

Certificate No:

P-14991

File No:

791.70

Job Id:

262.1-008664-2**TYPE APPROVAL CERTIFICATE****This is to certify:****That the Flexible Hoses of Non-Metallic Material with Permanently Fitted Couplings**

with type designation(s)

1SN and 1SC, 2SN and 2SC

Issued to

**PH Industrie-Hydraulik GmbH & Co. KG.
Sprockhövel Nordrhein-Westfalen, Germany**

is found to comply with

DNV Classification of Ships & HSLC Pt.4 Ch. 6 "Piping Systems"**Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment****Det Norske Veritas' Standards for Certification 2.9 No. 5-791.70****Application :****The hoses may be used in short lengths in the following: Hydraulic, Lubricating oil and Fresh water**

Type:	Temperature range:	Max. working press.:	Sizes:
1SN and 1SC	-40°C to +100°C	40 bar to 250 bar size dependent	3/16" (1 SN only), 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 1", 1 1/4", 1 1/2", 2", 2 3/8" (1SN only), 2 1/2" (1SC only), 3" (1SC only)
2SN and 2SC	-40°C to +100°C	80 bar to 415 bar size dependent	3/16" (2SN only), 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 1", 1 1/4", 1 1/2", 2", 2 3/8" (2SN only), 2 1/2" (2SC only), 3" (2SC only)

This Certificate is valid until **2018-06-30**.Issued at **Høvik** on **2014-08-08**DNV GL local station: **DNV Essen**Approval Engineer: **Tom Berg-Nielsen**for **DNV GL**

Digitally Signed By: Marianne Spæren Marveng

Location: DNV Høvik, Norway

Signing Date: 2014-08-12

**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.

If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million.

In this provision the "Society" shall mean DNV GL AS as well as all its direct and indirect owners, affiliates, subsidiaries, directors, officers, employees, agents and any other person or entity acting on behalf of DNV GL AS.

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Product description

Flexible hoses types:

- 1SN according to EN 853 - 1SN - SAE 100 R1AT - ISO 1436-1 1SN/R1AT
- 1SC according to EN 857-1SC

- 2SN according to EN 853 2SN - SAE 100 R2AT - ISO 1436-1 2SN/R2AT
- 2SC according to EN 857 - 2SC

Design:

1SN and 1SC: The hoses are made of oil resistant NBR rubber, and have a weather and oil resistant SBR cover. The hoses are reinforced with one high tensile steel wire braid.

2SN and 2SC: The hoses are made of oil resistant NBR rubber, and have a weather and oil resistant SBR cover. The hoses are reinforced with 2 high tensile steel braids.

Coupling material:

Couplings are made of stainless steel AISI 316, types as per PH catalogue section 2

Hose Manufacturer:

Manuli Hydraulics(Suzhou) Co., Ltd, Suzhou, Jiangsu, China

and

Manuli Rubber Industries, S.p.A. Ascoli Piceno, Italy

Coupling manufacturer:

PH Industrie-Hydraulik GmbH & Co. KG., Sprockhövel, Germany

Application/Limitation

Maximum working pressure:

Nominal size		1 SN and 1SC		2SN and 2SC	
Inch	DN	psi	bar	psi	bar
3/16 (1SN and 2SN only)	5	3600	250	6010	415
1/4	6	3260	225	5800	400
5/16	8	3110	215	5070	350
3/8	10	2610	180	4780	330
1/2	12	2320	160	3980	275
5/8	16	1880	130	3620	250
3/4	20	1520	105	3110	215
1	25	1270	88	2390	165
1 1/4	32	910	63	1810	125
1 1/2	40	720	50	1300	90
2	50	580	40	1160	80
2 3/8 (1SN and 2SN only)	60	720	50	1300	90
2 1/2 (1SC and 2SC only)	63	720	50	1010	70
3 (1SC and 2SC only)	76	500	35	650	45

Temperature range: -40°C to + 100°C.

This certificate is valid for the specific assembly of hose and coupling type as specified, assembled and delivered by the holder (named as manufacturer) of this certificate.

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All hose assemblies delivered under this type approval certificate shall be in compliance with an assembly procedure issued by the certificate holder.

Each hose assembly is before delivery to be hydraulic pressure tested to 1.5 times the maximum working pressure.

Hose assemblies delivered from the certificate holder shall be delivered with the following documentation:

- Pressure test report with reference to the type approval certificate.

The hose assemblies covered by this type approval may be assembled and delivered by other than the certificate holder under the following conditions:

- The assembler is authorised by a written authorization to fit the couplings to the hoses. The course holder shall keep record of all assembler authorisations.
- Hose assemblies are in accordance with an assembly procedure issued by the certificate holder and the assembler
- One sample of each hose type is to be burst tested and the testing is to be witnessed by DNV. This testing is to be performed every 4 years

Hose assemblies delivered from an authorized assembler shall in addition to the pressure test report with reference to the type approval certificate be delivered with a copy of the written authorization stamped by DNV.

The hoses can be used in short lengths (up to 2 meters) for ordinary machinery purposes in the systems mentioned on the front page.

Hoses used for continuous operation at temperatures higher than 100°C will have their lifetime reduced. In such cases more frequent inspections and planned exchange should be a part of the maintenance program.

The hoses must only be fitted in places where they are always accessible.

Flexible hoses of these types are not to be used on boiler fronts.

The hoses are to be mounted in accordance with the manufacturer's instructions.

It must be possible to shut off from the system all flexible hoses used in systems for lubrication oil, fuel oil and petroleum base hydraulic oil.

Type Approval documentation

Manufacturer's ring binder with:

- PH Hose- and Coupling brochure/catalogues including assembly instructions
- General list of types and sizes.
- Documents and information.
- Material- Reference to international standards.

DNV witnessed test reports "Static pressure test report" dated 14.10.2009.

Test reports from Brunel Car Synergies GmbH:

2A2006-0597-8 bis 10 dated 02.06.2008,

2A2006-0597-7 dated 05.05.2008

2A2006-0597-6 dated 29.04.2008

2A2006-0597-5 dated 10.04.2008

2A2006-0597-4 dated 04.02.2008

2A2006-0597-1 und 3 dated 29.03.2007

Manuli test report 89/03, 90/03, 91/03, 92/03, 93/03, 94/03 and 95/03

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Tests carried out

Dimensional Check, Change-in-Length, Burst test, Impulse test, Oil Resistance, Ozone Resistance, Cold Flexibility and Fire testing.

Marking of product

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

- Manufacturers trade mark PH on hose fittings
- Specification or hose name
- Hose size (inside diameter in inches)
- Date code (quarterly and daily production code)

Periodical assessment

For retention of the Type Approval, DNV Surveyor shall perform a survey every second year, to verify that the conditions for the type approval are complied with and to witness the following tests on a selection of sizes:

- Dimensional check.
- Change in length
- Leakage test
- Burst test

The tests shall be performed in accordance with procedures given in Det Norske Veritas' Certification Notes no. 2.9 – 5.791.70, "Type Approval of Flexible Hoses of Non-Metallic Material", or another recognised standard.

The tests are to be performed with the type of couplings fitted that are Type Approved with the hoses.

END OF CERTIFICATE