ZERTIFIKAT ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT ◆ CERTIFICATE

Italia

COMPLIANCE

with IEC EN 61508

Certificate No.: TUV IT 24 SIL 0396

CERTIFICATE OWNER: **Crotti Valvole S.r.l.**
Via Ada Gobetti, 4
20834 - Nova Milanese (MB)
Italy

WE HEREWITH CONFIRM THAT

TRUNNION BALL VALVES

MEET THE SIL REQUIREMENTS DETAILED IN THE ANNEXED TABLES

FOR THE SAFETY FUNCTION:

SIF1: "correct switching on demand (open to closed), in low demand mode of operation"

SIF2: "correct switching on demand (open to closed) and tight for closing phase, in low demand mode of operation"

SIF3: "correct switching on demand (closed to open), in low demand mode of operation"

Examination result:	**The above reported Trunnion Ball Valves were found to meet the standard defined requirements of the safety levels detailed in the following table) according to IEC EN 61508, under fulfillment of the conditions listed in the Report R TUV IT 24 SIL 0352 in its currently valid version, on which this Certificate is based**
Examination parameters:	**Construction/Functional characteristics and reliability and availability parameters of the above Trunnion Ball Valves**
Official Report No.:	**R TUV IT 24 SIL 0352**
Expiry Date	**June, 12th 2027**

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN INTEGRAL PART OFTHIS DOCUMENT
THE PRESENT DOCUMENT SUBSTITUTES AND REPEALS THE DOCUMENT C-IS-722256024-01

Reference Standard **IEC EN 61508:2010 Part 2, 4, 6, 7**

Milan, June, 13th 2024

TÜV ITALIA Srl

TÜV Italia Srl Industrie Service Italia

TÜV ITALIA Srl
Industrie Service Division
Managing Director

Alberto Carelli

Italia

SUMMARY TABLE

E/EE/EP safety-related system (final element)	**Trunnion Ball Valves produced by Crotti Valvole S.r.l.**		
System type	Type A		
Systematic Capability	*SC3*		
Safety Function Definition	*SIF1*[3]	*SIF2*[3]	*SIF3*[3]
Max SIL[1]	**SIL3**		
λ_{TOT}	1,164E-08	1,164E-08	1,164E-08
λ_{S}	0,000E+00	0.000E+00	0.000E+00
$\lambda_{DD,PST}$[2]	2,361E-09	5,312E-09	5,634E-09
$\lambda_{DU,FPT}$	1,083E-09	3,540E-09	2,021E-09
λ_{NE}	8,192E-09	2,784E-09	3,981E-09
MRT	8 h		
Hardware Safety Integrity	Route 2_H		
Systematic Safety Integrity	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 a Partial Stroke Test.

(3) SIF1: "correct switching on demand (open to closed), in low demand mode of operation".

SIF2: "correct switching on demand (open to closed) and tight for closing phase, in low demand mode of operation".

SIF3: "correct switching on demand (closed to open), in low demand mode of operation".

SIL classification according to Standard IEC EN 61508 (Chapters: 2, 4, 6, 7) for Trunnion Ball Valves produced by Crotti Valvole S.r.l.

NOTE: The present table is integral part of the Document: TUV IT 24 SIL 0396
Date: June, 13th 2024

ZERTIFIKAT ◆ 認證證書 ◆ CERTIFICATE ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Italia

COMPLIANCE

with IEC EN 61508

Certificate No.: TUV IT 24 SIL 0397

CERTIFICATE OWNER: **Crotti Valvole S.r.l.**
Via Ada Gobetti, 4
20834 - Nova Milanese (MB)
Italy

WE HEREWITH CONFIRM THAT

FLOATING BALL VALVES

MEET THE SIL REQUIREMENTS DETAILED IN THE ANNEXED TABLES

FOR THE SAFETY FUNCTION:

SIF1: "correct switching on demand (open to closed), in low demand mode of operation"

SIF2: "correct switching on demand (open to closed) and tight for closing phase, in low demand mode of operation"

SIF3: "correct switching on demand (closed to open), in low demand mode of operation"

Examination result:	**The above reported Floating Ball Valves were found to meet the standard defined requirements of the safety levels detailed in the following table) according to IEC EN 61508, under fulfillment of the conditions listed in the Report R TUV IT 24 SIL 0352 in its currently valid version, on which this Certificate is based**
Examination parameters:	**Construction/Functional characteristics and reliability and availability parameters of the above Floating Ball Valves**
Official Report No.:	**R TUV IT 24 SIL 0352**
Expiry Date	**June, 12th 2027**

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN INTEGRAL PART OFTHIS DOCUMENT
THE PRESENT DOCUMENT SUBSTITUTES AND REPEALS THE DOCUMENT C-IS-722256024-02

Reference Standard **IEC EN 61508:2010 Part 2, 4, 6, 7**

Milan, June, 13th 2024

TÜV ITALIA Srl

TÜV ITALIA Srl
Industrie Service Division
Managing Director

Alberto Carelli

TÜV Italia Srl Industrie Service Italia

CERTIFICAT ◆ СЕРТИФИКАT ◆ 認證證書 ◆ CERTIFICATE ◆ ZERTIFIKAT

Italia

SUMMARY TABLE

E/EE/EP safety-related system (final element)	**Floating Ball Valves produced by Crotti Valvole S.r.l.**		
System type	Type A		
Systematic Capability	*SC3*		
Safety Function Definition	*SIF1*(3)	*SIF2*(3)	*SIF3*(3)
***Max SIL*(1)**	**SIL3**		
λ_{TOT}	2,678E-09	2,678E-09	2,678E-09
λ_{S}	0,000E+00	0.000E+00	0.000E+00
$\lambda_{DD,PST}$(2)	5,433E-10	1,222E-09	1,297E-09
$\lambda_{DU,FPT}$	2,493E-10	8,148E-10	4,652E-10
λ_{NE}	1,885E-09	6,408E-10	9,161E-10
MRT	8 h		
Hardware Safety Integrity	Route 2_H		
Systematic Safety Integrity	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.

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