DNV·GL

Certificate No:
TAD00000M0

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Accumulators

with type designation(s)
Accumulator, Piston Style, Model 052A50-4-B786, 1/2 Gallon Capacity

Issued to
Tobul Accumulator
Bamberg SC, 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 - Ch.2 Sec.7 DRILL(N), July 2015

Application :

See Page 2

Issued at **Houston** on **2017-02-07**
This Certificate is valid until **2022-02-06**.
DNV GL local station: **Houston, Approval CMC**

Approval Engineer: **M. Kevin Mandeville Jr.**

for **DNV GL**

Christian Nilsen
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: **262.1-024959-1**
Certificate No: **TAD00000M0**

The following design codes/standards were used as references:

ASME *Boiler & Pressure Vessel Code,* Section VIII, Division 1, 2015 Edition
ASME B1.1, *Unified Inch Screw Threads (UN and UNR Thread Form)*, 2003 Edition
ASME B1.9, *Buttress Inch Screw Threads 7°/45° Form with 0.6 Pitch Basic Height of Thread Engagement,* 1985 Edition

Product description

Piston Type Accumulator (Subsea Application)
Model No. 052A50-4-B786 (1/2 Gallon Capacity)

Application/Limitation

Design Parameter	Value	Equivalent
Max Allowable Working Pressure	5,000 psi	345 bar
Hydrostatic Test Pressure	7,500 psi	517 bar
Max Allowable External Working Pressure †	3575 psi	246 bar
Minimum Design Metal Temperature	-20°F	-29°C
Design Temperature	200°F	93°C
Corrosion Allowance (internal and external)	0in	0mm
ASME Code Stamp "U"	Yes	

†Note: The accumulator is not rated for external gage pressure. This statement does not, however, prevent subsea applications.

Type Approval documentation

Drawings

Drawing No.	Rev.	Description
052A50-4-B786	02	Accumulator Assembly, Model No. 052A50-4-B786
C42TF33-129	00	Cylinder 052A30 Series
HF33MC19-4	00	End Cap - Fluid (Threaded Type), 5.2A50 Series
HG33MC19-1	02	End Cap - Gas (Threaded Type), 5.2A50 Series

Materials

Item	Material Specification	Min. Yield Strength	Charpy V-Notch Test Requirements
Cylindrical Shell, Retaining Ring	ASTM-A487-CA6NM-Class A QF: 85%	80 ksi	0.015in Minimum Lateral Expansion @-20°F
End Cap	ASTM-A479-Type 316	30 ksi	Exempt

*Note: Approved alternative materials for the end caps.

Design Calculations:

Design Calculations for 052A50-4-B786, Piston Type Accumulator, Revision 0 (8 pages)
External Pressure Calculation for 052A50-4-B786 (cylinder), Revision 0 (1 page)

Tests carried out

Type Test performed on serial numbers 351137-351139 on 08/15/2016, witnessed by M. Mierlo.

Marking of product

For traceability to this Type Approval Certificate the products are as a minimum to be marked as follows:

1. Serial Number
2. Manufacturer's name and trademark
3. Additional marking at manufacturer’s option
4. As required in Paragraph UG-116 of ASME BPVC, Section VIII, Division 1, 2015 Edition

Certificate retention survey

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

Other Comments and Conditions

1. Cylinder castings are to be processed per ASME BPVC Section VIII, Division 1, Appendix 7 and 8 for a quality factor of 85%.
1. DNV GL Ref. Project PP174944-01.

END OF CERTIFICATE