

The manufacturer  
may use the mark:



**Reports:**

FLO 10-01-53 R007 Mark  
Series Assessment Report  
V1 R1

FLO 10-01-53 R002 V1R1 -  
Flowserve Mark Six FMEDA  
Report

**Validity:**

This assessment is valid for  
Mark Six valve

This assessment is valid until  
July 1, 2013.

Revision 1.0 June 29, 2010



# Certificate / Certificat Zertifikat / 合格証

FLO 10-01-53 C002

*exida* hereby confirms that the:

**Mark Six valve**

**Flowserve Corporation  
Springville, UT - USA**

Has been assessed per the relevant requirements of:

**IEC 61508 Parts 1, 2**

and meets requirements providing a level of integrity to:

**Systematic Integrity: SIL 3 Capable**

**Random Integrity:**

**Type A; SIL must be verified for the entire  
final element application**

Safety Function:

The 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.



Product Assessor

Auditor

# Certificate / Certificat / Zertifikat / 合格証

FLO 10-01-53 C002

**Systematic Integrity: SIL 3 Capable**

**Random Integrity:**

**Type A, SIL must be verified for the entire final element application**

Mark Six valve

Flowserve Corporation  
Springville, UT - USA

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.

#### Failure rates Mark Six valve (Clean Service)

	$\lambda_{sd}$ (FIT)	$\lambda_{su}^1$ (FIT)	$\lambda_{dd}$ (FIT)	$\lambda_{du}$ (FIT)
Full Stroke	0	1068	0	556
Tight Shutoff	0	342	0	1282
Open to Trip	0	1278	0	346
Full Stroke with PVST	0	1068	187	369
Tight Shutoff with PVST	0	342	187	1095
Open to Trip with PVST	210	1068	187	159

<sup>1</sup> It is important to realize that the "no effect" failures are included in the "safe undetected" failure category according to IEC 61508. Note that these failures on their own will not affect system reliability or safety, and should not be included in spurious trip calculations

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<sup>9</sup> hours



Form	Version	Date
C61508	2.3	May 2010