Certificate / Certificat
Zertifikat / 合格証

NAF 070721 C004

exida hereby confirms that the:

NAF - Torex Butterfly Valves
DN 80 – DN 700 (3” – 28”)
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 Butterfly 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 June 1, 2021

Evaluating Assessor

Certifying Assessor

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

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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

Torex Series
Butterfly 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 FIT[1]

Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
Full Stroke, Clean Service	0	0	0	540
Tight Shut-Off, Clean Service	0	0	0	1303
Open on Trip, Clean Service	0	128	0	406
Full Stroke with PVST[2], Clean Service	0	0	240	300
Tight Shut-Off with PVST, Clean Service	0	0	279	1024
Open on Trip with PVST, Clean Service	128	0	240	166
Full Stroke, Severe Service	0	0	0	931
Tight Shut-Off, Severe Service	0	0	0	2338
Open on Trip, Severe Service	0	249	0	676
Full Stroke with PVST, Severe Service	0	0	384	547
Tight Shut-Off with PVST, Severe Service	0	0	423	1915
Open on Trip with PVST, Severe Service	249	0	384	292

[1] FIT = 1 failure / 10^9 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: NFENDS4142

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