DNV·GL

Certificate No:
TAD000013A

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Drill-through Hydraulic Connector Equipment

with type designation(s)
DX 10K Hydraulic Connectors, DX-DW 15K Hydraulic Connectors

Issued to
Dril-Quip, Inc.
Houston, TX, USA

is found to comply with
DNVGL-OS-E101 – Drilling facilities, Edition January 2018
DNVGL-SI-0166 – Verification for compliance with Norwegian shelf regulations, Edition July 2018

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL when accompanied with a DNV GL Product Certifcate (PC).

Issued at **Houston, TX** on **2019-03-20**
This Certificate is valid until **2024-03-19**.
DNV GL local station: **Certification & Inspection Services**

Approval Engineer: **Mark Miser**

for **DNV GL**

Christian Nilsen
CMC Manager - Approval

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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Product description

Hydraulically actuated drill-through equipment that locks and seals on end connections.

Part No.	Rev.	Description	Note
2-608257-03	A	16-3/4 10K DX Hydraulic Connector	For 25.75 Mandrel
2-602835-05	F	18-3/4 10K DX Hydraulic Connector	For 27.00 Mandrel
2-608262-03	A	18-3/4 10K DX Hydraulic Connector	For 27.00 Mandrel
2-608375-02	A	18-3/4 10K DX Hydraulic Connector	For 27.00 Mandrel
2-608376-02	B	18-3/4 10K DX Hydraulic Connector	For 27.00 Mandrel
2-602834-05	K	18-3/4 15K DX-DW Hydraulic Connector	For 27.00 Mandrel
2-604686-03	A	18-3/4 15K DX-DW Hydraulic Connector	For 27.00 Mandrel
2-608647-03	NC	18-3/4 15K DX-DW Hydraulic Connector	For 27.00 Mandrel
2-608267-03	A	18-3/4 15K DX-DW Hydraulic Connector	For 30.00 Mandrel

Applied Normative References

[1] API Spec 16A, Specification for Drill-through Equipment, 3rd Edition

[2] NACE MR0175, Petroleum and Natural Gas Industries - Materials for Use in H_2S-Containing Environments in Oil and Gas Production, 2nd Edition

Special Limitation

The applied normative reference for this Type Approval Certificate is API 16A 3rd Edition. For DNV GL Classed vessels contracted after the effective date of API 16A 4th Edition, or when API 16A 4th Edition is required by the equipment manufacturer's contract, this Type Approval Certificate shall not be applied.

Application/Limitation

DX Hydraulic Connector, P/N 2-608257-03

Design Parameter	Value	(Equivalent)
Nominal Size Designation	16.75 in	(425mm)
Rated Working Pressure	10,000 psi	(69.0 MPa)
Hydrostatic Test Pressure	15,000 psi	(103.5 MPa)
Normal Hydraulic Operating Pressure	1,500 psi	(10.3 MPa)
Max. Hydraulic Operating Pressure	3,000 psi	(20.7 MPa)
Hydraulic Operating Test Pressure	4,500 psi	(31.0 MPa)
External Load & Bending Moment at 0 psi[Note 1]	6,546,000 lbf & 3,219,000 ft-lbf	(29,118.1 kN & 4,364.4 kN-m)
External Load & Bending Moment at RWP	3,974,000 lbf & 1,954,000 ft-lbf	(17,677.2 kN & 2,649.3 kN-m)
API 16A Temperature Classification (T-0)	0°F to 250 °F	(-18°C to 121°C)
System, Equipment, Service	Well Control System, BOP Equipment, H_2S (Sour)	

DX Hydraulic Connectors, P/Ns 2-602835-05, 2-608262-03, 2-608375-02 & 2-608376-02

Design Parameter	Value	(Equivalent)
Nominal Size Designation	18.75 in	(476mm)
Rated Working Pressure	10,000 psi	(69.0 MPa)
Hydrostatic Test Pressure	15,000 psi	(103.5 MPa)
Normal Hydraulic Operating Pressure	1,500 psi	(10.3 MPa)
Max. Hydraulic Operating Pressure	3,000 psi	(20.7 MPa)
Hydraulic Operating Test Pressure	4,500 psi	(31.0 MPa)
External Load & Bending Moment at 0 psi[Note 2]	7,343,000 lbf & 3,837,000 ft-lbf	(32,663.3 kN & 5,202.3 kN-m)
External Load & Bending Moment at RWP	4,192,000 lbf & 2,190,000 ft-lbf	(18,647.0 kN & 2,969.2 kN-m)

API 16A Temperature Classification (T-0)	0°F to 250 °F	(-18°C to 121°C)
System, Equipment, Service	Well Control System, BOP Equipment, H_2S (Sour)	

DX-DW Hydraulic Connectors, P/Ns 2-602834-05, 2-604686-03 and 2-608647-03

Design Parameter	Value	(Equivalent)
Nominal Size Designation	18.75 in	(476mm)
Rated Working Pressure	15,000 psi	(103.5 MPa)
Hydrostatic Test Pressure	22,500 psi	(155.1 MPa)
Normal Hydraulic Operating Pressure, Lock	750 psi	(5.2 MPa)
Max. Hydraulic Operating Pressure, Lock	1,500 psi	(10.3 MPa)
Normal Hydraulic Operating Pressure	1,500 psi	(10.3 MPa)
Max. Hydraulic Operating Pressure	3,000 psi	(20.7 MPa)
Hydraulic Operating Test Pressure	4,500 psi	(31.0 MPa)
External Load & Bending Moment at 0 psi[Note 3]	13,490,000 lbf & 7,233,000 ft-lbf	(60,006.5 kN & 9,806.6 kN-m)
External Load & Bending Moment at RWP	8,763,000 lbf & 4,698,000 ft-lbf	(38,979.8 kN & 6,369.6 kN-m)
API 16A Temperature Classification (T-0)	0°F to 250 °F	(-18°C to 121°C)
System, Equipment, Service	Well Control System, BOP Equipment, H_2S (Sour)	

DX-DW Hydraulic Connector, P/N 2-608267-03

Design Parameter	Value	(Equivalent)
Nominal Size Designation	18.75 in	(476mm)
Rated Working Pressure	15,000 psi	(103.5 MPa)
Hydrostatic Test Pressure	22,500 psi	(155.1 MPa)
Normal Hydraulic Operating Pressure	1,500 psi	(10.3 MPa)
Max. Hydraulic Operating Pressure	3,000 psi	(20.7 MPa)
Hydraulic Operating Test Pressure	4,500 psi	(31.0 MPa)
External Load & Bending Moment at 0 psi[Note 4]	19,600,000 lbf & 8,354,000 ft-lbf	(87,185.1 kN & 11,326.5 kN-m)
External Load & Bending Moment at RWP	14,870,000 lbf & 5,811,000 ft-lbf	(66,145.1 kN & 7,878.7 kN-m)
API 16A Temperature Classification (T-0)	0°F to 250 °F	(-18°C to 121°C)
System, Equipment, Service	Well Control System, BOP Equipment, H_2S (Sour)	

Notes**:**

1. The listed capacities are based on pure tension capacity and equivalent bending moment. They do not take into account compression of the hub face during pure bending or the capacity of the wellhead. When considering the compression of the hub face during pure bending, the system has a pure bending capacity of 3,034,000 ft-lbf without internal pressure. Equipment may be further limited by the API 16A End Connection.

2. The listed capacities are based on pure tension capacity and equivalent bending moment. They do not take into account compression of the hub face during pure bending or the capacity of the wellhead. When considering the compression of the hub face during pure bending, the system has a pure bending capacity of 3,224,000 ft-lbf without internal pressure. Equipment may be further limited by the API 16A End Connection.

3. The listed capacities are based on pure tension capacity and equivalent bending moment. They do not take into account compression of the hub face during pure bending or the capacity of the wellhead. When considering the compression of the hub face during pure bending, the system has a pure bending capacity of 3,549,000 ft-lbf without internal pressure. Equipment may be further limited by the API 16A End Connection.

4. The listed capacities are based on pure tension capacity and equivalent bending moment. They do not take into account compression of the hub face during pure bending or the capacity of the wellhead. When considering the compression of the hub face during pure bending, the system has a pure bending capacity of 7,947,000 ft-lbf without internal pressure. Equipment may be further limited by the API 16A End Connection.

Type Approval documentation

Tests carried out

Report No.	Description	Note	Serial No.
FT-377	16-3/4 10K DX Hyd Connector	For 25.75 Mandrel	217403-01
FT-377	18-3/4 10K DX Hyd Connector	For 27.00 Mandrel	231646-01
FT-377	18-3/4 10K DX Hyd Connector	For 27.00 Mandrel	207727-01
FT-377	18-3/4 10K DX Hyd Connector	For 27.00 Mandrel	235143-01
FT-377	18-3/4 10K DX Hyd Connector	For 27.00 Mandrel	207727-01
FT-377	18-3/4 15K DX-DW Hyd Connector	For 27.00 Mandrel	163801-01
FT-377	18-3/4 15K DX-DW Hyd Connector	For 27.00 Mandrel	209069-01
FT-377	18-3/4 15K DX-DW Hyd Connector	For 27.00 Mandrel	209069-01
FT-377	18-3/4 15K DX-DW Hyd Connector	For 30.00 Mandrel	203747-01

Marking of product

Marking shall:

1. Be reviewed and approved by the DNV GL local surveyor.
2. Identify and differentiate each production unit <i.e. serial number>.
3. Establish traceability to product design and fabrication documentation.
4. Be in conformance to API 16A §9.

Periodical assessment

For retention of the Type Approval, DNV GL's surveyor shall perform a survey every second year in accordance with DNV GL Type Approval Scheme DNVGL-CP-0338.

END OF CERTIFICATE