Certificate / Certificat
Zertifikat / 合格証

DUN 2312104 C002

exida hereby confirms that the:

3/2 Solenoid Valves
Series 3A1N, 3A4N

Duncan Engineering Limited
Maharashtra - India

Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-2

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

PFH/PFD_{avg} and Architecture Constraints must be verified for each application

Safety Function:
The solenoid valve will move to the designed safe position when de-energized / energized within the specified safety time.

Application Restrictions:
The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.

The manufacturer may use the mark:

Revision 1.0 April 30, 2024
Surveillance Audit Due
May 01, 2027

ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17065
PRODUCT CERTIFICATION BODY
#1004

Evaluating Assessor

Certifying Assessor

Certificate / Certificat / Zertifikat / 合格証

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Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

PFH/PFD_{avg} and Architecture Constraints must be verified for each application

3/2 Solenoid Valves – Series 3A1N, 3A4N

Systematic Capability:

The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This device meets *exida* criteria for Route 2_H.

IEC 61508 Failure Rates in FIT*

Valve Group and Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
3A1N, DTT, 2-9 W, Class F	0	175	0	49
3A1N, ETT, 2-9 W, Class F	0	24	0	140
3A1N, DTT, 2-9 W, Class H	0	159	0	49
3A1N, ETT, 2-9 W, Class H	0	24	0	135
3A1N, DTT, 9-16 W, Class F	0	417	0	49
3A1N, ETT, 9-16 W, Class F	0	24	0	177
3A1N, DTT, 9-16 W, Class H	0	307	0	49
3A1N, ETT, 9-16 W, Class H	0	24	0	167
3A4N, DTT, 2-9 W, Class F	0	149	0	112
3A4N, ETT, 2-9 W, Class F	0	39	0	163
3A4N, DTT, 2-9 W, Class H	0	133	0	112
3A4N, ETT, 2-9 W, Class H	0	39	0	158
3A4N, DTT, 9-16 W, Class F	0	391	0	112
3A4N, ETT, 9-16 W, Class F	0	39	0	200
3A4N, DTT, 9-16 W, Class H	0	281	0	112
3A4N, ETT, 9-16 W, Class H	0	39	0	190

* FIT = 1 failure / 10^9 hours

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/PFD_{avg} considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: DUN 23-12-104 R015 V1R1 (or later)

Safety Manual: DEL-SSM-ENG-02 R0 (or later)

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