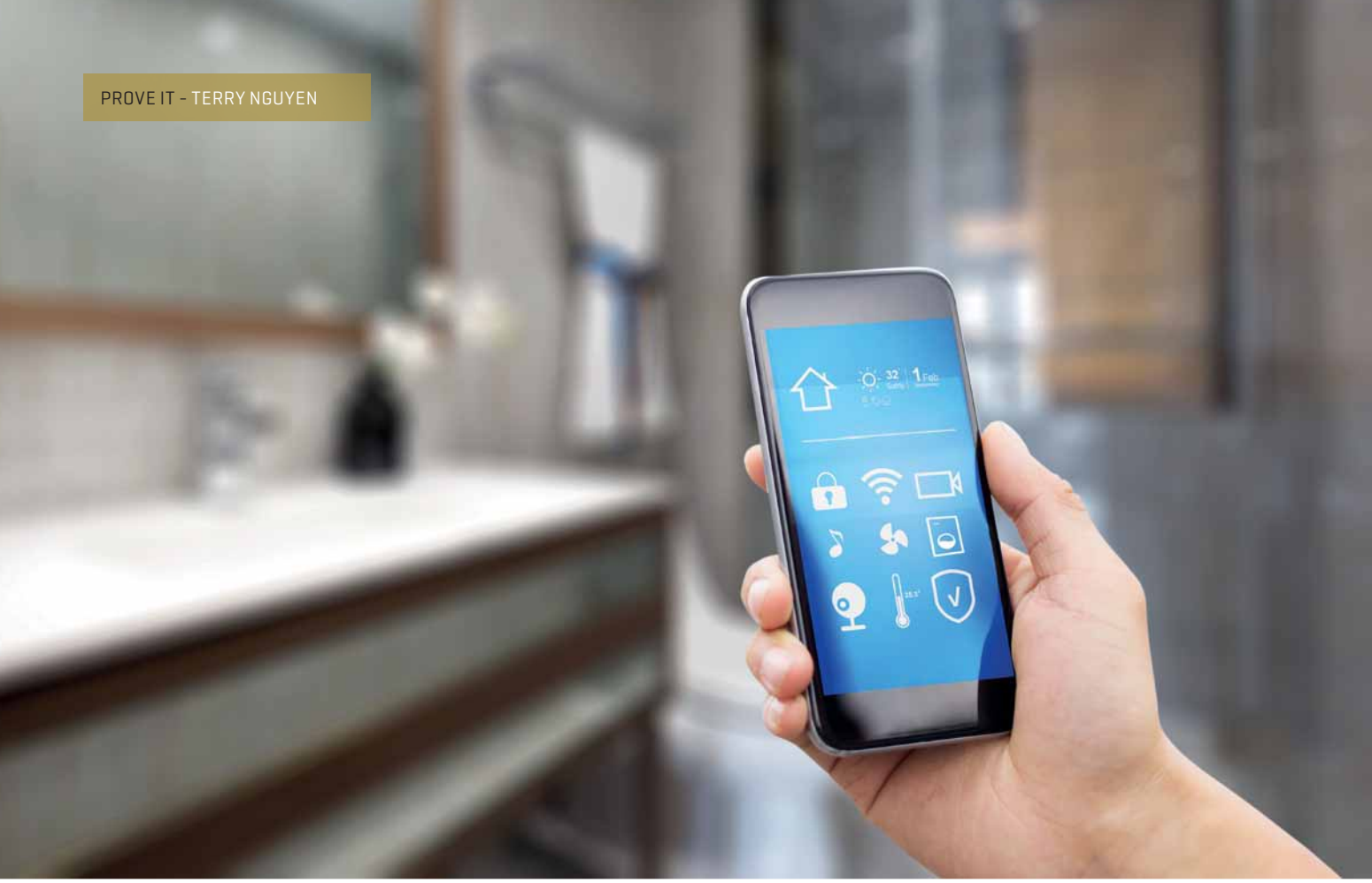

SMARTENING UP ON PRODUCT TESTING METHODS

Terry Nguyen explains how testing methods for the likes of toilets, taps and showers have had to change with the times to accommodate new technology.

Products covered under the WELS scheme are tested via many methods to ensure they meet minimum water saving performance requirements complementing the government's larger water conservation strategy.

The test methods have worked well over the years, but recent developments in technology and consumer demands have exposed some possible areas of concern.

As product development continues to push forward, the test methods used also need to evolve to maintain a consistent standard for performance. The nature of the construction industry also shapes the landscape of plumbing product design in dictating what it wants for proposed new buildings.

Many new buildings are looking at bringing cutting-edge technology into commercial bathrooms around Australia.

These new bathrooms use central command units that monitor individual usage from fixtures that are connected in the larger network. Often these units also include the master controls which determine the final parameters that the fixtures use during operation.

What this means is that all products connected in the network must be electronically operated. They need to be operated using solenoid valves.

Solenoid valves can affect the hydraulic performance of products in different ways, although some products aren't impacted at all.

Taps and showers use flow controllers to restrict the flow that passes through them to a nominal value representing their WELS rating. The flow rate tests for both of these products take into consideration the pressure variations that exist in Australia's potable water network to show that regardless of what pressure you may have, the tap/shower will deliver the rating on the WELS label.

The test is performed at dynamic pressures of 150kPa, 250kPa and 350kPa to verify the product flow rate remains about the same. To meet this requirement, the flow controllers need to exist as an integral component of the tap/shower itself. Whether the tap/shower then is supplied with mechanical valves, or electronic solenoid valves ➤

therefore becomes almost irrelevant.

Toilets and urinals on the other hand can be greatly influenced by the type and nature of the flushing device that supplies them with water. Cisterns that were the staple flushing device for our toilets and urinals provided two major benefits to flushing performance. They had a fixed volume giving a known discharge per flush (when working correctly) but more importantly the cistern sits at a fixed height above the toilet/urinal giving a consistent flush pressure each and every time.

Products were able to be designed knowing the expected flush pressures and volumes and therefore performance was easy to guarantee.

Toilets and urinals flushed with direct mains connected flush valves have a long list of variables that alter the hydraulic characteristics, and therefore the final performance of the product.

Mains connected valves aren't brand new to the plumbing landscape, and there are some valves that have been around for a number of years. However, up until fairly recently mains connected valves for flushing toilets/urinals (particularly in Australia) were a premium option over a cistern alternative.

Premium products operating in a niche market had the opportunity for hours of product development through testing and all else that was needed to deliver a solution that would meet the performance requirements of the final installation. This could be considered above the minimum requirements for WaterMark certification.

The test methods in Australian Standards for flush valves connected to toilets and urinals do not take into consideration the same inlet pressure variability that taps and showers need to account for.

Tests are performed only using the manufacturer's recommended specifications. So if the manufacturer's recommended pressure is 250kPa, this is the only pressure that the system is verified at for certification. Whether that pressure is dynamic or static is sometimes up to the laboratory to try and interpret.

The system itself is also prone to variability with the size, length and configuration of inlet and flush pipes also contributing to flushing performance. Mains connected flush valves in Australia also need to have physical pipe interrupters which can cause installation issues with water spilling from the vent ports into wall or ceiling cavities.

All of this leads to products that may have been tested using a single set of parameters and then being asked to perform under a wider range of conditions when set up in the real world.

Leading manufacturers accommodate for real world variabilities and look to design their products to be able to compensate for differences outside of optimal conditions.

Sensitivity testing is performed to understand the potential for reduced performance with varying pressures, flush pipes, water supplies etc.

Ideal flush pressures are difficult to achieve all of the time, and it is important to identify how sensitive the products are to fluctuations from standard pressures. Using this information the manufacturer is able to provide a matrix of how controllers should be set up based on pressures available at each location to meet performance and WELS discharge volumes.

Manufacturers who go to the extra efforts of development gather knowledge about how variations affect the final performance of the overall setup. It provides the basis for understanding the limits of the system about how high pressures can be before observing splashing out of the fixture or out of the vent ports of the pipe interrupter. Also the minimum flush pressures that are needed to achieve proper rinsing of the surfaces.

Products that are designed and able to compensate from pressure fluctuations dynamically are also less susceptible to varying performance. Similar to how taps and showers negate the effects of pressure changes using dynamic flow controllers.

The process can be quite time and resource intensive to iron out all of the curves. And with demand continually increasing for smart flushing products in a competitive environment, the process is often seen as an unnecessary cost for bringing a product to market.

The demand for smart flushing products has exposed a small gap in how products are tested and assessed for WaterMark certification.

If you've had issues when installation and commissioning urinals and pans using solenoid controlled flushing valves, it is possible the products are not able to operate under the parameters of the finished construction. If the fixtures are not being fed water at the flow rates/pressures they were designed for flushing performance will be compromised.

When selecting products, it is always a good idea to request data from the manufacturer on how the products were tested to provide a level of confidence that the installation will perform as required.

The demand for smart flushing products has exposed a small gap in how products are tested and assessed for WaterMark certification. The respective test methods will be updated to cover the gap, but until such times it is the responsibility of all in the construction industry to show due diligence in ensuring Australia's smart bathrooms maintain a high standard of quality and hygiene.

Terry Nguyen from PROVE Engineering is a key signatory for mechanical testing and measurement of plumbing, waterworks and solar hot water.