Certificate No:
TAP00002KC

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Hydraulic Cylinders

with type designation(s)
ET2291

Issued to
ET Hydraulikk AS
Vatne, **Norway**

is found to comply with
DNV standard DNV-ST-0378 – Offshore and platform lifting appliances
DNV standard DNV-ST-0194 – Hydraulic cylinders

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Design pressure (push)	**140 bar**
Design pressure (pull)	**140 bar**
Cylinder sizes	**80/50 x 840 mm**

Issued at **Høvik** on **2022-08-29**

This Certificate is valid until **2027-08-28**.

for **DNV**

DNV local station: **Mid-North Norway FiS**

Approval Engineer: **Khurram Saeed Khaliq**

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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.

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

Equipment designation:
Hydraulic cylinder used for luffing of gangway

Tube outer diameter: 100 mm
Tube inner diameter: 80 mm
Rod diameter: 50 mm
Stroke: 840 mm

Design pressure (push): 150 bar
Design pressure (pull): 150 bar

Design temperature: -20°C to +60°C

Materials

Cylinder type	Cylinder tube	Piston rod	Piston	Stuffing box	Rod end eye	End cover + end eye
ET2291	E355+SR	1.4418 QT900	S355J2	S355J2G3	316L	S355J2G3

*Material shall be fine grain treated as per RU-SHIP Pt.2 Ch.2 Sec.2 [2.6.6]

Application/Limitation

1. All welding is to be carried out by qualified welders and according to approved welding procedures. Non-destructive testing of all welds is to be performed according to DNVGL-ST-0194. Minimum requirement to NDT is UT and MT.
2. Material for pressure containing parts and end eye connections are to meet Charpy V-notch energy value as described on drawings. These data are to be verified by DNV surveyor during the product certification.

Type Approval documentation

Tests carried out

This Type Approval covers design(s) only, i.e. the Type Approval is not valid for the final product, but may be used as basis for obtaining a product certificate.

If a DNV Product Certificate is required, the following shall apply:
Each cylinder is to be hydraulically pressure tested to 1.5 times of the design pressure or 1.5 times the safety relief valve set pressure, whichever is the greatest, and be delivered with a DNV product certificate. The test pressure is to be applied on both sides of the piston in sequence. Testing is to be in accordance with DNVGL-ST-0194 - Hydraulic Cylinders, in presence of DNV surveyor.

Marking of product

The hydraulic cylinders are to be marked with manufacturer’s name or trademark, type designation and serial number.

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.