



The manufacturer
may use the mark:



Revision 2.0 February 27, 2015



ANSI Accredited Program
PRODUCT CERTIFICATION
#1004

Certificate / Certificat Zertifikat / 合格証

Flowserve 105035 P0022 C01.1

exida hereby confirms that the:

Argus FK79, FK75M, FK76M and HK35 Ball Valves

Flowserve Flow Control GmbH Ettlingen - Germany

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 1_H Device

**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.



Evaluating Assessor

Certifying Assessor

Certificate / Certificat / Zertifikat / 合格証

Flowserve 105035 P0022 C01.1

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A , Route 1_H Device

PFD_{AVG} 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.

IEC 61508 Failure Rates in FIT¹

Floating Ball Valve FK79

Application	λ_{Safe}	λ_{DD}	λ_{DU}
Full Stroke, Clean Service	0	0	521
Tight Shut-Off, Clean Service	0	0	1547
Open on Trip, Clean Service	183	0	338
Full Stroke with PVST ² , Clean Service	0	225	296
Tight Shut-Off with PVST, Clean Service	0	225	1322
Open on Trip with PVST, Clean Service	183	225	113

Trunnion Ball Valve FK75M

Application	λ_{Safe}	λ_{DD}	λ_{DU}
Full Stroke, Clean Service	0	0	535
Tight Shut-Off, Clean Service	0	0	1561
Open on Trip, Clean Service	179	0	356
Full Stroke with PVST, Clean Service	0	236	299
Tight Shut-Off with PVST, Clean Service	0	236	1325
Open on Trip with PVST, Clean Service	179	236	120

Trunnion Ball Valve FK76M

Application	λ_{Safe}	λ_{DD}	λ_{DU}
Full Stroke, Clean Service	0	0	642
Tight Shut-Off, Clean Service	0	0	1668
Open on Trip, Clean Service	182	0	460
Full Stroke with PVST, Clean Service	0	298	344
Tight Shut-Off with PVST, Clean Service	0	298	1370
Open on Trip with PVST, Clean Service	182	298	162

Trunnion Ball Valve HK35

Application	λ_{Safe}	λ_{DD}	λ_{DU}
Full Stroke, Clean Service	0	0	672
Tight Shut-Off, Clean Service	0	0	1735
Open on Trip, Clean Service	186	0	486
Full Stroke with PVST, Clean Service	0	314	358
Tight Shut-Off with PVST, Clean Service	0	314	1421
Open on Trip with PVST, Clean Service	186	314	172

¹ FIT = 1 failure / 10⁹ hours

² 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_{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: 1105-035-C R002 V1R1

Safety Manual: Flowserve Flow Control Safety Manual R1.1

Argus FK79, FK75M,
FK76M and HK35
Ball Valves



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T-061, V1R7