

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Hoisting, Rotation and Pipehandling Equipment**with type designation(s)
BSFB 600-R-300 Spring Applied Disc Brake

Issued to

Svendborg Brakes ApS
Vejstrup Syddanmark, Denmarkis found to comply with
DNV-OS-E101 Drilling Plant October 2013
and DNV GL AS' understanding of the implementation and interpretation of:
PSA's "Regulations relating to design and outfitting of the facilities etc. in the petroleum activities" (THE FACILITIES REGULATIONS), Last amended 16 December 2014, Ch.VIII**Application :****See next page****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2017-08-24**This Certificate is valid until **2022-08-23**.DNV GL local station: **Fredericia**for **DNV GL**Approval Engineer: **Ola E. Ruud**.....
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.



Reference standards

- EN 1993-1-9:2005, Eurocode 3 "Design of steel structures"
- VDI-Richtlinie 2230 B1.a, "Systematic calculation of high duty bolted joints – Joints with one cylindrical bolt"

Product description

Fail safe, dual spring – applied, hydraulically released disc brake. The two spring calipers are connected to a bracket with a slip resistant joint consisting of 6 bolts. This type approval covers two bracket designs. Bracket according to drawing 490-3977-001 rev. C can be used for all four Caliper types, with only one pair of spring calipers to be mounted. The bracket according to drawing 86-J643-H66 rev. A is only approved for Caliper type BSFB 630 with two pairs of spring calipers mounted.

Caliper type	Clamping force ¹⁾ [kN]		Loss of force per 1 mm [%]	Braking force ²⁾ [kN]	Operating pressure [bar]	Pad surface pressure ³⁾ [N/mm ²]
	Min.	Max.				
BSFB 630	300	320	4.5	216	110	2.71-3.05
BSFB 635	350	380	5.5	252	125	3.05-3.22
BSFB 640	400	430	4.5	288	135	3.64-4.10
BSFB 645	450	490	8.5	324	160	3.81-4.29

1) The figures are based on 1mm air gap (i.e. 1mm on each side of disc on Dual Spring and 1mm total on Mono Spring)

2) Braking force is based on min. clamping force, nominal coefficient of friction $\mu = 0.36$ and 2 brake surfaces.

3) Pad surface pressure based on organic/sintered pads and max. clamping force.

Application/Limitation

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

-Fatigue life limitations of bracket according to drawing 490-3977-001 rev.C:

- One – directional operation at 333 kN braking force:
520 000 cycles
- Bi – directional operation at 333 kN braking force:
130 000 cycles

-Fatigue life limitations of bracket according to drawing 86-J643-H66 rev.A:

- One – directional operation at 480 kN braking force:
15 000 000 cycles
- Bi – directional operation at 480 kN braking force:
475 000 cycles

Type Approval documentation

Other conditions and comments

1. Braking forces under product description are based on min. clamping force, estimated nominal dynamic coefficient of friction $\mu = 0.36$ and 2 brake surfaces.
2. The structure can handle static braking forces equivalent to a coefficient of friction $\mu = 0.45$.
3. Mounting and connection of the bracket to supporting structure are not covered in this type approval and must be approved for each delivery.
4. This type approval does not include the hydraulic system of the brakes. The system is to be approved separately, including possible interfaces.

5. The pump unit is to be delivered with the manufacturer's CoC.
6. If applicable, a closer fatigue assessment should be performed with the relevant load spectrum and number of calipers.
7. Eyebolts for lifting are not included in this type approval.
8. Each product are to be surveyed during fabrication in accordance with the requirements for equipment forming a part of hoisting equipment of Category I as defined in DNV GL's Offshore Standard DNV-OS-E101 Drilling Plant, followed by issuance of Product Certificate Form No. 20.92a. Fabrication records are to be maintained in accordance with DNV-OS-E101 Ch.3, Sec.3
9. Qualification of welding procedures and qualification of welders shall be in accordance with DNV-OS-E101, Ch.2, Sec.6 and DNV-OS-C401 Ch.2, Sec.1.
10. 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 manufacturer's/operator's responsibility to ensure compliance with relevant EU Directives.

Testing

Each product is to be tested according to DNV GL's Offshore Standard DNV-OS-E101 "Drilling Plant", October 2013, Ch.2, Sec.6

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

Certificate retention survey

For retention of Type Approval, DNV GL's representative shall carry out biennial Product Audits.

This Type Approval replaces certificate no. D-4946.

END OF CERTIFICATE