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IEC 61508 Functional Safety Capability Statement

Moto Mecánica Argentina S.A mSafe 3AC Electro-Hydraulic Assembly

Manufacturer:	Moto Mecánica Argentina S.A Río Pilcomayo 449-499, B1657 El Libertador, Provincia de Buenos Aires, Argentina
Product:	Electro-Hydraulic Assembly
Model:	mSafe 3AC

Application:	Low Demand Mode Safety Instrumented Function
Safety Function:	Upon detection of configured alarm settings by the pressure transmitter, logic solver (Printed Circuit Board (PCB) L03-60590-01) de-energised the coil of the solenoid relief valves causing release of interface valves and draining of the hydraulic oil going to the actuator/well valve assembly (actuator and well valve not part of this analysis)
Applied standard:	IEC 61508 Ed2 2010 Parts 1-3
Systematic Capability:	Not Assessed
Applicable report:	Environmental Resources Management Ltd Report: 0754427_CT001 Rev. 1 Gefran KX Series TUV Rheinland State of conformity no: 28713306, certificate Exida EJA E Series & J Series, EJX A Series & J Series Certificate, Certificate no: YEC 1110046 C001, Date: 22/06/2023

Assessment Route:	1_H
Hardware Fault Tolerance:	0
Type:	A & B (refer to Table below)
Application restrictions:	Pressure transmitter is to be configured in such a way that any self-detected fault or out of range (high or low) causes de-energising and opening of solenoid relief valve via logic solver (PCB L03-60590-01) Any self-detected fault in the logic solver will cause de-energising and opening of solenoid relief valve Results are based on the use of the Gefran KX or Yokogawa EJA Series pressure transmitter. Any other pressure transmitter used will require an update in the assessment

The Electro-hydraulic assembly assessed comprises the following sub-elements / functional blocks:

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- Pressure Transmitters (Gefran KX / Yokogawa EJA Series).
- Printed Circuit Board (PCB L03-60590-01): consisting of a power supply, an analogue input, a microcontroller, an external memory and a digital output (See Environmental Resources Management Ltd Report: L115_FM001 Rev.2);
- Hydraulic Assembly: Assessed via FMEA technique (See Environmental Resources Management Ltd Report: 0754427_FM001 Rev. 1).

Component	Pressure Transmitter – Gefran KX	Pressure Transmitter – Yokogawa EJA Series	PCB			Hydraulic Assembly
			Power Supply / Analogue Input	Microcontroller / Memory	Digital Output	
λ_{DU} (/hr)	6.81E-08	3.00E-08	2.48E-09	1.50E-08	2.72E-08	2.40E-08
λ_{DD} (/hr)	1.55E-08	3.54E-07	3.83E-08	5.75E-08	0.00E00	0.00E00
λ_{S} (/hr)	7.00E-08	5.50E-08	9.00E-08	8.27E-08	1.31E-07	1.50E-06
SFF (%)	91%	93%	98%	90%	83%	98%
HFT required for SIL 3	1	1	0	1	1	0
Device Type	B	B	A	B	A	A

IMPORTANT: It should be noted that this assessment considers only the I Moto Mecánica Argentina S.A, mSafe 3AC Electro-Hydraulic Assembly. It does not cover opening and closing time requirements and a random hardware failures assessment must be conducted for the entire safety function for each application as per the appropriate Safety Requirements Specification.

The Moto Mecánica Argentina S.A, mSafe 3AC Electro-Hydraulic Assembly has been assessed and is considered capable for use in a low demand mode safety function up to (and including) SIL 2 with regards to random hardware failures and architectural constraints.

Note 1: The SIL of a complete SIF (sensor, logic solver and final element subsystems) must be verified to calculate the required Probability of Failure on Demand (PFD) / Probability of Failure per Hour (PFH), considering any redundancy, Proof Test Interval (PTI), Proof Test Coverage (PTC), Mission Time and Mean Time To Restoration (MTTR) for all elements included in the SIF. Each subsystem should be verified to ensure compliance with the minimum HFT requirements.

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