The manufacturer may use the mark

Reports
MAR 09/10-51 R004 V1 R1 Assessment Report
MAR 09/10-51 R001 V1 R3 FMEDA Report

Validity:
This assessment is valid for the Series 99, 91D, 90D, 90, 96D, 88, 83, 77 & 22, 2-Way Ball Valves

This assessment is valid until April 1, 2014

Revision 1.0 March 23, 2011

exida Certification Services

Certificate / Certificat
Zertifikat / 合格証

MAR 091051 C001

exida hereby confirms that the:

Series 99, 91D, 90D, 90, 96D, 88, 83, 77 & 22
2-Way Ball Valves

Mars Valve Co., Ltd.
Taichung, Taiwan – R.O.C.

Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1 - 7

and meets requirements providing a level of integrity to:

Systematic Integrity: SIL 3 Capable

Random Integrity: Type A Device

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

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

Series 99, 91D, 90D, 90, 96D, 88, 83, 77 & 22, 2-Way Ball Valves

Mars Valve Co., Ltd. Taichung, Taiwan – R.O.C.

Certificate / Certificat / Zertifikat / 合格証

MAR 091051 C001

Systematic Integrity: SIL 3 Capable

Random Integrity: Type A Device

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

SIL 3 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 without "prior use" justification by end user or diverse technology redundancy in the design.

IEC 61508 Failure Rates in FIT*, Clean Service

Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Full Stroke	0	0	0	472
Tight Shut-Off	0	0	0	1338
Open on Trip	0	144	0	327
Full Stroke with PVST**	0	0	158	314
Tight Shut-Off with PVST	0	0	158	1180
Open on Trip with PVST	144	0	158	169

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.

*FIT = 1 failure / 10^9 hours

**PVST = Automated Partial Valve Stroke Test

exida Certification Services
64 N Main St
Sellersville, PA 18960

Form	Version	Date
C61508	2.7-3	Mar 2011