ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD
Italia

COMPLIANCE

with IEC EN 61508 and IEC EN 61511

Certificate No.: C – IS – 722118399

CERTIFICATE OWNER: Industrial Valves Manufacturer
2nd Industrial City – Dammam
Kingdom of Saudi Arabia

WE HEREWITH CONFIRM THAT

BSE (TRUNNION MOUNTED ACTUATOR OPERATED) BALL VALVES

MEET THE SIL REQUIREMENTS DETAILED IN THE ANNEXED TABLES

FOR THE SAFETY FUNCTIONS:

"correct switching on demand (open to closed), and tight for closing phase, in low demand mode of operation".

"correct switching on demand (closed to open), in low demand mode of operation".

Examination result:	**The above reported BSE (Trunnion mounted actuator operated) Ball Valves were found to meet the standard defined requirements of the safety levels detailed in the following tables (T – IS – 722118399) according to IEC EN 61508 and IEC EN 61511, under fulfillment of the conditions listed in the Report R-IS-722118399-01 Rev.1 dated April, 05th 2017 in its currently valid version, on which this Certificate is based**
Examination parameters:	**Construction/Functional characteristics and reliability and availability parameters of the above BSE (Trunnion mounted actuator operated) Ball Valves**
Design owner:	**OMB Valves S.p.A.** **24069 - Cenate Sotto (BG) - Italy**
Official Report No.:	**R-IS-722118399-01 Rev. 1**
Expiry Date	**April, 04th 2020**

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN INTEGRAL PART OF THIS DOCUMENT
THE PRESENT DOCUMENT SUBSTITUTES AND REPEALS THE DOCUMENT C – IS – 264667

Reference Standard	**IEC EN 61508:2010 Part 2, 4, 6, 7 - IEC EN 61511:2016 Part 1, 2, 3**

Sesto San Giovanni, April, 05th 2017

TÜV Italia Srl Industrie Service
TÜV SÜD
Italia

TÜV ITALIA Srl
Industry Service Division
Director

Paolo Marcone

Italia

SUMMARY TABLE
T – IS – 722118399

E/EE/EP safety-related system (final element)	**BSE ball valves produced by IVM**	
System type	Type A	
Size (Class)	*BSE ball valves size ≤ 6"*	*6 " < BSE ball valves size ≤ 24"*
Systematic Capability	*SC3*	
Safety Function Definition	*SIF1: Correct switching on demand (open to closed), and tight for closing phase, in low demand mode of operation*	
Max SIL[1]	**SIL3**	**SIL3**
λ_{TOT}	1,077E-07	1,858E-09
λ_{SD}	3,639E-09	6,277E-11
λ_{SU}	4.945E-08	8,528E-10
$\lambda_{DD,PST}$[2]	1,729E-08	2,981E-10
$\lambda_{DU,FPT}$	3,734E-08	6,440E-10
β and β_D factor	10%	10%
MTTR	8 h	8 h
Hardware Safety Integrity	Route 2_H	Route 2_H
Systematic Safety Integrity	Route 2_S	Route 2_S

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Testing

SIL classification according to Standards IEC EN 61508:2010 (Chapters: 2, 4, 6, 7) for the BSE ball valves (SIF1) produced by IVM

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SUMMARY TABLE
T – IS – 722118399

E/EE/EP safety-related system (final element)	**BSE ball valves produced by IVM**	
System type	Type A	
Size (Class)	*BSE ball valves size ≤ 6"*	*6 "< BSE ball valves size ≤ 24"*
Systematic Capability	*SC3*	
Safety Function Definition	*SIF2: Correct switching on demand (closed to open), in low demand mode of operation*	
Max SIL(1)	**SIL3**	**SIL3**
λ_{TOT}	1,077E-07	1,858E-09
λ_{SD}	9,830E-09	1,695E-10
λ_{SU}	2,796E-08	4,822E-10
$\lambda_{DD,PST}$(2)	5.121E-08	8.832E-10
$\lambda_{DU,FPT}$	1,871E-08	3,227E-10
β and β_D factor	10%	10%
MTTR	8 h	8 h
Hardware Safety Integrity	Route 2_H	Route 2_H
Systematic Safety Integrity	Route 2_S	Route 2_S

Remarks

(1) The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the 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 the minimum hardware fault tolerance (HFT) requirements.

(2) Considering an automatic Partial Stroke Testing

SIL classification according to Standards IEC EN 61508:2010 (Chapters: 2, 4, 6, 7) for the BSE ball valves (SIF2) produced by IVM

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