DNV·GL

Certificate No:
TAP00000WN

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Gas Loaded Accumulator

with type designation(s)
10-330-22 ~ 50-330-22 (see page 2), 04-350-16,8 ~ 10-350-16,8 (see page 2), 01-350-11,4 ~ 05-350-11,4 (see page 2)

Issued to
Roth Hydraulics GmbH
Biedenkopf Hessen, Germany

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment

Application :

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

Type:	Temperature range:	Operating media:	Design pressure:	Sizes:
10-330-22 ~ 50-330-22 (see page 2)	**-40°C to +80°C**	**hydraulic fluid / gas**	**330 bar**	**D200**
04-350-16,8 ~ 10-350-16,8 (see page 2)	**-40°C to +80°C**	**hydraulic fluid / gas**	**350 bar**	**D150**
01-350-11,4 ~ 05-350-11,4 (see page 2)	**-40°C to +80°C**	**hydraulic fluid / gas**	**350 bar**	**D100**

Issued at **Hamburg** on **2018-06-28**
This Certificate is valid until **2023-06-27**.
DNV GL local station: **Essen**

Approval Engineer: **Stefan Wiemer**

for **DNV GL**

Harald Pauli
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.

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

Product description

- Bladder accumulator, as a seamless steel bottle with oil valve, rubber compound bladder and gas connection,

- Types and sizes:

Typ	Size	Volume (L)	Design Pressure (bar)	Diameter (mm)
BLAK 10-330-22	D200	10	330	220
BLAK 20-330-22	D200	20	330	220
BLAK 24-330-22	D200	24	330	220
BLAK 32-330-22	D200	32	330	220
BLAK 40-330-22	D200	40	330	220
BLAK 50-330-22	D200	50	330	220
BLAK 04-350-16,8	D150	4	350	168
BLAK 06-350-16,8	D150	6	350	168
BLAK 10-350-16,8	D150	10	350	168
BLAK 01-350-11,4	D100	1	350	114
BLAK 2,5-350-11,4	D100	2,5	350	114
BLAK 05-350-11,4	D100	5	350	114

- Approved according to DNV GL rules ship Pt.4 Ch.7 (edition January 2017), designed according to DIN EN 14359 (12/2014), fatigue calculation according to EN 13445-3 Ch. 18 (12/2014),

- For details of the bladder accumulator (e. g. design data, materials or dimensions) see approved drawings (listed below in "Type Approval documentation").

Application/Limitation

- The bladder accumulators are graded as pressure equipment class I according to DNV GL rules ship Pt.4 Ch.7 Sec.1 Table 2,

- The accumulators have been designed for cyclic loading as follows:

Size	Cyclic load range (bar)	Allowed number of load cycles
D200	0 – 330	≤ 10.500
D200	157 – 300	≤ 2.000.000
D150	0 – 350	≤ 10.400
D150	155 – 318	≤ 2.000.000
D100	0 – 350	≤ 7.400
D100	143 – 318	≤ 2.000.000

  The use of accumulators outside these cyclic load ranges shall be subject to special consideration by DNV GL in each individual case,

- In his operating instructions the manufacturer shall give advice about the allowable cyclic loadings, and the necessary inspections for the safe use of the accumulators regarding EN 13445-3 Annex M.2 (timing and scope of inspections due to cyclic loading).
  In case of cyclic loading, the user shall establish an inspection plan accordingly, track the number of cyclic loadings and arrange the necessary inspections,

- All pressurized material shall be delivered with material certificates according to DNV GL rules ship Pt.4 Ch.7 Sec.1 Table 5,

- The material of the accumulator components subject to pressure shall be delivered by a manufacturer holding a valid certificate according to DNVGL CP-0346 'DNV GL approval of manufacturing scheme',

- The material 1.7220 PMA of the shell is according to EN 14359 or an EN Standard. Strength properties to be confirmed in the material certificate:

Size	D100	D150	D200	
Drawing	3_10X1135-04_1	3_10X1735-05_1	3_10X2233-09_1_A	3_10X2233-09_1_B
Rm N/mm^2	985	825	965	880
Rp0,2 20^{0}C N/mm^2	870	730	865	755
Rp0,2 80^{0}C N/mm^2	800	660	800	705

  Impact test at -40° C ≥ 27J, Rp0,2 80^{0}C may be interpolated if Rp0,2 150^{0}C is confirmed.
  Material and strength properties of the oil vent and gas connection see approved stress calculation in the type approval documentation,

- The lowest design temperature of -40°C shall be increased to -32°C / -20°C / -15°C / -30°C / -15°C in case the bladder material is ECO / FKM / IIR / N28 / N33 (according to manufacturers specification),

- Each accumulator is to be:
  - Hydraulic pressure tested to minimum 1.43 x design pressure,
  - Certified by DNV GL and to be delivered with a product certificate.

Type Approval documentation

Marking of product

For traceability to this type approval the products are at least to be marked with:

- the name and domicile of the manufacturer,
- the manufacturer's type designation and serial number,
- the year of manufacture,
- the design pressure,
- the design temperature in °C,
- the hydraulic test pressure, and
- DNV GL's identifying mark

Periodical assessment

The objective of the periodical assessment is to verify that the conditions for the type approval (TA) have not been altered.

The main scope of the periodical assessment will normally include:

- verification of the TA applicant's production and quality system w.r.t. ensuring continued consistent production of the TA products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products
- review of TA documentation and that this is still used as basis for the production
- review of possible changes in the design, the materials and the performance of the product
- verification of the product marking

For retention of the TA certificate in its validity period the periodical assessments will be carried out bi-yearly.

Unscheduled assessments for retention of the certificate may be carried out when there is reason to believe that the type approval applicant has not adhered to the obligations stipulated in the type approval certificate.

End of Certificate