



ENGINEERING SAFETY CONSULTANTS

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Certificate of Conformity to IEC 61508 In Terms Of Diagnostic Random Hardware Reliability Requirements

Functional Safety of Safety-Related Programmable Electronic Systems

The **Imtex Controls Ltd, Type V Valve Controller Partial Stroke Electronic Circuit** has been assessed for its capability in terms of random hardware reliability, for use in a Safety Instrumented Function (SIF) for low demand applications as partial stroke diagnostic testing of a valve system. Based on the information provided and assumption given in the report, the device has demonstrated that there are no dangerous failure modes which could impact on the safety function performed by the SIF. The random hardware failure rate of the diagnostic circuit was also assessed.

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

- **ESC Ltd Report: J161_FM001 rev. 2.**

The table below presents a summary of the FMEA in terms of failures in terms of, no effect, failures which cause the valve to spuriously de-energise, failures that cause the Partial Stroke Test (PST) to fail and are not annunciated, failures that cause the PST to fail and are annunciated immediately and failures that cause the PST to fail and are not annunciated until another PST is initiated.

	Failure rate (/hr)				
	No Effect	Causes Spurious Trip	Partial Stroke Test Fails and is not annunciated	Partial Stroke Test Fails and is annunciated immediately	Partial Stroke Test Fails and is annunciated upon initiation of PST
Total	8.36E-07	1.58E-08	4.92E-08	2.84E-07	1.59E-07

It is assumed that for any dangerous detected failure that is annunciated, the unit is repaired before there is a requirement for another PST.

The table below presents the results of the probability of the diagnostics circuit still working after the useful life period of the device without having an undetected failure. The probability was calculated for a useful life period of 10, 20 and 30 years.

Device Useful Life Period (years)	Probability of diagnostic circuit still working after useful life period
10	99.57%
20	99.14%
30	98.71%

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Assessment Date: November 2019, valid to November 2021
Certificate: J161_CT001 rev. 2

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