



Certificate no.:
TAP000032H

TYPE APPROVAL CERTIFICATE

This is to certify:

that the **Hydraulic Cylinders**

with type designation(s)
VY120041232, VY120041233

issued to

VREMAC Cylinders B.V.
Apeldoorn, Gelderland, Netherlands

is found to comply with

DNV standard DNV-ST-0194 – Hydraulic cylinders
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021
DNV rules for classification – Ships Pt.4 Ch.6 Piping systems

Application:

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

Issued at **Høvik** on

This Certificate is valid until .

for **DNV**

DNV local unit: **Netherlands 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

Type	Outside diameter	Inside diameter	Piston rod diameter		Stroke	Design pressure	
			Outside	Inside		Push	Pull
VY120041232	720 mm	580 mm	410 mm	0 mm	5750 mm	350 bar	350 bar
VY120041233	570 mm	460 mm	380 mm	0 mm	6070 mm	350 bar	350 bar

Materials:

Type	Cylinder tube	Piston rod	End eye	Piston	End cover	Stuffing box
VY120041232	S355J2G3+N* (EN10210-1)	34CrNiMo6+QT (EN10083-3)	S355J2+N* (EN10025-2)	S355J2G3+N* (EN10210-1)	S355J2G3+N*/** (EN10210-1)	S355J2G3+N* (EN10210-1)
VY120041233	S355J2G3+N* (EN10210-1)	34CrNiMo6+QT (EN10083-3)	S355J2+N* (EN10025-2)	S355J2G3+N* (EN10210-1)	S355J2G3+N*/** (EN10210-1)	S355J2G3+N* (EN10210-1)

* 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 (min/max), test pressures, and the limiting number of full load cycles over the life span of the hydraulic cylinders:

Type	Design temperature (min/max)	Test pressure		Number of load cycles
		Push	Pull	
VY120041232	-20°C to 70°C	525 bar	525 bar	75 000
VY120041233	-20°C to 70°C	525 bar	525 bar	75 000

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 DNV-ST-0194 [2.3].

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].

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 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 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 trade mark
- type designation
- DNV product certificate number, if applicable
- charge number for the materials used in the cylinder tube and the piston rod

Periodical assessment

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>.