

Brammer Standard Company, Inc.
Certificate of Analysis

B.S. LAS-8

Low Alloy Steel Reference Material

Analysis listed as percent by weight

	Certified Value ¹	Estimate of Uncertainty ²		Certified Value ¹	Estimate of Uncertainty ^{2,3}
C	0.80	0.01	Co	0.028	0.002
Mn	0.30	0.004	N	0.0268	0.0006
P	0.002	0.0004	O	0.0013	0.0003
S	0.036	0.002	Nb	0.007	0.001
Si	1.01	0.02	Pb	0.013	0.001
Cu	0.428	0.005	Sb	0.033	0.003
Ni	1.32	0.02	Sn	0.015	0.002
Cr	0.063	0.002	Ta	(<0.02)	
Mo	0.040	0.002	Ti	0.010	0.001
Al	0.009	0.001	V	0.011	0.001
As	0.012	0.001	W	0.020	0.002
B	0.0006	0.0002	Zr	0.002	0.001

¹ The certified value listed is the present best estimate of the true value based on the results of an interlaboratory testing program.

² The uncertainties listed are based on value judgments of the material inhomogeneity and possible bias in the determined analytical values. No attempt is made to derive exact statistical measurements of imprecision because several methods were used in the determination of most constituents.

³ The value in parentheses is not certified and is provided for information only.

The requirements of ISO Guide 31 and ISO Guide 35 were generally followed for the preparation of this reference material and certificate of analysis. This is a reference materials as defined by ISO Guide 30.

See the following pages for more information.

Certificate Number LAS8-021297

Brammer Standard Company, Inc., 14603 Benfer Road, Houston, TX 77069-2895
Telephone (281) 440-9396 Fax (281) 440-4432

BS LAS-8 data listed as % by weight Certificate Number LAS8-021297

Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
Average	0.7994	0.3010	0.0017	0.0356	1.0144	0.4280	1.3243	0.0632	0.0395
Std Dev	0.0180	0.0081	0.0012	0.0033	0.0403	0.0126	0.0378	0.0029	0.0028
Nr. Labs	120	94	66	124	80	89	94	89	90
C(95%)	0.0033	0.0017	0.0003	0.0006	0.0090	0.0027	0.0077	0.0006	0.0006

Analysis	Al	As	B	Co	N	O	Nb
Average	0.0089	0.0115	0.0006	0.0278	0.0268	0.0013	0.0068
Std Dev	0.0016	0.0013	0.0002	0.0018	0.0008	0.0008	0.0017
Nr. Labs	72	33	59	43	44	28	62
C(95%)	0.0004	0.0005	0.0001	0.0006	0.0002	0.0003	0.0004

Analysis	Pb	Sb	Sn	Ta	Ti	V	W	Zr
Average	0.0134	0.0330	0.0148	<0.02	0.0099	0.0109	0.0204	0.0020
Std Dev	0.0030	0.0034	0.0018		0.0010	0.0015	0.0042	0.0011
Nr. Labs	8	7	68	2	69	88	32	34
C(95%)	0.0025	0.0031	0.0004		0.0002	0.0003	0.0015	0.0004

$C(95\%) = (t \times sd) / \sqrt{n}$ The half-width confidence interval, where t is the appropriate Student's t value, sd is the interlaboratory standard deviation, and n is the number of acceptable mean values. For further information regarding the confidence interval for the certified value see ISO Guide 35:1989 section 4.

Analysis: This material was used as an unknown test specimen in a nationally recognized Proficiency Testing Program (PTP) for low-alloy steel. The participating laboratories were instructed to use ASTM Standard Test Methods E 322, E 415, E 1085, and E 1019. The data shown above are the results from the PTP.

Homogeneity: This Reference Material was tested for homogeneity using ASTM Standard Practice E 826 and found acceptable.

Source: This material was produced by Carpenter Technology Corporation, Reading, Pennsylvania. The material was made in an electric arc furnace and cast into ingots. The bar stock was forged from the ingots and the resulting bar stock was annealed.

Available Form: This Reference Material is available only in the form of a disc, approximately 40 mm (1.60") in diameter and 30 mm (1.18") thick.

Use: This Reference Material is intended for use in optical emission and x-ray spectrometric methods of analysis. The entire depth of the disc may be used.

Caution: As with any bar material produced from ingots, avoid optical emission spectrometric burns in the center of the discs (6 mm radius), as some carbon segregation is present.

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

Safety Notice: A Material Safety Data Sheet (MSDS) 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. Phone: (281) 440-9396
14603 Benfer Road
Houston, Texas 77069-2895 USA Fax: (281) 440-4432

Signed by: _____ on February 12, 1997.
 G. R. Brammer

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Referenced Documents

ASTM documents available from ASTM, 1916 Race Street, Philadelphia, PA, 19103.

E 322 - 67 (Reapproved 1990) Standard Method for X-Ray Emission Spectrometric Analysis of Low-Alloy Steels and Cast Irons

E 415 - 85 (Reapproved 1989) Standard Test Method for Optical Emission Vacuum Spectrometric Analysis of Carbon and Low-Alloy Steel

E 826 - 85 (Reapproved 1990) Standard Practice for Testing Homogeneity of Materials for the Development of Reference Materials

E 1019 - 93 Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel and in Iron, Nickel, and Cobalt Alloys

E 1085 - 95 Standard Test Method for X-Ray Emission Spectrometric Analysis of Low-Alloy Steels

ISO Guides available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.

ISO Guide 30 (Second edition, 1992), Terms and definitions used in connection with reference materials.

ISO Guide 31 (First edition, 1981), Contents of certificates of reference materials.

ISO Guide 33 (First edition, 1989), Uses of certified reference materials.

ISO Guide 35 (Second edition, 1989), Certification of reference materials - General and statistical principles.

Other useful documents available at no cost from NIST, U.S. Department of Commerce, Gaithersburg, MD 20899.

NBS 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

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