Schedule of Accreditation

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Offshore Renewable Energy Catapult

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Testing performed by the Organisation at the locations specified

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address ORE Catapult 50m Blade Test Facility Euroseas Centre Albert Street Blyth Northumberland NE24 1LZ	**Local contact** Mr J Robison	**WIND TURBINE BLADES** - Physical	A1
Address ORE Catapult 100m Blade Test Facility Albert Street Blyth Northumberland NE24 1LZ United Kingdom	**Local contact** Mr J Robison	**WIND TURBINE BLADES** - Physical	A2
Address Charles Parsons Technology Centre High Quay Blyth NE24 2AZ	**Local contact** Mr J Robison	**POWER CABLES, BUSHINGS, TRANSFORMERS and SWITCHGEAR**	B
Address ORE Catapult Blade Erosion Test Rig Offshore House Albert Street Blyth Northumberland NE24 1LZ	**Local contact** Mr J Robison	**LEADING EDGE PROTECTION SYSTEMS**	C

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
WIND TURBINE BLADES (ORE Catapult 50m Blade Test Facility)	<u>Physical Testing</u> Full-scale testing of rotor blades: Static testing Fatigue testing Natural frequency testing Centre of Gravity and mass Test Facility limiting dimensions: Hub Centre: 4.2 m above floor Hub Centre: 15 m from winch wall Floor to roof: 10 m Max individual force: 400 kN Max strain: 10,000 μ strain Max Laser distance: 20 m String pots: 0 - 15 m Surface Temperature: 0-50 °C nominal Four Wire Resistance measurement: 0-1000 Ω	IEC 61400-23:2014 excluding • cl. 10.4.3, Creep, Mass distribution, Stiffness distribution • cl. 11.1, Blade sectioning In-house procedures: PR10012 Fatigue testing PR10011 Static testing PR10015 Natural frequency PR10025 Natural frequency (Blade damping calculations and mode shapes) PR10081 Centre of gravity and mass PR22702 Blade Lightning Protection System	A1

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
WIND TURBINE BLADES (ORE Catapult 100m Blade Test Facility) (cont'd)	<u>Physical Testing</u> (cont'd) Full-scale testing of rotor blades: Static testing Fatigue testing Natural frequency testing Centre of Gravity and mass Torsional Stiffness Test Facility limiting dimensions: Hub Centre 1: 3.75 m above floor Hub Centre1: 8.1 to 35.7 m from winches Hub Centre 2: 10 m above floor Hub Centre2: 8.1 to 35.7 m from winches Floor to roof: 25 m Max individual force: 600 kN Max strain: 10,000 µ strain Max Laser distance: 24 m Optical tracking distance Range 100 m CMC 16.4 mm Surface Temperature: 0-50 °C nominal Four Wire Resistance measurement: 0-1000 Ω	IEC 61400-23:2014 excluding • cl. 10.4.3, Creep, Mass distribution, Stiffness distribution • cl. 11.1, Blade sectioning In-house procedures: PR22050 Torsional stiffness blade testing procedure PR22030 Fatigue testing PR22020 Static testing PR10015 Natural frequency PR10025 Natural frequency (Blade damping calculations and mode shapes) PR10081 Centre of gravity and mass PR22702 Blade Lightning Protection System	A2

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
Leading Edge Protection Systems (Blade Erosion Test Rig)	Liquid Impingement testing / Blade Erosion Testing	In-house procedure PR 38001 (Procedure based on the testing methods in ASTM G73 (2012) and the reporting requirements in DNVGL-RP 0171 (2018))	C
Power Cables 1 kV to 30kV (IEC 60502-2) 30 kV to 150 kV (IEC 60840) 150 kV to 500 kV (IEC62067)	Partial Discharge (PD)	IEC 60885-3, 2.4.1 IEC 60502-2:2014, 18.2.5 IEC 60840:2020, 12.4.4 BS 6622, 17.5 BS 7835, 18.5 IEC 60502-4:2010, Table 4 IEC 61442: 2005, cl 7 IEC 62067:2011, 12.4.4 IEC 63026:2019, 12.5.3	B
	Tan Delta	IEC 60502-2:2014,18.2.6 IEC 60840:2020, 12.4.5 BS 6622:2007, 20.4 and 20.5 BS 7835:2007, 21.4 and 21.5 BS 7870-2:2011, 3.11.1, and 3.11.3.1 IEC 62067:2011, 12.4.5 IEC 63026:2019, 12.5.4	B
	Heat cycle	IEC 60502-2:2014,18.2.7 IEC 60840:2020, 13.3.2.4 BS 6622:2007, 20.6 BS 7835:2007, 21.6 BS 7870-2, 2011, 3.8	B
	Heat cycle voltage test	IEC 60840:2020, 12.4.6 IEC 60840:2020, 13.2.4 IEC 60502-4:2010, Table 4 IEC 61442:2005, cl 9 IEC 62067:2011, 12.4.6 IEC 63026:2019, 12.5.5	B

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
Power Cables (cont'd)	Impulse testing	IEC 60230:2002 IEC 60502-2:2014,18.2.8 IEC 60840:2020, 12.4.7 IEC 60840:2020, 13.2.5 BS 6622:2007, 20.7 BS 7835:2007, 21.7 BS 7870-2:2011, 3.2.4 IEC 60502-4:2010, Table 4 IEC 61442:2005, cl 6 IEC 62067:2011, 12.4.7 IEC 63026:2019, 12.5.6	B
	HVAC	IEC 60502-2:2014,18.2.8 and 18.2.9 IEC 60840:2020, 12.4.7 BS 6622:2007, 20.8 BS 7835:2007, 21.8 and 19.18.1 BS 7870-2:2011, 3.2.5 IEC 60502-4:2010, Table 4 IEC 61442:2005, cl 4	B
	Resistivity of semiconducting screens	IEC 60502-2:2014, 18.2.10 IEC 62067:2011, 12.4.9 IEC 63026:2019, 12.5.8 IEC 60840:2020, 12.4.9	B
	Tests on Outer protection of Joints	IEC 62067:2011 Annex G IEC 60840:2020 Annex H	B
	Pressure test at high temperature	IEC 60502-2:2014, 19.9 IEC 60840:2020, 12.5.7 IEC 62067:2011, 12.5.6 IEC 63026:2019, 12.7.6	B
	Check cable construction	IEC 60502-2:2014 17.4-17.6, 19.2-19.4 IEC 60840:2020 10.4-10.7, 12.5.2 IEC 62067:2011 10.4-10.7, 12.5.1 IEC 63026:2019, 12.7.2	B

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
Power Cables (cont'd)	Mechanical tests - shrinkage test for insulations	IEC 60502-2:2014, 19.18 IEC 60840:2020, 12.5.17 IEC 63026:2019, 12.7.12	B
	Mechanical tests – shrinkage test for sheaths	IEC 60502-2:2014, 19.22 IEC 60840:2020, 12.5.18 IEC 63026:2019, 12.7.15	B
	Determining the mechanical properties of insulation before and after ageing.	IEC 60502-2:2014, 19.5 IEC 60840:2020, 12.5.3 IEC 62067:2011, 12.5.2 IEC 63026:2019, 12.7.3	B
	Cable sheath: Determining the mechanical properties of oversheaths before and after ageing.	IEC 60502-2:2014, 19.6 IEC 60840:2020, 12.5.4 IEC 62067:2011, 12.5.3 IEC 63026:2019, 12.7.4	B
	Cables and accessories: Ageing tests on pieces of complete cable to check compatibility of materials.	IEC 60502-2:2014, 19.7 IEC 60840:2020, 12.5.5 IEC 62067:2011, 12.5.4 IEC 63026:2019, 12.7.5	B
	Hot Set Test for cross-linked materials	IEC 60811-507:2012 IEC 60502-2 IEC 60811-501 IEC 63026:2019, 12.7.8 IEC 60840:2020, 12.5.11	B
	Moisture determination in solid samples	BS 7870-2:2011, section 2.5.10 CENELEC HD605 S2:2008	B
	Cables and accessories: Visual inspection	IEC 60840:2020, 12.4.8 IEC 62067:2011, 12.4.8 IEC 63026:2019, 12.5.7	

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
Power Cables (cont'd)	Cable Insulation Measurement of density of HDPE insulation	IEC 60840:2020 Clause 12.5.12 IEC 62067:2011 Clause 12.5.11	B
	Cable Sheath Tests on components of cables with longitudinally applied metal tape or foil, bonded to the oversheath.	IEC 60840 (2020) Clause 12.5.16 IEC 62067 (2011) Clause 12.5.15 IEC 63026 (2019) Clause 12.7.10 BS 7970 (2012) Clause 8.3.3	
	Cables and accessories: Handling test on repair joints.	CIGRE TB 623:2015, 6.8	
	Cables and accessories: Tensile test on repair joints.	CIGRE TB 623:2015, 5.5 IEC 63026:2019; 12.4.3	A1
	Cable and accessories Longitudinal/Radial Water Penetration (LWP, RWP) Test	CIGRE TB 490, Clause 8.7 Including conductor water penetration, metal sheath water penetration, radial water penetration for joints IEC 63026:2019 Clause 12.6 Longditudinal/Radial WP test	B
	Cable Insulation – Water Absorption test (gravimetric method):	IEC 63026: 2019, Clause 12.7.11 IEC 60811-402: 2012	B
	Conditioning - PF withstand - wetting for 500 hr Ageing - 50 Hz for 17500 hr and - 500 Hz for 3000 hr Ageing assessment - Power frequency voltage step test	BS 7870-2: 2011 Clause 5.4.15 Harmionised long duration test - 5.4.15.3.2 Conditioning - 5.4.15.3.3 Ageing procedure (50 Hz ageing) - 5.4.15.3.4 Ageing assessment (step breakdown test) Clause 5.4.8 Test of resistance to water (500 Hz ageing)	B

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
Power Cables (cont'd) Insulated Bushings for alternating voltages above 1 kV	Dry or wet PF withstand (up to 600 kV) Dry lightning impulse test (up to 400 kV) EMC test (up to 400 kV) Temperature rise test Capacitance and tan delta measurements Partial discharge measurements (up to 600 kV) Test of tap insulation	BS EN (IEC) 60137 : 2008 Clauses 8.1 8.3 8.6 8.7 9.1 9.4 9.5	B
Power transformers. insulation levels, dielectric tests and external clearances in air	Full wave lightning impulse test (up to 400 kV) Lightning impulse tests on a neutral terminal	BS EN (IEC) 60076-3:2013, Clauses: 13.2 13.4	B
Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies	Dielectric properties Power-frequency withstand 0 to 5000 V 100 mA Impulse withstand voltage 0 to 32 kV Lightning Impulse Power Frequency with stand for Insulated enclosures Verification of temperature rise by testing with current. 8000 A, 10 °C to180 °C Mechanical Operation	BS EN (IEC) 61439-2:2011 BS EN (IEC) 61439-1:2011 10.9 10.9.2 10.9.3 10.9.4 10.10.2 10.13	B
High-voltage switchgear and controlgear		IEC62271-1: Edition 1.1 2011 IEC 62271-100 Edition 2.1 2012 IEC 62271-102 Edition 1.2 2013 IEC 62271-103 Edition 1.0 2011 IEC 62271-200 Edition 2.0 2011 IEC 62271-201 Edition 1.0 2006	B

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
High-voltage switchgear and controlgear (cont'd)	Dielectric tests Wet and dry tests Power frequency voltage tests AC voltage 0 kV to 600 kV Lightning impulse voltage tests 0 kV to 400 kV Measurements of the resistance of Circuits 0 mW to 200 mW, 0 A to 200 A Temperature-rise tests 8000 A, 10 °C to 180 °C	Clause 6.2 Clause 6.2.6.1 (IEC 60060-1 Edition 3 2010-09) Clause 6.2.6.2 (IEC 60060-1 Edition 3 2010-09 lightning impulse) Clause 6.4 Clause 6.5	B
Low-voltage switchgear and controlgear assemblies: Busbar trunking systems (busways)	Verification of temperature rise by testing	BS EN (IEC) 61439-6:2012 10.10.2	B
END			