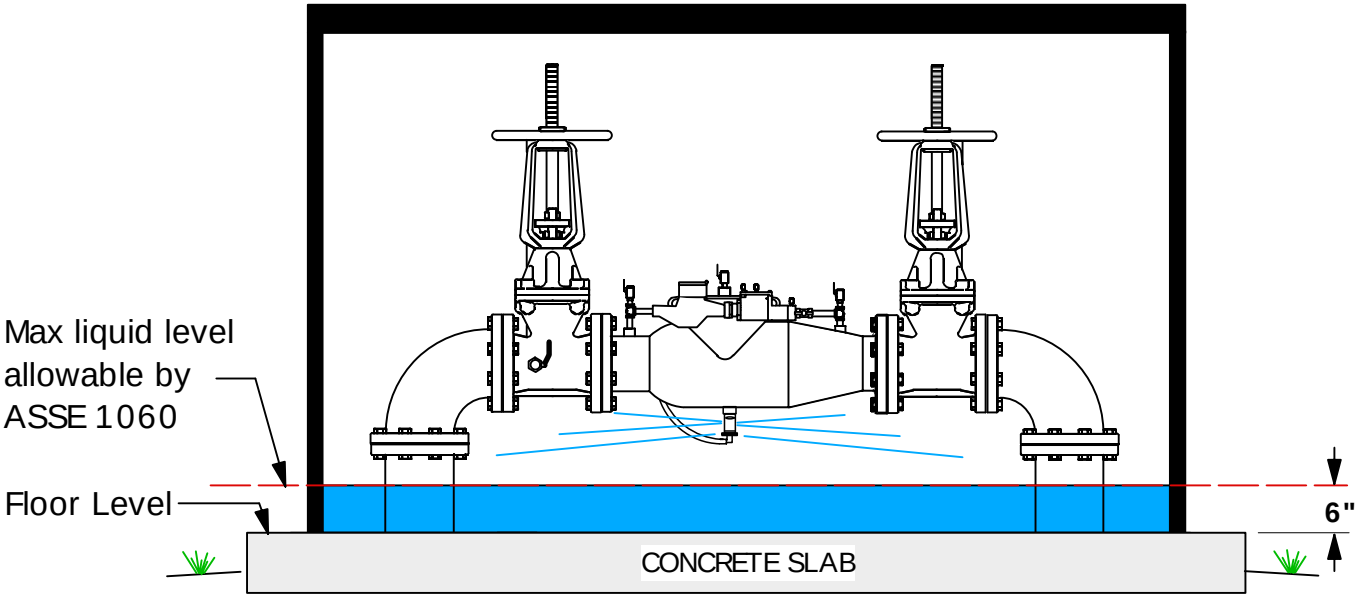

Figure 1

Heaters installed inside the enclosures more than six inches above the floor must be liquid tight and suitable for use in damp or wet locations to meet the construction requirements of Article 424-12(b) of the National Electrical Code.

It can be seen that any heater mounted less than six inches above the floor level of an enclosure can be submersed. Submersion of the heater virtually guarantees the entrance and accumulation of water or other liquids in or on wired sections and electrical components inside the heater. Therefore, to satisfy the installation requirements of Article 424-12(b) heaters must be mounted more than six inches above the floor to prevent the entrance of water or other liquids into the heaters.

Heaters that are suitable for use in damp or wet locations have been tested by ETL or UL for conditions found in those environments. The name plate on the heater will bear the statement "*for use in damp or wet locations*" and the ETL or UL mark and control number. These heaters are not tested for or meant to be immersed; therefore, they should not be mounted less than six inches above the floor.

It is also strongly recommended that ground fault circuit interrupters are installed in the heater circuits for additional protection. However, It should be warned that GFCI's do not take the place of the requirements of Article 424-12(b) of the National Electrical Code.

GFCI's are susceptible to damage by voltage surges from utility companies and lightning strikes and can continue to deliver power when they no longer provide ground fault protection.

According to OSHA: "Due to the complexity of a GFCI, it is necessary to test the device on a regular basis. For permanently wired devices, a monthly test is recommended. GFCI's have a built-in test circuit which imposes an artificial ground fault on the load circuit to assure that the ground fault is still functioning. Test and reset buttons are provided for testing."

Aside from being complex devices requiring frequent testing, no one can be assured that GFCI's will be installed in the field. The National Electrical Code only requires GFCI's in bathrooms, kitchens and on rooftops in commercial and industrial buildings. See Article 210.8(B) of the 2002 Edition.

Some designers and owners consider the heater operation essential to prevent freeze damage to their water supply, therefore, they prohibit the installation of GFCI's in the heater circuit due to nuisance tripping. For the same reason, GFCI's are not used on refrigerators and freezers.

About ASSE, The National Electrical Code, UL and ETL:

Since its inception in 1906, the ASSE (American Society of Sanitary Engineering) has adopted the fundamental policy of "Prevention Rather Than Cure". This policy has been used in the formulation of programs to educate the plumbing industry and the public in the safe and correct manufacture and installation of plumbing components. Therefore, backflow prevention devices represent a large part of the ASSE Standards Program. ASSE 1060, The Standard for Outdoor Enclosures for Backflow Prevention Assemblies was issued in 1996.

The National Electrical Code was established in 1896 and has evolved into being the most widely recognized code in the world. It is adopted by law throughout the United States. The Code is sponsored by the NFPA (National Fire Protection Association) and is also known as NFPA 70. The Code brings the latest electrical safety requirements to the electrical industry.

UL (Underwiters Laboratories) and ETL (Edison Testing Laboratories) are independent, product safety testing and certification organizations. UL was founded in 1894 and ETL was founded in 1904. These organizations test products of all descriptions (plumbing, electrical, mechanical, etc.) to known standards and list them as certified to the applicable test standard. Both are members of NRTL (Nationally Recognized Testing Laboratories) by OSHA.