

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Lifting Gear**

with type designation(s)

Sheave 4-57686

Issued to

GOSAN, S.A.**Ortuella, 48, Spain**

is found to comply with

DNV GL standard DNVGL-ST-0378 – Standard for offshore and platform lifting appliances

Application :**Loose gear for offshore cranes****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**This Certificate is valid until **2024-02-06**.Issued at **Høvik** on **2019-02-07**DNV GL local station: **Bilbao**for **DNV GL**Approval Engineer: **Antonio Sendin Alvarez**

Aldo Matteucci**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.

If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million.

In this provision the "Society" shall mean DNV GL AS as well as all its direct and indirect owners, affiliates, subsidiaries, directors, officers, employees, agents and any other person or entity acting on behalf of DNV GL AS.

Certificate No: **TAS00001XF**
File No: **686.70**
Job Id: **262.1-017956-2**

Product description

SHEAVE 4-57686:

Design temperature: -20 °C
Sheave diameter: 646 mm
Wire rope diameter: 34 mm

Load condition 1 (Rear part of knuckle boom):

- Max static line pull: 21.4 tonnes / E5 (F.E.M 1001)
- Dynamic factor (DAF): 1.40
- Max. wire inclination: 1.18 deg
- Wire clamp arch: 77 deg

Load condition 2 (in boom tip):

- Max static line pull: 22.5 tonnes / E5 (F.E.M 1001)
- Dynamic factor (DAF): 1.33
- Max. wire inclination: 0 deg
- Wire clamp arch: 180 deg

For crane applications, the max static load shall include effects such as the weight of the hook/block, the weight of the wire rope and the sheave friction.

The max dynamic load shall include effects such as the weight of the hook/block, the weight of the wire rope and the crane's design dynamic factor.

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. Welding and 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. It is the responsibility of the Holder of the Certificate to ensure that both design and production are in compliance with Rules, Standards and/or Regulations listed on page 1 of this Type Approval Certificate.

Type Approval documentation

Tests carried out

If a CG3 is requested, each sheave is to be load tested in accordance to ST-0378 Table 14-2

Marking of product

Each sheave shall be marked according to ST-0378 clause 14.5

Periodical assessment

For retention of the Type Approval, a DNV GL 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 DNVGL-CP-0338.

END OF CERTIFICATE