

Certificate



SIL/PL
Capability

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ID 060000000

Nr./No.: 968/V 1083.00/18

Prüfgegenstand
Product tested

Absperrklappen
Butterfly Valve

**Zertifikats-
inhaber**
**Certificate
holder**

Ebro Armaturen Gebr. Bröer
GmbH
Karlstr. 8
58135 Hagen
Germany

Typbezeichnung
Type designation

HP 111, HP 112, HP 114, HP 111-C, HP 114-C, HP 114 K3

Prüfgrundlagen
Codes and standards

IEC 61508 Parts 1-2 and 4-7:2010

**Bestimmungsgemäße
Verwendung**
Intended application

Die Bewertung der Absperrklappen auf Basis des Zertifizierungsprogramms der Zertifizierungsstelle kommt zu dem Ergebnis, dass die Ventile die Anforderungen der IEC 61508:2010 erfüllen und somit für den Einsatz in einem sicherheitsgerichteten System bis SIL 2 (Low Demand Mode) und SIL 1 (High Demand Mode) geeignet sind. Unter Berücksichtigung der minimal erforderlichen Hardware-Fehlertoleranz HFT = 1 können die Klappen in einer redundanten Architektur bis SIL 3 nach IEC 61508 und IEC 61511 eingesetzt werden.

The assessment based on the certification program of the Certification Body comes to the result that the valves meet the requirements of IEC 61508:2010 and are therefore suitable for use in a safety instrumented system up to SIL 2 (low demand mode) and SIL 1 (high demand mode of operation).

Under consideration of the minimum required hardware fault tolerance HFT = 1 the valves may be used in a redundant architecture up to SIL 3 acc. IEC 61508 and IEC 61511.

Besondere Bedingungen
Specific requirements

Die Hinweise in der zugehörigen Installations- und Betriebsanleitung sowie des Sicherheitshandbuchs sind zu beachten.

The instructions of the associated Installation, Operating and Safety Manual shall be considered.

Zusammenfassung der Testergebnisse siehe Rückseite des Zertifikates.
Summary of test results see back side of this certificate.

Gültig bis / Valid until 2023-12-17

Der Ausstellung dieses Zertifikates liegt eine Prüfung zugrunde, deren Ergebnisse im Bericht Nr. 968/V 1083.00/18 vom 17.12.2018 dokumentiert sind.

Dieses Zertifikat ist nur gültig für Erzeugnisse, die mit dem Prüfgegenstand übereinstimmen.

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/V 1083.00/18 dated 2018-12-17.

This certificate is valid only for products which are identical with the product tested.

TÜV Rheinland Industrie Service GmbH

Bereich Automation

Funktionale Sicherheit

Am Grauen Stein, 51105 Köln

Köln, 2018-12-17

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Gebhard Bouwer

Holder: EBRO ARMATUREN Gebr. Bröer GmbH
Karlstr. 8
D-58135 Hagen

Product tested: Absperrklappen / Butterfly Valve
HP 111, HP 112, HP 114, HP 111-C,
HP 114-C, HP 114 K3

Results of Assessment

Route of Assessment		2 _H / 1 _S
Type of Sub-system		Type A
Mode of Operation		Low and High Demand Mode
Hardware Fault Tolerance	HFT	0
Systematic Capability		SC 3

Closing on Demand

Dangerous Failure Rate	λ_D	4.53 E-07 / h	453 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	1.98 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	2.03 E-04	

Tight Shut Off

Dangerous Failure Rate	λ_D	1.07 E-06 / h	1,067 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	4.67 E-03	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	4.94 E-04	

Open on Demand

Dangerous Failure Rate	λ_D	1.64 E-07 / h	164 FIT
Average Probability of Failure on Demand 1oo1	$PFD_{avg}(T_1)$	7.18 E-04	
Average Probability of Failure on Demand 1oo2	$PFD_{avg}(T_1)$	7.25 E-05	

Assumptions for the calculations above: DC = 0 %, $T_1 = 1$ year, $\beta_{1oo2} = 10$ %

High demand Mode (see note)

B_{10d}		41,000	
Assumed Demands per Year	n_{op}	8,760 / a	1 / h
Average Frequency of a dangerous Failure per Hour	PFH	2.44 E-06	

Note: PFH has to be verified by the end user with the correct demand rate for the certain application.

The resulting PFH shall not be lower than 10 FIT. If the PFH calculation results in a lower value, 10 FIT shall be used for further investigation.

Origin of values

The stated values are the results of a FMEDA for the design and manufacturing process. In addition, the failure rate was verified by the analysis of field feedback of the last five years and by results of qualification tests.

Random and systematic failures which are in the responsibility of the manufacturer were examined.

Periodic Tests and Maintenance

The given values require periodic tests and maintenance as described in the Safety Manual.

The operator is responsible for the consideration of specific external conditions (e.g. ensuring of required quality of media, max. temperature, time of impact), and adequate test cycles.