

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Mud and Cementing Equipment**

with type designation(s)

High Pressure Mud Hoses GOLDENDRILL/5000 & 7500**Flexible Specification Level: FSL1**

Issued to

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

is found to comply with

DNV-OS-E101 Drilling Plant October 2013**Application :****Rotary hose, vibrator hose, or jumper hose****Reference standard:****API Spec. 7K "Specification for Drilling and Well Servicing Equipment", 5th edition, June 2010****API Spec. 16C "Specification for Choke and Kill Systems" 1st edition (used for fire testing requirements only)**This Certificate is valid until **2019-09-17**.Issued at **Høvik** on **2015-09-18**for **DNV GL**DNV GL local station: **Shanghai CMC**Approval Engineer: **Sinisa Sedlan**

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

Mud hose assemblies including:

- bonded flexible hose
- coupling
- end connector

Application/Limitation

Max design pressure:	5000 psi
Internal diameter (ID):	3.5", 4"
FSL level:	1
Temperature range (API 7K):	II
Min Design Temp:	-20 deg C
Max Design Temp:	+100 deg C
Firerated:	Yes, acc. to DNV GL requirements of 5 min minimum fire endurance acc. to ISO 15540

Max design pressure:	7500 psi
Internal diameter (ID):	3", 3.5"
FSL level:	1
Temperature range (API 7K):	II
Min Design Temp:	-20 deg C
Max Design Temp:	+100 deg C
Firerated:	Yes, acc. to DNV GL requirements of 5 min minimum fire endurance acc. to ISO 15540

Type Approval documentation Tests carried out

1. Design verification testing performed according to Ch. 9.6.10 in API Spec. 7K 5th edition. Reference is made to DNV Survey Reports MIL-13-2365-1 and MIL-14-0762-1, and SwRI® Report 18.18158.01.038.
2. Fire testing performed according to ISO 15540. Reference is made to Report JY-E-04-33, "Fire test related to Goldenfrill/5000 DN51 vs ISO 15540 witnessed by DNV GL surveyor".

Other conditions and comments

- Each mud hose is to be surveyed during fabrication in accordance with the requirements for equipment of Category I as defined in DNV's Offshore Standard DNV-OS-E101 Drilling Plant, followed by issuance of Product Certificate Form No. 20.92a. Fabrication records are to be maintained in accordance with DNV-OS-E101 Ch.3 Sec.3, Clause 2.
- NDT of the coupling assembly shall be in accordance with API 7K, 5th edition, chapter 8.
- Material certificates for the hose reinforcing cables and coupling assembly shall be in accordance with DNV-OS-E101 Ch.2 Sec.2, Clause 4.
- End connectors shall be of standard design according to API Spec. 7K 5th edition or they shall be delivered with DNV GL Product Certificate specific for the end connector.

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Certificate No: **TAD000004R**

- Connection between bonded flexible hose and coupling shall be according to "Hose Assembling Procedure" DAS-006.
- MBR (minimum bend radius) for the hose meets the requirements given in API Spec 7K, 5th edition, Table 9.
- Production locations covered by this Type Approval are:
 - Hose manufacturer and assembly plant: Suzhou, Jiangsu, China
 - Fitting production plant: Myslowice, Poland
 - Hose assembly plant: Manuli Hydraulics UK, Halesowen, UK

Testing

- Each hose assembly is to be pressure tested according to 1,5 x Max Working Pressure according to API Spec 7K, 5th edition.

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 7K, 5th ed.

Periodical assessment

For retention of the Type Approval, DNV GL's representative shall carry out biennial Product Audits.

END OF CERTIFICATE