Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

2769

Accredited to ISO/IEC 17025:2017

Offshore Renewable Energy Catapult

Issue No: 028 **Issue date:** 15 March 2022

Ridley Street
Blyth
Northumberland
NE24 3AG
United Kingdom

Contact: Jonathan Robison
Tel: +44 (0)1670 357 706
Fax: +44 (0)1670 359 666
E-Mail: jonathan.robison@ore.catapult.org.uk
Website: www.ore.catapult.org.uk

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 •	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)	<u>Physical testing</u> 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 PR22050 Torsional stiffness blade testing procedure	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

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
Power Cables (continued)	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
	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

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
Power Cables (continued)	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	B
	Check cable construction Cable insulation:	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	B
	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	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	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	B
	Cables and accessories: Visual inspection	IEC 60840:2020, 12.4.8 IEC 62067:2011, 12.4.8	
	Cables and accessories: Handling test on repair joints.	CIGRE TB 623:2015, 6.8	A2
	Cables and accessories: Tensile test on repair joints.	CIGRE TB 623:2015, 5.5 IEC 63026:2019; 12.4.3	A1

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
Power Cables (continued)	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
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
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

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
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
	Dielectric tests Wet and dry tests Power frequency voltage tests AC voltage 0 kV to 600 kV	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)	
	Lightning impulse voltage tests 0 kV to 400 kV	Clause 6.4	
	Measurements of the resistance of Circuits 0 mW to 200 mW, 0 A to 200 A	Clause 6.5	
	Temperature-rise tests 8000 A, 10 °C to 180 °C		
Cables	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
Cable Insulation	Hot Set Test for cross-linked materials	IEC 60811-507:2012 IEC 60502-2 IEC 60811-501	B
	Moisture determination in solid samples	BS 7870-2:2011, section 2.5.10 CENELEC HD605 S2:2008	B
END			