



Certificate / Certificat Zertifikat / 合格証

NAF 1006013 C001

exida hereby confirms that the:

NAF - Trunnball DL Ball Valves

DN 150 – DN 900 (6" – 36")

PN 10 – PN 40 (ANSI Class 150 & 300)

Flowserve - NAF AB

SE-581 87 Linköping, Sweden

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_H Device

**PFH/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.

The manufacturer
may use the mark:



Revision 2.2 June 12, 2018

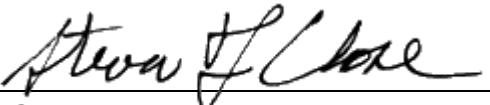
Surveillance Audit Due
January 1, 2021



ANSI Accredited Program
ISO/IEC 17065
PRODUCT CERTIFICATION BODY
#1004




Evaluating Assessor


Certifying Assessor

NAF 1006013 C001

Systematic Capability: SC 3 (SIL 3 Capable)**Random Capability: Type A, Route 2_H Device****PFH/PFD_{avg} and Architecture Constraints
must be verified for each application****Trunnball DL Series
Trunnion Mounted
Ball Valves****Systematic Capability:**

The products have 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 in FIT¹

Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Full Stroke, Clean Service	0	0	0	558
Tight Shut-Off, Clean Service	0	0	0	1246
Open on Trip, Clean Service	0	131	0	428
Full Stroke with PVST ² , Clean Service	0	0	221	337
Tight Shut-Off with PVST, Clean Service	0	0	221	1025
Open on Trip with PVST, Clean Service	131	0	221	207
Full Stroke, Severe Service	0	0	0	1015
Tight Shut-Off, Severe Service	0	0	0	2308
Open on Trip, Severe Service	0	248	0	767
Full Stroke with PVST, Severe Service	0	0	394	621
Tight Shut-Off with PVST, Severe Service	0	0	394	1914
Open on Trip with PVST, Severe Service	248	0	394	373

¹ FIT = 1 failure / 10⁹ hours

² PVST = 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 PFH/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 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: NAF 07/07-21 R005 V4 R1 (or later)

Safety Manual: NFENDS4168



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