

DET NORSKE VERITAS

DESIGN VERIFICATION REPORT

(Independent Review Certificate)

MANUFACTURER

Type B Solutions, LLC

LOCATION

Seabrook, Texas - USA

PURCHASE ORDER NO.

GE/ODER/NORB X/XI

END USER

Nobre X

VESSEL ID

D30748

DNV FILE NO.

EP030995

This is to certify that the design of:

Class 300 4-in. Valve (P/N: 3143290-03 & Model No: 4E5-3-JI-30-H25-ML-IN) Class 300 6-in. Valve (P/N: 3143423-06 & Model No: 6E5-3-JI-30-H25-ML-IN) Class 300 16-in. Valve (P/N: 3143287-04 & Model No: 16E5-3-JI-30-H10-ML-IN)

has been reviewed and found to comply with:

- Det Norske Veritas' Offshore Standard DNV-OS-E101, 'Drilling Plant', October 2009

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

The verification is based on the following:

A. The following were used as references:

- ASME Boiler & Pressure Vessel Code Section VIII Division 1 'Rules for Construction of Pressure Vessels' 2007 Edition
- ASME B16.34 'Valves Flanged, Threaded, and Welding End' 2004 Edition
- API 6D 'Specification for Pipeline Valves' 23rd Edition, April 2008

B. Design Limitations

- Maximum Design Pressure : 51 bar (740 psi)
- Minimum Design Temperature : 38 °C (100 °F)
- Service : Sour/H₂S

C. Design Specifications

Drawings:

Drwg. No.	Rev.	Description
- BS3R-SW,A105N/NO.75333-B7	'M/2HM -	Class 300 Size 6~24"
- BS3R-FU V1,A105N/NO.15333	-INC-B7M/2HM -	Class 300 Size 4"

D. Calculations

Doc. No.	<u>Date</u>	Description
- N/A - N/A - N/A - N/A - N/A - N/A	12 March 2009 23 February 2009 12 March 2009 12 March 2009 23 February 2009 15 March 2010	4" – 300 lbs Valve Parameters, Data, Dimensions, Moments & Stresses 6" – 300 lbs Valve Parameters, Data, Dimensions, Moments & Stresses 16" – 300 lbs Valve Parameters, Data, Dimensions, Moments & Stresses 4" – 300 lbs Trunnion Ball Valve Calculations of Strength 6" – 300 lbs Trunnion Ball Valve Calculations of Strength 16" – 300 lbs Trunnion Ball Valve Calculations of Strength
		8

E. Material Specifications

Component	<u>Material</u>	Minimum Yield
 Body, Bonnet, Flange, Top Flange, Gland Ball, Seat Retainer, Stem, Trunnion Washer, Seal Gasket, Gland & Body Gasket Studs, Screws, Bolts Nuts 	ASTM A105N ASTM A105N/ENP 316 S.S. + Graphite ASTM A193 – B7M ASTM A194 – 2HM	36,000 psi (248 MPa) 36,000 psi (248 MPa) 205,000 psi (1,413 MPa) 105,000 psi (724 MPa)

DET NORSKE VERITAS AS, VERITASVEIEN 1, N-1322 HØVIK, NORWAY Form No.: 40.91a | Issue: June 2000

F. Comments

- 1. Certificate 3.1 to show compliance with Charpy values in Table B1 from DNV's Offshore Standard DNV-OS-E101 'Drilling Plant' October 2009.
- 2. Procedures related to testing, welding, NDT, etc are to be reviewed/approved by DNV's local surveyor.
- 3. Inspection and testing of the valve shall be in accordance to API 6D.
- 4. The lifting lugs were not reviewed and therefore excluded in this report.
- 5. Materials for pressure-containing and pressure-controlling shall meet the requirements of ISO 15156.

Houston, 16 September 2010

for DET NORSKE VERITAS (USA), INC.

Head of Section

Monique Annette Canales

Project Engineer

Distribution:

Orig: Type B Solutions, LLC (Attn: W.H. Stewart III)

CC: File; NPS