

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

 <p>Accredited to ISO/IEC 17025:2005</p>	<p align="center">R-TECH Services Ltd trading as R-TECH Materials</p> <p align="center">Issue No: 020 Issue date: 24 August 2018</p>	
	<p>Testing House Kenfig Industrial Estate Margam Port Talbot SA13 2PE</p>	<p>Contact: Dr A Franks Tel: +44 (0)1656 748000 Fax: +44 (0)1656 670130 E-Mail: tony.franks@r-techmaterials.com Website: www.rtech-materials.co.uk</p>
<p align="center">Testing performed at the above address only</p>		

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
<p>METALS, ALLOYS and METAL PRODUCTS</p> <p>Plain carbon and low alloy steels</p> <p>Plain carbon, low alloy and stainless steels</p> <p>Carbon steel, stainless steel & stainless steel clad reinforcing bars, wire rod, wires, welded fabrics for the reinforcement of concrete, and steel bars, wire and strand for the pre-stressing of concrete</p>	<p><u>Chemical Tests</u></p> <p>Elemental Analysis C, Si, Mn, P, S, Cr, Mo, Ni, Al, B, Co, Cu, Nb, Sn, Ti, V, N</p> <p>Carbon and Sulphur</p> <p>Nitrogen</p> <p><u>Mechanical Tests</u></p> <p>Tensile (Forces up to 1500 kN)</p> <p>Vickers hardness (HV10)</p> <p>Bend</p>	<p>Documented in house method APM03 using OES (Spectromax – X)</p> <p>Documented in house method APM 04 using Leco CS 244 analyser</p> <p>Documented in house method APM 05 using Leco TN 114 analyser</p> <p>BS EN ISO 6892-1:20016 (Method B) excluding annex G ASTM A370-17</p> <p>BS EN ISO 6507-1:2005</p> <p>BS 6744:2016 BS EN 10080:2005 ASTM A370-17 ASTM A615/A615M-16 ASTM A706/A706M-16</p>



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<p>METALS, ALLOYS and METAL PRODUCTS (cont'd)</p> <p>Carbon steel, stainless steel & stainless steel clad reinforcing bars, wire rod, wires, welded fabrics for the reinforcement of concrete, and steel bars, wire and strand for the pre-stressing of concrete (cont'd)</p>	<p><u>Mechanical Tests</u> (cont'd)</p> <p>Rebend</p> <p>Reverse bend</p> <p>Tensile (Forces up to 1500 kN)</p> <p>Fatigue (Forces up to 400 kN)</p> <p>Weld shear</p>	<p>BS 4482:1985 (Withdrawn) BS 4482:2005(2012) BS 4449:1997 (Superseded) BS 4449:2005 + A3:2016 BS EN ISO 15630-1:2010 BS EN ISO 15630-2:2010 BS EN ISO 15630-3:2010</p> <p>ISO 7801:1984</p> <p>BS 4449:1997 (Superseded) BS 4449:2005+A3:2016 BS 4482:1985 (Withdrawn) BS 4482:2005 BS 4483:1998 (Withdrawn) BS 4483:2005 BS 4486:1980 BS 6744:2016 BS EN ISO 6892-1:2016 (Method B) excluding Annex G BS EN ISO 15630-1:2010 BS EN ISO 15630-2:2010 BS EN ISO 15630-3:2010 ASTM A370-17 ASTM A615/A615M-16 ASTM A706/A706M-16</p> <p>BS 4449:1997 (Superseded) BS 4449:2005+A3:2016 BS 6744:2001 BS EN ISO 15630-2:2002 (withdrawn) BS EN ISO 15630-1:2010 BS EN ISO 15630-2:2010 BS EN ISO 15630-3:2010</p> <p>BS 4483:1998 (withdrawn) BS 4483:2005 BS EN ISO 15630-2:2010</p>



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<p>METALS, ALLOYS and METAL PRODUCTS (cont'd)</p> <p>Carbon steel, stainless steel & stainless steel clad reinforcing bars, wire rod, wires, welded fabrics for the reinforcement of concrete, and steel bars, wire and strand for the pre-stressing of concrete (cont'd)</p>	<p><u>Metallurgical tests</u></p> <p>Macro examination</p> <p><u>Dimensional Tests</u></p> <p>Determination of geometrical characteristics Indentation measurements Relative rib area Deviation from nominal mass per metre</p> <p>Determination of geometrical characteristics Relative rib area</p> <p>Effective cross sectional area Projected and relative rib area</p> <p>Measurement of Deformations</p>	<p>Documented In-House Method PM23</p> <p>BS EN ISO 15630-1:2010 BS EN ISO 15630-2:2010 BS EN ISO 15630-3:2010</p> <p>BS 6744:2016</p> <p>BS 4449:1997 (Superseded) BS 4449:2005+A3:2016</p> <p>ASTM A615/A615M-16 ASTM A706/A706M-16</p>
<p>Welded carbon & stainless steel reinforcing bars</p>	<p><u>Mechanical Tests</u></p> <p>Bend</p> <p>Tensile (Forces up to 1500 kN)</p> <p>Hardness survey</p> <p>Weld shear (forces up to 900 kN)</p> <p>Macro examination</p>	<p>BS EN ISO 17660-1:2006</p> <p>BS 4449:1997 (Superseded) BS 4449:2005+A3:2016 BS 6744:2016 BS 7123:1989 (Superseded) BS EN ISO 17660-1:2006</p> <p>BS EN ISO 9015-1:2011 BS EN ISO 15614-1:2004+A":2012</p> <p>BS EN ISO 15630-2:2010 BS EN ISO 17660-1:2006</p> <p>BS 7123:1989 (Superseded) Documented In-House Method PM25</p>



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Metallurgical tests</u>	
Mechanical splices, (couplers) for reinforcement of concrete	Tensile (Forces up to 1500 kN)	BS 4449:1997 (Superseded) BS 4449 :2005+A3:2016 BS EN ISO 15630-1:2010 BS 8597:2015 Sellafield engineering Standard ES_0_3110_2 Issue 4
	<u>Mechanical Tests</u>	
	Compression (Forces up to 1500 kN)	Documented In House Method PM51 Sellafield Engineering Standard ES_0_3110-2 Issue 4
	Cyclic tensile (Forces up to 1200 kN)	Documented In House Methods PM50 & PM 58 Sellafield engineering standard ES_0_3110_2 Issue 4
	Low cycle loading tests:- Alternating tension and compression of high stresses (S1) Alternating tension and compression of large strain (S2)	ISO 15835-2:2009
	Fatigue (Forces up to 400 kN)	BS 8597:2015 BS EN ISO 15630-1:2010
	Slip test	BS 8597:2015 ISO 15835-2:2009
	Tensile (Temperature of $\leq -7^{\circ}\text{C}$)(Forces up to 1200 kN)	Documented In House Method PM49 Sellafield engineering standard ES_0_3110_2 Issue 4



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Mechanical Tests (cont'd)</u>	
Mechanical splices, (couplers) for reinforcement of concrete (cont'd)	Determination of permanent offset (elongation / slip)	BS 8110-1:1997 (Withdrawn) Documented In-House Method PM18 & PM45 Sellafield Engineering Standard ES_0_3110_2 Issue 4
Headed anchors for reinforcing steel	Tensile (Forces up to 1000kN)	Documented In House Methods PM61 & PM62 Sellafield Engineering Standard ES_0_3110_2 Issue 4
	Load Transfer in air (tensile test)	ISO 15698-2:2012
	Robustness Test (wedge tensile test)	ISO 15698-2012
	Permanent elongation / slip in tension or compression (Forces up to 1000kN)	Documented In House Methods PM61 & PM62 Sellafield Engineering Standard ES_0_3110_2 Issue 4
	Tensile (Temperature ≤ -7°C) (Forces up to 1000kN)	Documented In House Method PM62 Sellafield Engineering Standard ES_0_3110_2 Issue 4
	Cyclic Tensile (Forces up to 1000kN)	Documented In House Method PM63 Sellafield Engineering Standard ES_0_3110_2 Issue 4
Bar, wire and strand for the pre-stressing of concrete	Modulus of elasticity (Forces up to 1000 kN)	BS EN ISO 15630-3:2010
Strand for pre-stressing of concrete	Fatigue (Forces up to 270kN)	BS EN ISO 15630-3:2010



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PLASTICS, INCLUDING REINFORCED PLASTICS, FIBRE REINFORCED PLASTIC COMPOSITES, LAMINATES and RESINS	<u>Chemical Tests</u>	
	Glass Content	BS EN ISO 1172:1999 Method A
	Resin, Fibre and Void Content	BS ISO 14127:2008 Procedure A3
	Density and Specific Gravity (Relative Density)	ASTM D792-08
	Water absorption	BS EN ISO 62:2008
	<u>Mechanical Tests</u> <u>(Performed in an environment of controlled temperature and relative humidity)</u>	
	Tensile properties (Forces up to 100kN)	BS EN ISO 527-2:2012 BS EN ISO 527-4:1997 BS EN ISO 527-5:2009 ASTM D638-14 ASTM D3039/D3039M-17
	Apparent interlaminar shear strength (forces up to 100 KN)	BS EN ISO 14130:1998 ASTM D2344/D2344M-16
	Barcol hardness	BS 2782- 10:Method1001:1977 (Withdrawn)
	Compressive properties (forces up to 100 KN)	BS EN ISO 604:2003 ASTM D6641/D6641M-16 ^{e1}
	Compressive modulus and strength	BS EN ISO 14126:1999 +Corr 1 prEN 2850: Ed P2 SACMA SRM IR-94
	Determination of heat deflection temperature	BS EN ISO 75-1:2013 BS EN ISO 75-2:2013



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PLASTICS, INCLUDING REINFORCED PLASTICS, FIBRE REINFORCED PLASTIC COMPOSITES, LAMINATES and RESINS	<u>Mechanical Tests</u> <u>(Performed in an environment of controlled temperature and relative humidity) (cont'd)</u> Flexural properties (forces up to 10 kN & 100kN) In-plane shear strength at 5%/shear strain/shear modulus by tensile test of a $\pm 45^\circ$ laminate (Forces up to 100 kN) Shore hardness (A & D)	BS EN ISO 178:2010+A1:2013 BS EN ISO 14125:1998+A1:2011 ASTM D790-15 BS EN ISO 14129:1998 ASTM D3518/D3518M-13 BS EN ISO 868:2003 AMD 14577 ASTM D2240-15 Using a Durometer
FIBRE REINFORCED RIGID PLASTIC	Compression	ASTM D695-15
ADHESIVES	Lap shear strength of rigid-to-rigid bonded assemblies (Forces up to 100 kN)	ISO 4587:2003
	Climbing drum peel (Forces up to 10 kN)	ASTM D1781-98(2012)
	Core shear properties of sandwich constructions by beam flexure (Forces up to 100 kN)	ASTM C393/C393M-16
	Compression – foam / composite sandwich (Forces up to 10 kN)	ASTM D1621-16
Sandwich Construction (Core)	Flatwise Tensile	ASTM C297/C297M-15
END		