Prototype Certificate AW-Energy WaveRoller™

Office: **London**

Date: **18 December 2019**

This Certificate is issued to AW-Energy Ltd proceeds on from the issued Technology Qualification (ECL-RPW-1600042) and Manufacturing Certificate (PRJGB11108615/AC/01) in recognition that the relevant documentation provided by AW Energy has been reviewed by LR, and it has been established that the novel aspects of the WaveRoller™ prototype device have been designed in accordance with the qualification activities outlined in the WaveRoller Technology Qualification plan (2016). It is also recognises that the proven aspects of the device have been designed in accordance with the codes and standards specified by AWE in 'D302347 – Certification – Master Certification Plan (ID 2796).' Finally, it confirms that LR has reviewed the provided documentation related to the testing of the WaveRoller™ prototype device as specified in D305636 CTI Plan FOAK Final Assembly, Installation and Deployment. The certification has followed the procedure outlined in DNV-OSS-312: Certification of Tidal and Wave Energy Converter

Technology Description

WaveRoller™ is a nearshore wave energy to electricity conversion device, predominantly submerged, employing the principles of an oscillating wave surge converter and performing conversion via a seabed mounted hydraulic/ electrical system.

Technology Application

The design of the WaveRoller™ has been evaluated in accordance with the technology qualification activities and codes and standards as outlined in 'D302347 – Certification – Master Certification Plan (ID 2796).' The standards for the design review referenced are DNV-DSS-401 Technology Qualification Management, DNV RP-A203 2011 Technology qualification, DNV-OS-C101 (July 2015) Design of offshore steel structures, general - LRFD method, DNV-OS-C401 (April 2013) Fabrication and testing of offshore structures, DNV-RP-B401 (October 2010) Cathodic Protection Design, DNV-RP-B101 (July 2015) Corrosion protection of floating production and storage units, DNV-OS-C502 (September 2012) Offshore Concrete Structures, EN 1992-1-1 (Eurocode 2) - Design of concrete structures, NP EN 13670 (2011) Execução de Estruturas Em Betão / Execution of Concrete Structures, EN 10080 (September 2005) Steel for the Reinforcement of Concrete - Weldable Ribbed Reinforcing Steel Part 1-6, The Pressure Equipment Directive (PED) 2014/68/EU, ISO 4413 (November 2010) Hydraulic fluid power — General rules and safety requirements for systems and their components, Commercial component: IEC, IEC 60034-14 Rotating electrical machines - Part 14 Grade A, EN61131-2: 2007 Programmable controllers – Part 2: Equipment requirements and tests, Directive 2006/42/EC on machinery and LR ENV 3 Type Approval.

This certificate is valid until 01 Jan 2024. LR is to be notified of any modification to the concept design or technology goals. This certificate should be read in conjunction with Design Appraisal Document ECL-ACL-1700030/R01, which contains comments for the final assembly and testing of the device. It should also be read in conjunction with the previously issued certificates, TQ Certificate ECL-RPW-1600042 and Manufacturing Certificate PRJGB11108615/AC/01 and their supporting documents.

Antonis Calogiros
Project Manager to Lloyd's Register EMEA

a member of the Lloyd's Register group.