



**BUREAU  
VERITAS**

**CERTIFICATE OF TYPE APPROVAL  
BUREAU VERITAS MARINE & OFFSHORE  
E&P/11970N-C-2014-001 Rev.0**

This is to confirm that the general certification procedure described in Appendix E has been satisfactorily applied, with respect to conformity of NOV Flexibles design, qualification and manufacturing procedures versus API 17J specification 3<sup>rd</sup> ed. (2008) / ISO 13628-2 (2006), and results successfully evaluated for:

Manufacturing Units: **NOV Flexibles – Kalundborg, Denmark**  
**NOV Flexibles – Açú, Brazil**

**Product** NOV Non-Bonded Flexible Pipelines  
**Description** Range of Internal Diameter: up to 16”  
Family I: Smooth Bore Pipes with Steel Strips or C-Profile Pressure Wires  
Family III: Rough Bore Pipes with Steel Strips or C-Profile Pressure Wires  
**Design pressure** Up to 552 bar (55.2 MPa, 8000 psi) depending on internal diameter and materials used  
**Design temperature** From –50°C to 130 °C depending on steel and plastic materials used  
**Application** Static and Dynamic applications as described in Appendix B  
Sweet and Sour service

The validated ranges are based on testing of relevant flexible pipe samples addressing different failure modes (refer to Appendix B).

For Açú manufacturing unit specific range refer to Appendix A.

In the process,

- Design rules for flexible pipes and end-fittings have been ascertained (see Appendix B),
- The main flexible pipes behaviour prediction and failure modes prediction methodologies, as well as NOV Flexibles in-house software Pipeflex, E-Flex and TFlex (see Appendix C), have been confirmed as being validated through correlation with small and/or full scale tests,
- Raw materials qualification has been confirmed (see Appendix D),
- Fabrication, Repair and Control procedures have been regularly re-assessed, for ability to implement design parameters and maintain Quality with good continuity,
- QA / QC system has been confirmed as independently certified to ISO 9001: 2008 and API Q1.

In particular, NOV Flexibles design and manufacturing procedures have been scrutinised for conformity versus API 17J standard.

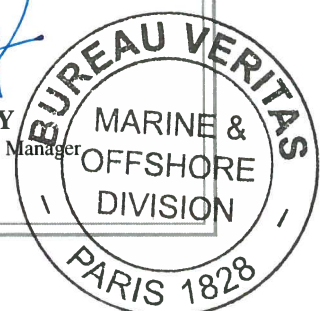
The results of this evaluation being satisfactory, within the limitations in the Technical Report n°E&P11190U-R-2011-01 / R1318 and n°E&P11970N-R-2014-01 / R1447 (dedicated to Açú plant), the present certificate is valid until 31<sup>st</sup> May 2016, within the scope of the BUREAU VERITAS General Conditions of Service, to whom it may concern. In case of any change in the design, manufacturing procedures of the above referenced items, the present Certificate would de facto lose its validity. This document and its appendices form the entire Certificate.

Neuilly-sur-Seine, 8<sup>th</sup> January 2015, Rev.0

For and on behalf of BUREAU VERITAS

**L. MERILLON / A. DAVID  
F. MIGEON / E. RULENCE**  
Project Engineers

**L. VERNEY**  
SURF & Jacket – Unit Manager



This certificate is delivered within the scope of the BUREAU VERITAS General Conditions of Service.