



# Certificate / Certificat Zertifikat / 合格証

PBM 1111013 C002

exida hereby confirms that the:

## TN Series Ball Valve

**PBM, Inc.**

**Irwin, PA - USA**

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<sub>H</sub> Device**

**PFD<sub>AVG</sub> and Architecture Constraints  
must be verified for each application**

Valid until October 1, 2018

Revision 1.2 September 30, 2015

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.



ANSI Accredited Program  
PRODUCT CERTIFICATION  
#1004



Evaluating Assessor

Certifying Assessor

PBM 1111013 C002

**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**

TN Series Ball Valve

**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 TN Series Ball Valve - Clean Service

Application	$\lambda_{SD}$	$\lambda_{SU}$	$\lambda_{DD}$	$\lambda_{DU}$
Full Stroke	0	0	0	586
Tight Shut-Off	0	0	0	1207
Open on Trip	0	117	0	469
Full Stroke with PVST**	0	0	250	336
Tight Shut-Off with PVST	0	0	250	957
Open on Trip with PVST	117	0	250	219

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

\*\* PVST= Automated Partial Valve Stroke Test

**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:** PBM 11/10-013 R005 V1 R2

**Safety Manual:** FRM011, Rev0 or later



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