


# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

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

 <p><b>UKAS TESTING</b> 0142</p> <p>Accredited to <b>ISO/IEC 17025:2005</b></p>	<p><b>Howmet Ltd</b></p> <p><b>Issue No: 022    Issue date: 19 August 2010</b></p>	
	<p><b>Exeter Alloy</b> Heron Road Exeter Devon EX2 7LL</p>	<p><b>Contact: Mr E Farley</b> Tel: +44 (0)1392 429700 Fax: +44 (0)1392 429702 E-Mail: <a href="mailto:eric_farley@alcoa.com">eric_farley@alcoa.com</a> Website:</p>
<p><b>Testing performed at the above address only</b></p>		

### DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
NICKEL BASE ALLOYS	<p><u>Chemical Tests</u></p> <p>Elemental analysis</p> <p>Aluminium Chromium Cobalt Copper Hafnium Iron Manganese Molybdenum Nickel Niobium Palladium Phosphorus Platinum Rhenium Silicon Tantalum Titanium Tungsten Vanadium Yttrium Zirconium</p> <p>Boron Calcium</p> <p>Magnesium</p>	<p>Documented In-House Methods from Materials Control Laboratory Manual (MCLM) using:</p> <p>XRFS (291) XRFS (281) Glow Discharge OES (288) Spark OES (284)</p> <p>Glow Discharge OES (288) Spark OES (284)</p> <p>Glow Discharge OES (288) High Temperature Hollow Cathode OES (287)</p>



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Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
NICKEL BASE ALLOYS (cont'd)	<u>Chemical Tests</u> (cont'd)  Elemental analysis (cont'd)  Carbon Sulphur  Nitrogen Oxygen  Antimony Arsenic Bismuth Cadmium Gallium Indium Lead Selenium Silver Tellurium Thallium Tin Zinc	Combustion and Infra-Red Absorption (282 or 289) Glow Discharge OES (288) Spark OES (284)  Inert Gas Fusion (285 or 286)  High Temperature Hollow Cathode OES (287)
COBALT BASE ALLOYS	<u>Chemical Tests</u>  Elemental analysis  Aluminium Beryllium Chromium Cobalt Copper Hafnium Iron Lanthanum Lithium Manganese Mercury Molybdenum Nickel Niobium Phosphorus Platinum Potassium Rhenium	XRFS (281) XRFS (291) Glow Discharge OES (288) Spark OES (284)



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COBALT BASE ALLOYS (cont'd)	<u>Chemical Tests</u> (cont'd)  Elemental analysis (cont'd)  Silicon Tantalum Titanium Tungsten Vanadium Yttrium Zirconium  Boron Calcium  Magnesium  Carbon Sulphur  Nitrogen Oxygen  Antimony Arsenic Bismuth Cadmium Gallium Indium Lead Selenium Silver Tellurium Thallium Tin Zinc	Glow Discharge OES (288) Spark OES (284)  Glow Discharge OES (288) High Temperature Hollow Cathode OES (287)  Combustion and Infra-Red Absorption (282 or 289) Glow Discharge OES (288) Spark OES (284)  Inert Gas Fusion (285 or 286)  High Temperature Hollow Cathode OES (287)



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IRON BASE ALLOYS	<u>Chemical Tests</u>	
	Elemental analysis	
	Aluminium	XRFS (291)
	Chromium	XRFS (281)
	Cobalt	Glow Discharge OES (288)
	Copper	Spark OES (284)
	Iron	
	Manganese	
	Molybdenum	
	Niobium	
	Phosphorus	
	Silicon	
	Tantalum	
	Tin	
	Titanium	
Tungsten		
Vanadium		
Zirconium		
Boron	Glow Discharge OES (288)	
Calcium	Spark OES (284)	
Magnesium	Glow Discharge OES (288) High Temperature Hollow Cathode OES (287)	
Carbon	Combustion and Infra-Red Absorption (282 or 289)	
Sulphur	Glow Discharge OES (288) Spark OES (284)	
Nitrogen	Inert Gas Fusion (285 or 286)	
Oxygen		
Antimony	High Temperature Hollow Cathode OES (287)	
Arsenic		
Bismuth		
Cadmium		
Gallium		
Indium		
Lead		
Selenium		
Silver		
Tellurium		
Thallium		
Tin		
Zinc		



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METALS, ALLOYS AND METAL PRODUCTS	<u>Mechanical Tests</u>  Vickers Hardness (HV 30)  Rockwell Hardness (HRC)  Stress Rupture (973K - 1323K)  Tensile tests: Ambient Temperature (Range 0.1 - 50kN)  Elevated Temperature (650 °C and 850 °C)	BS EN ISO 6507-1:1998 ASTM E92-82 (2003)  ASTM E18-05  BS 4A.4:Part 1, Section 3, Oct 1967 ASTM E139-00 EN 10291:2000  BS EN 10002-1:2001 ASTM E8-04  BS EN 10002-5:1992
NICKEL, COBALT and IRON ALLOYS	<u>Chemical Tests</u>  Test codes: - Gravimetric chemical analysis (D) Instrumental quantitative analysis (F) Carbon determination (G) Sulphur determination (H) Nitrogen analysis (J) Oxygen analysis (K)	GE Aviation S-400 (19 Feb 2010)
	END	