CERTIFICATE

Flowserve 105035 P0022 C01.1

exida Certification S.A. hereby confirms that the

Argus Ball Valves FK79, FK75M, FK76M and HK35

Flowserve Flow Control GmbH

Ettlingen, Germany

Has been assessed according to the relevant requirements of

IEC 61508:2010

Parts 1 - 2, and meets requirements providing a level of integrity to

Systematic Integrity :	SIL 3 Capable
Random Integrity :	Type A device, PFD_{AVG} and architecture constraints must be verified for each application

Safety Function
The valve will move to the designed safe position within the specified safety time.

Application Restrictions
The unit must be properly designed into a Safety Instrumented Function per the requirements in the Installation, Operations and Maintenance and Safety Manuals for the respective valve type.

Assessor

Certifying Assessor

Date: 24 July 2012

exida Certification SA, Nyon, Switzerland

Systematic Integrity: SIL 3 Capable

SIL 3 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. For a Argus Ball Valve used in final element assembly, SIL must also be verified for the specific application using the following failure data:

Summary for the Argus Ball Valves :

V1 - Floating Ball Valve FK79
V2 - Trunnion Ball Valve FK75M
V3 - Trunnion Ball Valve FK76M
V4 - Trunnion Ball Valve HK35

| | Type A device, IEC 61508 failure rates | | | | | | | | |
| | Full Stroke | | | Tight Shutoff | | | Open to trip | | |
Valve and application	λ_{safe}	λ_{dd}	λ_{du}	λ_{safe}	λ_{dd}	λ_{du}	λ_{safe}	λ_{dd}	λ_{du}
V1 Clean service	0	0	521	0	0	1547	183	0	338
V1 Clean service with PVST	0	225	296	0	225	1322	183	225	113
V2 Clean service	0	0	535	0	0	1561	179	0	356
V2 Clean service with PVST	0	236	299	0	236	1325	179	236	120
V3 Clean service	0	0	642	0	0	1668	182	0	460
V3 Clean service with PVST	0	298	344	0	298	1370	182	298	162
V4 Clean service	0	0	672	0	0	1735	186	0	486
V4 Clean service with PVST	0	314	358	0	314	1421	186	314	172

PVST - Partial Valve Stroke Test
All failure rates are given in FIT=10^{-9}/h

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 subsystem must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are mandatory parts this certificate:

Flowserve Flow Control 1105-035-C R002 V1R0 Assessment report.
Flowserve Flow Control Safety Manual Rev 1.1 March 2012

The holder of this certificate may use this mark.

exida Certification SA, Nyon, Switzerland