

Certificate No:

P-14992

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)

4SH - DIN EN 856, 4SP - DIN EN 856, R13 - DIN EN 856

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 :****May be used for: Hydraulic, lubricating oil, fresh water, sea water and sanitary systems.**

Type:	Temperature range:	Max. working press.:	Sizes:
4SH - DIN EN 856	-40°C to +100°C	250 bar to 420 bar size dependent	3/4", 1", 1 1/4", 1 1/2", 2"
4SP - DIN EN 856	-40°C to +100°C	175 bar to 485 bar size dependent	1/4", 3/8", 1/2", 5/8", 3/4", 1", 1 1/4", 1 1/2" and 2"
R13 - DIN EN 856	-40°C to +121°C	350 bar all sizes	3/4", 1", 1 1/4", 1 1/2" and 2"

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 Spaeren 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

4SH according to DIN EN 856/4SH

The hoses are made of oil resistant CR-NBR with an oil and weather resistant CR cover. The hoses are reinforced with 4 layers of steel wire spirally wrapped in alternating directions. Rubber layer between spirals.

4SP according to DIN EN 856/4SP.

The hoses are made of oil resistant CR-NBR rubber, and has a weather and oil resistant CR cover. The hose is reinforced with 4 layers of spiral wire with rubber layers between spirals.

R13 according to EN 856 R13

Hoses are made of synthetic rubber inner tube reinforced by four (for DN<31) and six (DN 31, 38, 51) high tensile steel spirals with a rubber layer between spirals. Cover: Synthetic Rubber

Couplings made of stainless steel AISI 316 as per PH catalogue section 2 and 3

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:

4 SP

Nominal size		Max. WP	
Inch	DN	bar	psi
1/4	6	485	7250
3/8	10	450	6670
1/2	12	425	6160
5/8	16	400	5800
3/4	19	380	5510
1	25	320	4640
1 1/4	31	210	3040
1 1/2	38	185	2680
2	51	175	2530

Temperature range -40°C to 100°C

4 SH

Nominal size		Max. WP	
inches	DN	bar	psi
3/4	19	420	6090
1	25	385	5580
1 1/4	31	350	5070
1 1/2	38	300	4350
2	51	250	3620

Temperature range -40°C to 100°C

R13

Nominal size		Max. WP	
inches	DN	bar	psi
3/4	19	350	5070
1	25	350	5070
1 1/4	31	350	5070
1 1/2	38	350	5070
2	51	350	5070

Temperature range -40°C to 121°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.

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 from a course holder. 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 has proved their qualifications by burst testing of a selection of hose/coupling combinations.
 - 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.

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.

Flexible hoses are only to be used where it is necessary due to vibrations or flexible mounting of the machinery. The hoses shall not replace/be used where permanent piping is possible/required.

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

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 compressed air, lube 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:

- 2A2006-0597-14 dated 16.11.2009
- 2A2006-0597-13 dated 01.09.2009
- 2A2006-0597-12 dated 03.11.2008
- 2A2006-0597-11 dated 06.10.2008

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

Tests carried out

Dimensional check, change in length, burst test, impulse test, oil resistance, ozone resistance, cold flexibility and fire test

Marking of product

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

- Manufacturers trademark 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 and before the expiry date of this certificate, 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 recognized standard.

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

END OF CERTIFICATE