Certificate no.:
TAD00001MM

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Hoisting, Rotation and Pipehandling Equipment

with type designation(s)
Sheaves E220299, E230532 and E240061

issued to
Ropeblock B.V.
Oldenzaal, Overijssel, Netherlands

is found to comply with
DNV-OS-E101 – Drilling facilities, Edition July 2021

Application:

Drilling

Issued at **Høvik** on **2024-04-10**
This Certificate is valid until **2029-04-09**.
DNV local unit: **Netherlands VMC**

for **DNV**

Approval Engineer: **Fredrik Per Olof Höglund**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Product description

The Type Approval covers two types of sheaves:

- 72'' Drilling sheave for 2'' wire rope – 14'' shaft, 4-7/8'' hub width, drawing numbers
  04G.1684.445.124.27,5.H rev. 00
  E220299 rev. 01
  E230532 rev. 01

- 72'' Drilling sheave for 1-3/4'' wire rope – 14'' shaft, 4-7/8'' hub width, drawing numbers
  04G.1685.445.124.24.H
  E240061

Sheave	**04G.1684.445.124.27,5.H**	**04G.1685.445.124.24.H**
Min design temperature [°C]	-20	-20
Product specification level, PSL	PSL 1	PSL 1
Outer diameter [in]	72	72
Wire rope diameter [in]	2	1-3/4
Load condition		
Maximum dynamic line pull* [kN]	820	820
Maximum fleet angle in/out [deg]	2/2	2/2
Wrap angle [deg]	180	90/180
Design safety factor	3.0	3.0

Maximum dynamic line pull below is, for all component groups, based on fleet angle in/out of 1/1 deg.

Sheave	**04G.1684.445.124.27,5.H**		
F.E.M. 1.001 component group	**E1-E6**	**E7**	**E8**
Maximum dynamic line pull [kN]	820	675	615**
Sheave	**04G.1685.445.124.24.H**		
F.E.M. 1.001 component group	**E1-E6**	**E7**	**E8**
Maximum dynamic line pull [kN] Wrap angle 90deg	720	650	350***
Maximum dynamic line pull [kN] Wrap angle 180deg	820	674	354***

* The maximum dynamic load shall include effects such as the weight of the hook/block, the weight of the wire rope and the design dynamic factor. Static line pull x dynamic factor shall not exceed maximum dynamic line pull.
** E8 is based on spectrum factor: 0.125 & Number of cycles: 215 million
*** E8 is based on spectrum factor: 1.0 & Number of cycles: 100 million

Reference standards

API Specification 8C, Drilling and Production Hoisting Equipment (PSL 1 and PSL 2), 5th Ed. 2012
F.E.M., Rules for the Design of Hoisting Appliances, 3rd Ed. 1998

Application/Limitation

1. All materials are to be delivered with 3.1 certificates, documenting mechanical properties and chemical composition in accordance with the Type Approval documentation.
2. NDT as specified in the Type Approval Documentation are to be carried out by certified personnel.
3. The sheave bearings are not covered by this Type Approval.
4. Sheave bearings (FAG 804108) are to be delivered with manufacturer's CoC, confirming sufficient strength and capacity.
5. Proper lubrication of the bearings is to be guaranteed during operation and use of the sheaves.

Type Approval documentation

Tests to be carried out

Functional tests shall be conducted in accordance with DNV-OS-E101 Ch.2 Sec.8 §3.5.
Testing shall be witnessed by DNV representative.

Marking of product

Each sheave shall be marked according to API Spec.8C Sec.9.2.6.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNV-CP-0338.

This certificate is only valid if required periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com.

END OF CERTIFICATE