SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

HOWMET RESEARCH CENTER
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CHEMICAL

Valid To: March 31, 2025 Certificate Number: 2208.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests on carbon, clay, ceramics and related products, coatings, contaminants, Ti, Ni, Co, Al, LAS, Stainless, metals and alloys, ores and minerals, surface coatings, petroleum products, plastics and polymers, sand (foundry, glass, and agents), and trace element analysis in dyes and inks, lubricants, rubbers, plastics and related materials:

Test:	**Test Method(s) [1]:**
Physical Testing – Particle Size	
Sieve Analysis of Metal Powders	ASTM B214
Physical Testing – Density	
Density of Metal Powders and Compounds (Scott Volumeter Density)	ASTM B212, B329
Porosity, Apparent Density, and Bulk Density	ASTM C830
Physical Testing – Wax / Resin Properties	
Ash	ASTM D482
Apparent Viscosity	ASTM D3236
Chemical Analysis – Spectrometric	
Spark-AES	
a. Carbon and Low Alloy Steels	
Al, B, Ca, Co, Cr, Cu, Mn, Mo, Nb, Ni, P, Si, Ti, V, Zr	ASTM E415
Al, B, Ca, Co, Cr, Cu, Mg, Mn, Mo, Nb, Ni, P, Si, Ta, Ti, V, W, Zr	MCLIII-144
b. Austenitic Stainless Steels	
Cr, Cu, Mo, Mn, Ni, P, Si	ASTM E1086
Al, B, Ca, Co, Cr, Cu, Mg, Mn, Mo, Nb, Ni, P, Si, Ta, Ti, V, W, Zr	MCLIII-144
c. Aluminum Alloys	
Ca, Co, Cr, Cu, Fe, Mg, Ni, P, Pb, Sb, Si, Sn, Ti, V, Zn, Zr	ASTM E1251
Ca, Co, Cr, Cu, Fe, Mg, Mn, Ni, Pb, Sb, Si, Sn, Ti, V, Zn, Zr	MCLIII-144

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Test:	**Test Method(s) [1]:**
Chemical Analysis – Spectrometric (cont)	
Spark-AES	
d. Nickel Alloys	
Al, B, Co, Cr, Cu, Fe, Mg, Mn, Mo, Nb, P, Si, Ta, Ti, W, V, Zr	ASTM E3047
Al, B, Co, Cr, Cu, Fe, Hf, Mg, Mn, Mo, Nb, P, Re, Si, Ta, Ti, V, W, Zr	MCLIII-144
e. Cobalt Alloys Al, B, Cr, Cu, Fe, Hf, Mg, Mn, Mo, Nb, Ni, P, Si, Ta, Ti, V, W, Zr	MCLIII-144
X-Ray Fluorescence (XRF)	
a. Cast Irons and Low Alloy Steels	
Mn, Mo, Ni, Cr, Cu, V	ASTM E322
Al, Co, Cr, Cu, Fe, Mn, Mo, Nb, Ni, P, Si, Ti, V, W, Zr	MCLIII-138
b. Titanium Alloys	
Al, Cr, Cu, Fe, Mn, Mo, Nb, Ni, Pd, Ru, Si, Sn, V, Y, Zr	ASTM E539
Al, Cr, Cu, Fe, Mn, Mo, Nb, Ni, Pd, Ru, Sn, Ta, Ti, V, W, Zr	MCLIII-138
c. Low Alloy Steels	
Cr, Co, Cu, Mn, Mo, Ni, Nb, P, Si, V	ASTM E1085
Al, Co, Cr, Cu, Fe, Mn, Mo, Nb, Ni, P, Si, Ti, V, W, Zr	MCLIII-138
d. Nickel Alloys	
Al, Co, Cr, Cu, Fe, Mn, Mo, Nb, Ni, P, Si, Ti, W	ASTM E2465
Al, Co, Cr, Cu, Fe, Hf, Mn, Mo, Nb, Ni, Re, Ta, Ti, V, W, Zr	MCLIII-138
e. Cobalt Alloys	
Al, Co, Cr, Cu, Fe, Hf, Mn, Mo, Nb, Ni, Si, Ta, Ti, V, W, Zr	MCLIII-138
Inductively Coupled Plasma (ICP-AES)	
a. Titanium Alloys	
Al, B, Co, Cr, Cu, Fe, Mn, Mo, Ni, Nb, Pd, Ru, Si, Ta, Sn, W, V, Y, Zr	ASTM E2371
Al, B, Co, Cr, Cu, Fe, Hf, Mg, Mn, Mo, Na, Nb, Ni, Re, Si, Ta, Ti, V, W, Y, Zr	MCLIII-027/MCLIII-141
b. Nickel Alloys	
Al, B, Ca, Co, Cr, Cu, Fe, Mg, Mn, Mo, Nb, Ni, P, Si, Ta, Ti, W, V, Zr	ASTM E2594
Al, B, Ca, Co, Cr, Cu, Fe, Hf, Mg, Mn, Mo, Na, Nb, Ni, P, Re, Si, Ta, Ti, V, W, Y, Zr	MCLIII-141
c. Aluminum Alloys	
Cr, Co, Cu, Fe, Mg, Mn, Mo, Na, Ni, P, Si, Sr, Zn, V, Zr	ASTM E3061
B, Bi, Ca, Co, Cr, Cu, Fe, Hf, Ga Mg, Mn, Mo, Na, Nb, Ni, P, Re, Si, Sn, Sr, Ta, Ti, V, W, Y, Zn, Zr	MCLIII-141

Inductively Coupled Plasma Mass Spectrometer (ICP-MS)	
Nickel	
Ag, Bi, Ga, Pb, Sb, Sn, Tl	ASTM E2823
As, Ag, Bi, Cd, Ce, Ga, In, La, Mg, Pb, Pd, Pt, Re, Ru, Sb, Se, Sn, Te, Th, Tl, U, Zn, Mn, Cu, Nb, P, Ti, V, Fe, Zr, Hf, Mo, Ta, W, Y	MCLIII-1002
Cobalt/Iron	
As, Ag, Bi, Cd, Ce, Ga, In, La, Mg, Pb, Pd, Pt, Re, Ru, Sb, Se, Sn, Te, Th, Tl, U, Zn, Mn, Cu, Nb, P, Ti, V, Fe, Zr, Hf, Mo, Ta, W	MCL3-1002
Glow Discharge Mass Spec (GDMS)	
Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Cl, Cs, Cu, Dy, Eu, F, Fe, Ga, Gd, Ge, Hf, Hg, Ho, I, Ir, In, K, La, Li, Lu, Mg, Mn, Mo, Na, Nb, Nd, Os, P, Pb, Pd, Nd, Pr, Pt, Re, Rh, Ru, S, Sb, Rb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Ti, Tm, Th, Tl, U, V, W, Y, Yb, Zn, Zr	MCL III-1006
Chemical Analysis – Combustion / Fusion	
Carbon and Sulfur (Leco)	ASTM E1019, E1941
Oxygen and Nitrogen (Leco)	ASTM E1019, E1409
Hydrogen (Leco)	ASTM E1447
Electron Micro-Probe (EMP)	MCL-III-504

[1] When the date, edition, version, etc. is not identified in the scope of accreditation, laboratories may use the version that immediately precedes the current version for a period of one year from the date of publication of the standard measurement method, per part C., Section 1 of A2LA *R101 - General Requirements- Accreditation of ISO-IEC 17025 Laboratories*.

Accredited Laboratory

A2LA has accredited

HOWMET RESEARCH CENTER

Whitehall, MI

for technical competence in the field of

Chemical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 11th day of April 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2208.02
Valid to March 31, 2025

For the tests to which this accreditation applies, please refer to the laboratory's Chemical Scope of Accreditation.