CERTIFYING SOLENOIDS: A SERIOUSLY STICKY SITUATION!

While solenoid valve design principles have not changed dramatically in a century, their modern use and compliance is incredibly challenging, particularly when these valves are 'components' of more sophisticated devices. Terry Nguyen from Prove Standards & Engineering explains.

In the digital age we live in now it is no surprise that smart electronic devices have surfaced into something as simple as the plumbing that we use for our day-to-day living. Smart electrical devices have overtaken our lives in so many other areas, so it is only natural that the world of water distribution is seeing similar trends following the numerous other areas.

Electronic solenoid valves themselves have been around now for over 100 years, and are not a recent addition to processes and controls. They have been used in the plumbing industry, and the humble clothes washing machine is a great example of how long they've existed in our everyday lives. Improvements in solenoid valve technology have changed somewhat over the years, but for the most part the products are not that dissimilar to earlier iterations from the last century. A voltage moves a metal stem using an electrified coil to manipulate the state of the valve, switching the flow of water on or off. The most recent differences now are how they are activated and the different types of applications for which they are being used.

Valves that are electrically operated don't need human physical activation, and can of course be integrated with smart devices connected to Bluetooth or on a Wi-Fi network. Command systems have the ability now to operate entire bathroom blocks, remotely activating (or locking out) various fixtures as needed whilst also monitoring water consumption. So, although an electronically activated toilet flush valve is not a new product, the birth of smart control systems has increased how attractive it is against mechanically operated equivalents. The same can be said for wash basins or other fixtures servicing bathrooms that may benefit from monitoring or controls.

SMARTER DEVICES

In the domestic setting smart products are emerging into the markets to revolutionise the kitchen and bathroom experience. Smart toilets, temperature-controlled shower systems, kitchen boiling/chilled dispensers, water filters, fridges, and even plumbed coffee machines all use solenoid valves. And, as such, they also provide opportunities for connectivity to our smart devices through various apps.

Manufacturers are electrifying more products to satisfy our growing desire for having artificial intelligence (AI) make life easier. Regardless of where your ethics lie for AI in our everyday lives, there is no question that it will be a big part of the future.

Many of these products require WaterMark certification in Australia, which is keeping the certifiers on their toes. The challenge is distinguishing

The 'compliance' of electronic solenoid valves is highly dependent on their application.

the exact application of the solenoid valve, and what is appropriate for it to be approved, understanding that the controls that operate the solenoid valves may or may not be a part of what is needed to be tested.

TESTING METHODS

There are two ways in which solenoid valves are assessed under the WaterMark certification scheme.

Firstly, a solenoid valve is able to receive WaterMark certification against WMTS-030, which is the Technical Specification for them as a generic product. However, if the solenoid valve is simply a component of a larger product seeking certification, then its performance requirements are altered.

For example, a solenoid valve (certified as just that) needs to meet a cyclic endurance of 50,000 cycles to achieve WaterMark certification. However, if that same solenoid valve is used as a part of an electronic tap, then it is required to meet a 200,000-cycle life test. More confusing still is that some product Standards under the WaterMark-certification scheme do not require life-cycle testing at all where solenoid valves aren't exposed to any cyclic testing for certification.

With solenoid valves being often a component of a larger assembly, the majority in existence will not have a visible WaterMark on the valve itself. The licence in most cases is applied to the finished assembly where the WaterMark logo is likely to be on a part of the product that the manufacturer makes. Solenoid valves are usually procured and added to the finished assembly with often generic solenoid valve information from the manufacturer. In this instance, it is expected that the valves provided are those that were certified with the product during assessment. Most WaterMark certified products that include solenoid valves will have been tested with the valve that is supplied with it. Interchanging the valve with another could cause problems even if it doesn't seem obvious. Leading suppliers of solenoid valves produce many variations of solenoid valves understanding that there are differences.

Increasingly complex componentry, including electronic solenoid valves, in water delivery systems can pose headaches for WaterMark assessment agencies.

An electronically activated toilet flush valve will likely provide different performance if the DN25 solenoid valve is replaced with another 'equivalent'. Replacement valves for installations where the original has failed should always be made with the same part.

> The challenge is distinguishing the exact application

The other way solenoid valves achieve WaterMark is through assessment against WMTS-030, where the valve itself receives certification. Manufacturers have their valves independently certified where the manufacturer's licence number will be visible on these products. These valves are approved for use as stand-alone items in plumbing networks, which could control or be used in a number of different applications. This could include installation of valves into buildings where separate priority software is able to control them. When selecting such valves for an application, it is important to understand what the limitations of the valve are. These limitations extend well beyond basic specifications such as maximum operating temperatures and pressures.

ALL ABOUT PURPOSE

Solenoid valves are simple in principle but like all products have differences that are usually determined by their intended purpose. Water temperature, and maximum rated operating pressures are standard specifications, no different to many other mechanical valves. However, solenoid valves need much more technical parameters to be carefully considered during selection. Water quality, duty cycles, actuation type, flow rate, flow velocity and minimum differential pressures are also important. Solenoid valves can be direct acting or pilot operated. They come with either metal or plastic bodies, they can be normally open, normally closed, bi-stable and take all sorts of voltage in both AC and DC power supplies. In short, the combinations are endless, simply because they are made for different purposes.

If you are looking to install a solenoid valve into a specific application, it is always best to consult the manufacturer of the valve first to confirm that it will operate correctly in its finished installation. Unlike many other valves found in plumbing retail networks, solenoid valves are sensitive to other environmental factors to be able to function without issues. An incorrectly specified valve will likely have a reduced lifespan, or fail to meet correct operation at all.

Electronic solenoid valves will be more and more prevalent in plumbing systems moving forward. It will be a big responsibility of licensed plumbers to ensure correct installations in our smart buildings to ensure that they do not create more problems than they aim to solve. ■

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