THE CHALLENGES OF LARGER WATERWORKS

Plumbing contractors and waterworks mechanical fitters operate on opposing sides of the water meter. The side of the meter you are working governs the required qualifications of the practitioner, as well as the product approval process for the fittings being installed. Terry Nguyen from PROVE Standards & Engineering explains.

Any products that are located downstream of the utility water meter, along with the works carried out by individuals on those products, is regulated by the Plumbing Code of Australia (PCA). The water meter itself, and everything upstream, is owned and maintained by the local water authority in the manner that it sees fit.

Many years ago the two disciplines operated almost mutually exclusively from one another, but as times change they find themselves drawing nearer. There are a couple of main drivers for the merging of the industries and there are implications for the practitioners that work within them.

In a competitive world, growing businesses of all types continually look to increase their size and scope of capability. The world of plumbing contractors is no different. Higher-density living has seen the need for companies that can mobilise large labour resources to complete projects quickly and efficiently inside apartments and commercial properties. This is quite well known, but there is also another consequence of the shift for multi-dwelling properties. The incoming water mains needs to be of sufficient size to cater for all buildings on the subdivided property, and very large properties have incoming mains that may be similar in size to what is found in a residential street. As such, fittings required to connect the large incoming water supply and branch off internally are products typically located upstream of the utility water meter.

Being downstream of the utility water meter now finds these products well into WaterMark jurisdiction, where different rules apply. The products must have current WaterMark certification against the correct Standard/Specification, and the practitioner fitting the product is required to be a licensed plumber. With these scenarios becoming more prevalent with high-density living, the two industries from opposing sides of the meter look to capitalise on the new opportunity.

LARGER-SCALE WORK

Plumbing contractors need to upskill their domestic/commercial plumbers to understand the nuances to correctly install large water-carrying products. Offtake clamps, tapping bands, unrestrained mechanical couplings, flange adaptors, and other associated fittings require special training for correct fitting and installation.

On the other hand, infrastructure-based waterworks fitters who already have the experience and knowledge to fit these products correctly are required to return to the classroom to ensure they are appropriately licensed to legally install the products under the PCA.

Pipes and fittings of large diameter see extreme forces to withstand internal pressures without leakage. This results in many fittings employing the use of strong high-tensile bolts to be able to have the required force to clamp components together for mechanical sealing and structural rigidity. This is quite different from small-sized plumbing applications where connections can be through threaded fittings, push fit, press fit, or other relatively quick and simple style methods.

The challenges in laboratory testing highlights the special techniques and training that is required to correctly fit large water carrying fittings. The PROVE laboratory has in the past seen multiple samples arrive for testing, where only a single sample passes the range of tests required. And the reason is not a slightly better sample in an identical batch; rather, it is due purely to the installation method.

A mechanical bolted unrestrained coupling (better known as a 'gibbo'), for example, has to contend with pipes within a generously broad range of pipe diameters, and sometimes with unequal diameters and pipe material at either end. When combining this with linear and/or angular misalignment it becomes an engineering challenge to create an effective, long-term, robust joint. The challenge in this case relies more on correct installation methods than other plumbing connection types that offer greater deviations.

TESTING METHODS

The testing of these fittings is completed using solid metal pipes machined to the manufacturer's smallest claimed pipe size, which are then set at the furthest pipe setting gap. This is then topped off with holding and maintaining the pipes during the test at the maximum declared deflection angle with an internal pressure far greater than the maximum allowed. For a DN150-sized fitting, this means pushing a set of deliberately misaligned metallic pipes outwards with a force of 4,300kgs. Or, in other words, it would completely lift a small truck even in its most unfavourable setting. The testing of large-sized water carrying fittings at incorrect angles is quite impressive, and if you have ever had the pleasure of witnessing how this is achieved in person, you would know what I am talking about.

Many variables exist that need to be engineered correctly during product design, which must then be followed precisely by the installer to achieve the desired outcome. The bolt and nut material selection, the presence (or absence) and amount of lubrication on the bolts, lubrication requirements on the sealing gaskets and/or pipe, as well as the bolting sequence pattern and correct torque all contribute to changing how the product behaves once installed. The process is time-consuming to complete as per instructions, and shortcuts can be tempting. Over-tightening is also possible, and given the size of these fittings nothing short of a catastrophe awaits those who get the process wrong.

Similarly, something as simple as a tapping band with only two bolts either side of the water mains at first glance is an installation that cannot be simpler. However, the bolting of these components again is quite critical, and it is important to understand the dynamics of how the product was engineered. A tapping band installed with, or without, lubricant on the bolts will be the difference of a correct installation or a DN100+ sized pipe disaster.

PVC pipes expand and contract based on the water pressure, and at the time of installation it is often impossible to know where the pipe is in relation to its natural state. Bolting the product onto the pipe to what appears to look all right during installation may not coincide with how it was engineered to sit on the pipe over its 50-year life expectancy. Long-term underground water leakages or over-tightened crushed PVC pipes are the effects of ignoring correct installation practices. Large-sized pipe failures are not an easy rectification and need to be treated with respect based on the consequence of failure.

Large sized plumbing fittings are a staple in today's plumbing world and the process to have them installed properly requires education, training and experience. Manufacturers often continue to tweak installation methods to provide as much information to the installer as possible to achieve a perfect joint. Laboratories such as PROVE follow these installation instructions when testing products for certification, and they should always be used as a reference when attempting an installation to replicate the results that saw the product meet the necessary requirements.

For information on how large fittings used in water distribution networks are tested, please contact PROVeng.com.au

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