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

Italia

COMPLIANCE

with IEC EN 61508 and IEC EN 61511

Certificate No.: C – IS – 264667

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 FUNCTION:

"correct switching on demand (open to closed and closed to open), and tight for closing phase, 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 – 264667) according to IEC EN 61508 and IEC EN 61511, under fulfillment of the conditions listed in the Report R-IS-264667-01 Rev.1 dated November, 30th 2015 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-2646676-01 Rev. 1
Expiry Date	October, 22nd 2016

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN INTEGRAL PART OF THIS DOCUMENT

Reference Standard	IEC EN 61508:2010 Part 2, 4, 6, 7 - IEC EN 61511:2003 Part 1, 2, 3

Sesto San Giovanni, November, 30th 2015

TÜV ITALIA Srl
Industry Service Division
Director

TÜV Italia Srl Industrie Service
TÜV SÜD
Italia

Gennaro Oliva

SUMMARY TABLE
T – IS – 264667

Italia

E/EE/EP safety-related system (final element)	**BSE ball valves produced by IVM**					
Type	A		A		A	
Class	**0,5" ≤ dn ≤ 2" T ≤ - 46°C** (Class 1 CRIO)		**2" < dn ≤ 16" T ≤ - 46°C** (Class 2 CRIO)		**2" < dn ≤ 16" T > + 300°C** (Class 2 HT)	
Safety Function Definition	*Correct switching on demand (open to closed and closed to open) and tight for closing phase, in low demand mode of operation"*					
Max SIL claimable	**SIL 2 (with HFT = 0)**	**SIL 3 (with HFT = 1)**	**SIL 2 (with HFT = 0)**	**SIL 3 (with HFT = 1)**	**SIL 2 (with HFT = 0)**	**SIL 3 (with HFT = 1)**
Additional requirements for the max SIL classification	*Execution of Partial Stroke Test with time interval not higher than 12 months and Full Functional Proof Test with time interval not higher than 36 months*		*Execution of Partial Stroke Test with time interval not higher than 8 months and Full Functional Proof Test with time interval not higher than 18 months*		*Execution of Partial Stroke Test with time interval not higher than 12 months and Full Functional Proof Test with time interval not higher than 36 months*	
λ_{TOT}	4,677E-08		1,970E-06		1,169E-06	
λ_{SD}	0,000E+00		0,000E+00		0,000E+00	
λ_{SU}	2,188E-08		9,219E-07		5,469E-07	
λ_{DD}	0,000E+00		0,000E+00		0,000E+00	
λ_{DU}	2,489E-08		1,049E-06		6,220E-07	
λ_{FPT}	6,230E-09		2,624E-07		1,557E-07	
λ_{FST}	1,866E-08		7,861E-07		4,663E-07	
PFD[1]	1,636E-04		4,020E-03		4,088E-03	
β and β_D factor	10%		10%		10%	
MTTR	2		4		4	
Hardware Safety Integrity	Route 2_H		Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S		Route 2_S	

Remarks
PFD of reference calculated on the basis of a Full Functional Proof Test with time interval reported in the line Additional requirements for the max SIL classification for HFT = 0 configuration. This time intervals are considered by TÜV as reasonably consistent with the implementation of the equipment for safety related-applications, with reference to the overall range of results shown in the report, where other possible combination of time intervals adequate for a classification up to SIL 2 are reported. Note that, concerning Full Proof Tests, time intervals for higher than 36 months are considered by TÜV as not adequate and consistent for equipment for safety related applications.

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

SUMMARY TABLE
T – IS – 264667

Italia

E/EE/EP safety-related system (final element)	**BSE ball valves produced by IVM**			
Type	A		A	
Class	**0,5" ≤ dn ≤ 2" - 45°C ≤ T ≤ + 300°C** (Class 1 STD)		**2" < dn ≤ 16" - 45°C ≤ T ≤ + 300°C** (Class 2 STD)	
Safety Function Definition	*Correct switching on demand (open to closed and closed to open) and tight for closing phase, in low demand mode of operation"*			
Max SIL claimable	**SIL 2 (with HFT = 0)**	**SIL 3 (with HFT = 1)**	**SIL 2 (with HFT = 0)**	**SIL 3 (with HFT = 1)**
Additional requirements for the max SIL classification	*Execution of Partial Stroke Test with time interval not higher than 12 months and Full Functional Proof Test with time interval not higher than 36 months*		*Execution of Partial Stroke Test with time interval not higher than 9 months and Full Functional Proof Test with time interval not higher than 27 months*	
λ_{TOT}	1,150E-07		1,552E-07	
λ_{SD}	0,000E+00		0,000E+00	
λ_{SU}	5,380E-08		7,261E-08	
λ_{DD}	0,000E+00		0,000E+00	
λ_{DU}	6,118E-08		8,258E-08	
λ_{FPT}	1,531E-08		2,067E-08	
λ_{PST}	4,587E-08		6,191E-08	
PFD[1]	4,021E-04		4,071E-04	
β and β_D factor	10%		10%	
MTTR	2		4	
Hardware Safety Integrity	Route 2_H		Route 2_H	
Systematic Safety Integrity	Route 2_S		Route 2_S	

Remarks

(1) PFD of reference calculated on the basis of a Full Functional Proof Test with time interval reported in the line Additional requirements for the max SIL classification for HFT = 0 configuration. This time intervals are considered by TÜV as reasonably consistent with the implementation of the equipment for safety related-applications, with reference to the overall range of results shown in the report, where other possible combination of time intervals adequate for a classification up to SIL 2 are reported. Note that, concerning Full Proof Tests, time intervals for higher than 36 months are considered by TÜV as not adequate and consistent for equipment for safety related applications.

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

SUMMARY TABLE
T – IS – 264667

Italia

E/EE/EP safety-related system (final element)	**BSE ball valves produced by IVM**	
Type	A	
Class	**16" < dn ≤ 24" - 45°C ≤ T ≤ + 300°C** (Class 3 STD)	
Safety Function Definition	*Correct switching on demand (open to closed and closed to open) and tight for closing phase, in low demand mode of operation"*	
Max SIL claimable	**SIL 2 (with HFT = 0)**	**SIL 3 (with HFT = 1)**
Additional requirements for the max SIL classification	*Execution of Partial Stroke Test with time interval not higher than 5 months and Full Functional Proof Test with time interval not higher than 18 months*	
λ_{TOT}	2,542E-07	
λ_{SD}	0,000E+00	
λ_{SU}	1,189E-07	
λ_{DD}	0,000E+00	
λ_{DU}	1,353E-07	
λ_{FPT}	3,386E-08	
λ_{PST}	1,014E-07	
PFD[(1)]	4,075E-04	
β and β_D factor	10%	
MTTR	8	
Hardware Safety Integrity	Route 2_H	
Systematic Safety Integrity	Route 2_S	

Remarks

(1) PFD of reference calculated on the basis of a Full Functional Proof Test with time interval reported in the line Additional requirements for the max SIL classification for HFT = 0 configuration. This time intervals are considered by TÜV as reasonably consistent with the implementation of the equipment for safety related-applications, with reference to the overall range of results shown in the report, where other possible combination of time intervals adequate for a classification up to SIL 2 are reported. Note that, concerning Full Proof Tests, time intervals for higher than 36 months are considered by TÜV as not adequate and consistent for equipment for safety related applications.

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