

# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

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

 0038 Accredited to ISO/IEC 17025:2017	<b>Element Materials Technology Aerospace UK Limited, Trading as Element Materials Technology</b>	
	Issue No: 062    Issue date: 22 July 2020	
	<b>Crosslands House White Cross South Road Lancaster LA1 4XQ</b>	<b>Contact: Mr Rafael Leon Tel: +44 (0)1524 841070 Fax: +44 (0)1524 62983 E-Mail: rafael.leon@element.com Website: www.element.com</b>
<b>Testing performed by the Organisation at the locations specified below</b>		

### Locations covered by the organisation and their relevant activities

Element Materials Technology Aerospace UK Limited, location code LAN, is accredited for a flexible scope that enables them to establish new and amended test methods, modification of existing methods and include newly revised or technically equivalent methods to conduct the activities detailed below, in accordance with their documented in-house procedure EX-AE-QU-X -LA-SOP 27020.

Element Materials Technology Aerospace UK Limited, location code MID, is accredited for a limited flexible scope that enables them to conduct accredited testing through the modification of existing test methods and include newly revised and technically equivalent methods to activities detailed below, in accordance with their documented in-house procedure E-E-QU-EE-X-TS-SOP001.

Element Materials Technology Aerospace UK Limited, location code BRI (Bridgwater), does not hold a flexible scope.



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**Laboratory locations:**

LAN: Element Materials Technology Aerospace UK Limited, Trading as Element Materials Technology Lancaster

BRI: Element Materials Technology Aerospace UK Limited, Trading as Element Materials Technology Bridgwater

MID: Element Materials Technology Aerospace UK Limited, Trading as Element Materials Technology Teesside

Location details	Activity	Location code
<p><b>Address</b> Crosslands House White Cross South Road Lancaster LA1 4XQ</p> <p><b>Local contact</b> Mr. Rafael Leon Tel: +44(0)1524 841070 Fax: +44(0)1524 62983 Email: rafael.leon@element.com Website: www.element.com</p>	Metals & Weldments - Mechanical tests Plastics and Composites – Mechanical tests & Physical Properties	LAN
<p><b>Address</b> No.1 Festival Units The Showground Business Park Bridgwater Somerset TA6 6LS</p> <p><b>Local contact</b> Contact: Mrs Rosemary Cowin Tel: +44 (0)1278 456888 Fax: +44 (0)1278 453123 E-Mail: rosemary.cowin@element.com Website: www.element.com</p>	Metals & Weldments - Corrosion tests Metals & Weldments - Mechanical tests Metals & Weldments - Metallurgical tests Plastics and Composites – Mechanical tests & Physical Properties	BRI
<p><b>Address</b> Holwick Road Riverside park Middlesbrough TS2 1QS</p> <p><b>Local contact</b> Mr. Alan Gale Tel: +44(0)1642 250336 Fax: +44(0)1642 250337 Email: alan.gale@element.com Website: www.element.com</p>	Metals & Weldments - Corrosion tests Metals & Weldments - Mechanical tests Metals & Weldments - Metallurgical tests Metals & Weldments – Elemental analysis	MID



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#### DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
METALS, ALLOYS and METAL PRODUCTS  Iron, Steel, Stainless Steel and other ferrous materials, Nickel, Titanium, and other non-ferrous materials	<u>Mechanical Tests</u>  <u>Fatigue:</u>  Low and high cycle, tensile/compressive and complex waveforms with: (a) Force control (b) Strain control (c) Displacement control  (Temperature range -196°C and -100°C to 1150°C) (Forces up to ± 400 kN)	BS 3518-1 BS 3518-3 BS 6072 BS 7270 BS EN 3987 prEN 3874 (April 1988) prEN 3988 P1 (April 1998) ISO 1099 ASTM D3479/3479M ASTM E466 ASTM E606/E606M Documented In-House Method developed using procedure EX-AE-QU-X-LA-SOP 27020	LAN
	Rotating bending	BS ISO 1143 Documented In-House Method developed using procedure EX-AE-QU-X-LA-SOP 27020	LAN
	Fatigue crack growth rate and threshold determination	BS EN 3873 BS ISO 12108 ASTM E647 Documented In-House Method developed using procedure EX-AE-QU-X-LA-SOP 27020	LAN
Iron, Steel, Stainless Steel and other ferrous materials, Nickel, Titanium, and other non-ferrous materials	<u>Fracture Toughness:</u>  K <sub>Ic</sub> (Temperature range -196°C and -100°C to 1150°C)	BS 7448-1 BS 7448-2 (Withdrawn) BS EN ISO 12737 BS EN ISO 15653 ASTM B645 ASTM E399 ASTM E740M	LAN
	K <sub>As</sub>	ASTM E561 BMS 7-323D	LAN



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Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
METALS, ALLOYS and METAL PRODUCTS (cont'd)  Iron, Steel, Stainless Steel and other ferrous materials, Aluminium, Nickel, Titanium, and other non-ferrous materials	<u>Mechanical Tests</u> (cont'd)  <u>Fracture Toughness:</u> (cont'd)  R-Curve	ASTM E561	LAN
	CTOD (Temperature range: - 40 °C to ambient)	BS 7448-1:1991 (Partially replaced) BS 7448-2:1997 (Withdrawn) BS EN ISO 15653 ISO 12135	MID
	<u>Impact:</u>  Charpy (U & V-notch) (Temperature range -196°C and -80°C to ambient)	ASTM E23-18 ASTM A370-19 <sup>e1</sup>	BRI
	Charpy (U & V Notch) (Temperature range: - 196 °C to 100 °C)	ASTM E23 ASTM A370 ASTM A923 (Method B)	MID
	Izod	BS 131:Part 1:1961(2015)	BRI
	Crystallinity and Shear	BS EN ISO 148-1 BS 131-5 ASTM E23	MID
	<u>Bend :</u>  Bend Test	BS EN ISO 7438:2016 ASTM A370-19 <sup>e1</sup> ASTM E290-14	BRI
	Bend Test	BS EN ISO 7438	MID



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Mechanical Tests</u> (cont'd)		
	<u>Hardness:</u>		
Iron, Steel, Stainless Steel and other ferrous materials, Nickel, Titanium, and other non-ferrous materials	Brinell (HBW 1/30 and 1/10)	BS EN ISO 6506-1:2014 ASTM E10-18	BRI
	Brinell (HBW 10/3000)	BS EN ISO 6506-1 ASTM E10	MID
	Rockwell (B & C Scale)	BS EN ISO 6508-1:2016 ASTM E18-19	BRI
	Rockwell (B & C Scales)	BS EN ISO 6508-1 ASTM E18	MID
	Vickers (HV5, HV10 & HV30)	BS EN ISO 6507-1:2018 ASTM E92-17	BRI
	Vickers (HV5, HV10 & HV30)	BS EN ISO 6507-1 ASTM E92	MID
	Low Force Vickers (HV0.2 to 1)	BS EN ISO 6507-1:2018	BRI
	Microhardness (HV0.1 & 0.2) and Knoop (HK 0.2 & 0.5)	ISO 4545-1:2018 ASTM E384-17	BRI
	<u>Proof loading:</u>		
Iron, Steel, Stainless Steel and other ferrous materials, Nickel, Titanium, and other non-ferrous materials	Proof Loading (Forces up to 500 KN)	Documented In-House Method E-E-OP-AS-ME-BW-MD030	BRI
Bearings and bushes	Proof Loading (Forces up to $\pm$ 400kN)	Documented In-House Method developed using procedure EX-AE-QU-X-LA-SOP 27020 Documented In-House Method E-E-OP-AS-ME-LA-MP-07	LAN



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METALS, ALLOYS and METAL PRODUCTS (cont'd)  Iron, Steel, Stainless Steel and other ferrous materials, Nickel, Titanium, and other non-ferrous materials	<u>Mechanical Tests</u> (cont'd)		
	<u>Tensile:</u>		
	(Forces up to 300 kN) (Ambient temperature)	BS 4A 4:Part 1:Section 1:1966 (Withdrawn) BS EN 2002-1:2005 BS EN ISO 6892-1:2016 ASTM A370-19 <sup>e1</sup> ASTM B557-15 ASTM E8/E8M-16a	BRI
	(Forces up to 300 kN) (Temperature range ambient to 900°C)	BS 4A4:Part 1: Section 2:1967 (Withdrawn) BS EN 2002-2:2005 BS EN ISO 6892-2:2018 ASTM E21-17 <sup>e1</sup>	BRI
	(Forces up to 300 kN) (-100°C to ambient)	BS EN ISO 6892-3:2015	BRI
	Modulus and ultimate strength by ring tensile	Documented In-House Method E-E-OP-AS-ME-BW-MD031	BRI
	Forces 2 kN up to 1000 kN Ambient temperature	BS EN ISO 6892-1 BS EN 2002-1 BS 4A.4:Part 1 ASTM A370 ASTM E8/E8M	MID
	Forces 1 kN up to 200 kN Temperature range 60°C to 650°C	BS EN ISO 6892-2 ASTM E21	MID
Pipe and Pipeline Components	Through thickness tensile	BS EN 10164 ASTM A770/A770M	MID
	Ring flattening tests (Forces up to 1000 kN)	BS EN ISO 8492 ASTM A106/A106M Clause 12 ASTM A370 ASTM A530/A530M Clause 21	MID
	Ring flaring tests	ASTM A370	MID



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Metallurgical Tests</u>			
Iron, Steel, Stainless Steel and other ferrous materials, Nickel, Titanium, and other non-ferrous materials	Microstructural Examination	Documented In-House Method EX-G-OP-MET-X-MD 25217 API STD 6ACRA	MID	
	Inclusion counting	ASTM E45	MID	
	Volume fraction	ASTM E562	MID	
	Duplex stainless steels	Detecting detrimental Intermetallic phases	ASTM A923 (Method A)	MID
		Austenite Spacing	DNV-RP-F112 Section 7	MID
		CTOD HAZ validation	EEMUA 158:3 <sup>rd</sup> Edition BS 7448-2:1997(Withdrawn) BS EN ISO 15653	MID
	Grain size (Comparison method and Intercept method)	ASTM E112	MID	
	Grain size	BS EN ISO 643:2012 ASTM E112-13	BRI	
	Depth of decarburisation	BS EN ISO 3887:2018	BRI	
	Depth of carburized and hardened case	BS EN 10328:2005 BS EN ISO 2639:2002 SAE J423A:1983(1998) SAE ARP1341 Rev B:2018	BRI	
Phase volume fraction	ASTM E562-19	BRI		
$\alpha$ Case in Titanium	BS EN 2003-009:2007 Documented In-House Method EX-AE-OP-MET-BW-MD20823	BRI		
	<u>Mechanical Tests</u>			
	$\alpha$ -case assessment by bend test	prEN 2002-6 Ed P2	BRI	
	<u>Mechanical &amp; metallurgical</u> Plating thickness	BS EN ISO 1463:2004 BS EN ISO 4526:2004 Documented In-House Method E-E-OP-AS-ME-MD-BW-MD034	BRI	



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Corrosion Tests:</u>		
Austenitic chromium-nickel stainless steel	Intercrystalline corrosion	BS HC 100:2010 BS 3146:Part 2:1975(2012) BS EN ISO 3651-2:1998 ASTM A262-15 Method E	BRI
Austenitic Stainless Steels	Pitting corrosion	BS 4515-2 (Annex C) ASTM G48 (Method A)	MID
Stainless Steels	Susceptibility to inter-granular corrosion	ASTM A262 Practices A & E	MID
Duplex Stainless steels	Detecting detrimental Intermetallic phases	ASTM A923 (Method C)	MID
Nickel based alloys	Susceptibility to inter-granular corrosion	ASTM G28 Method A	MID
Weldments	<u>Mechanical/Visual Tests</u>		
	Tests designated in specified welding codes as detailed below: Bend, Fracture, Hardness, Impact Tensile, Micro-examination, Visual examination	BS 4871-3:1985 (Withdrawn) BS 4872-1:1982(2013) BS 4872-2:1976(2013) BS EN ISO 9606-2:2004 BS EN ISO 15614-1:2017 BS EN ISO 15614-2:2005 BS EN ISO 15614-7:2016 BS EN ISO 15614-8:2016 BS EN ISO 4136:2012 BS EN ISO 5173:2010+A1:2011 BS EN ISO 5178:2019 BS EN ISO 9015-1:2011 BS EN ISO 9016:2012(2018) BS EN ISO 9017:2018 BS EN ISO 9606-1:2017 BS EN ISO 17637:2016 BS EN ISO 17639:2013 PD 5500:2012+A1:2012 ASME BPVC IX:2019 CAP 553 BCAR Section A8-10 AVP 84, D505:1969 AVP 84, D507:June 1969	BRI





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<p>METALS, ALLOYS and METAL PRODUCTS (cont'd)</p> <p>Weldments (cont'd)</p>	<p>Bend, CTOD, fracture, hardness, impact, tensile micro and macro-examination, in accordance with specified welding codes</p>	<p>BS EN 287-1  BS EN 288-9:1999(Withdrawn)  BS 4515-1  BS 4515-2  BS 4871-3 (Withdrawn)  BS 4872-1  BS 4872-2  BS EN ISO 9606-1  BS EN ISO 9606-2  BS EN ISO 15614-1  BS EN ISO 15614-2  BS EN ISO 4136  BS EN ISO 5173  BS EN ISO 5178  BS EN ISO 9015-1  BS EN ISO 9016  BS EN ISO 9017  BS EN ISO 17639  PD 5500  ASME BPVC IX  AWS D1.1/D1.1M  ASME B31.3  API 1104  API 5L  API 6A  DNV-OS-F101</p>	<p>MID</p>



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Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used	Location Code
METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Elemental Analysis</u>		
Metals and alloys	Elemental analysis Selected by variable detection array	Documented In-House Method TL/CHEM 03B using ICAP ICP	MID
Aluminium Alloys	B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Ti, V, Zn & Zr	Documented In-House Method TL/CHEM03B-1 using ICP-OES	MID
Titanium Alloys	Al, B, Bi, Co, Cr, Cu, Fe, Mn, Mo, Nb, Ni, Si, Sn, Ta, V, W, Y, Zn & Zr	Documented In-House Method TL/CHEM03B-8 and TL/CHEM03C-8 using ICP-OES	MID
Cobalt Alloys	Al, B, Cr, Cu, Fe, Mn, Mo, Nb, Ni, P, Si, Ti, V, W & Zr	Documented In-House Method TL/CHEM03B-22 using ICP-OES	MID
Copper Alloys	Ag, As, Al, B, Be, Bi, Cd, Co, Cr, Fe, In, Mg, Mn, Ni, P, Pb, Sb, Se, Si, Sn, Te, Ti, Zn & Zr	Documented In-House Method TL/CHEM03B-5 using ICP-OES	MID
Carbon & Low Alloy Steels, Tool Steels, Cast Iron	As, Al, B, Bi, Ca, Cd, Ce, Co, Cr, Cu, La, Mg, Mn, Mo, Nb, Ni, P, Pb, Sb, Se, Si, Sn, Ta, Te, Ti, V, W, Zn & Zr	Documented In-House Method TL/CHEM03B-2 using ICP-OES	MID
Stainless Steels	Al, B, Ca, Cd, Ce, Co, Cr, Cu, La, Mg, Mn, Mo, Nb, Ni, P, Si, Sn, Ta, Te, Ti, V, W, Zn & Zr	Documented In-House Method TL/CHEM03B-2 using ICP-OES	MID
Nickel Alloys	Al, B, Bi, Ca, Co, Cr, Cu, Fe, Hf, Mg, Mn, Mo, Nb, Ni, P, Pb, Si, Sn, Ta, Ti, V, W, Zn & Zr	Documented In-House Method TL/CHEM03B-4 using ICP-OES	MID
Tin Alloys	As, Al, Bi, Cd, Cu, Fe, Ni, Pb, Sb, Zn & Zr	Documented In-House Method TL/CHEM03B-15 using ICP-OES	MID
Zinc Alloys	As, Al, B, Be, Bi, Cd, Ce, Co, Cr, Cu, Fe, Hg, In, Mg, Mn, Ni, P, Pb, Sb, Si, Sn, Ti, Tl, Zn & Zr	Documented In-House Method TL/CHEM03B-6 using ICP-OES	MID



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Elemental Analysis</u> (cont'd)		
Carbon & Low Alloy Steels	Al, B, C, Ca, Co, Cr, Cu, Mn, Mo, Nb, Ni, P, S, Si, Sn, Ta, Ti, V, W & Zr	Documented In-House Method TL/CHEM 02 using Spark OES	MID
Stainless Steels	Al, B, C, Co, Cr, Cu, Mn, Mo, Nb, Ni, P, S, Si, Sn, Ta, Ti, V & W	Documented In-House Method TL/CHEM 02 using Spark OES	MID
Cast Irons	Al, Ce, Cr, Cu, Mn, Mo, Ni, P, Si, Ti & V	Documented in-House Method TL CHEM/16 using XRF	MID
Nickel Alloys	Al, Co, Cr, Cu, Fe, Mn, Mo, Nb, P, Si, Ta, Ti, V, W & Zr	Documented in-House Method TL CHEM/16 using XRF	MID
Titanium Alloys	Al, Co, Cr, Cu, Fe, Mn, Mo, Nb, Ni, Pd, Ru, Si, Sn, Ta, V, W, Zr & Y	Documented in-House Method TL CHEM/16 using XRF	MID
Titanium Aluminide Alloys	Al, Co, Cr, Cu, Fe, Hf, Mn, Mo, Nb, Ni, Si, Sn, Ta, V, W, Zr & Y	Documented in-House Method TL CHEM/16 using XRF	MID
Carbon and Low Alloy Steels, Stainless Steels, Austenitic Steels and Ferritic Steels, Cast Irons, Silicon-Iron and Titanium Alloys	Carbon and Sulphur content	Documented In-House Method TL/CHEM 04 using combustion techniques	MID
Iron, Steel, Stainless Steel and other Ferrous Metals, Nickel Alloys, Cobalt Alloys and Titanium Alloys	Oxygen and Nitrogen content	ASTM E1447 Documented In-House Method TL/CHEM13A (Eltra ONH-2000) and TL/CHEM13B (LECO TC-400) using Inert Gas Fusion techniques	MID
Titanium alloys	Hydrogen content	Documented In-House Method CHEM14 using Inert Gas Fusion techniques	MID
Iron, Steel, Stainless Steel and other ferrous materials	Hydrogen content	Documented In-house method TL/CHEM 18 using Inert Gas Fusion Technique	MID



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PLASTICS, including Rigid and Reinforced Plastics and COMPOSITES	<u>Mechanical Tests</u> (Performed in a controlled environment 23°C ± 2°C and Rh 50% ± 5% ; temperature range - 65°C to 300°C)		
	Low Cycle Fatigue	ASTM D3479/D3479M Documented In-House Method EX-AE-QU-X-LA-SOP-27020	LAN
	Bearing strength	ASTM D5961/D5961M-17 AITM 1.0009 Issue 4	BRI
	Compressive strength and elastic modulus	BS EN ISO 604:2003 ASTM D695-15M ASTM D3410-03/D3410M-16 AITM 1.0008 Issue 8	BRI
	Compression strength after impact of fibre reinforced polymers	ASTM D7136/D7136M-15 ASTM D7137/D7137M-17 AITM 1.0010 Issue 3	BRI
	Flexural properties	BS 2782:Part 10:Method 1005: 1977(2003) BS EN 2562:1997 BS EN 2746:1998 BS EN ISO 178:2019 BS EN ISO 14125:1998+A1:2011 ASTM C393/C393M-16 ASTM D790-17 MSRR 9992 Issue 12 July 16Method 9	BRI
	<u>Fracture toughness:</u>		
	Inter-laminar Fracture Toughness (G <sub>1c</sub> & G <sub>2c</sub> )	ASTM D5528-13 AITM 1-0005 Issue 4 AITM 1-0006 Issue 2 AITM 1-0053 Issue 6	BRI
In-plane shear strength	ASTM D3518/D3518M-18 MSRR 9992 Issue 12 July 16	BRI	



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PLASTICS, including Rigid and Reinforced Plastics and COMPOSITES (cont'd)	<u>Mechanical Tests</u> (cont'd)		
	Interlaminar shear strength	BS EN 2563:1997 MSRR 9992 Issue 12 July 16	BRI
	Tensile strength, elongation and elastic modulus	BS 2782:Part 3:Method 320C-F: 1976 (withdrawn) BS 2782:Part 10:Method 1003: 1977(2003) BS EN 2561:1995 BS EN 2597:1998 BS EN 2747:1998 BS EN ISO 527-1:2019 BS EN ISO 527-2:2012(2017) BS EN ISO 527-3:2018 BS EN ISO 527-4:1997 BS EN ISO 527-5:2009 ASTM D3039/D3039M :2017 AITM 1.0007 Issue 5 MSRR 9992 Issue 12 July 16	BRI
	<u>Physical Tests</u>		
	Density	BS 2782-6: Method 620A-D:1991 BS EN ISO 1183-1:2019 ASTM D792-13 MSRR 9992 Issue 12 July 16	BRI
Fibre and Void Content (Burn off and Acid Digestion)	BS 2782:Part 10:Method 1002: 1977(2003) BS EN 2559:1997 BS EN 2564:2018 BS EN ISO 1172:1999 BS EN ISO 3451-1:2019 BS EN ISO 3451-4:2000 BS EN ISO 3451-5:2002 ASTM D2584-18 ASTM D3171-15 ASTM D3529-16	BRI	
Glass Transition Temperature (DMA T <sub>g</sub> ) by flexure in three-point bending mode	BS EN 6032:2015 AITM 1-0003 Issue 3	BRI	



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ADHESIVES	<u>Mechanical and Physical Tests</u>		
	Lap shear	BS 5350:Part C5:2002(2014) BS EN 2243:Part 1:2005 ASTM D1002-10(2019) ASTM D3528-96(2016)	BRI
	Climbing drum peel test	BS 5350-C13:1990(2016) BS EN 2243-3:2005 ASTM D1781-98(2012)	BRI
	Bond strength in direct tension	BS 5350:Part C6:1990(2017) ASTM C297/C297M-16 ASTM D897-08(2016) ASTM D2095-96(2015) SAE AMS STD401:1999	BRI
END			