



**BUREAU
VERITAS**

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

Ref.: GD-MG-CB859-7102299-18-R-015-0

BUREAU VERITAS

certifies that

Butterfly valve:

**Concentric Disc Design &
High Performance Offset Design**
as presented to BUREAU VERITAS by

**Intervalve Poonawalla Ltd., Butterfly Valve Division:
94/1, Manjari, Off Soli Poonawalla Road, Pune-412307, 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-015-0
Emission date: 20th of February 2018
End of validity: 19th of February 2021

GDENNER7

Gabriel DENNERY
Assessor

[Signature]
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 Butterfly valve: Concentric Disc Design & High Performance Offset Design 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 |
|-----------------|---|
| Butterfly valve | Concentric Disc Design (DN40 – DN1400) & High Performance Offset Design (Double Offset Disc: DN50 –DN 3200, Triple Offset Disc: DN80 – DN1200) |

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.: IIVPIM-015-R1). These elements must be checked for each integration of the product.

The certified Safety Function(s) of Butterfly valve: Concentric Disc Design & High Performance Offset Design 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 |
| Concentric Disc Design | HFT=1 | SF1 | 12 months 8760h | 24h | 2.73×10^{-6} | 3.20×10^{-6} | SIL 3 | 1.41×10^{-5} |
| High Performance Offset Disc Design | HFT=1 | SF1 | 12 months 8760h | 24h | 1.48×10^{-6} | 2.85×10^{-7} | SIL 3 | 1.27×10^{-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 Butterfly valve: Concentric Disc Design & High Performance Offset Design shall be calculated taking into account the characteristics of the complete system supporting the safety function.