Manufacturer Statement

14682890.01

Safe failure fraction (SFF) details for

Diaphragm Seals and built on components

This manufacturer statement summarizes the safe failure fraction (SFF) within the scope of functional safety for WIKA mechanical component in accordance with IEC 61508 and under the specified condition in product operational instruction and datasheet.

In general, for a complete evaluation of a system, all requirements of IEC 61508 must be considered for all components used in the system. Please note that the individual failure rates for each component must be added up to get the overall failure rate of the entire system.

The tables listed in the appendix apply to the failure rates in accordance with IEC 61508 for the worst-case configurations of the following variants (Failure rates based on exida Report No.: WIKA 10/03-056 R003):

Reference tables in appendix *	Diaphragm Seals and built on components
DS01	990.15; 990.18; 990.19; 990.20; 990.21; 990.22; 990.24; 990.30; 990.37; 990.50; 990.51; 990.52; 990.53; 990.60
DS02	990.27
DS03	990.28; 990.29; 990.35; 990.48; 990.49
DS04	990.26
DS05	990.10; 990.12; 990.14; 990.16; 990.34; 990.40; 990.41
DS06	990.36
DS01+AD05**	DMS27; DMSFP
DS05+AD05**	DMS34
IS01	981.10; 981.18; 981.19; 981.20; 981.21; 981.22; 981.27; 981.50; 981.51; 981.52; 981.53
AD01	Cooling tower, welding adapter, capillary, threaded connector

** For safety applications only the described configurations of the Diaphragm Seals have been considered. All other possible variants and configurations are not covered.*
*** Please note the total failure rate has to be calculated from the tables below.*

Signed for and on behalf of

WIKA Alexander Wiegand SE & Co. KG

Klingenberg, 2024-02-23

CoE Pressure

i.V.

Matthias Kirch

Quality management / CoE Pressure

i.A.

Roland Stapf

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg
Germany
WEEE-Reg.-Nr. DE 92770372

Tel. +49 9372 132-0
Fax +49 9372 132-406
info@wika.de
www.wika.de

Kommanditgesellschaft: Sitz Klingenberg
Amtsgericht Aschaffenburg HRA 1819

Komplementärin:
WIKA International SE - Sitz Klingenberg -
Amtsgericht Aschaffenburg HRB 10505
Vorstand: Alexander Wiegand
Vorsitzender des Aufsichtsrats: Prof. Dr. Roderich C. Thümmel

Appendix - Failure rates for WIKA Diaphragm Seals and built on components

The Diaphragm Seals and built on components are classified as a device that is part of a Type A' element according to IEC 61508, having a hardware fault tolerance of 0.

The Diaphragm Seal can be classified as a 2H device when the listed failure rates are used. When 2H data is used for all of the devices in an element, then the element meets the hardware architectural constraints up to SIL 2 at HFT=0 (or SIL 3 @ HFT=1) per Route 2H. If Route 2H is not applicable for the entire final element, thel architectural constraints will need to be evaluated per Route 1_H.

The failure rates listed below are based an over 350 billion-unit operating hours of process industry field failure data. The failure rate predictions reflect realistic failures and include site specific failures due to human events for the specified Site Safety Index (SSI).

Example system calculation

The following table shows the results of typical system configuration as example:

	Profile 3	
	Normal service	**Severe service**
Fail Safe (λ_{safe})	**0 FIT**	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**21 FIT + 23 FIT = 44 FIT**	**51 FIT + 23 FIT = 74 FIT**
No effect	0 FIT + 3 FIT = 3 FIT	0 FIT + 3 FIT = 3 FIT
External leakage	0 FIT	0 FIT
Total failure rate (safety function)	**44 FIT**	**74 FIT**

Failure rate tables

The following tables show the failure rates per IEC 61508 for the worst-case configurations of the considered variants.

Table 3: DS01 - Diaphragm seal, flanged or front flush

	Profile 3	
	Normal service	**Severe service**
Fail Safe (λ_{safe})	**0 FIT**	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**21 FIT**	**51 FIT**
No effect	0 FIT	0 FIT
External leakage	0 FIT	0 FIT
Total failure rate (safety function)	**21 FIT**	**51 FIT**

Table 4: DS02 - Diaphragm Seal, flanged or front flush, with insert of special material

	Profile 3	
	Normal service	**Severe service**
Fail Safe (λ_{safe})	**0 FIT**	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**44 FIT**	**74 FIT**
No effect	2 FIT	2 FIT
External leakage	0 FIT	0 FIT
Total failure rate (safety function)	**44 FIT**	**74 FIT**

Table 5: DS03 - Diaphragm Seal - with extended diaphragm and for vacuum applications

	Profile 3	
	Normal service	**Severe service**
Fail Safe (λ_{safe})	**0 FIT**	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**65 FIT**	**95 FIT**
No effect	9 FIT	9 FIT
External leakage	15 FIT	15 FIT
Total failure rate (safety function)	**65 FIT**	**95 FIT**

Table 6: DS04 - Diaphragm seal with internal diaphragm

	Profile 3	
	Normal service	**Severe service**
Fail Safe (λ_{safe})	**0 FIT**	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**26 FIT**	**56 FIT**
No effect	0 FIT	0 FIT
External leakage	0 FIT	0 FIT
Total failure rate (safety function)	**26 FIT**	**56 FIT**

Table 7: DS05 - Diaphragm Seal with internal diaphragm and threaded connection

	Profile 3	
	Normal service	Severe service
Fail Safe (λ_{safe})	**0 FIT**	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**21 FIT**	**51 FIT**
No effect	26 FIT	26 FIT
External leakage	61 FIT	61 FIT
Total failure rate (safety function)	**21 FIT**	**51 FIT**

Table 8: DS06 - Diaphragm Seal - with plate for abrasive media

	Profile 3
	Severe service
Fail Safe (λ_{safe})	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**100 FIT**
No effect	0 FIT
External leakage	0 FIT
Total failure rate (safety function)	**100 FIT**

Table 9: IS01 - In-line Diaphragm Seal

	Profile 3	
	Normal service	Severe service
Fail Safe (λ_{safe})	**0 FIT**	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**45 FIT**	**75 FIT**
No effect	1 FIT	1 FIT
External leakage	0 FIT	0 FIT
Total failure rate (safety function)	**45 FIT**	**75 FIT**

Table 10: AD01 - Cooling tower, welding adapter, capillary, threaded connector

	Profile 3
	Normal service
Fail Safe (λ_{safe})	**0 FIT**
Fail Dangerous ($\lambda_{dangerous}$)	**23 FIT**
No effect	3 FIT
External leakage	0 FIT

Total failure rate (safety function)	**23 FIT**

Table 11: AD05 - diaphragm break monitoring system

	Profile 3
	Normal service
Fail Safe (λ_{safe})	**0 FIT**
Fail Dangerous Detected (λ_{DD})	**33 FIT**
Fail Dangerous Detected (λ_{dd})	10 FIT
Fail Annunciation Detected (λ_{AD})	23 FIT
Fail Dangerous Undetected (λ_{DU})	**1 FIT**
Fail Annunciation Undetected (λ_{AU})	3 FIT
No effect	3 FIT
External leakage	0 FIT

Total failure rate (safety function)	**34 FIT**

Herstelleraussage

14699083.01

Wir erklären in alleiniger Verantwortung, dass die folgende Beschichtung von WIKA Druckmittlern

PFA (antistatisch)

den folgenden Anforderungen entspricht:

- IEC 60079-0:2017 Abschnitt 7.4.2 c) für Geräte der Gruppe I oder Gruppe II

- IEC 60079-0:2017 Abschnitt 7.4.3 b) für Geräte der Gruppe III

Manufacturer's Statement

14699083.01

We declare under our sole responsibility, that the following coating of WIKA diaphragm seals

PFA (anti-static)

complies with the following requirements:

- IEC 60079-0:2017 clause 7.4.2 c) for equipment of Group I or Group II

- IEC 60079-0:2017 clause 7.4.3 b) for equipment of Group III

Unterzeichnet für und im Namen von / Signed for and on behalf of

WIKA Alexander Wiegand SE & Co. KG

Klingenberg, 21.06.2024

i.V. Matthias Kirch
Vice President
Center of Excellence Pressure

i.V. Dr. Michael Glombitza
Head of Quality Management
Corporate Quality Pressure

Unterschrift autorisiert durch das Unternehmen / Signature authorized by the company

Herstelleraussage

14777501.01

Klassifzierung mechanischer Komponenten von WIKA nach 2014/34/EU

Druckmittler, die als mechanische Komponenten in explosionsgefährdeten Bereichen eingesetzt werden, sind im Rahmen der ATEX 2014/34/EU Leitlinien 5. Edition klassifiziert als:

§ 38
Geräte, die nicht unter die Richtlinie fallen

Dies gilt für folgende Typen:

Druckmittler,
Rohr-Druckmittler
auch mit
Kapillarleitung oder Kühlelement

990, 981

Die Einsatzgrenzen und Klassifizierung des Equipment Protection Level (EPL) des Druckmittlersystems werden durch das angebaute Messgerät festgelegt.

Beim Einsatz von Druckmittlern in Druckmittlersystemen in explosionsgefährdeten Bereichen sind die zusätzlichen Hinweise im Dokument 14351843 zu beachten.

Manufacturer Statement

14777501.01

Classification of mechanical components from WIKA according to 2014/34/EU

Diaphragm seals used as mechanical components in potentially explosive atmospheres are classified in accordance with the ATEX 2014/34/EU Guidelines 5th Edition as:

§ 38
Devices not covered by the Directive

This applies to the following models:

Diaphragm seal,
In-line diaphragm seal
also with
capillary tube or cooling element

990, 981

The application limits and the classification of the Equipment Protection Level (EPL) of the diaphragm seal system are determined by the mounted measuring device.

When using diaphragm seals in diaphragm seal systems in potentially explosive atmospheres, the additional information in the document 14351843 must be followed.

Unterzeichnet für und im Namen von / Signed for and on behalf of

WIKA Alexander Wiegand SE & Co. KG

Klingenberg, 2025-07-16

i.V.

Matthias Kirch, Vice President
Center of Excellence Pressure

Andreas Massong, Head of Quality Assurance
Center of Excellence Pressure

Unterschrift autorisiert durch das Unternehmen / Signature authorized by the company

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg
Germany
WEEE-Reg.-Nr. DE 92770372

Tel. +49 9372 132-0
Fax +49 9372 132-406
E-Mail info@wika.de
www.wika.de

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Vorstand: Alexander Wiegand
Vorsitzender des Aufsichtsrats: Prof. Dr. Roderich C. Thümmel

Herstelleraussage

Dokument Nr.: 14825328.01

Wir als Hersteller bestätigen für unsere folgend genannten Produkte,

Druckmittler,
Rohr-Druckmittler
auch mit
Kapillarleitung oder Kühlelement

990., 981.****

dass diese **permanent technisch dicht** sind.

Alle Druckmittler werden mit der lokalen Sprühmethode A3 nach EN 1779:1999 geprüft und halten die Anforderungen der TA Luft (Vermeidung von Emissionen) ein.

Die Eignung der Dichtungen zum Einsatz, sowie die geeignete Auswahl der Montage, Prüfung und Wartung der Dichtsysteme, ist bezogen auf die Applikation vom Anwender sicherzustellen.

Manufacturer's Statement

Document No.: 14825328.01

We as manufacturer confirm for our products listed below,

Diaphragm seal,
In-line diaphragm seal
also with
capillary tube or cooling element

990., 981.****

that they are **permanently technically sealed.**

All diaphragm seals are tested by the local spray method A3 according to EN 1779:1999 and keep requirements oft he „TA-Luft" (Avoiding emissions).

Based on the specific application, the user must ensure the suitability of the seals and the correct selection, installation, testing, and maintenance of the sealing systems.

Unterzeichnet für und im Namen von: / Signed for and on behalf of:

WIKA Alexander Wiegand SE & Co. KG
Klingenberg, 2025-11-26

i.V.

Matthias Kirch, Vice President
Center of Excellence Pressure

Andreas Massong, Head of Quality Assurance
Center of Excellence Pressure

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg
Germany
WEEE-Reg.-Nr. DE 92770372

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E-Mail info@wika.de
www.wika.de

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Amtsgericht Aschaffenburg HRA 1819

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