

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Hoisting, Rotation and Pipehandling Equipment**

with type designation(s)

BSFK 500-R-300 Spring applied disc brake

Issued to

**Svendborg Brakes ApS
VEJSTRUP, Denmark**

is found to comply with

DNVGL-OS-E101 – Drilling plant, Edition July 2015**DNVGL-SI-0166 – Verification for compliance with Norwegian shelf regulations, Edition July 2015****Application :****Fail safe, spring applied, hydraulically released disc brakes BSFK 520, 523, 525, 527.
Maximum braking force from 144 kN to 194 kN.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**This Certificate is valid until **2021-06-30**.Issued at **Høvik** on **2017-01-23**DNV GL local station: **Fredericia**Approval Engineer: **Mohsen Mohebbi**for **DNV GL**

**Per Esvall
Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Job Id:
Certificate No: **TAD00000K0**

Reference standards

EN 1993-1-9:2005, Eurocode 3 "Design of steel structures"

VDI-Richtlinie 2230 B1.1, "Systematic calculation of high duty bolted joints – Joints with one cylindrical bolt"

Product description

The BSFK 500 series Dual Spring is designed as a fail-safe spring-applied, hydraulically released disc brake. The two spring calipers are connected to a bracket with a slip resistant joint consisting of 6 bolts. The bracket is NOT included in this Type Approval.

Caliper type	Clamping force ¹⁾ [KN]		Loss of force per 1 mm[%]	Braking force ²⁾ [KN]	Operating pressure ⁴⁾ [MPa]	Balancing pressure [MPa]	Pad surface pressure ³⁾ [N/mm ²]
	Min.	Max.					
BSFK 520	200	220	5.5	144.0	13.5	8.57	3.07 – 3.05
BSFK 523	230	250	6.5	165.6	14.0	9.86	3.48 – 3.45
BSFK 525	250	270	5.5	180.0	14.5	10.72	3.76 – 3.73
BSFK 527	270	295	5.0	194.4	15.5	11.58	4.11 – 4.07

- 1) All figures are based on 1 mm air gap
- 2) Braking force is based on a min. clamping force, nominal coefficient of friction $\mu = 0.36$ and 2 brake surfaces.
- 3) Pad pressure for organic / sintered pads respectively (based on max. clamping force).
- 4) The operating pressure is the minimum needed for operating the brake.

Application/Limitation

The brakes are approved for the following particulars:

- Min. Design Temperature: -20° C
- Max. Design Temperature: 70° C

Type Approval documentation

Tests carried out

Each product is to be tested according to DNV GL's Offshore Standard DNV GL-OS-E101 "Drilling Plant", Ch.2, Sec.6, Clause 4.

Charpy testing shall be performed in accordance with DNV GL-OS-E101 "Drilling Plant" Ch.2, Sec.2, Clause 2.

NDE/NDT procedures shall be performed in accordance with DNV GL-OS-E101 "Drilling Plant" Ch.2, Sec.6, Clause 3.

Qualification of welding procedures and qualification of welders shall be in accordance with DNV GL-OS-E101 "Drilling Plant" Ch.2, Sec.6, Clause 2.

Marking of product

For traceability the following marking is to be carried out on each product:

- Part No.
- Serial No.
- Rated Braking capacity
- Manufacturers Name or Mark

Other conditions and comments

- The structure can handle braking forces equivalent to a coefficient of friction $\mu = 0.45$
- The bracket and the mounting and connection of the bracket to supporting structure is not covered in this type approval and must be approved for each delivery.

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- The hydraulic unit is not covered in this type approval and must be approved for each drawwork delivery.
- Eyebolts for installation lifting are not included in this type approval.
- Each product is to be surveyed during fabrication in accordance with the requirements for equipment of Category I as defined in DNV GL's Offshore Standard DNV GL-OS-E101 Drilling Plant, followed by issuance of Product Certificate. If the intended installation is DNV GL classed, then this automatically means DNV GL Product Certificate. Fabrication records are to be maintained in accordance with DNV GL-OS-E101 Ch.3, Sec.3, Clause 2.
- This document may be used as part of the documentation required to comply with European Union (EU) Directives referenced in PSA's Acts, regulations and provisions for the petroleum activities. It should however be noted that the scope covered by this document does not necessarily cover all aspects required to issue the EU Declaration of Conformity and to affix the CE-mark. It is the manufacturer's/operator's responsibility to ensure compliance with relevant EU Directives.

Periodical assessment

For retention of the Type Approval, DNV GL representative shall carry out biennial Product Audits in accordance with DNV GL type approval scheme (DNVGL-CP-0338), Section 4, dated October 2015.

END OF CERTIFICATE