SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017 &
ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: February 28, 2027 Certificate Number: 3397.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Chemical

Parameter/Equipment	Range[5]	CMC[2, 4] (±)	Comments
Optical Emission Spectrometers[3]	(0.05 to 99.9) $^{W}/_{O}$	See Table 1	ASTM E305 using certified reference materials in matrices including Fe, Ni, Cu, Al, Ti and Mg
Handheld X-Ray Fluorescence Spectroscopy	(0 to 100) $^{W}/_{O}$	See Table 2	ASTM B568 and ISO guide 33:2015, 10.1.3 and 10.3.2
Coating Composition	(1 to 99.9) $^{W}/_{O}$ (1st layer) (1 to 99.9) $^{W}/_{O}$ (2nd layer)	3.2 % 3.6 %	ASTM B568 by x-ray ratio method

II. Dimensional

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Coating Thickness – Measurement Equipment[3]	Up to 5000 µin (1st layer) (1 to 5000) µin (2nd layer) Up to 0.0015 in	3.6 % 4.0 % 3.2 %	ASTM B568 (x-ray) ASTM E376 (eddy current) Zn/Fe, Cd/Fe, Cr/Fe, Ni/Fe, Cu/Fe

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Coating Thickness – Measurement Equipment[3] (cont)	(0.001 to 0.05) in	4.3 %	ASTM B244 (eddy current) non-conductive/conductive
	Up to 0.1 in	5.3 %	ASTM B499 (magnetic induction)
	(35 to 200) µin	3.8 %	ISO 14571 microresistance (rate panel)
	(0.003 to 0.0055) in	5.8 %	ISO 14571 microresistance (surface copper)
	Up to 0.0055 in	4.3 %	ASTM B530 (Ni/non-magnetic)
	(0.1 to 5.5) mils	7.2 %	ISO 14571 (95M) 1 mil = 0.001 in
Plated Thru-Hole – Measuring Equipment[3]	Up to 0.004 in (0.0012 to 0.0018) in [(1.2 to 1.8) mils]	6.4 %	ASTM E376 (eddy current – ETP)
Coating Thickness – Measurement Standards	Up to 0.0015 in	3.9 %	ASTM E376 (eddy current) Zn/Fe, Cd/Fe, Cr/Fe, Ni/Fe, Cu/Fe
	(0.001 to 0.05) in	4.7 %	ASTM B244 (eddy current) non-conductive/conductive
	Up to 0.1 in	6.6 %	ASTM B499 (magnetic induction)
	(35 to 200) µin	4.3 %	ISO 14571 microresistance (rate panel)
	(0.0003 to 0.0055) in	6.5 %	ISO 14571 microresistance (surface copper)
	Up to 0.0055 in	5.2 %	ASTM B530 (Ni/non-magnetic)
	(1 to 5000) µin (1st layer) (1 to 5000) µin (2nd layer)	3.9 % 4.6 %	ASTM B568 (x-ray)

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Plated Thru-Hole Standards	Up to 0.004 in (0.0012 to 0.0018) in (1.2 to 1.8) mils	7.6 %	ASTM E376 (eddy current – ETP)

[1] This laboratory offers commercial calibration service and field calibration service.

[2] Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95% level of confidence, usually using a coverage factor of k=2. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] Field calibration service is available for this calibration. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

[4] In the statement of CMC, the value is defined as the percentage of reading unless otherwise noted.

[5] The notation $^{w}/_{o}$ is defined as weight percent.

[6] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter

Table 1: CMC values are in Weight Percent. The actual uncertainty associated with the calibration of the unit under test will vary depending on the element matrix involved.

Element	Concentration (^{w}/o) [5]
Aluminum (Al)	0.08%
Boron (B)	0.15%
Carbon (C)	0.33%
Cobalt (Co)	0.02%
Chromium (Cr)	0.04%
Copper (Cu)	0.06%
Hydrogen (H)	0.21%
Iron (Fe)	0.11%
Lead (Pb)	1.07%
Magnesium (Mg)	0.02%
Manganese (Mn)	0.06%
Molybdenum (Mo)	0.62%
Nickel (Ni)	0.01%
Nitrogen (N)	0.23%
Phosphorus (P)	0.19%
Silicon (Si)	0.3%
Sulfur (S)	1.0%
Tin (Sn)	0.04%
Titanium (Ti)	0.5%
Vanadium (V)	0.3%
Zinc (Zn)	0.02%

Table 2: CMC values are in Weight Percent. The actual uncertainty associated with the calibration of the unit under test will vary depending on the element matrix involved.

Element	Ranges (wt%)	CMC (± wt %)	Ranges (parts per million)	CMC (±parts per million)	CMC (± wt%)
Aluminum (Al)	0 to 0.34	4.39			
	6.79 to 8.79	0.39			
	91.0 to 97.1	10.3			
Bismuth (Bi)	0 to 0.15	4.9			
Bromine (Br)			883 to 1323	0.0000363	3.63
Cadmium (Cd)			209 to 389	0.000133	13.0
Chromium (Cr)	0 to 0.2	2.0			
	0.63 to 1.05	0.73			
	11.0 to 12.0	0.17			
	14.35 to 17.05	1.26			
	14.93 to 16.55	1.26			
	16.12 to 17.00	0.6			
	16.31 to 17.19	0.6			
	18.8 to 21.6	0.95			
			750 to 1250	0.000 04	4.0
Cobalt (Co)	0 to 0.04	15.0			
	0 to 0.34	4.12			
Copper (Cu)	0.034 to 0.064	1.42			
	0.15 to 0.22	1.64			
	0.17 to 0.53	2.31			
	0.33 to 0.77	1.09			
	23.61 to 25.65	1.22			
	78.3 to 90.7	0.24			
Iron (Fe)	0 to 0.27	1.5			
	0.01 to 0.07	4.08			
	0.09 to 0.29	2.07			
	0.89 to 2.75	2.2			
	5.39 to 6.23	1.15			
Gold (Au)	57.85 to 59.47	0.51			
Lead (Pb)	0.06 to 0.16	1.87			
	3.2 to 6.6	2.04			
	35.33 to 39.33	0			
			959 to 1439	0.000 033	3.3

Element	Ranges (wt%)	CMC (± wt %)	Ranges (parts per million)	CMC (± parts per million)	CMC (± wt%)
Magnesium (Mg)	3.6 to 5.4	1.56			
Mercury (Hg)	0 to 0.11	4.08			
			881 to 1321	0.000 036 3	3.63
Manganese (Mn)	0 to 0.7	1.95			
	0.26 to 0.58	2.38			
	0.49 to 0.89	1.02			
	0.72 to 0.94	1.09			
	1.15 to 2.65	1.89			
	1.54 to 2.02	1.76			
Molybdenum (Mo)	0 to 0.29	0.9			
	0.74 to 0.98	1.35			
	0.94 to 1.1	1.96			
	1.98 to 2.22	0.99			
	14.2 to 15.8	1.3			
Nickel (Ni)	0 to 0.754	1.18			
	1.51 to 2.11	0.33			
	9.32 to 10.92	0.89			
	9.5 to 11.5	1.07			
	9.98 to 10.78	0.89			
Phosphorus (P)	0 to 0.06	10.0			
	0 to 0.14	3.57			
	0 to 0.21	4.29			
Silicon (Si)	0 to 0.34	23.53			
	0 to 0.512	2.34			
	0 to 0.524	0.11			
	0 to 0.8	4.03			
	0 to 0.88	1.36			
Silver (Ag)	3.87 to 4.17	0.75			
	12.53 to 14.27	2.2			
Sulfur (S)	0 to 0.026	23.08			
	0 to 0.06	16.67			
Tin (Sn)	4.62 to 5.42	0.8			
	59.2 to 64.2	0.49			
	94.33 to 96.33	0			
Titanium (Ti)	0 to 0.11	1.41			

Element	Ranges (wt%)	CMC (± wt %)
Tungsten (W)	2.65 to 4.15	1.24
	14.25 to 16.15	0.61
Vanadium (V)	0 to 1.54	3.9
	0 to 1.8	2.0
Zinc (Zn)	0 to 0.14	1.6
	2.81 to 3.81	9.1
	3.79 to 6.99	0.98

Accredited Laboratory

A2LA has accredited

HITACHI HIGH-TECH AMERICA, INC.

Westford, MA

for technical competence in the field of

Calibration

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 laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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 31st day of December 2024.

Mr. Trace McInturff Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3397.01
Valid to February 28, 2027

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