



**BUREAU
VERITAS**

Type certificate by assessment of the product design regarding Functional Safety standards

Ref.: GD-MG-CB859-7102299-18-R-014-0

BUREAU VERITAS

certifies that
Ball valve:

**2 way/ 3 way Floating Ball Valves &
2 way/ 3 way Trunnion Mounted Ball Valves,**
as presented to BUREAU VERITAS by

Intervalve Poonawalla Ltd., Ball Valve Division:

S. No. 114, Plot No. 32B, Hadapsar Industrial Estate, Pune-411013, India,
are compliant with requirements:

SIL 3 Capable

(with HFT=1, SIL 2 Capable with HFT=0)

of the following standard:

IEC 61508 Ed2 – Parts 1, 2, 4 (2010)

The assessment performed by BUREAU VERITAS to certify the compliance of the above product is recorded in a specific Assessment Report "GD-MG-CB859-7102299-18-R-012-0" which is fully part of the present certificate.

The present certificate is valid for a system exclusively provided to and used by professionals. The present certificate is subject to the terms of BUREAU VERITAS General Conditions of services (CGSBV 10/2015).

This certificate only applies to the design of the product (as referred above) and to the corresponding technical file.

The appendix 1 is an integral part of this certificate.

Certificate N°: GD-MG-CB859-7102299-18-R-014-0

Emission date: 20th of February 2018

End of validity: 19th of February 2021

G DENNERY

Gabriel DENNERY
Assessor

Maxime GENET
Approbatory

Date: February, 20th 2018

BUREAU VERITAS EXPLOITATION (herewith named Bureau Veritas)

Société par actions simplifiée au capital social de 36 315 050,00 €

Siège social - 8 cours du Triangle - 92800 Puteaux | RCS Nanterre 790 184 675

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Appendix 1:

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The use of the product Ball valve: 2 way/ 3 way Floating Ball Valves & 2 way/ 3 way Trunnion Mounted Ball Valves must obey the required rules to maintain the SIL Capable properties. These rules are stated in the section 7 of the Assessment Report reference: GD-MG-CB859-7102299-18-R-012-0.

The product versions of hardware components used for the assessment are the following:

Component	Model
Ball valve	Floating Ball Valve 2 way/ 3 way (1/2" – 12") & Trunnion Mounted Ball Valves 2 way (2" – 30")/ 3 way (2" – 12")

Assessed documents for the present certification are defined in the Appendix 1 of the Assessment Report reference: GD-MG-CB859-7102299-18-R-012-0.

Acceptable environmental constraints and design lifetime for the product are stated in the safety Manual (Ref.: IVL-TDS-0072). These elements must be checked for each integration of the product.

The certified Safety Function(s) of Ball valve: 2 way/ 3 way Floating Ball Valves & 2 way/ 3 way Trunnion Mounted Ball Valves is the following:

- SF1: Open or Close on demand.

Hypothesis used for mode of operation is the following:

- The mode of operation is "Low demand", which means less than 1 trip demand each year;

Type	Component architecture	Safety function	Calculation hypothesis		Intermediate results		Final results	
			Tests intervals	MTTR	Failure Rate	Undetected dangerous failure rate	SIL Capability	Probability of Failure on Demand
2 way Floating	HFT=1	SF1	12 months 8760h	24h	7.36×10^{-7}	3.34×10^{-7}	SIL 3	1.50×10^{-4}
3 way Floating	HFT=1	SF1	12 months 8760h	24h	1.34×10^{-6}	9.45×10^{-7}	SIL 3	4.35×10^{-4}
2 way Trunnion Mounted	HFT=1	SF1	12 months 8760h	24h	6.06×10^{-6}	1.75×10^{-6}	SIL 3	8.37×10^{-4}
3 way Trunnion Mounted	HFT=1	SF1	12 months 8760h	24h	2.18×10^{-6}	1.95×10^{-6}	SIL 3	9.33×10^{-4}

HFT: Hardware Fault Tolerance, HFT=1 means that the system architecture set by the final user shall allow failure of 1 component without loss of the safety function (such as 1oo2 redundant configuration).

The Safety Integrity Level of the safety function using the Ball valve: 2 way/ 3 way Floating Ball Valves & 2 way/ 3 way Trunnion Mounted Ball Valves shall be calculated taking into account the characteristics of the complete system supporting the safety function.