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IEC 61508 Hardware Safety Integrity Assessment

Duxaoil Texas LLC, Printed Circuit Board

Manufacturer:	Duxaoil Texas LLC 1920 W W Thorne Drive, Houston, TX 77073, United States
Product:	Printed Circuit Board
Model:	N/A

Application:	Low Demand Mode Safety Instrumented Function
Safety Function:	A 4-20 mA analogue input signal is received by the microcontroller which digitalises the signal and compares the value to reference values stored in the microcontroller's internal flash memory. In case any of the three input signal values is outside of the safe range, a digital output signal is activated with a logic "0" value (causing de-energising and opening of hydraulic assembly valve) (Sensor and final element subsystems not part of this analysis)
Applied standard:	IEC 61508 Ed2 2010 Parts 1-3 (Partial)
Systematic Capability:	Not Assessed
Applicable report:	Environmental Resources Management Ltd Report: 0828762_FM001 rev. 2

Assessment Route:	1_H
Hardware Fault Tolerance:	0
Type:	A/B (Refer to Table below)
Application restrictions:	None identified

Module	λDU (/hr)	λDD (/hr)	λS (/hr)	SFF	SIL AC (HFT = 0)
Power Supply / Analogue Input / Digital Output	5.7E-08	3.8E-08	4.1E-07	89%	SIL 2
Microcontroller	1.5E-08	4.7E-08	8.3E-08	90%	SIL 2

SIL AC (Architectural Constraints): Represents the maximum allowable SIL of each hardware element, assuming Hardware Fault Tolerance (HFT) = 0.

It should be noted that for a device to claim compliance with a specified SIL, the SIL AC and SC of the device needs to both be met. In addition to this, the required Average Probability of Failure on Demand (PFDavg) value for the complete Safety Instrumented Function (SIF) needs to adhere to the SIL PFDavg ranges.

IMPORTANT: It should be noted that this assessment considers only the Duxaoil Texas LLC, Printed Circuit Board. It does not cover opening and closing time requirements and a random

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hardware failures assessment must be conducted for the entire safety function for each application as per the appropriate Safety Requirements Specification.

The Duxaoil Texas LLC, Printed Circuit Board 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 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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