

# Brammer Standard Company, Inc.

## Certificate of Analysis

### BS LF2D

Certified Reference Material for ASTM A350 (LF2) Carbon Steel - UNS Number K03011

	Certified Value <sup>1</sup>	Estimate of Uncertainty <sup>2</sup>	<b>Certified Values<sup>3</sup></b>	Certified Value <sup>1</sup>	Estimate of Uncertainty <sup>2</sup>
<b>Al</b>	<b>0.026</b>	0.002		<b>Mo</b>	0.003
<b>As</b>	<b>0.0046</b>	0.0005		<b>N</b>	0.0006
<b>B</b>	<b>0.0002</b>	0.0001		<b>Ni</b>	0.008
<b>C</b>	<b>0.195</b>	0.009		<b>O</b>	0.0006
<b>Co</b>	<b>0.0066</b>	0.0007		<b>P</b>	0.0009
<b>Cr</b>	<b>0.170</b>	0.006		<b>S</b>	0.001
<b>Cu</b>	<b>0.202</b>	0.009		<b>Si</b>	0.009
<b>Fe</b>	<b>97.9</b>	0.1		<b>Ti</b>	0.0002
<b>Mn</b>	<b>1.06</b>	0.05		<b>V</b>	0.0005

	Reference Value <sup>1</sup>	Estimate of Uncertainty <sup>2</sup>	<b>Reference Values<sup>3,4</sup></b>	Reference Value <sup>1</sup>	Estimate of Uncertainty <sup>2</sup>
<b>Ca</b>	<b>&lt;0.005</b>			<b>Sb</b>	<b>&lt;0.05</b>
<b>H</b>	<b>&lt;0.005</b>			<b>Sn</b>	0.003
<b>Mg</b>	<b>&lt;0.005</b>			<b>W</b>	0.0008
<b>Nb</b>	<b>&lt;0.005</b>			<b>Zn</b>	<b>&lt;0.005</b>
<b>Pb</b>	<b>&lt;0.005</b>			<b>Zr</b>	0.0005

<sup>1</sup> For each element, the certified value listed is the present best estimate of the true value based on the mean of the weighted results of an interlaboratory testing program. See page 4 for more information on its calculation.

<sup>2</sup> For each element, the uncertainty listed is based on a statistical evaluation of the contributions of homogeneity and the interlaboratory testing program. See page 4 for more information on its calculation.

<sup>3</sup> Values are given in weight percent. Values in brackets are reported by difference.

<sup>4</sup> Reference values are not certified and are provided for information only.

Trace element information values for Ag, Ba, Ce, Ga, Ge, K, La, Na, Re, and Th are shown on page 3.

The requirements of ISO Guides 30, and Standards 33401 and 33405 were followed for the preparation of this Certified Reference Material and certificate of analysis.

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\* Code for method

Certified values listed as weight percent

Analysis	*	Al	*	As	*	B	*	C	*	Co	*	Cr	*	Cu	*	Fe	*	Mn	*	Mo		
1	5	0.0248667	3	0.004	5	0.000133	1	0.184667	5	0.0059	3	0.16	3	0.188	4	97.790	4	1.023	5	0.0255		
2	5	0.0248667	4	0.00403333	12	0.000140	1	0.184667	4	0.00592	4	0.164667	5	0.192667	16	97.8264	5	1.023	5	0.0255		
3	4	0.0249333	4	0.00416667	5	0.000193	1	0.185333	10	0.006	10	0.165	5	0.192667	16	97.8736	8	1.03	4	0.025633		
4	12	0.0256667	9	0.00426667	4	0.000200	1	0.187667	3	0.006	3	0.166	10	0.196667	16	97.88	14	1.04333333	10	0.026		
5	14	0.0257	4	0.0045	4	0.000213	3	0.189	4	0.0061	4	0.167333	10	0.198	14	97.9	4	1.048	4	0.026833		
6	4	0.0257667	4	0.00456667	4	0.000260	1	0.192667	4	0.0062	11	0.168	4	0.199667	10	97.906667	10	1.05	5	0.026933		
7	4	0.0261333	5	0.00466667	5	0.000267	3	0.1928	4	0.0062733	4	0.168733	4	0.1999	16	97.916	4	1.054	4	0.027		
8	4	0.0262	4	0.0047	3	0.000300	1	0.193313	4	0.0063	4	0.168867	4	0.200333	16	97.92	4	1.05576667	4	0.027167		
9	4	0.0263	5	0.00476667	4	0.000400	1	0.1942	5	0.0063667	4	0.169	4	0.200433	16	97.920433	4	1.05733333	11	0.028		
10	11	0.0264	5	0.00496667			1	0.195	5	0.0063667	10	0.17	4	0.201	4	97.923333	4	1.05986667	3	0.028		
11	4	0.0264	12	0.00496667			11	0.195	4	0.0064333	4	0.170333	3	0.202	4	97.93	7	1.060	3	0.028		
12	4	0.0265667	3	0.005			1	0.196	3	0.0065	4	0.1705	4	0.202033	16	97.93	4	1.06	10	0.0284		
13	3	0.0267	10	0.005			1	0.1966	11	0.0065	14	0.170667	14	0.203333	16	97.966667	3	1.06	14	0.028433		
14	10	0.0269	5	0.00502667			1	0.197	4	0.0065	3	0.171	4	0.2036	16	97.966667	4	1.06333333	4	0.0287		
15	3	0.027					1	0.198333	12	0.0068333	3	0.171	4	0.203667			4	1.0650	4	0.0288		
16	3	0.027					1	0.199333	14	0.0069	10	0.171	4	0.204333			4	1.06533333	3	0.029		
17	5	0.0271333					1	0.201333	4	0.007	4	0.1717	3	0.205			10	1.066	4	0.029233		
18	3	0.028					3	0.204	3	0.007	4	0.172	4	0.205667			3	1.07	4	0.029233		
19	4	0.0283333					1	0.2050	4	0.0078	4	0.175	4	0.206			3	1.073	4	0.0296		
20							1	0.206667	4	0.0078333	4	0.1750	11	0.206			10	1.07333333	3	0.0299		
21													5	0.175667	4	0.207333			3	1.078	10	0.030
22													5	0.175667	8	0.21			11	1.08		
23													4	0.176	10	0.21			4	1.083		
24															3	0.21			4	1.087867		
Average		0.02644		0.00462		0.0001972		0.1949		0.00658		0.1702		0.2020		97.904		1.0588		0.0279		
Std Dev		0.00084		0.00037		0.0000022		0.0065		0.00018		0.0025		0.0056		0.017		0.0050		0.0014		
H		0.0017		0.00078		0.00024		0.0045		0.00090		0.0042		0.0045		0.19		0.011		0.0017		
U <sub>1</sub>		0.0019		0.00078		0.00024		0.0045		0.00092		0.0049		0.0045		0.19		0.012		0.0019		
t-statistic		2.10		2.16		2.31		2.09		2.09		2.07		2.07		2.16		2.07		2.09		
U <sub>2</sub>		0.0039		0.0017		0.00056		0.0093		0.0019		0.010		0.0094		0.41		0.025		0.0040		
U <sub>3</sub>		0.00090		0.00045		0.00019		0.0021		0.00043		0.0021		0.0019		0.11		0.0052		0.00088		
Certified		<b>0.026</b>		<b>0.0046</b>		<b>0.0002</b>		<b>0.195</b>		<b>0.0066</b>		<b>0.170</b>		<b>0.202</b>		<b>97.9</b>		<b>1.06</b>		<b>0.028</b>		
Uncertainty		0.002		0.0005		0.0001		0.009		0.0007		0.006		0.009		0.1		0.05		0.003		
Tolerance		0.006		0.0017		0.0001		0.027		0.0021		0.018		0.027		0.4		0.15		0.009		

Analysis	*	N	*	Ni	*	O	*	P	*	S	*	Si	*	Ti	*	V
1	2	0.00765	4	0.07623333	2	0.00085	14	0.0084	1	0.0115667	4	0.259667	5	0.000507	12	0.0013333
2	2	0.0078667	5	0.07953333	2	0.0010	3	0.0086	1	0.0123833	4	0.259667	5	0.000533	5	0.0013333
3	2	0.0079	5	0.07953333	2	0.0011567	4	0.0088	1	0.0126667	6	0.26	5	0.000553	5	0.0013333
4	2	0.0080	4	0.07966667	2	0.0011667	6	0.008933	3	0.0128	10	0.26	3	0.0006	4	0.00139
5	2	0.0080	4	0.08093333	2	0.0012333	3	0.009	1	0.0134333	4	0.260667	3	0.0007	4	0.0014
6	2	0.0081	10	0.08136667	2	0.0014333	4	0.009007	1	0.0134333	11	0.264	11	0.0007	5	0.0014233
7	2	0.0083	3	0.082	2	0.0015667	4	0.009033	1	0.0135333	14	0.264	4	0.000733	5	0.0014667
8	2	0.0084	4	0.0820	2	0.00195	10	0.0091	4	0.0137	3	0.265	4	0.000797	3	0.0015
9	2	0.0084233	4	0.08266667	2	0.0020	5	0.00915	1	0.0139	4	0.266833	12	0.000797	4	0.0015
10	2	0.0085	3	0.083	2	0.0020	4	0.009333	11	0.0139	4	0.267333	14	0.0008	11	0.0017
11	2	0.0086	10	0.084	4	0.0095	1	0.0140	5	0.0140	5	0.267667	4	0.0013	14	0.0017
12	2	0.0087633	4	0.08436667	4	0.009533	1	0.0142	4	0.0142	4	0.267667	4	0.001333	4	0.0017667
13	2	0.0088	11	0.085	11	0.0096	4	0.0142333	5	0.0142	5	0.267667			10	0.002
14			8	0.085	5	0.009967	1	0.0146	4	0.0146	4	0.2695			3	0.002
15			3	0.0859	5	0.009967	3	0.015	4	0.015	4	0.269667			4	0.0020
16			4	0.0868	3	0.0102	10	0.015	10	0.015	10	0.269667			4	0.0020733
17			4	0.0872	4	0.010233	1	0.0151333	3	0.0151333	3	0.27			4	0.0024
18			4	0.0873	4	0.0105	1	0.0156667	10	0.0156667	10	0.27				
19			14	0.0873	4	0.011033	3	0.0161	3	0.0161	3	0.27				
20			4	0.08736667	10	0.0113	1	0.0161333	6	0.0161333	6	0.2721				
21			3	0.088	12	0.011667			3	0.011667	3	0.273				
22			4	0.08856					4	0.08856	4	0.275				
23									4	0.2750						
24									4	0.2766						
Average		0.00834		0.0838		0.00144		0.00966		0.0141		0.2680		0.000652		0.00167
Std Dev		0.00027		0.0034		0.00043		0.00090		0.0012		0.0031		0.000053		0.00032
H		0.0010		0.0029		0.00049		0.0011		0.0013		0.0053		0.00036		0.00052
U <sub>1</sub>		0.0010		0.0029		0.00050		0.0011		0.0013		0.0061		0.00037		0.00052
t-statistic		2.18		2.08		2.26		2.09		2.09		2.07		2.20		2.12
U <sub>2</sub>		0.0023		0.0061		0.0011		0.0023		0.0026		0.013		0.00081		0.0011
U <sub>3</sub>		0.00063		0.0013		0.00036		0.00050		0.00059		0.0026		0.00023		0.00027
Certified		<b>0.0083</b>		<b>0.084</b>		<b>0.0014</b>		<b>0.0097</b>		<b>0.014</b>		<b>0.268</b>		<b>0.0007</b>		<b>0.0017</b>
Uncertainty		0.0006		0.008		0.0006		0.0009		0.001		0.009		0.0002		0.0005
Tolerance		0.0023		0.024		0.0013		0.0027		0.003		0.027		0.0006		0.0016

**BS LF2D** \* Code for method Reference values listed as weight percent

Analysis	*	Ca	*	H	*	Mg	*	Nb	*	Pb	*	Sb	*	Sn	*	W	*	Zn	*	Zr
1	12	0.000827	2	0.00006	12	0.000083	12	0.00014	12	0.000051	5	0.0016	4	0.006	12	0.0006	12	0.00083	12	0.000037
2			2	0.0000553							5	0.0016	5	0.006967	5	0.0008			5	0.00004
3			2	0.000125							5	0.001633	5	0.006967	5	0.0008333			5	0.00004
4			2	0.00013667							12	0.001633	4	0.0072	4	0.0009667			4	0.0004
5			2	0.00013667							5	0.00173	5	0.0074	5	0.0010367			3	0.001
6			2	0.00016667							4	0.001743	4	0.007433	4	0.0013			10	0.001
7			2	0.00016667							5	0.001967	4	0.007667	3	0.0014			4	0.001093
8			2	0.00020333							9	0.0020	12	0.007667	11	0.0019			4	0.001133
9			2	0.00024667							4	0.0040	4	0.00789	4	0.0021667			4	0.0012
10			2	0.00043333							4	0.00405	5	0.007937	4	0.00218			11	0.0012
11											4	0.0041	10	0.008	4	0.0022			4	0.0017
12													3	0.008					3	0.0017
13													3	0.008						
14													4	0.0083						
15													3	0.009						
16													4	0.009533						
17													4	0.010533						
18													9	0.0109						
19													4	0.012067						
20													4	0.0123						
Average		0.00083		0.000108		0.000083		0.000140		0.0000510		0.0024		0.0085		0.00140		0.000833		0.00088
Std Dev		0.00038		0.000012		0.000020		0.000010		0.0000056		0.0011		0.0017		0.00061		0.000023		0.00061
H		0.00040		0.00020		0.00018		0.00022		0.00016		0.00059		0.0011		0.00045		0.00048		0.00048
U <sub>1</sub>		0.00055		0.00020		0.00018		0.00022		0.00016		0.00060		0.0011		0.00045		0.00048		0.00049
t-statistic		12.71		2.26		12.71		12.71		12.71		2.23		2.09		2.23		12.71		2.2
U <sub>2</sub>		0.0070		0.00045		0.0023		0.0027		0.0020		0.0013		0.0023		0.0010		0.0062		0.0011
U <sub>3</sub>		0.0070		0.00014		0.0023		0.0027		0.0020		0.00040		0.00051		0.00030		0.0062		0.00031
Reference		<0.005		<0.005		<0.005		<0.005		<0.005		<0.05		0.009		0.0014		<0.005		0.0009
Uncertainty														0.003		0.0008				0.0005
Tolerance														0.008		0.0013				0.0008

**BS LF2D** \* Code for analytical method Trace analysis listed as mg/kg (ppm)

Analysis	*	Ag	*	Ba	*	Ce	*	Ga	*	Ge	*	K	*	La	*	Na	*	Re	*	Th
1	12	0.69	12	0.08	12	0.02	12	6.9	12	11	12	0.1	12	0.02	12	0.01	12	0.03	12	0.005
2	12	0.75	12	0.10	12	0.02	12	7.1	12	12	12	0.14	12	0.02	12	0.02	12	0.03		
3	12	0.77	12	0.19	12	0.03	12	7.5	12	12	12	0.19	12	0.04	12	0.03	12	0.03		

**Analytical Method Codes:**

- |                           |                           |                           |
|---------------------------|---------------------------|---------------------------|
| 1 Combustion (ASTM E1019) | 7 Photometric             | 13 Titrimetric            |
| 2 Fusion (ASTM E1019)     | 8 Flame Atomic Absorption | 14 DCP Atomic Emission    |
| 3 Spark Atomic Emission   | 9 GF Atomic Absorption    | 15 HG Atomic Fluorescence |
| 4 ICP Atomic Emission     | 10 X-Ray Fluorescence     | 16 Difference             |
| 5 ICP Mass Spectrometry   | 11 GD Atomic Emission     |                           |
| 6 Gravimetric             | 12 GD Mass Spectrometry   |                           |

ICP = Inductively Coupled Plasma      GF = Graphite Furnace      GD = Glow Discharge  
 DCP = Direct Current Plasma      HG = Hydride Generation

For each element, in accordance with the requirements of ISO 17034 and Standard 33405, an effort must be made to account for the effects on the certified value of the uncertainty estimate from homogeneity testing (H) and the uncertainties of the contributing laboratories. The average (A) is calculated using a weighted mean where the reciprocal of the square of each laboratory's combined uncertainty ( $C_L$ ), calculated from its standard deviation ( $S_L$ ) and its uncertainty estimate ( $U_L$ ), is used as the weight ( $W_L$ ) for its mean ( $M_L$ ). The standard deviation (S) is calculated as the square root of the reciprocal of the sum of the weights.  $U_1$  is the combined uncertainty from homogeneity and labs.  $U_2$  is  $U_1$  multiplied by the coverage factor (95 % t-statistic).  $U_3$  is  $U_2$  divided by the square root of the number of determinations (n). Thus:

$$C_L = \sqrt{S_L^2 + U_L^2} \quad W_L = \frac{1}{C_L^2} \quad A = \frac{\sum_{i=1}^n W_L M_L}{\sum_{i=1}^n W_L} \quad S = \frac{1}{\sqrt{\sum_{i=1}^n W_L}} \quad U_1 = \sqrt{H^2 + S^2} \quad U_2 = t \times U_1 \quad U_3 = \frac{U_2}{\sqrt{n}}$$

All but the final reported values are taken to two significant figures as determined by each quantity's uncertainty estimate. The final reported Uncertainty is  $U_3$  rounded to one significant figure and represents the half width of the 95 % confidence interval for the **Certified** value. The final reported **Certified** value is A rounded to the same decimal place as the Uncertainty. The Uncertainty is a measure of the quality of the **Certified** value.

The Tolerance is a measure of the expected performance of an analysis. This involves further expanding the sample uncertainty to include instrument and operator uncertainty, for those without access to such calculations.

For further information regarding the confidence interval for the certified value see ISO Standard 33405:2024 section 10.

Lab Name	Location	Registrar	Accreditation
Brammer Standard Company, Inc.	Houston, TX	A2LA	17025, 17034
NSL Analytical	Cleveland, OH	ANAB	17025
Dirats Laboratories	Westfield, MA	ANAB	17025
Vitkovice Testing Center	Hulvaky, Ostrava	Czech Accreditation Institute	17025
National Analysis Center For Iron And Steel	Beijing, China	CNAS	17025
Element Materials Technology	Glendale Heights, IL	A2LA	17025
Elemental Analysis, Inc.	Lexington, KY	A2LA	17025
Anderson Laboratories, Inc.	Greendale, WI	A2LA	17025
TUV Rheinland Pvt Ltd	Bangalore, India	NABL	17025
Shiva Analyticals Private Limited	Hoskote, Bangalore	NABL	17025
Raghavendra Spectro Metallurgical Laboratory	Karnataka, India	NABL	17025
Luvak Inc.	Boylston, MA	PRI	17025
Eurofins EAG Materials Science, LLC	Liverpool, NY	A2LA	17025
Laboratory Testing, Inc.	Hatfield, PA	A2LA	17025
Instytut Metalurgii Zelaza	Gliwice, Poland	PCA	17025

A2LA = American Association for Laboratory Accreditation

ANAB = ANSI-ASQ National Accreditation Board

CNAS = China National Accreditation Service

NABL = National Accreditation Board for Testing and Calibration Laboratories

PCA = Polish Center for Accreditation

PRI = Performance Review Institute

**Analysis:** Chemical analyses were made on solid pieces and chips prepared by an end mill from representative samples for the certified portion of the lot in accordance with ASTM Standard Practice E1806. The laboratories participating in the testing followed the requirements of ISO Standard 17025.

**Traceability:** The following Certified Reference Materials were used to validate the analytical data: AR 511, 546, 555, 556, 629, 644, 647, 654, 662, 668, 670, 673, 675, 867, 8770, 872, 876, 882, 889, 895, 946, 951, 957, 1023F, 1650, 1652, 1653; BAM 038-1; BAS 325, 407, 452, 454/1, 459/1, 464/1; BS CE 26, HON T, LF2B, LF2C, 30D, 33F, 45C, 50G, 52D, 54H, 54J, 55H, 73D, 300A, 304A, 1018A, 1020, 1030A, 1932, 2023, 2931A, 2932, 3011, 3942, 3981, 8620A; DSZU CA031; IAMR 20A, 28G, 30C, 30F, 31C, 36C, 47B, 199C, 200A; IMZ 74B, 112A; IPT 29-1B; KMS HCS-001; KMS HCS-001; LECO 501-503, 501-677, 502-060, 502-364, 502-449, 502-863, 502-893, 502-904, 502-916, 502-918, 502-935, 509-903, 509-916; NCS NS11043; SPL CM 24A; SRM 9C, 13G, 14D, 132A, 155, 160B, 361, 362, 363, 364, 365, 368, 1163, 1262, 1262A, 1764, 1767.

**Homogeneity:** This Certified Reference Material (CRM) was tested for homogeneity using ASTM Standard Method E826 and found acceptable. It was also examined by spark atomic emission spectrometry and found to be compatible with the following Reference Materials: BAS 454/1; BS LF2B, 52D, 1932, 2931A, 2932, 3011, 3981, 8620A; SRM 1163.

**Validity statement:** ISO Standard 33401 states that the certification should contain an expiration date for all materials where instability has been demonstrated or is considered possible, after which the certified value is no longer guaranteed by the certifying body. The certification of BS LF2D is valid indefinitely. The certification is nullified if this CRM is damaged, contaminated, or otherwise modified.

**Storage:** This CRM must be stored in a cool, dry, non-corrosive environment.

**Source:** The bar stock for this CRM was produced by Steel Dynamics, Inc., Pittsboro, IN.

**Form:** This CRM is machined in the form of a disc, approximately 38mm in diameter and 19mm thick by Brammer Standard Company, Inc.

**Use:** This CRM is intended for use in spark atomic emission, glow discharge, and x-ray spectrometric methods of analysis. Refer to ISO Standard 33403 for information about the use of Certified Reference Materials.

**Certified Area:** The entire depth of the CRM may be used.

Caution: As with any bar material, avoid spark atomic emission spectrometric burns in the center of the CRM (5 mm radius), as some segregation may be present.

**Sample Preparation:** For best analytical results, use the same method for preparing the analytical surface on all reference materials as used for production specimens. Avoid overheating the sample during surface preparation.

Caution: CRM contains significant insoluble soft metal inclusions. Surface smearing may occur. Spark atomic emission spectrometers may require extended preburns to compensate.

**Certificate Number:** The unique identification number for this certificate of analysis is LF2D-100726. You may obtain information on revisions of certificates from the internet at [www.brammerstandard.com](http://www.brammerstandard.com).

**Safety Notice:** A Safety Data Sheet (SDS) is not required for this material. This material will not release or otherwise result in exposure to a hazardous chemical, under normal conditions of use. Inquiries concerning this Reference Material should be directed to:

**Brammer Standard Co., Inc.**  
14603 Benfer Road  
Houston, Texas 77069-2895 USA

**Phone: (281) 440-9396**  
**Fax: (281) 440-4432**

**Web: [www.brammerstandard.com](http://www.brammerstandard.com)**  
**Email: [contact@brammerstandard.com](mailto:contact@brammerstandard.com)**

**Brammer Standard Company, Inc., is accredited by the American Association for Laboratory Accreditation (A2LA) to ISO Standard 17034:2016 as a Reference Material Producer for the production of Certified Reference Materials and Reference Materials (our current Certificate Number 656.02 expires 01/31/2027)**

**Brammer Standard Company's Chemical Laboratory is accredited by A2LA to ISO Standard 17025:2017. (Our current Certificate Number 656.01 expires 01/31/2027)**

**By current Certificate Number 10539 expiring 01/01/2027, the Quality System of Brammer Standard Company, Inc., is registered to ISO 9001:2015 by National Quality Assurance (NQA), U.S.A.**

The scopes of accreditation are listed on the website: [www.brammerstandard.com](http://www.brammerstandard.com)

### **References:**

Versions used were those available at the time of testing and characterization

- E826 Standard Practice for Testing Homogeneity of a Metal Lot or Batch in Solid Form by Spark Atomic Emission Spectrometry
- E1019 Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel, Iron, Nickel, and Cobalt Alloys by Various Combustion and Fusion Techniques
- E1806 Standard Practice for Sampling Steel and Iron for Determination of Chemical Composition

ISO Standard 17025:2017 General requirements for the competence of testing and calibration laboratories

ISO Standard 9001:2015 Quality Management Systems - Requirements

ISO Guide 30:2015 Terms and definitions used in connection with reference materials + 2008 amendment

ISO Standard 33401:2024 Reference materials - Contents of certificates, labels, and accompanying documentation

ISO Standard 33403:2024 Reference materials – Requirements and recommendations or use

ISO Standard 17034:2016 General requirements for the competence of reference material producers

ISO Standard 33405:2024 Reference Materials – Approaches for characterization and assessment of homogeneity and stability

*ASTM documents available from ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428.*

*ISO Guides and Standards available from Global Engineering - [www.global.ihs.com](http://www.global.ihs.com)*

*Other useful documents available from NIST, U.S. Department of Commerce, Gaithersburg, MD 20899.*

NIST Special Publication 260-100, Handbook for SRM Users

NIST Special Publication 829, Use of NIST Standard Reference Materials for Decisions on Performance of Analytical Chemical Methods and Laboratories

Certified by: \_\_\_\_\_ on January 7, 2026.

Beau R. Brammer  
President