

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Miscellaneous

with type designation(s)

Wellbore Sensor Assembly

Models: 219063, 219065, 234969

Issued to

Lord Corporation dba Stellar Technology

Amherst NY, United States

is found to comply with

DNVGL-OS-E101 – Drilling plant, Edition July 2015

DNVGL-SI-0166 – Verification for compliance with Norwegian shelf regulations, Edition July 2015

Application :

see page 2

This Certificate is valid until **2022-02-15**.

Issued at **Houston** on **2017-02-16**

DNV GL local station: **New York**

Approval Engineer: **Monique Seymore**

for **DNV GL**

Mark Miser
Team Lead

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.

Certificate No: **TAD00000MB**
File No: **523.89**
Job Id: **262.1-013278-6**

Product description

This device mounts in the wellbore stream and monitors the wellbore medium – specifically drilling mud pressure and temperature.

The following part numbers are included:

-	219063-20000G-001 Rev. B	3 1/16 x 15M, AX-6S Hub
-	219063-20000G-002 Rev. B	3 1/16 x 15M, AX-6S Hub
-	219065-7500BD-002 Rev. A	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-003 Rev. D	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-004 Rev. C	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-005 Rev. C	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-006 Rev. D	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-007 Rev. C	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-008 Rev. C	3 1/16 x 15M, AX-154 Hub
-	234969-20000G-000 Rev. C	4 1/16 x 15M, BX-155 Hub
-	219063-20000G-101 Rev. A	3 1/16 x 15M, AX-6S Hub
-	219063-20000G-102 Rev. A	3 1/16 x 15M, AX-6S Hub
-	219065-7500BD-102 Rev. A	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-103 Rev. B	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-104 Rev. B	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-105 Rev. B	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-106 Rev. B	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-107 Rev. B	3 1/16 x 15M, BX-154 Hub
-	219065-20000G-108 Rev. B	3 1/16 x 15M, AX-154 Hub
-	219065-20000G-206 Rev. B	3 1/16 x 15M, BX-154 Hub

Design codes/standards used as references

- API 6A "Specification for Wellhead and Christmas Tree Equipment" 20th Edition

Application/Limitation

Nominal Bore Size	: 4 1/16" (103 mm)
Working Pressure	: 15,000 psi (103.4 MPa)
Test Pressure	: 22,500 psi (155.1 MPa)
Product Specification Level	: PSL 3
Service	: Internal H ₂ S
API 6A Temperature Rating	: P (-20°F)
Designation of Systems	: Well Monitoring Systems
Type of Equipment	: Measuring device/sensor

Type Approval documentation

Note: Other part numbers or updated revisions may be acceptable under this Certificate, provided critical aspects of the design remain the same. Changes shall be documented and approved (via Engineering Change Notice or similar) by the Manufacturer's Engineering and/or Quality Department as appropriate. DNV GL's local surveyor shall verify the change before issuance of the Product Certificate.

DRAWINGS:

Dwg No.	Revision	Description
227802	Rev. B	Assembly, Wellbore, 219063-001
228049	Rev. B	Assembly, Wellbore, 219063-002
223865	Rev. F	Assembly, Wellbore, 219065-002
224502	Rev. C	Assembly, Wellbore, 219065-003
228903	Rev. C	Assembly, Wellbore, 219065-004
228020	Rev. C	Assembly, Wellbore, 219065-005

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233111	Rev. D	Assembly, Wellbore, 219065-006
240438	Rev. B	Assembly, Wellbore, 219065-007
240427	Rev. A	Assembly, Wellbore, 219065-008
235257	Rev. C	Assembly, Wellbore, 234969-000
247814	Rev. A	Assembly, Wellbore, 219063-101
247815	Rev. A	Assembly, Wellbore, 219063-102
247816	Rev. A	Assembly, Wellbore, 219065-102
247818	Rev. A	Assembly, Wellbore, 219065-103
247819	Rev. A	Assembly, Wellbore, 219065-104
247820	Rev. A	Assembly, Wellbore, 219065-105
247821	Rev. A	Assembly, Wellbore, 219065-106
247822	Rev. A	Assembly, Wellbore, 219065-107
247823	Rev. A	Assembly, Wellbore, 219065-108
251393	Rev. A	Assembly, Wellbore, 219065-206
227805	Rev. B	Adapter, Wellbore, Cameron Hub
224184	Rev. D	Adapter, Flange, Riser-DP
224620	Rev. E	Adapter, Flange, Wellbore, 7-Pin Connector
240428	Rev. A	Adapter, Flange, Wellbore, AX Style
235283	Rev. C	Adapter, Flange, Wellbore, BX-155 15M, 7-Pin Connector
221719	Rev. L	Tube, Wellbore
235284	Rev. E	Tube, Wellbore, Ø4.00
226622	Rev. B	Adapter, Receptacle, Wellbore, Ø5.87, 217936
224546	Rev. D	Adapter, Receptacle, Wellbore, Ø5.87
224186	Rev. D	Adapter, Receptacle, Wellbore, 219065-002
219110	Rev. F	Block, Housing, Wellbore
231981	Rev. F	Header, High Pressure, 7 Pin, O-Ring Seal
219093	Rev. F	Ring, Retainer, Wellbore
231980	Rev. D	Header, Shell, High Pressure, 7 Pin, O-Ring Seal
241183	Rev. B	Adapter, Receptacle, Ø5.87, 7/16-20 Face Seal, Wellbore
235287	Rev. B	Block, Housing, Sensing Element, Wellbore, Ø4.00

CALCULATIONS :

Document Number 235291C – Wellbore Sensor Assembly Design Data Book

MATERIAL SPECIFICATIONS:

<u>Material</u>	<u>Rev</u>	<u>Minimum Yield</u>	<u>Avg. Charpy</u>
218881B (DCN 3331)	B	30,000 psi (207 MPa)	NA
234288A (DCN 6945)	C	Annealed: 48,000 psi (331 MPa) Annealed & Hardened: 120,000 psi (827 MPa)	40 ft·lbs @ -75°F
221721A (DCN 0598)	A	105,000 psi (724 MPa)	31 ft·lbs @ -75°F

Note: These Material Specifications are specified on the Bill of Materials for the above referenced Part Numbers.

Tests carried out

Reference DNV GL's Type Approval Certification Report, dated 2012-05-29

Marking of product

For traceability, the following markings shall be carried out on each product:

- Serial No.
- As stated in API 6A
- According to the manufacturer's specification(s)

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Other comments/conditions

1. Procedures related to testing, welding, NDT, etc. are to be reviewed/approved by DNV GL's local surveyor.
2. Fabrication records are to be maintained in accordance with DNVGL-OS-E101 Ch.3 Sec. 3 [2].
3. When DNV GL Product Certification is required, each product is to be surveyed during fabrication in accordance with the requirements for Category I equipment as defined in DNV GL's Offshore Standard DNVGL-OS-E101.
4. TAD00000MB replaces TAC D-6061.

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, October 2015 Edition.

END OF CERTIFICATE