

# Certified for functional safety



Qualified by TÜV Nord

The subjects of safety and protection are becoming more and more important. Brakes are used in a variety of safety-critical applications. TÜV Nord has now certified the suitability of the BFK458 spring-applied brake for the use as service brake and holding brake, which serves to furnish proof of the functional safety of the drive system.

The  $B_{10d}$  value determined in the context of a series of tests provides the basis of the verification of suitability. The  $B_{10d}$  value describes the number of switching cycles to the point at which 10% of the components fail **dangerously**. If the value falls short of a specific minimum braking torque, this is referred to as a **dangerous failure**. This minimum torque may be below the characteristic torque of the brake and must be taken into consideration by the system manufacturer as the dimensioning torque of the brake.

## Highlights

- Certified for functional safety
- Safety Integrity Level (SIL) 1 as single-brake
- Performance Level (PL) c as single brake
- Safety Integrity Level (SIL) 2 as non-adjustable double brake
- Performance Level (PL) d as non-adjustable double brake
- Higher PL and SIL values on request

# BFK458 spring-applied brake



The springs applied in the BFK458 series, which serve to generate the braking torque, are approved as **reliable components** complying with the DIN EN ISO 13849-2 standard, Table A.2. Classification of the safety function is carried out on the basis of the PL

Performance Level (DIN EN ISO 13849:2015) and the SIL Safety Integrity Level (EN 61508). TÜV Nord has confirmed the following characteristic values of the brakes in compliance with DIN EN 13849-1:2015:

	BFK 458 Size 6 – 25	
	As single brake Basic modules E and N	As double brake 2 x Basic module N
HFT (hardware fault tolerance)	0	1
$B_{10d}$	$6 \times 10^6$	

With the operating conditions assumed and defined for the further calculations of the PL and SIL

Values per year:	$d_{op}$	220 days;
Operating hours per day:	$h_{op}$	8 hours;
Time for an operating cycle:	$t_{cycle}$	10 s;
Probability of error detection:	DC <60%	(worst case),

the characteristic values listed in the following result for the single brake and the double brake:

	BFK 458 Size 6 – 25	
	As single brake Basic modules E and N	As double brake 2 x Basic module N
Medium time until a hazardous failure occurs MTTFd	94.6 years	94.6 years
Performance Level (PL)	c	d
Probability of occurrence of a severe hardware error PFHD (EN 61508-1)	$1.205 \times 10^{-6}$	$2.59 \times 10^{-7}$
Safety Integrity Level (SIL)	1	2

Higher PL and SIL levels can be achieved by higher error detection probabilities (DC) with additional brake tests in the application.

Corresponding examples of applications can be requested from Lenze.

# BFK458 spring-applied brake



## Information relating to the brake dimensioning process:

- In order to comply with the safety function it is absolutely necessary to take the notes for the intended use and safe mounting in compliance with the INTORQ operating instructions of the BFK458 spring-applied brake into consideration.
- For brake applications with a safety function, the shaft-hub joint must be designed using a featherkey as well as being glued or thermally joined. The safe design of the shaft-hub joint must be ensured by the customer.
- In general, it must be taken into account that the spring-applied brake is selected so that 80% of the characteristic torque specified are sufficient for ensuring the safety-relevant function.
- The characteristic safety values given furthermore apply under the following basic conditions:
  - Brake with a noise-reduced rotor with a toothed intermediate ring.
  - Ambient temperature during operation in accordance with the operating instructions: -20 °C to +40 °C.
  - Relative humidity during operation: <85%, non-condensing.

## Example with regard to the brake selection:

Customer requirement from drive dimensioning: 4Nm  
Dimensioning as safe service brake:  $4\text{Nm}/80\% = 5\text{Nm}$   
Brake selection: BFK458-06 with 5Nm

If you require a verification of suitability for the BFK458 spring-applied brake or if you have any questions, we'll be pleased to be at your service.

