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Certificate

Project #: 21-066-DUXVLV2021021

SIL 3 Capable

Type A, Route 1H

DUXVALVES B.V., DDP and DDH SRC Series Rotating Actuators [bare actuator]

Application: Severe unclean [upstream] duty class NU-Naval Unsheltered; this includes the lighter clean process service duty class NU. Naval Unsheltered (non-protected surface ship borne equipment exposed to vibrations and environmental naval weather conditions).

Function: Spring Return Open-to-Close or Close-to-Open duty. Low Demand Mode. Architectural constraint, Route 1H: HFT= 0 for SIL-2; HFT= 1 for SIL-3; and HFT= 2 for SIL-4.

Verified: Meets the applicable requirements of IEC 61508:2010 Parts 1-7 per the analysis report.

Systematic: Assessed the manufacturer's product development, design, and quality control processes. For SIL-2 and above applications, disassembly, assembly, repair or modification of the actuator performed by any party other than the manufacturer invalidates this certification.

Random: Quantitative analysis supported by failure modes effects and criticality analysis.

Ir. Ing. C. P. Willig, Dependable Industrial Automation Consultancy USA LLC

Eloise Roché, SIS-TECH

Valid Until: July 2, 2025

Failure Analysis: The referenced Analysis Report includes a quantification of the product performance as manufactured. For the SIL Certificate to be valid it is mandatory that transport, construction, operation, inspection and maintenance are in full compliance with manufacturer's requirements. The user needs to carefully review the use constraints documented in the Analysis Report and within the product Safety Manual to identify the differences between the use constraints and the intended application. The actual product performance can be significantly different if the use constraints in the analysis report or safety manual are violated, or the product is misapplied or abused, whether intentional or unintentional.

Summary Data Table:

		1H Best Estimate Failure Rates and MTBF's			
MODEL	**ASPECT**	**MTBF_Dangerous** MINIMUM 2.5% value [year]	AVERAGE 50% value [year]	**Failure Rate_D** AVERAGE 50% value [1/hour]	MAXIMUM 97.5% value [1/hour]
DDP	DDP SRC Series Rotating Actuator [bare actuator]	3161	6006	1.90E-08	3.61E-08
DDH	DDH SRC Series Rotating Actuator [bare actuator]	3132	6031	1.89E-08	3.64E-08
DDP & DDH	Full Stroke Failure Dangerous - DDP & DDH	3147	6019	1.90E-08	3.63E-08
		Confidence: 95%			
MODEL	**ASPECT**	**MTBF_Safe** MINIMUM 2.5% value [year]	AVERAGE 50% value [year]	**Failure Rate_Safe** AVERAGE 50% value [1/hour]	MAXIMUM 97.5% value [1/hour]
DDP	DDP SRC Series Rotating Actuator [bare actuator]	1402	1674	6.82E-08	8.14E-08
DDH	DDH SRC Series Rotating Actuator [bare actuator]	1228	1500	7.61E-08	9.30E-08
DDP & DDH	Full Stroke Failure Safe - DDP & DDH	1315	1587	7.21E-08	8.72E-08
		Confidence: 95%			

[#]	REMARKS
1	1H Best Estimates MTBF's per 20+ Design Review GOFA-FMECA's 10% - 25% conservative lower than 2H field values

DIACUSA-DUXVLV-2021-021-R1A UCP-DRFMECA PNEUM ACTUATOR.xlsm

References:

Analysis Report: DIACUSA-DUXVLV-2021-021-R1B-SILCERT-DDP-DDH-SIGNED.pdf, July 1, 2021.

Safety Manual(s): DIACUSA-DUXVLV-2021-022-R1B-SFMNL-DDP-DDH-CTFD.pdf, July 1, 2021.