



Certificate No:
TAP00002FT

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Hydraulic Cylinders

with type designation(s)
Cranemaster, CM1-35T-500-A

Issued to

Servi AS
RISSA, Norway

is found to comply with

DNV standard DNV-ST-0378 – Standard for offshore and platform lifting appliances
DNV GL standard DNVGL-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) -
Design pressure (pull) 373 bar
Cylinder sizes 230/195/155x500

Issued at **Høvik** on **2021-12-10**

This Certificate is valid until **2026-12-09**.

for **DNV**

DNV local station: **Norway CMC, Mid-North**

Approval Engineer: **Khurram Saeed Khaliq**

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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.

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.



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Page 1 of 2

Product description

Dimensional data:

Outside diameter	Inside diameter	Piston rod outside diameter	Piston rod inside diameter	Stroke
280 mm	230 mm	195	155	500 mm

Materials:

Cylinder tube	Piston rod	Piston	Piston-gas	End cover + eye	Piston end eye	Stuffing box
P355NL1 (EN10216-3)	P355NL1 (EN10216-3)	S355J2* (EN10025-2)	S355J2* (EN10025-2)	S355J2* / S355J2G3** (EN10025-2 / EN10250-2)	1.4418 QT900 (EN10088-3)	1.4418 QT900 (EN10088-3)

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

** The test unit size for the material shall comply with RU-SHIP Pt.2 Ch. 2 Sec.6.

Application/Limitation

Design temperature(min/max): -30°/50°C

Design pressure (pull): 373 bar

Test pressure (pull): 543 bar

If the end cover is made from rolled plate it is to be tensile tested in the Z-direction.

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 [2.3] - Hydraulic Cylinders.

Both piston parts and end cover shall be Charpy-V impact tested at min. design temperature. Min. specified average energy value shall be as per relevant parts of DNVGL-RU-SHIP Pt.2 Ch.2.

Type Approval documentation

Tests carried out

Each cylinder is to be hydraulically pressure tested to 1.5 times of the design pressure 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 to DNV standard ST-0194 - Hydraulic Cylinders in presence of DNV surveyor.

Materials for cylinder tube, piston rod, end covers and end eyes shall be delivered with 3.1 material certificates.

Marking of product

Hydraulic cylinders shall be permanently marked in order to enable unique traceability to a product certificate or a type approval certificate. The marking shall at least consist of the following:

- manufacturers name or trademark
- type designation
- DNV product certificate number, if applicable
- charge number for the materials used in the cylinder tube and the piston rod.

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 DNVGL-CP-0338.