DNV·GL

Certificate No:
TAD00000C4

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Marine Riser Equipment

with type designation(s)
Drilling Riser, 5.0K Subsea FlexJoint Assembly

Issued to
Oil States Industries Inc.
ARLINGTON TX, United States

is found to comply with
DNV-OS-E101 Drilling Plant October 2013
and DNV GL AS' understanding of the implementation and interpretation of:
PSA's "Regulations relating to design and outfitting of the facilities etc. in the petroleum activities" (THE FACILITIES REGULATIONS), Last amended 16 December 2014, Ch.VIII

Application :

See Page 2

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **2016-12-31**.

Issued at **Houston** on **2014-08-11**

for **DNV GL**

DNV GL local station: **Houston - Systems & Components**

Approval Engineer: **Mark Miser**

Brandon D Caraway
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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Job Id: **262.1-022291-1**
Certificate No: **TAD00000C4**

Product description

A Marine Drilling Riser FlexJoint is a steel and elastomer assembly having a central through-passage equal to or greater in diameter than the riser bore that may be positioned in the riser string to allow greater angular deflection which reduces local bending stress in the riser string.

Referenced Standards

[1] API 16F, "Specification for Marine Drilling Riser Equipment", 1st Edition

Application/Limitation

Design Parameter	Value	(Equivalent)
Rated Axial Tensile Load	: 11,121 kN	(2,500,000 lb_f)
Rated Axial Compressive Load	: 0 kN	(0 lb_f)
Rated Working Pressure	: 34.5 MPa	(5,000 psi)
Hydrostatic Test Pressure	: 51.7 MPa	(7,500 psi)
Minimum Design Temperature	: -20°C	(-4°F)
Maximum Design Temperature	: 230°C for 7 days : 25°C for 300 years	(446°F) (77°F)
Combined Loading Condition #1	: 8,896 kN, ±10° Conical Rotation, at 34.5 MPa : (2.0 x 10^6 lb_f, ±10° Conical Rotation, at 5,000 psi)	
Combined Loading Condition #2	: 11,121 kN, ±10° Conical Rotation, at 0 MPa : (2.5 x 10^6 lb_f, ±10° Conical Rotation, at 0 psi)	
Hydrotest Condition	: 0 kN, ±0° Conical Rotation, at 51.7 MPa : (0 lb_f, ±0° Conical Rotation, at 7,500 psi)	
Maximum Flex Angle	: ±10° Conical Rotation	
Service	: Well Control System, Marine Drilling Riser Equipment, Sour (H_2S)	

Design Limitation Note: Customer supplied Riser Couplings shall be provided with DNV GL Product Certification and may reduce the indicated design limitations.

Type Approval documentation

PD14806 A Back Flange with Inconel Lined O Ring Grooves 5.0 ksi Riser Flexjoint

Component	Material	Rev.	Grade	Min. Yield	Average Charpy
Nipple and Upper Flange	SP1B-00-002	T	V	80 ksi	31 ft–lb_f at -25°F
Reinforcements	SP1B-00-036 or SP1B-00-003	L N	N/A 1	90ksi 95 ksi	40 ft–lb_f at -20°F 40 ft–lb_f at -20°F
Back Flange	SP1B-00-003	N	2	120 ksi	40 ft–lb_f at -20°F
Retainer Flange	SP1B-00-003	N	1 or 2	95 ksi	40 ft–lb_f at -20°F
Body	SP1B-00-002	T	III	60 ksi	31 ft–lb_f at -25°F
Groove Insert	SP1B-00-002	T	III	60 ksi	31 ft–lb_f at -25°F
Wear Ring	SP1B-00-002	T	III	60 ksi	31 ft–lb_f at -25°F
Wear Sleeve	AISI 4140/4340			187-237 HB	N/A
Stud	ASTM A320 or ASTM A193		L7 B7	105 ksi	20 ft–lb_f at -50°F
Nut	ASTM A194		7	N/A	20 ft–lb_f at -50°F

Prototype Testing

For prototype testing as required by API Specification 16F,
see DNV GL reports ANMUS476PP002832emay20110823D, ANMUS476PP002832jdun20110608A, ANMUS476PP002832jdun20110615A and ANMUS476PP002832wdd6july2011A

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 accordance with API 16F (Ref. 1st Edition §8.7).

Comments

None

Periodical assessment

For retention of the Type Approval, DNV GL's surveyor shall perform a survey every second year in accordance with DNV Standard for Certification No. 1.2.

Revision

TAD00000C3 was issued to revise TAC D-5656. Added drawings (PD14804, PD14805, PD14806, PD8053), and revision level for PD7437 has been changed from Rev. D to Rev. E.

ENG OF CERTIFICATE