



Certificate / Certificat Zertifikat / 合格証

MAR 091051 C002

exida hereby confirms that the:

**Series 33 & 39
3-Way Ball Valves**

**Mars Valve 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, Route 2_H Device

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

Valid until February 1, 2017
Revision 2.0 January 8, 2014

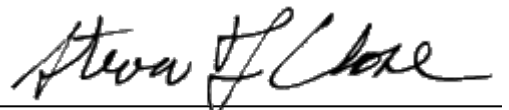
Safety Function:

The Ball Valve will move to the designed safe position per the actuator design within the specified safety time.

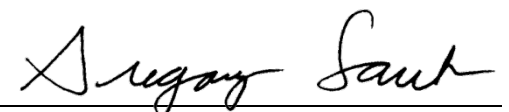
Application Restrictions:

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





Evaluating Assessor



Certifying Assessor



ANSI Accredited Program
PRODUCT CERTIFICATION
#1004

MAR 091051 C002

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

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, Clean Service in FIT*

Series 33 Ball Valve - Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Floating, Full Stroke	0	0	0	508
Floating, Tight Shut-Off	0	0	0	1079
Floating, Open on Trip	0	110	0	398
Trunnion, Full Stroke	0	0	0	565
Trunnion, Tight Shut Off	0	0	0	1154
Trunnion, Open on Trip	0	113	0	451

Series 39 Ball Valve Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Full Stroke	0	0	0	473
Tight Shut-Off	0	0	0	1041
Open on Trip	0	112	0	361

* 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 subsystem must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: MAR Q091051 R004 V2R1 IEC 61508 Assessment Report

Safety Manual: 25-04-07 Safety Manual 3-Way Ball Valve

Series 33 & 39, 3-Way Ball Valves



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