DNV·GL

Certificate No:
TAP000013A

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Hydraulic Accumulator

with type designation(s)
SK350

Issued to
HYDAC Technology GmbH
Sulzbach Saarland, Germany

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment
DNVGL-OS-E101 – Drilling plant, Edition July 2015
DNV GL standard DNVGL-ST-0378 – Standard for offshore and platform lifting appliances
DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition July 2015
DNV GL standard DNVGL-ST-0358 – Certification of offshore gangways for personnel transfer

Application :

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

Temperature range:	**-20°C to 100°C (depending on type)**
Operating media:	**Hydraulic fluid/ Nitrogen**
Design pressure:	**210 - 350 bar (depending on type)**
Sizes:	**2.5 - 3300 l (depending on type)**

Issued at **Høvik** on **2017-12-19**
This Certificate is valid until **2022-12-18**.
DNV GL local station: **Essen Business Support**

for **DNV GL**

Approval Engineer: **Iselinn Vindstad**

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

11 types of piston accumulator with threaded cover

	Model (drawing number)	Design pressure	Test pressure	Design temperature	Size	Design code
a)	SK350 50-500l d355 (03937162)	350 bar	500,5 bar	-20°C / 80°C	50 - 500l	EN14359:2017
b)	SK350 2,5-70l d150 (03942536)	330 bar	472 bar	-20°C /100°C	2,5 -70 l	EN14359:2017
c)	SK350 100-2100l d490 (03910721)	300 bar	429 bar	-20°C /80°C	100 - 2100 l	EN14359:2017
d)	SK350 2,5-200l d200 (03899967)	350 bar	500,5 bar	-20°C / 80°C	2,5 - 200 l	EN14359:2017
e)	SK350 500-3300l d610 (03903803)	250 bar	357,5 bar	-20°C / 50°C	500 - 3300 l	EN14359:2017
f)	SK350 10-220l d250 (03910927)	350 bar	500,5 bar	-20°C / 80°C	10 - 220l	EN14359:2017
g)	SK350 16-250l d250 (03828103)	345 bar	517,5 bar	-20°C / 80°C	16 - 250l	ASME VIII Div 1
h)	SK350 100-2100l d490 (03874348)	350 bar	500,5 bar	-20°C / 80°C	100 - 2100l	EN14359:2017
i)	SK350 2,5-70l d150 (03810637)	210 bar	300,3 bar	-20°C / 80°C	2,5 -70 l	EN14359:2017
j)	SK350 1,5-100l d180 (03326897)	330 bar	472 bar	-25°C / 80°C	1,5 - 100 l	EN14359:2017
k)	SK350 50-500l d355 (03542236)	350 bar	500,5 bar	-20°C / 80°C	50 - 500 l	EN14359:2017

	Model	Inner diameter	Outer diameter	Length range	Corrosion allowance	Load cycles
a)	SK350 50-500l d355	355 mm	434 mm	1055 - 5600 mm	1 mm	(ΔP=299bar) 2 000 000 cycles
b)	SK350 2,5-70l d150	150 mm	180 mm	390 - 4210 mm	1 mm	(ΔP=165bar) 2 000 000 cycles
c)	SK350 100-2100l d490	490 mm	570 mm	1130 - 11835 mm	1 mm	(55 to 300 bar) 2 000 000 cycles
d)	SK350 2,5-200l d200	200 mm	235 mm	400 - 6690 mm	0.5 mm	(ΔP=266bar) 2 000 000 cycles
e)	SK350 500-3300l d610	610 mm	690 mm	2540 - 12121 mm	1 mm	(35 to 250 bar) 2 000 000 cycles
f)	SK350 10-220l d250	250 mm	300 mm	610 - 4890 mm	1 mm	(30 to 350 bar) 2 000 000 cycles
g)	SK350 16-250l d250	250 mm	286 mm	710 - 5480 mm	0 mm	(115 to 345 bar) 2 000 000 cycles
h)	SK350 100-2100l d490	490 mm	570 mm	1230 - 11835 mm	1 mm	(ΔP=246bar) 2 000 000 cycles
i)	SK350 2,5-70l d150	150 mm	180 mm	375 - 4195 mm	1 mm	(ΔP=210bar) 2 000 000 cycles
j)	SK350 1,5-100l d180	180 mm	224 mm	320 - 4190 mm	1 mm	(ΔP=330bar) 2 000 000 cycles
k)	SK350 50-500l d355	355 mm	434 mm	1040 - 5585 mm	1 mm	(ΔP=295bar) 2 000 000 cycles

	Material: end cover / Model	P355QH1* (EN10222-4)	1.4462** (EN10222-5/ EN10028-7/ EN10216-5, EN10272)	P355NH (EN10273)	P460NH (EN10273)	SA564 type 630 Cond. H1150 ****
a)	SK350 50-500l d355	x				
b)	SK350 2,5-70l d150	x		x	x	
c)	SK350 100-2100l d490	x				
d)	SK350 2,5-200l d200	x				
e)	SK350 500-3300l d610	x	x			
f)	SK350 10-220l d250	x				
g)	SK350 16-250l d250					x
h)	SK350 100-2100l d490	x				
i)	SK350 2,5-70l d150	x				
j)	SK350 1,5-100l d180	x				
k)	SK350 50-500l d355	x				

	Material: cylinder / Model	P355NL1 (EN10216-3)	P460NL1 (EN10216-3)	20MnV6K (039R)***	34CrMo4 (EN10083-1) ***	SA564 type 630 Cond. H1150 ****
a)	SK350 50-500l d355	x	x	x	x	
b)	SK350 2,5-70l d150		x	x		
c)	SK350 100-2100l d490		x	x	x	
d)	SK350 2,5-200l d200		x			
e)	SK350 500-3300l d610		x	x	x	
f)	SK350 10-220l d250		x	x		
g)	SK350 16-250l d250					x
h)	SK350 100-2100l d490		x	x	x	
i)	SK350 2,5-70l d150		x			
j)	SK350 1,5-100l d180	x	x	x	x	
k)	SK350 50-500l d355	x	x	x	x	

* The material is Charpy V-tested at -40°C, impact value 27 J.
** The material is Charpy V-tested at -40°C, impact value 40 J.
***The material is not a harmonized material according to EN 13445-3, and a particular material appraisal is required in order for material to be accepted (reference is made to EN 14359 [4.1]).
**** The material is charpy v-tested at -23°C, impact value 41 J.

Material piston: Steel/Aluminium

Application/Limitation

Each accumulator shall be protected on both gas and hydraulic fluid side by a safety device such as relief valve, fuse plug or rupture disc to prevent excess pressure if overheated. When the accumulator is an integral part of a system with such a safety device, the accumulator itself need not be supplied with a safety device.

For accumulators certified according to DNVGL-OS-E101 special attention to DNVGL-OS-E101 Ch. 2 Sec. 2 [2.8] are to be made.

Type Approval documentation

Tests carried out
N/A

Production testing
Each accumulator shall be hydraulically pressure tested to the above mentioned test pressures in the presence of a DNV GL Surveyor.

Certification
Each accumulator is to be certified by a DNV GL Surveyor.

Materials shall be delivered with certificates as per DNVGL-RU-SHIP Pt. 4 Ch. 7 Sec. 1 Table 5. For accumulators certified according to DNVGL-ST-0378, DNVGL-ST-0358, DNVGL-OS-D101 and/or DNVGL-OS-E101, 3.1 material certificate is sufficient for pressurized parts.

All manufacturing, workmanship and testing shall be done in accordance with EN 14359, except for type SK350 160-250l d250 (Abnz) W3 (SA564)TA where manufacturing, workmanship and testing shall be done according to ASME Sec. VIII Div.1 Edition 2017.

For type SK350 160-250l d250 (Abnz) W3 (SA564)TA:
Materials shall fulfil requirements given in ASME Sec. VIII Div.1 Edition 2017.

Marking of product
Each pressure equipment shall be permanently and legibly marked on the pressure part or on a nameplate permanently attached to a principal pressure part to show its identity and origin.

The marking of pressure vessels shall show at least the following particulars:
— manufacturer's name and address
— type designation and serial number
— year of manufacture
— maximum allowable working pressure
— hydrostatic test pressure.

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.