



# Certificate / Certificat Zertifikat / 合格証

FLO 1303024 C004

*exida* hereby confirms that the:

**Worcester 53/54 2 piece, 55/56 and  
819/829 Series Ball Valves**

**Flowserve Flow Control  
Haywards Heath, West Sussex - UK**

Have 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<sub>H</sub> Device**

**PFD<sub>avg</sub> 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

The manufacturer  
may use the mark:



Revision 1.2 September 25, 2019

Surveillance Audit Due  
September 1, 2022



ISO/IEC 17065  
PRODUCT CERTIFICATION BODY  
#1004

FLO 1303024 C004

**Systematic Capability: SC 3 (SIL 3 Capable)**

**Random Capability: Type A, Route 2<sub>H</sub> Device**

**PFD<sub>avg</sub> 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<sub>H</sub>.

**IEC 61508 Failure Rates in FIT\***

Failure rates for 53/54 2 piece, 55/56 and 819/829 Series Ball Valves according to IEC 61508 in clean service

Application	$\lambda_{SD}$	$\lambda_{SU}$	$\lambda_{DD}$	$\lambda_{DU}$
Full Stroke	0	0	0	464
Tight Shut-Off	0	0	0	1330
Open on Trip	0	145	0	320
Full Stroke with PVST	0	0	161	303
Tight Shut-Off with PVST	0	0	161	1169
Open on Trip with PVST	145	0	161	159

\* FIT = 1 failure / 10<sup>9</sup> hours

† PVST = Partial Valve Stroke Test of a final element Device

**SIL Verification:**

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD<sub>avg</sub> 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:** FLO 13-03-024 R001 V2, R1 (or later)

**Safety Manual:** FLOSIL81982953545556-02 Rev1 (or later)



80 N Main St  
Sellersville, PA 18960

Worcester 53/54 2 piece, 55/56 and 819/829 Series Ball Valves