

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p>Accredited to ISO/IEC 17025:2005</p>	ATI ALLVAC Ltd	
	Issue No: 034 Issue date: 18 July 2011	
	Commercial Testing Services Blackmore Street Sheffield S4 7TZ	Contact: Mr A Sheldon Tel: +44 (0)114-2768758 Fax: +44 (0)114-2720449 E-Mail: cts@allvac.co.uk Website:
Testing performed at the above address only		

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
METALS, ALLOYS and METAL PRODUCTS	<u>Chemical Tests</u>	
	Elemental analysis:	
Cobalt base alloys	C, Si, Mn, P, S, Cr, Mo, Ni, Al, B, Cu, N, Nb, Sn, Ti, V, W, Ta, Fe	Documented In-house methods using OES: TI OP-CHEM-8-002-LTD & TI OP-CHEM-8-003-LTD
Copper base alloys	C, Si, Mn, P, S, Cr, Ni, Al, AS, B, Co, Pb, Sn, Ti, Zr, Ag, Bi, Mg, Sb, Se, Zn, Fe, Be	Documented In-house methods using OES: TI OP-CHEM-8-002-LTD & TI OP-CHEM-8-003-LTD
Iron base alloys	C, Si, Mn, P, S, Cr, Mo, Ni, Al, AS, B, Co, Cu, N, Nb, Sn, Ti, V, W, Zr, Ca, Mg, Ta	Documented In-house methods using OES: TI OP-CHEM-8-002-LTD & TI OP-CHEM-8-003-LTD
Nickel base alloys	C, Si, Mn, P, S, Cr, Mo, Al, As, B, Co, Cu, N, Nb, Sn, Ti, V, W, Zr, Ca, Mg, Ta, Fe	Documented In-house methods using OES: TI OP-CHEM-8-002-LTD & TI OP-CHEM-8-003-LTD
Titanium base alloys	C, Si, Mn, Cr, Mo, Ni, Al, Cu, N, Nb, Sn, V, W, Zr, Fe	Documented In-house methods using OES: TI OP-CHEM-8-002-LTD & TI OP-CHEM-8-003-LTD
Cobalt / Iron / Nickel base alloys	Si, Mn, P, Cr, Mo, Ni, Al, Co, Cu, Nb, Sn, Ti, V, W, Zr, Ta, Fe	Documented In-house methods using XRF: TI OP-CHEM-3-003-LTD
Titanium base alloys	Si, Mn, Cr, Mo, Ni, Al, Co, Cu, Nb, Sn, V, W, Zr, Fe, Y	Documented In-house methods using XRF: TI OP-CHEM-3-003-LTD



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Chemical Tests</u> (cont'd)	
Low alloy materials	Al, As, B, Co, Cr, Cu, Mg, Mo, Nb, Ni, P, Pb, S, Sb, Si, Sn, Ta, Ti, V, W, Zr	Documented In-house Method using ICP: TI OP-CHEM-8-010-LTD, TI OP-CHEM-8-010-LTD ADD 1 & TI OP-CHEM-8-010-LTD APP 1
Nickel base alloys	Al, B, Ca, Co, Cr Cu, Fe, Mg, Mn, Mo, Nb, P, Ta, Si, Sn, Ti, W, V, Zr	Documented In-house Method using ICP: TI OP-CHEM-8-010-LTD, TI OP-CHEM-8-010-LTD ADD 1 & TI OP-CHEM-8-010-LTD APP 3
Stainless steels	Al, B, Co, Cr, Cu, Mn, Mo, Nb, Ni, P, Si, Sn, Ti, V, W	Documented In-house Method using ICP: TI OP-CHEM-8-010-LTD, TI OP-CHEM-8-010-LTD ADD 1 & TI OP-CHEM-8-010-LTD APP 2
Titanium alloys	Al, B, Co, Cr, Cu, Fe, Mn, Mo, Nb, Ni, P, Si, Sn, Ta, V, Y, W, Zr	Documented In-house Method using ICP: TI OP-CHEM-8-010-LTD, TI OP-CHEM-8-010-LTD ADD 1 & TI OP-CHEM-8-010-LTD APP 4
Cobalt / Iron / Nickel based alloys	C, S, N, H, O	Documented In-house Methods: TI OP-CHEM-4-010-LTD (O ₂ /N ₂) TI OP-CHEM-5-010-LTD (C/S) TI OP-CHEM-9-002-LTD (H ₂)
Titanium alloys	C, N, H, O	Documented In-house Methods: TI OP-CHEM-4-010-LTD (O ₂ /N ₂) TI OP-CHEM-5-010-LTD (C/S) TI OP-CHEM-9-002-LTD (H ₂)
Cobalt / Iron / Nickel / Titanium Alloys	Elemental Analysis	Documented in-house Methods using Atomic Absorption Spectroscopy / Gravimetric / Titrimetric / LIA 400 Based on BS Handbook 19:1970 BS 6200 TI OP-CHEM-7-001-LTD



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Corrosion Tests</u>	
Austenitic stainless steels	Inter-crystalline corrosion	BS EN ISO 3651-2:1998 ASTM A262-10 Practice A, E
Wrought nickel and chromium bearing alloys		ASTM G28-02(2008) Practice A
Stainless steels	Pitting resistance	ASTM G48-03 Practice A
	<u>Mechanical Tests</u>	
Ferrous and non-ferrous alloys	Bend	BS EN ISO 5173 :2010 BS EN ISO 7438:2005
	Stress rupture Creep Creep and rupture (temperature from ambient to 1273 K)	BS EN 2002-5 :2007 BS EN ISO 204 :2009 BS 4A4:Part 1:Section 3:1967 ASTM E139-06 ASTM E292-09
	Fatigue	BS 4449:2005
	Hardness: Brinell (HBW 10/3000)	BS EN ISO 6506-1:2005 ASTM E10-08
	Rockwell (Scales B & C)	BS EN ISO 6508-1:1999 (Superseded) ASTM E18:08
	Vickers (HV5,10, 30)	BS EN ISO 6507-1:2005
	Impact: Izod	BS 131:Part 1:1961
	Charpy (V- and U-Notches) (77 K - 473 K)	BS EN ISO 148-1:2010 ASTM E23-07ae1 Def.Stan 10-13/3 ASTM A370:10
	Crystallinity	BS 131:Part 5:1965
	Jominy	ASTM A255-10



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Mechanical Tests</u> (cont'd)	
	Nick fracture	BS 4S100:1975 (Withdrawn)
	Tensile (temperature from ambient to 1273 K) (forces up to 300 kN)	BS EN 10002-1:2001 (Superseded) BS EN 10002-5:1992 BS 4A4:Part 1:Section 1:1966 BS 4A4:Part 1:Section 2:1967 BS EN 2002-1:2005 BS EN 2002-2:2005 BS EN ISO 6892:2009 Method B ASTM E8M-09 ASTM E8-09 ASTM E21-09
	<u>Metallurgical Tests</u>	
	Alpha case	PrEN 2003-9 P3TF19 DMC 0205
	Case depth	BS EN ISO 2639-2002
	De-carburised depth Thin Surface hardened layer thickness	BS EN ISO 3887:2003 BS 6286:1982 Documented In-House Method MET-072-LTD
	Grain size	ASTM E112-10 ASTM E930-99(2007) ASTM E1181:02(2008)
	Inclusion content	ASTM E45-10 DIN 50602-85
	Macro etch rating	ASTM E381-01(2006) ASTM A604: 07
Sulphur printing	BS 6285:1982	
Volume fraction	ASTM E562-08 AMS 2315F	



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	<u>Metallurgical Tests</u> (cont'd)	
Nickel and Nickel alloys	Grain size	E50 TF133-Issue S9 Documented In-house Method MET-32-LTD
	Identification of delta and laves phases in Inconel 718	API Spec 6A718 1 st edition Documented In-house Method MET 77-LTD
	Beta Transus	Documented In-house Method MET 88-LTD
	<u>Mechanical and Metallurgical Tests</u>	
Weldments	Bend, Hardness, Impact, Tensile and Macro-examination tests in accordance with specified welding codes	BS EN 287:Part 1:2004 BS EN ISO 15614-1:2004 BS EN 288:Part 4:1992 BS EN 875:1995 BS EN 876:1995 BS EN 895:1995 BS EN ISO 5173 :2010 BS EN 1043-1:1996 BS EN 1320:1997 BS EN 1321:1997 BS 709:1983 BS 4872:Part 1:1982 BS 4872:Part 2:1976 ASME IX-2010 (CAA BCAR A8-10 Supplement)
METALS, ALLOYS and METAL PRODUCTS	Tests codes: Ambient temperature tensile (A) Elevated temperature tensile (B) Stress rupture (C) Wet chemistry - Gravimetric (D) Instrumented chemistry (F) Carbon determination (G) Sulphur determination (H) Hydrogen analysis (I) Nitrogen analysis (J) Oxygen analysis (K) Trace element analysis (XD) Metallography - micro (L) Metallography - macro (XL)	GE Aviation S-400 (31 Oct 2007)



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METALS, ALLOYS and METAL PRODUCTS (cont'd)	Tests codes: (cont'd) Hardness testing (M) Corrosion Testing (Q) - ASTM A262	GE Aviation S-400 (31 Oct 2007)
END		