DNV·GL

Certificate No:
TAP000028S

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Hydraulic Cylinders

with type designation(s)
D012987, D012988

Issued to
Servi AS
RISSA, Norway

is found to comply with
DNV GL standard DNVGL-ST-0194 – Hydraulic cylinders

Application :

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

Type	Design pressure (push)	Design pressure (pull)	Cylinder sizes
D012987	270	270	200/100x810mm
D012988	270	270	100/63x750mm

Issued at **Høvik** on **2020-12-10**
This Certificate is valid until **2025-12-09**.
DNV GL local station: **Norway CMC, Mid-North**

Approval Engineer: **Renata Rossi**

for **DNV GL**

Zeinab Sharifi
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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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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Product description

2 types of double acting hydraulic cylinders.

Dimensional data:

Type	Outside diameter	Inside diameter	Piston rod diameter	Stroke
D012987	241 mm	200 mm	100 mm	810 mm
D012988	118.5 mm	100 mm	63 mm	750 mm

Materials:

Type	Cylinder tube	Piston rod	Piston	End eye	End cover	Stuffing box
D012987	E355+N (EN10305-1)	1.4462 (EN 10088-3 /EN 10272)	S355J2+N (EN10025-2)	S355J2+N (EN10025-2)	S355J2+N*/** (EN10025-2)	S355J2+N* (EN10025-2)
D012988	E355+SR (EN10305-1)	1.4462 (EN 10088-3 /EN 10272)	S355J2+N (EN10025-2)	S355J2+N (EN10025-2)	S355J2+N*/** (EN10025-2)	S355J2+N* (EN10025-2)

*The material shall be fine grain treated according to RU-SHIP Pt.2 Ch.2 Sec.2 [2.6.6], RU-SHIP Pt.2 Ch.2 Sec.3 [1.5.3].
** If the end cover is made from rolled plate it is to be tensile tested in the Z-direction

Application/Limitation

Design temperature(min/max): -20°/60°C

Test pressures:

Type	Pull	Push
D012987	270 bar	270 bar
D012988	270 bar	270 bar

The following cylinders are limited to the following number of full load cycles over the life span:

Type	Number load cycles
D012987	15 000
D012988	15 000

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.

Cylinder tube, piston rod, end covers, and end connections shall be Charpy-V impacted tested at minimum design temperature. Minimum specified average energy value shall be according to ST-0194 [2.1.1].

Type Approval documentation

Production test and Certification

Each cylinder is to be hydraulically pressure tested to 1.5 times of the design pressure and be delivered with a DNV GL product certificate.The test pressure is to be applied on both sides of the piston in sequence. Testing are to be in accordance with to DNVGL standard ST-0194 - Hydraulic Cylinders in presence of DNV GL 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 trade mark
- type designation
- DNV GL 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 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.