Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 1931

AISI Steel Grade 8620 Reference Material

	Certified Value[1]	Estimate of Uncertainty[2]		Certified Value[1]	Estimate of Uncertainty[2]
		Analysis listed as percent by weight			
C	**0.194**	0.007	**As**	**0.007**	0.001
Mn	**0.84**	0.015	**Co**	**0.012**	0.001
P	**0.007**	0.001	**N**	**0.0079**	0.0007
S	**0.018**	0.001	**Sn**	**0.007**	0.001
Si	**0.235**	0.005	**V**	**0.002**	0.001
Cu	**0.116**	0.005			
Ni	**0.42**	0.01			
Cr	**0.50**	0.01	Informational values		
Mo	**0.168**	0.005	Ca	(0.0008)	
Al	**0.021**	0.004	O	(0.0052)	

[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.

Data in parentheses are not certified and are 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 material as defined by ISO Guide 30.

See reverse side for more information. Certificate Number 1931-122793

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

BS 1931 Certificate number 1931-122793

Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
1	0.182	0.824	0.0064	0.0180	0.230	0.110	0.396	0.490	0.164
2	0.1874	0.8275	0.0069	0.0180	0.231	0.110	0.42	0.492	0.165
3	0.1905	0.828	0.007	0.018	0.232	0.114	0.422	0.496	0.166
4	0.193	0.831	0.0072	0.018	0.234	0.114	0.423	0.497	0.166
5	0.194	0.832	0.0075	0.0181	0.234	0.115	0.424	0.498	0.167
6	0.1945	0.838	0.0076	0.0185	0.235	0.115	0.424	0.498	0.168
7	0.196	0.84	0.008	0.0189	0.236	0.116	0.426	0.498	0.169
8	0.196	0.849	0.008	0.019	0.238	0.117	0.427	0.500	0.170
9	0.201	0.85		0.0192	0.240	0.118	0.428	0.503	0.174
10	0.2037	0.850			0.240	0.118	0.429	0.507	0.176
11		0.857				0.119	0.436	0.508	
12						0.120	0.437	0.51	
Average	0.1938	0.8388	0.0073	0.0184	0.2350	0.1155	0.4243	0.4998	0.1685
Std Dev	0.0063	0.0112	0.0006	0.0005	0.0035	0.0032	0.0103	0.0062	0.0039
Certified	0.194	0.84	0.007	0.018	0.235	0.116	0.42	0.50	0.168

Analysis	Al	As	Co	N	Sn	V	Ca	O
	0.017	0.0052	0.011	0.0072	0.006	0.001	0.0006	0.0047
	0.017	0.0055	0.012	0.0078	0.0064	0.001	0.0007	0.0052
	0.020	0.006	0.0124	0.0079	0.0067	0.0011	0.00109	0.0057
	0.0204	0.0063	0.0125	0.0079	0.007	0.0012		
	0.0210	0.0065	0.0127	0.0085	0.007	0.0016		
	0.0216	0.0069	0.0127		0.0079	0.002		
	0.022	0.007	0.0128		0.0079	0.002		
	0.023	0.0076	0.013		0.0079	0.0022		
	0.0235	0.008	0.013		0.008	0.003		
	0.0242				0.008	0.004		
						0.004		
Average	0.0210	0.0066	0.0125	0.0079	0.0073	0.0021	0.0008	0.0052
Std Dev	0.0025	0.0009	0.0006	0.0005	0.0008	0.0011	0.0003	0.0005
Certified	0.021	0.007	0.012	0.0079	0.007	0.002	(0.0008)	(0.0052)

Data in parentheses are not certified but provided for information only.

Analysis: Chemical analyses were made on chips prepared by a lathe from the certified portion of the discs. The laboratories participating in the testing normally followed the requirements of ISO Guide 25. The individual values listed above are the average of each analyst's results. Methods of analysis used were a combination of ASTM Standard Methods E 322, E 350, E 415, E 1019, plus additional ICP, and AA spectrometric methods. The following Certified Reference Materials were used to validate the analytical data listed above: NIST SRM 361 - 365, 125b; JSS 003; ECRM 085-1, 088-1, 096-1, 097-1, 184-1, 481-1; BAM 044-1; BCS 455/1, 458/1

Co-operating Laboratories: Some of the co-operating laboratories were:

Brammer Standard Co., Inc., Houston, Texas
Crucible Specialty Metals, Syracuse, New York
Hoesch Stahl AG, Dortmund, Germany
J. Dirats and Co., Inc., Westfield, Massachusetts
Lukens Steel, Coatsville, Pennsylvania
Republic Engineered Steels, Canton, Ohio
The Timken Company, Harrison Steel Plant, Canton, Ohio
The Timken Company, Faircrest Steel Plant, Canton, Ohio
VHG Laboratories, Inc., Manchester, New Hampshire

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

Instrument analysis using ASTM Standard Test Method E 1019

	C	S
Number of Labs	28	27
Grand Average	0.1936	0.0186
Standard Deviation	0.0065	0.0016

Optical Emission Spectrometric Analysis using ASTM Standard Test Method E 415

	C	Mn	P	S	Si	Cu	Ni
Number of Labs	30	33	36	28	37	37	37
Grand Average	0.1969	0.8359	0.0083	0.0187	0.2353	0.1157	0.4188
Standard Deviation	0.0068	0.0138	0.0013	0.0019	0.0086	0.0055	0.0133

	Cr	Mo	Al	Co	Sn	As	V
Number of Labs	35	35	37	22	32	14	30
Grand Average	0.4949	0.1675	0.0225	0.0130	0.0077	0.0074	0.0026
Standard Deviation	0.0087	0.0062	0.0025	0.0020	0.0009	0.0017	0.0018

X-ray Emission Spectrometric Analysis using ASTM Standard Test Method E 322

	Mn	Cu	Ni	Cr	Mo	V
Number of Labs	9	9	9	9	9	5
Grand Average	0.8302	0.1130	0.4220	0.4997	0.1679	0.0051
Standard Deviation	0.0081	0.0031	0.0112	0.0080	0.0047	0.0045

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

Traceability: This Reference Material was also examined by optical emission spectrometry and found to be compatible with the following Certified Reference Materials: NIST SRM C1173, 1261A - 1265A, 1761 - 1767; ECRM 186-1, 191-1; SS 457/1, 458/1; JSS 169-4, 170-6, 171-4

Source: This material was produced by Copperweld Steel Company, Warren, Ohio. The material was made in an electric arc furnace and cast into ingots. The bar stock was produced by hot rolling and given a normalizing heat treatment.

Available Form: This Reference Material is available only in the form of a disc, approximately 41 mm (1.62") in diameter and 19 mm (0.75") 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, avoid optical emission spectrometric burns in the center of the disc (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 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.
14603 Benfer Road
Houston, Texas 77069-2895 USA

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

Certified by: _____ on December 27, 1993
G. R. Brammer

Certificate Number 1931-122793

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 350 - 90 Standard Test Methods for Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

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

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

ISO Guide 25 (Third edition, 1990), General requirements for the competence of calibration and testing laboratories.

ISO Guide 30 (Second edition, 1991), 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