Technology Qualification Plan Statement of Endorsement

Office: **Lloyd's Register EMEA**
London Marine & Offshore Technical Support Office
71 Fenchurch Street
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Date: **24 August 2016** Endorsement Expiry Date: **24 August 2018**

LR Reference **586839**

This statement is issued to Kinetic Pressure Control Ltd. in recognition of the Technology Qualification Plan developed for the Kinetic Blowout Stopper (KBOS).

CLIENT: Kinetic Pressure Control Ltd.
PROJECT: Kinetic Blowout Stopper (KBOS)
SUBJECT: Endorsement of Technology Qualification Plan Submitted to LR by Kinetic Pressure Control Ltd.
Technical Review: Colin Moir, Said Baameur
Technology Qualification Review: Hassan Sadeghi, John Yates

Statement of Endorsement:

On 11-13th May 2016 a Technology Assessment workshop was held at above mentioned address, following which a Technology Assessment Report [2] was issued to KPC. Subsequently the Technology Qualification Plan [5] was submitted to LR by KPC on 16 August 2016.

KPC's TQ Plan [5] has been evaluated against LR Technology Qualification Guidance Note 2014 [1]. Throughout this process no major technological limitations were identified that renders the technology unfeasible. Lloyd's Register takes the view that upon successful completion of the technology qualification activities identified, the technology would be ready to be field tested in the operating environment and could achieve a Lloyd's Register Technology Qualification Certificate.

This statement must be read together with Technology Qualification Boundary and Lloyd's Register Scope of Review. See notes (3) and (4) below.

(1) Brief Overview of Technology	KBOS System introduces a novel technology whereby in an emergency event, a shearing blade accelerated by an electrically initiated primer, cuts downhole elements such as drill pipe and seals the well in the process.
(2) Technology Goals	1: Shear all wellbore elements under all expected and near term future conditions for High Pressure/High Temperature (HP/HT) offshore drilling operations. 2: Seal wellbore under all expected and expected future conditions for HP/HT offshore drilling operations. 3: Maintain control of well under all conditions. 4: Modularized and integratable with current and expected future MODUs drilling system design. 5: Meet current industry and class standards for safety and operation. 6: Ease of manufacture

(3) Technology Qualification Boundaries	It is understood that KPC will be utilising existing control system technology which does not introduce any novel elements to KBOS design. Hence KBOS' control system was excluded from the technology assessment. The TQ plan is endorsed for the mechanical aspects of KBOS design which consists of elements contained in mechanical KBOS Main Assembly and Sealing Sub-System. The control system is subject to conventional certification process and its integration into KBOS system must be captured in an additional revision of the TQ plan.
(4) Lloyd's Register Scope of Review	Lloyd's Register has evaluated the technological challenges and uncertainties within the technology qualification boundary (3) as reported in [2]. LR has reviewed the qualification plan developed by KPC in [5] & [6] which contains a range of qualification activities to mitigate against the technological uncertainties identified in [2]. Although great care has been taken during technology assessment process and subsequent review of TQ plan, Lloyd's Register cannot be held responsible for potential causes or failure modes that have not been identified or not mitigated as part of the qualification activities. Reference [3] and [4] have not been verified /approved by LR and are only used as reference documents. LR Technology Qualification methodology evaluates the technological uncertainties using metrics such as Technology Maturity Level (TML) and Integration Maturity Level (IML). It must be noted that although TQ methodology offers an evaluation of TML and IML, its purpose is not to issue an IML or TML certification, but rather to mitigate against the technological uncertainty posed by the technology, captured in form of LR TQ Certificates.
(5) Change Management	Any design changes to the KBOS system or the qualification activities must be captured in additional revisions of the TQ plan and is subject to approval by LR. Failure to follow this change management process will invalidates this statement.
(6) Reference Documents	[1] Guidance for Technology Qualification, Lloyd's Register, December 2014 [2] Technology Assessment Report - OGL/DA/10137, Lloyd's Register, May 2015 [3] KBOS Component Breakdown, K01-M-AD-001 Rev 1.0, KPC, April 2016 [4] Concept Design – KBOS Version 4.0, K01-Z-CD-001 Rev 1.2, KPC, April 2016 [5] KBOS Qualification Plan – K01-R-P-001 Rev 2 0, KPC, August 2016 [6] Specification & Qualification Matrix - K01-Z-QM-001 Rev.2.0, KPC, August 2016

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