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TechnipFMC

Heightened demand for true redundancy

SA Fire Protection's Valeriano Barrilà and Alessandro Bronco respond to a heightened demand for fully redundant architecture with the SIL 3-suitable double-chamber deluge valve.

For many years, the fire industry has developed solutions capable of meeting the SIL requirements for logic solvers and detectors, in line with an increasing realisation of the importance of functional safety in fire systems. However, the availability of SIL-suitable final elements (ie deluge water spray systems, monitors and gaseous-based systems), that are designed to be integrated in fire suppression systems is still very limited.

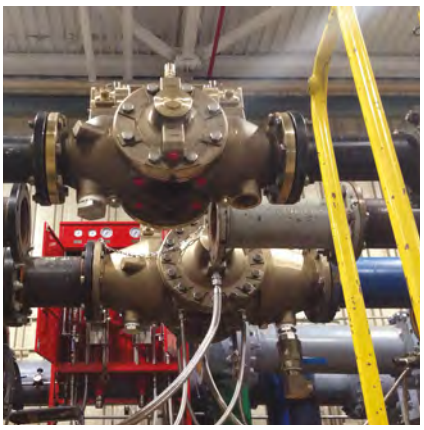
In emergency shut down systems we are used to seeing SIL valves interconnected to logic solvers, it is not unusual to see installations in which a deluge system meant to perform a mitigation action being equipped with SIL unsuitable deluge valve. Mostly they are assembled with SIL 2 or 3-capable solenoid valves, or possibly redundant solenoid valves, to activate a single control trim and its chamber. Unfortunately, these architectures represent an erroneous application of the basic principle of safety integrity.

The VDD deluge valve designed by SA Fire Protection is a complete actuation solution validated by Bureau Veritas, UL Listed and is suitable for SIL 3 fire suppression SIF (safety instrumented functions) in low demand mode, providing full redundancy and uninterrupted availability.

'Functional safety' is dependent on a system/equipment that operates correctly in response to outside inputs. Such systems are required to perform specific safety functions to reduce that risk. These systems are called 'safety-related systems', or 'safety instrumented systems' (SIS).

IEC 61508 specifies four levels of safety performance for a safety function, called 'safety integrity level' (SIL). SIL1 is the lowest level and SIL4 the highest. The Standard details the requirements necessary to achieve each SIL.

The VDD Double Chamber Deluge Valve is designed for fire protection systems according to NFPA 15, UL 260 and IEC 61508/61511. It combines all the functions available on traditional deluge valves with a fully redundant architecture, designed to achieve higher level of reliability.



The following example is often used to illustrate the VDD valve performance. Consider a fire or gas emergency condition where the deluge system must be actuated to respond to a fire outbreak or to mitigate a gas cloud detected by the fire and gas system.

All the deluge systems commonly used consist of a main deluge valve and an external bypass line that is installed on the deluge skid, and which is intended to provide manual actuation should the deluge valve fail on demand. It is in these circumstances that the VDD Deluge Valve makes the real difference – the VDD design can overcome a double failure affecting the whole valve assembly, therefore it is very unlikely for the VDD Valve to fail on demand.

Looking at the traditional deluge valves, the time needed for the operator to respond to a failure can be summarised as:

TR = T1+T2+T3+T4

Where:

TR = Time required to respond manually and activate the water spray system via the bypass line.

T1 = Time needed from signal sent via logic controller or manual activation to come back to the control room signalling that the deluge valve did not open.

T2 = Time needed for operator to analyse the signal and initiate emergency procedures.

T3 = Time needed for operator to respond to a given emergency message

T4 = Time needed for the operators to reach the failed deluge skid and open the bypass line.

Anyone can argue about the length of time each interval shown above takes, but the time for VDD to respond to a failure is zero.

Procedures to operate standard deluge skids are unnecessary with the VDD valve because it responds automatically and immediately to failures affecting the valve – even in faulty conditions affording continuous fire protection.

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