



Certificate / Certificat Zertifikat / 合格証

DIE 1510104 C002

exida hereby confirms that the:

2-Way Floating Ball Valves

**DIE ERSTE INDUSTRY CO., LTD.
Taichung, Taiwan - R.O.C.**

The manufacturer
may use the mark:



Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A Element

SIL 2 @ HFT=0; SIL 3 @ HFT = 1; Route 2_H

**PFD_{AVG} and Architecture Constraints
must be verified for each application**

Revision 1.1 December 5, 2018
Surveillance Audit Due
January 30, 2020

Safety Function:

The 2-Way Floating Ball Valves will close, close with tight shut-off or open to trip depending on the Safety Instrumented Function design.

Application Restrictions:

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



ANSI Accredited Program
PRODUCT CERTIFICATION
#1004



Diamond Lee

Evaluating Assessor

Stewart Chase

Certifying Assessor

Systematic Capability: SC 3 (SIL 3 Capable)**Random Capability: Type A Route 2_H**

**PFD_{AVG} and Architecture Constraints
must be verified for each application**

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*

Device	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Full Stroke, Clean Service	0	0	0	391
Tight Shut-Off, Clean Service	0	0	0	1167
Open on Trip, Clean Service	0	131	0	260
Full Stroke with PVST, Clean Service	0	0	130	261
Tight Shut-Off with PVST, Clean Service	0	0	130	1037
Open on Trip with PVST, Clean Service	130	1	130	130
Full Stroke, Severe Service	0	0	0	716
Tight Shut-Off, Severe Service	0	0	0	2228
Open on Trip, Severe Service	0	252	0	464
Full Stroke with PVST, Severe Service	0	0	227	489
Tight Shut-Off with PVST, Severe Service	0	0	227	2001
Open on Trip with PVST, Severe Service	249	3	226	238

* FIT = 1 failure / 10⁹ hours

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of 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: DIE 15/10-104 R005 V1R2

Safety Manual: DIE ERSTE 2 & 3-Way Ball Valves Safety Manual_v1.4 or later

Page 2 of 2

2-Way Floating Ball Valves



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