Italia

COMPLIANCE

with IEC EN 61508 and IEC EN 61511

Certificate No.: C-IS-722169914 Rev.1

CERTIFICATE OWNER: **ORION S.p.A.**
VIA CABOTO, 8
I-34148 – TRIESTE (Italy)

WE HEREWITH CONFIRM THAT

THE ANALYSIS DEVELOPED BY ORION; REPORTED IN THE REPORT:

"ORION, Safety Analysis Report for Gate Valves – N° 010/2015 Rev.01 dated June, 25th 2018"

MEETS THE SIL REQUIREMENTS DETAILED IN THE ANNEXED TABLE

FOR THE SAFETY FUNCTIONS:

"Switching on demand (open to closed / closed to open) and sealing in closed position **in low demand mode of operation"**

Examination result:	**The above described report was found to meet the standard defined requirements of the safety levels detailed in the following tables (T-IS-722169914 Rev.1) according to IEC EN 61508 and IEC EN 61511, under fulfillment of the conditions listed in the Report R-IS-722169914 Rev.1 dated July, 23rd 2018 in its currently valid version, on which this Certificate is based**
Examination parameters:	**Compliance of the operational approach adopted and followed in the aforementioned report by ORION: "*ORION, Safety Analysis Report for Gate Valves – N° 010/2015 Rev.01 dated June, 25th 2018*".**
Official Report No.:	**R-IS-722169914 Rev.1**
Expiry Date	**July, 22nd 2021**

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN INTEGRAL PART OFTHIS DOCUMENT
THE PRESENT DOCUMENT SUBSITUTES AND REPEALS THE DOCUMENT C-IS-260811-01

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

Sesto San Giovanni, May, 07th 2020

TÜV ITALIA Srl

TÜV Italia Srl Industrie Service
Italia

TÜV ITALIA Srl
Industry Service Division
Technical manager

Paolo Marcone

Italia

SUMMARY TABLE

T-IS-722169914 Rev.1

E/EE/EP safety-related system (final element)	**Gate Valves produced by ORION**	
System type	Type A	
Systematic Capability	SC3	
***Class*[(1)]**	Class 1 / Temperature range HT (from -29 to +400°C) Service NON-NACE	Class 2 / Temperature range HT (from -29 to +400°C) Service NACE
Safety Function Definition	*Switching on demand (open to closed / closed to open) and sealing in closed position in low demand mode of operation*	
***Max SIL*[(2)]**	**SIL 2 with HFT=0 (single valve configuration)** / **SIL3 with HFT=1 (redundant configuration)**	**SIL 2 with HFT=0 (single valve configuration)** / **SIL3 with HFT=1 (redundant configuration)**
λ_{TOT}	1,17E-07	4,14E-07
λ_{SD}	0,00E+00	0,00E+00
λ_{SU}	8,13E-08	2,89E-07
λ_{DD}	0,00E+00	0,00E+00
λ_{DU}	3,52E-08	1,25E-07
$\lambda_{DU,PST}$[(3)]	2,71E-08	9,63E-08
$\lambda_{DU,FPT}$[(4)]	8,12E-09	2,88E-08
β and β_D factor	10%	10%
MTTR	24 h	24 h
Hardware Safety Integrity	Route 2_H	Route 2_H
Systematic Safety Integrity	Route 2_S	Route 2_S

Remarks

(1) Category identified according to specific environment and application, in particular for fluid type and temperature range. Refer to product safety manual for detailed information on the categories.

(2) 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.

(3) Portion of the overall failure rate related to dangerous failure modes that can be detected by means of Partial Stroke Testing (DU,PST).

(4) Portion of the overall failure rate related to dangerous failure modes that can be detected by means of Full Proof Test (DU,FPT).

SIL classification according to Standards IEC EN 61508:2010 (Chapters: 2, 4, 6, 7) and IEC EN 61511:2016 (Chapters: 1, 2, 3) for GATE VALVES produced by ORION S.p.A.

T-IS-722169914 Rev.1
NOTE: The present table is integral part of the Document: C-IS-722169914 Rev.1
Date: May, 07th 2020

SUMMARY TABLE

T-IS-722169914 Rev.1

E/EE/EP safety-related system (final element)	**Gate Valves produced by ORION**	
System type	Type A	
Systematic Capability	SC3	
***Class*[1]**	Class 3 / Temperature range LT (from -196°C to 200°C) Service NACE	Class 4 / Temperature range LT (from -196°C to 200°C) Service NON-NACE
Safety Function Definition	*Switching on demand (open to closed / closed to open) and sealing in closed position in low demand mode of operation*	
***Max SIL*[2]**	**SIL 2 with HFT=0 (single valve configuration)** / **SIL3 with HFT=1 (redundant configuration)**	**SIL 2 with HFT=0 (single valve configuration)** / **SIL3 with HFT=1 (redundant configuration)**
λ_{TOT}	9,28E-08	9,99E-10
λ_{SD}	0,00E+00	0,00E+00
λ_{SU}	6,47E-08	6,97E-10
λ_{DD}	0,00E+00	0,00E+00
λ_{DU}	2,81E-08	3,02E-10
$\lambda_{DU,PST}$[3]	2,16E-08	2,33E-10
$\lambda_{DU,FPT}$[4]	6,47E-09	6,97E-11
β and β_D factor	10%	10%
MTTR	24 h	24 h
Hardware Safety Integrity	Route 2_H	Route 2_H
Systematic Safety Integrity	Route 2_S	Route 2_S

Remarks

(1) Category identified according to specific environment and application, in particular for fluid type and temperature range. Refer to product safety manual for detailed information on the categories.

(2) 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.

(3) Portion of the overall failure rate related to dangerous failure modes that can be detected by means of Partial Stroke Testing (DU,PST).

(4) Portion of the overall failure rate related to dangerous failure modes that can be detected by means of Full Proof Test (DU,FPT).

SIL classification according to Standards IEC EN 61508:2010 (Chapters: 2, 4, 6, 7) and IEC EN 61511:2016 (Chapters: 1, 2, 3) for GATE VALVES produced by ORION S.p.A.

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