

Brammer Standard Company, Inc.

Certificate of Analysis

B.S. XAAS
Low Carbon Steel

Carbon	0.041	Antimony	0.0005
Manganese	0.430	Arsenic	0.005
Phosphorus	0.007	Cobalt	0.004
Sulfur	0.010	Lead	<0.001
Silicon	0.045	Niobium	<0.002
Copper	0.015	Nitrogen	0.0037
Nickel	0.023	Oxygen	0.024
Chromium	0.020	Tin	<0.002
Molybdenum	0.007	Titanium	(0.0004)
Vanadium	<0.005	Zirconium	<0.002
Aluminum	0.006		

(analysis listed as percent by weight)

Some of the co-operating laboratories were:

Allegheny Ludlum Steel Corp., Brackenridge, Pennsylvania
Allegheny Ludlum Steel Corp., Lockport, New York
Anderson Laboratories, Inc., Greendale, Wisconsin
Brammer Standard Co., Inc., Houston, Texas
J. Dirats and Co., Inc., Westfield, Massachusetts
Charles C. Kawin Company, Broadview, Illinois
TCR Engineering Service Pvt. Ltd., Bombay, India
United States Steel Corporation, Pittsburgh, Pennsylvania
VHG Laboratories, Inc., Manchester, New Hampshire

CAUTION: Make certain that corrections are made for possible element interference. Do not use center of disc for aluminum analysis by optical emission spectrometry.

See reverse side for more information.

Certificate Number XAAS-111591

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

BS XAAS

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Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Al
1	0.0395	0.427	0.0059	0.0089	0.042	0.014	0.020	0.019	0.006	<0.001	0.0042
2	0.041	0.427	0.006	0.0090	0.044	0.0144	0.022	0.019	0.0062	<0.001	0.0049
3	0.0416	0.428	0.006	0.010	0.044	0.015	0.023	0.020	0.0064	<0.002	0.0058
4	0.0418	0.432	0.007	0.010	0.045	0.015	0.023	0.020	0.0067	<0.002	0.006
5	0.0425	0.436	0.008	0.010	0.048	0.015	0.0232	0.021	0.0068	<0.005	0.006
6			0.008	0.0105		0.016	0.0246	0.0222	0.007		0.007
7							0.026		0.008		0.007
Average	0.0413	0.430	0.0068	0.0097	0.0446	0.0149	0.0231	0.0202	0.0067		0.0058
Std. Dev.	0.0011	0.004	0.0010	0.0006	0.0022	0.0007	0.0019	0.0012	0.0007		0.0010
Certified	0.041	0.430	0.007	0.010	0.045	0.015	0.023	0.020	0.007	<0.005	0.006

Analysis	Sb	As	Co	Pb	Nb	N	O	Sn	Ti	Zr
1	0.0005	0.0040	0.0029	0.00006	<0.0001	0.0036	0.0212	0.0001	0.0003	<0.0001
2	0.0005	0.005	0.0035	0.00008	<0.0001	0.0036	0.0246	0.0003	0.0004	<0.0001
3	0.0006	0.0051	0.004	<0.0001	<0.002	0.0038	0.0248	0.0006	0.0005	<0.002
4		0.0056	0.004	<0.001	<0.002	0.0039		0.001		0.001
5		0.0061	0.0049					<0.002		
6			0.0051							
7			0.006							
Average	0.00053	0.0052	0.0043			0.0037	0.0235		0.00040	
Std.Dev.	0.00006	0.0008	0.0011			0.0002	0.0020		0.00010	
Certified	0.0005	0.005	0.004	<0.001	<0.002	0.0037	0.024	<0.002	(0.0004)	<0.002

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

Chemical analyses were made on millings from cross-sections of the bars. 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 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 32e, 125b, 361 to 365; BAM 039-2, 044-1; BCS 455/1, 456/1, 458/1; ECRM 085-1, 088-1, 096-1, 184-1, 481-1; GBW 1402; IMZ 1.22, 1.74

This Reference Material was tested for homogeneity using ASTM Standard Method E 826 and found acceptable. It was also examined by optical emission spectrometry and found to be compatible with the following NIST Certified Reference Materials: SRM 1222, 1224, 1225, 1261A to 1265A, 1761 to 1767

The bar stock used for this material was produced by hot-rolling billets and annealing. The entire depth of the disc may be used.

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

Certified by: _____ on November 15, 1991.
 G. R. Brammer