



Certificate no.:
TAP000033V

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Hydraulic cylinders for steering and reversing of water jet units

with type designation(s)

SH-8720 (Steering Cylinder), SH-8721 (Reverse Cylinder)

issued to

Arcos Hydraulik AB
Sävsjö, Jönköpings Län, Sweden

is found to comply with

DNV standard DNV-ST-0194 – Hydraulic cylinders

DNV rules for classification – Ships Pt.4 Ch.10 Steering gear

Application:

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

Type	Design pressure (push)	Design pressure (pull)	Cylinder sizes
SH-8720 (Steering Cylinder)	250 bar	250 bar (Reverse Cylinder)	125/90-960
SH-8721 (Reverse Cylinder)	250 bar	250 bar	150/90-411

Issued at **Høvik** on **2025-12-03**

This Certificate is valid until **2030-12-02**.

for **DNV**

DNV local unit: **Denmark CMC**

Approval Engineer: **Tobias Berntsen**

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 USD 300 000.

Product description

2 types of the hydraulic cylinders for steering and reversing of water jet units.

Type	Outside diameter	Inside diameter	Piston rod diameter	Stroke
SH-8720	160 mm	125 mm	90 mm	960 mm
SH-8721	180 mm	150 mm	90 mm	411 mm

Materials:

Type	Cylinder tube	Piston rod	Piston	End cover	Stuffing box	Flange
SH-8720	E355+SR (EN10305-1)	1.4460/1.4462 (EN 10088-3)	S355J2+N* (EN 10025-2)	S355J2+N*/** (EN 10025-2)	CC333G (EN 1982)	1.4460/1.4462 (EN 10088-3)
SH-8721	E355+SR (EN10305-1)	1.4460/1.4462 (EN 10088-3)	S355J2+N* (EN 10025-2)	S355J2+N*/** (EN 10025-2)	CC333G (EN 1982)	1.4460/1.4462 (EN 10088-3)

* The material shall be fine grain treated according to DNV-ST-0194 Table B-1.

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

Application/Limitation

Design temperature: -20°C / 80°C

Working pressures:

Type	Pull	Push
SH-8720	200 bar	200 bar
SH-8721	200 bar	200 bar

Test pressures:

Type	Pull	Push
SH-8720	375 bar	375 bar
SH-8721	375 bar	375 bar

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 DNV-ST-0194 [2.1.3].

Cylinder tube, piston rod, end covers, and end connections shall be Charpy-V impact tested at minimum design temperature. Minimum specified average energy value shall be according to DNV-ST-0194 [2.1.2].

Welding procedures shall fulfil relevant parts of DNV-RU-SHIP Pt.2 Ch.4 or DNV-OS-C401. Non-destructive testing of all welds is to be performed according to DNV-ST-0194 Section 2 2.3 - Hydraulic Cylinders.

Type Approval documentation

Production test and Certification

Each cylinder is to be hydraulically pressure tested according to DNV-ST-0194 [4.7.2] and be delivered with a DNV product certificate. Production testing shall be witnessed by DNV Surveyor.

The hydraulic cylinders are to be manufactured by a manufacturer holding a valid welding workshop approval (WWA).

Material certificates shall comply with DNV-ST-0194 [4.6.2.2].

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:

- manufacturer's name or trade mark
- design pressure
- type designation
- DNV product certificate number, if applicable
- charge number for the materials used in the cylinder tube and the piston rod.

Periodical assessment



Job ID: **262.1-044965-1**
Certificate no.: **TAP000033V**

This certificate is only valid if required periodical assessments are carried out with satisfactory results.

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.

To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>.