

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Mud and Cementing Equipment**with type designation(s)
High Pressure Mud HosesIssued to
Techfluid Yantai Limited
Yantai, Shandong Province, Chinais found to comply with
DNVGL-OS-E101 – Drilling facilities, Edition January 2018**Application :****Product(s) approved by this certificate is/are accepted for installation on vessels classed by DNV GL.****Reference standard:**
API Spec. 7K "Drilling and Well Servicing Equipment", 6th edition, December 2015
API Spec. 16C "Specification for Choke and Kill Systems" 1st edition (used for fire testing requirements only)Issued at **Høvik** on **2018-03-15**for **DNV GL**This Certificate is valid until **2019-12-31**.DNV GL local station: **Shanghai**Approval Engineer: **Maheshraja Venkatesan**

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.



Job Id: **262.1-017645-4**
Certificate No: **TAD00000MS**
Revision No: **1**

Product description

Mud hose assemblies including:

- bonded flexible hose
- coupling
- end connector

Application/Limitation

Rotary hose, vibrator hose, or jumper hose

Max design pressure	:	7500 psi
Internal diameter (ID)	:	2.5", 3", 3.5", 4" & 5"
FSL level	:	2
Temperature range (API 7K)	:	II
Min Design Temp.	:	-25 deg C
Max Design Temp.	:	+100 deg C
Firerate	:	Yes, acc. to DNV GL requirements of 5 min minimum fire endurance acc. to API 16C

Type Approval documentation

The following drawings are stamped "Type Approved":

<u>Drwg. No.</u>	<u>Title</u>
NJG-SZ-64x51.7-05 Rev.1	Ø64x51.7 MPa Hose Construction
NJG-SZ-64x51.7-01 Rev.1	Ø64x51.7 MPa Hose Coupling
NJG-SZ-64x51.7-04 Rev.1	Ø64x51.7 MPa Hose End Finishing
NJG-SZ-76x51.7-05 Rev.1	Ø76x51.7 MPa Hose Construction
NNG-SZ-76x51.7-05 Rev.1	Ø76x51.7 MPa Fire Rated Hose Construction
NJG-SZ-76x51.7-01 Rev.1	Ø76x51.7 MPa Hose Coupling
NJG-SZ-76x51.7-04 Rev.1	Ø76x51.7 MPa Hose End Finishing
NJG-SZ-89x51.7-05 Rev.1	Ø89x51.7 MPa Hose Construction
NJG-SZ-89x51.7-01 Rev.1	Ø89x51.7 MPa Hose Coupling
NJG-SZ-89x51.7-04 Rev.1	Ø89x51.7 MPa Hose End Finishing
NJG-SZ-102x51.7-05 Rev.1	Ø102x51.7 MPa Hose Construction
NNG-SZ-102x51.7-05 Rev.1	Ø102x51.7 MPa Fire Rated Hose Construction
NJG-SZ-102x51.7-01 Rev.1	Ø102x51.7 MPa Hose Coupling
NJG-SZ-102x51.7-04 Rev.1	Ø102x51.7 MPa Hose End Finishing
NJG-SZ-127x51.7-05 Rev.1	Ø127x51.7 MPa Hose Construction
NNG-SZ-127x51.7-05 Rev.1	Ø127x51.7 MPa Fire Rated Hose Construction
NJG-SZ-127x51.7-01 Rev.1	Ø127x51.7 MPa Hose Coupling
NJG-SZ-127x51.7-04 Rev.1	Ø127x51.7 MPa Hose End Finishing

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Tests carried out

1. Design verification testing performed according to Ch. 9.10.10 in API Spec. 7K 4th edition, Addendum 2.
Reference is made to DNV Survey Report SHA/80526516/TF/7K/0903-3.
2. Fire testing performed according to Ch.10.5.1 in API Spec. 16C 1st edition.
Reference is made to DNV Survey Reports SHA/80526516/TF/R/0910-2, SHA/80550600/TF/R/1209-1 and SHA/PP132433/SR-15-03.
3. High-Frequency Pulsation testing performed according to Ch. 9.6.10.5 in API Spec. 7K 5th edition.
Reference is made to Test Report 0711-005-01 endorsed by DNV 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 GL's Offshore Standard DNVGL-OS-E101 Drilling Facilities, followed by issuance of Product Certificate Form No. CMC 231. Manufacturing records are to be maintained in accordance with DNVGL-OS-E101 Ch.3 Sec.3, Clause 2.
- NDT of the coupling assembly shall be in accordance with API 7K, 6th edition, chapter 8.
- Material certificates for hose reinforcing cables and coupling assembly shall be in accordance with DNVGL-OS-E101 Ch.3 Sec.2, Clause 3.2.
- End connectors shall be of standard design according to API Spec. 7K 6th edition or they shall be delivered with DNV GL Product Certificate specific for the end connector.
- Connection between bonded flexible hose and coupling shall be according to "API 7K Hose End Coupling Method of Attachment to Hose Body" Drwg. No. SK-236, Rev.0. Epoxy resin shall be as specified in the document "Epoxy Physical indicators" No. TFY-095, Rev.1.
- MBR (minimum bend radius) for different hose sizes and ratings meets the requirements given in API Spec 7K, 6th edition, Table 10.
- This document may be used as part of the documentation required to comply with European Union (EU) Directives referenced in PSA's Acts, regulations and provisions for the petroleum activities. It should however be noted that the scope covered by this document does not necessarily cover all aspects required to issue the EU Declaration of Conformity and to affix the CE-mark. It is the manufacturer's/operator's responsibility to ensure compliance with relevant EU Directives.

Production Testing

- Each hose assembly is to be pressure tested to 1.5 x Max Working Pressure according to API Spec 7K, 6th 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, 6th ed.

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.