Certificate No:
TAD00000CA

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Mud and Cementing Equipment
with type designation(s)
1.25" to 3" Black Eagle Flexible Hoses for Cementing and Chemical Injection
Issued to

Parker Hannifin Manufacturing Germany GmbH & Co. KG - Polyflex Division Europe

LAMPERTHEIM, Germany
is found to comply with
DNVGL-OS-E101 – Drilling plant, Edition July 2015

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL, with exception of vessels where full compliance with API Specification 7K is mandatory.
Product(s) covered in this certificate are: cementing flexible hoses and chemical injection flexible hoses.

This Certificate is valid until **2021-04-30**.

Issued at **Høvik** on **2016-05-01**
DNV GL local station: **Augsburg**
Approval Engineer: **Sinisa Sedlan** for **DNV GL**

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.

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Reference standard

API Spec 7K, Drilling and Well Servicing Equipment, 6th edition.

Manufacturing location

Manufacturing of body structures and assembling of end fittings:

- Parker Hannifin Manufacturing Germany GmbH & Co. KG - Polyflex Division Europe
  An der Tuchbleiche 4, 68623 Lampertheim (Hüttenfeld), Germany

Product description

Cement and chemical injection hose assemblies including:

- unbonded flexible hose
- end termination
- end connector

Application/Limitation

Structure	Hose nominal size	Max design pressure	Tempe-rature range	Core tube ID (hose ID)	Hose OD	FSL
2440N-20V80	1.25"	10 000 psi	-40/100°C	32.2 mm	55.5 mm	0
2640N-24V80	1.5"	10 000 psi	-40/70°C	38.0 mm	70.5 mm	0
2640N-24V80 -15K	1.5"	15 000 psi	-40/70°C	38.0 mm	66.0 mm	0
2240N-32V10	2"	3 000 psi	-40/100°C	50.5 mm	68.5 mm	0
2248N-32V10	2"	5 000 psi	-40/100°C	50.5 mm	68.5 mm	0
2448N-32V80	2"	5 000 psi	-40/70°C	50.5 mm	80.5 mm	0
2449N-32V10	2"	8 000 psi	-40/100°C	50.5 mm	80.5 mm	0
2580N-32V80	2"	10 000 psi	-40/70°C	50.5 mm	84.5 mm	0
2648N-32V80	2"	15 000 psi	-40/70°C	50.5 mm	86.0 mm	0
2240N-48V80	3"	5 000 psi	-40/70°C	75.0 mm	114.0 mm	0
2440N-48V80	3"	10 000 psi	-40/70°C	75.0 mm	122.0 mm	0
2640N-48V80	3"	15 000 psi	-40/70°C	75.0 mm	130.0 mm	0

Type Approval documentation

Tests carried out

1. Design verification testing for FSL 0 performed according to Ch. 9.6.10.2, 9.6.10.3, 9.6.10.6 & Ch. 9.6.10.7 in API Spec. 7K 5th edition, for the largest hose with the highest pressure rating in the range covered by this Type Approval (3" 15 000 psi hose 2640N-48V80).
   Reference is made to SwRI® Report 18.18142.01.330, Rev.1.

Conditions and Comments

1. The hoses covered in this Type Approval are compliant with requirements of DNVGL-OS-E101. Their suitability for service is established by having demonstrated partial compliance with API 7K requirements, with the design intention of API 7K retained.
   The hoses are not fully compliant with API 7K in the following:
   - The hoses do not belong to the same design family acc. to definition of family in API 7K
   - Working pressure ratings of 3K and 8K are not specified in API 7K Table 10
   - Working pressure rating of 5K is not intended for cement hoses in API 7K Table 10
   - Hose nominal sizes 1.25" and 1.5" are not specified in API 7K Table 10
   - Temperature ranges of the hoses do not correspond with temperature ranges specified in API 7K clause 9.7.3.1
   - The hoses do not meet the requirement of API 7K 9.7.10.2 for Deformation Test Under Pressure. It is the end user's responsibility to ensure that possible adverse effect of change of length under pressure is considered in the installation.
2. The hoses covered in this Type Approval cannot be used on installations where full compliance with API Specification 7K is required.
3. The end couplings that are NOT according to recognised international standard (such as API 6A or API 16A, etc.), for example, but not limited to, Hammer Lug unions and Grayloc hubs, will need to be in compliance with DNVGL-OS-E101. To demonstrate this, suitability for all internal and external loading shall be proven for each individual hose. Certification of these end couplings shall be according DNVGL-OS-E101:2015 section 3 table 10. This type approval certificate does NOT cover compliance with DNVGL-OS-E101 for NON standard end couplings; this shall be estabilished separately.

Manufacturing and Testing

1. Assembling of end terminations on hose bodies shall be according to procedures written and maintained by Parker Polyflex Division Europe.

2. Production testing as described in API Spec. 7K shall be followed.
3. DNV GL Product Certificate shall be issued for use on DNV GL class vessel and rigs with notation DRILL, DRILL(N), WELL-1, WELL-2, WELL(N).

Marking of product

For traceability the following marking is to be carried out on each product:

- All equipment shall be clearly marked with identification and serial number which relates the equipment to certificates and fabrication documentation.
- Markings in accordance with API spec. 7K, 6th ed.

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, to verify that the conditions for the type approval are complied with.
When possible, this assessment may be harmonised with normal surveys for product certification and / or other surveys and audits carried out.
The main elements of the certificate retention survey are:

- Verification of the TA applicant's production and quality system w.r.t. ensuring continued consistent production of the type approved products at the TA applicant's own premises
- Review of Type Approval documentation and assurance that it is still used as basis for production
- Review of possible changes in design, materials and performance
- Assurance of traceability between manufacturer's product type marking and Type Approval Certificate.

Renewal should be applied for in writing before the certificate expires.