

Certificate of Conformity to IEC 61508 Safety Integrity Level (SIL) 1

Functional Safety of Safety-Related Programmable Electronic Systems

The **Actuated Gate Valve (XV-012643)** and **Hydraulic Control Panel (HCP)** have been assessed and are considered capable for use in a low demand Safety Function with a SIL requirement of up to (including) SIL 1.

This certificate covers the hardware reliability with respect to random hardware failures and architectural constraints. Systematic Capability (SC) has not been addressed as part of this certificate.

The assessment was carried out to determine compliance with IEC 61508 (2010 Edition) with regards to:

- Random Hardware Failure (Predicted PFD) with a Mean Down Time (MDT) of 168 hours, a Proof Test Interval (PTI) of 1 year (8760 hours), a Proof Test Coverage (PTC) of 95% or 90%, an Overhaul Interval of 10 years (87600 hours) and Partial Stroke Test (PST) of 6 months (4380 hours) with a 60% PST coverage;
- Architectural Constraint (Type A, Predicted SFF >60%).

The assessment was based on the assumptions, data provided, and recommendations given in:

- **Engineering Safety Consultants Ltd Report: L054_FM001 rev. 1.**

The product was assessed against the following failure modes:

- **Actuated Gate Valve (XV-012643):** To close gate valve and isolate pipework & equipment downstream.
- **HCP:** To de-energise, from the Emergency Shut Down (ESD) system, the solenoid-operated valve, which will provide open path for oil to flow from the hydraulic cylinder (in XV-012643 actuator), resulting in the valve moving to the closed position under the force of the spring.

The assessment results are as follows:

Device	PST Interval (hrs)	PST Coverage	Proof Test Coverage (PTC)	Selected SIL 1 PFD Target	Predicted PFD	HFT	Type	Predicted Overall SIL (PFD & Arch)
Actuated Gate Valve (XV-012643) + HCP	4380	60%	95%	3.0E-02	3.0E-03	0	A	1
			90%	3.0E-02	3.6E-03	0	A	1
	N/A	N/A	95%	3.0E-02	4.9E-03	0	A	1
			90%	3.0E-02	6.4E-03	0	A	1

IMPORTANT: It should be noted that this assessment does not include confirmation of the response time of the device. For response times (along with any relevant assumptions) reference should be made to the Safety Manual of each device and the total SIF response time **MUST** be compared against the process safety time for the specific application.



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