DNV·GL

Certificate No:
TAP00000ZY

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Hydraulic Cylinders

with type designation(s)
NH75

Issued to
Lind Jensens Maskinfabrik A/S
Lem St Midtjylland, Denmark

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition July 2015
DNV GL class guideline DNVGL-CG-0194 – Hydraulic cylinders

Application :

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

Design pressure (push)	**250 bar**
Design pressure (pull)	**250 bar**
Cylinder sizes	**Cylinder tube inner diameter from 50 to 320 mm**

Issued at **Høvik** on **2017-09-21**

This Certificate is valid until **2022-06-30**.
DNV GL local station: **Fredericia**

Approval Engineer: **Adel Samiei**

for **DNV GL**
Digitally Signed By: Marveng, Marianne Spæren
Location: DNV GL Høvik, Norway

Marianne Spæren Marveng
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.

Product description

Hydraulic cylinder type NH75 with End eye connections in the rod side, and flanged connections, trunnion mounting or end eye connections in the cylinder part.
Material

- Cylinder: E355+SR according to EN10305-1 or EN10305-2
- Rod Material: 20MnV6/E470 accoridng to EN10294-1
  1.4418/1.4542 accoridng to EN10088-1 & -3
- End cover: S355J2 accoridng to EN10025-2
- Stuffing box: S355J2 accoridng to EN10025-2
- End Eye: S355J2 accoridng to EN10025-2

All dimensional data shall be in accordance with drawings and tables mentioned in the "Type Approval documentation" part of this certificate.

Application/Limitation

Hydraulic cylinders covered by this certificate are approved for general use for 250 bar maximum working pressure and for -20°C to +80°C temperature range.
This type approval does not cover the following use of the cylinders:

- Subsea applications
- Steering gear / water jet steering
- Cleating application where the Rules require a mechanical lock of cleats.

If the cylinders are going to be used for above mentioned applications, they are subject to case by case approval.

Materials for the pressure containing parts (cylinder tube, piston rods and end covers) are to meet Charpy V-notch energy values of minimum 27 J at minimum design temperature (-20°C).

Manufacturing, workmanship and testing of each cylinder shall be done according to DNVGL-CG-0194. Each hydraulic cylinder is to be hydraulically pressure tested to 375 bar before paint or any coating is applied on the cylinders.

Each cylinder is to be certified by DNV GL Surveyor as outlined in DNVGL-CG-0194. A product certificate shall be issued by the DNV GL Surveyor for each cylinder.

Materials for cylinder tube, piston rod, end covers and end eyes shall be delivered with 3.1 material certificates (according to EN 10204 or equivalent).

Welding shall be in accordance with DNV GL Ship Rules Pt.2 Ch.4. A welding workshop approval certificate issued by DNV GL shall be in place for hydraulic cylinders delivered to DNV GL ship classed vessels.

The trunnion mounting location has been considered in the worst case due to buckling calculations. Since the maximum stroke is calculated for the worst case of the trunnion mounting, change of its placement is acceptable. Reference is made to drawing 10000167324 rev.01 dated 2017-06-28.

Type Approval documentation

Drawing number/title	Revision	Date	Status
10000163445	01	2017-06-28	Type approved
10000163869	01	2017-06-28	Type approved
10000163903	01	2017-06-28	Type approved
10000163905	01	2017-06-28	Type approved
10000164039	01	2017-06-28	Type approved
10000167324	01	2017-06-28	Type approved
Table 1 of sketch document no. 10000163445	01	2017-06-28	Type approved
Table 1 & 2 of sketch document no. 10000163869	01	2017-06-28	Type approved
Table 1 & 2 & 3 of sketch document no. 10000163903	01	2017-06-28	Type approved
Table 1 & 2 & 3 of sketch document no. 10000163905	01	2017-06-28	Type approved

Table 1 & 2 & 3 of sketch document no. 10000164039	01	2017-06-28	Type approved
Table 1 & 2 & 3 of sketch document no. 10000167324	01	2017-06-28	Type approved
Document No. 10000169738 "Overview NH75 DNVGL	02	-	For information
Tension and flaring stress calculation reports	-	-	For information
Calculation reports for all 6 general drawings and sizes	-	-	For information

Marking of product

For traceability to this type approval the cylinders are to be permanently marked with:

- Manufacturer's name or trade mark
- Type designation

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment every second year and before the expiry date of this certificate. The scope of the periodical assessment survey, is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the certificate retention survey are:

- Review of Type Approval documentation
- Review of possible changes in design, materials and performance
- Ensure traceability between manufacturer's product type marking and Type Approval Certificate.