Example entry

Category six – Best demonstrated healthy and safe work design

1: Describe how your design change has improved the work to achieve safer and healthier outcomes

In a building's construction - industrial, commercial, or residential - the Australian Standard requires all sanitary drainage system installations to be tested. This testing is to ensure the system holds water without leakage.

The traditional method for testing a drainage system is both a manual task and high injury risk. The initial risks result from constrained access to the inspection opening pipework, with the actual work performed with the hand inside and into the 100mm pipe.

In undertaking the process, a high level of force is required to tighten / loosen the 'plug', which expands inside the pipework to allow the testing process, refer to Attachment A for current inspection opening and plug. The force required to tighten / loosen the plug causes musculoskeletal disorders of the fingers, thumb, hand, and wrist. These are in addition to abrasions from working within the pipe.

Should the plug fail the plumber is exposed to an uncontrolled release of hydrostatic (water) pressure. Fingers, thumb, hand, wrist, and the back are at risk due to the awkward spinal position held during the test process.

Risks associated with the current method are at several levels and points of the process. The frequency of potential injury is, anecdotally, high and the consequences can be serious, generating lost time injuries (LTI's).

The engineered K-Valve test plug controls the flow of water by a simple quarter turn relief valve, eliminating injuries detailed above and thereby directly improving safety and business efficiency.

A feature of the test plug is the pneumatic functionality, allowing for water saving. The design of K-Valve system also eliminates any chance of lost plugs into the pipework which is time consuming to rectify and adds additional risk. Refer to Attachment B for how the K-Valve solution works.

The simplicity of the K-Valve design allows for easy install through:

- Using the multi-faceted K-Valve fitting as the inspection and test opening.
- Installing the separate re-usable test plug during the testing phase.
- Finalising the process with the permanent plug and cap.

I recognised from experience the current process was placing plumbers, including myself, at risk, I knew there had to be a safer and efficient way of doing the test.

The K-Valve system not only removes all the injury risk elements, it's faster. Current testing method is 4-5 minutes at best. KValve is 10-15 seconds.

Through discussion with other plumbers, the installation and testing process issues was universal. I then undertook further investigations, including:

- Researched available injury information.
  Confirming abrasion and other injuries to the wrist, hand, and fingers had a high level of incidence, as per the Table in Attachment C.
  More detail available at https://www.safeworkaustralia.gov.au/sites/default/files/2020-10/Key%20Work%20Health%20and%20Safety%20Stats%202020.pdf (site visited 01/06/22)
- Engaged a Safety and Ergonomic specialist to assess the current inspection testing process.

The assessment was undertaken using two WH&S QLD tools, ManTRA and PErForM.
The findings and conclusions of those assessments are at Attachments D and E. Essentially, the testing process in its entirety has various risk elements to the body, making the process unsafe.

2: Describe how your business has benefited from the design solution and the impact of industry.

After engaging with many plumbers during the K-Valve development phases, it is absolutely the case that all plumbers are aware of the risks faced when they undertake the sanitary drainage system testing process using the long-standing methods.

Individual plumbers who undertook initial in-field testing and now those using K-Valve have confirmed that their productivity for the wastewater testing process has increased by more than 90%. Although that is anecdotal it confirms pre-market testing which showed a 92% to 96% productivity benefit.

The feedback in terms of injury is as expected. There have been no issues, which is increasing the recognition that K-Valve removes the previous injury risks. This recognition is now attracting larger organisations, notably those with a more formal safety process and culture.

In a recent example, one of Australia's largest suppliers of plumbing services has specified K-Valve to be used exclusively in their PVC wastewater installations. This decision was largely made on safety grounds.

To a large degree, the success of K-Valve is reliant on the inherent safety. This is having an impact on the morale of those performing the task, i.e., plumbers. In fact, the adoption of K-Valve by the organisation nominated previously was driven by the plumbers, despite resistance from more senior staff.

The K-Valve product is specifically designed for sanitary drainage systems. Currently this is for Polyvinyl Chloride (PVC) installations.

A High-Density Polyethylene (HDPE) version - for use in areas such as restaurants, commercial supermarkets and hospitals – to deal with alkalis, acids and chemicals as well as trade waste applications is currently in development.

The existing K-Valve products, including the future HDPE version, can and are being used in New Zealand. The K-Valve system is adaptable to other operating methods and standards in countries where the method for testing sanitary drainage systems is similar to Australia and New Zealand.

While there are many countries to which this applies the strategic intent, just now being pursued, is to identify the applicability of the K-Valve system for the UK and US and, potentially, in Europe.