

Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 30C
Grade T-1 Tool Steel

Carbon	0.76	Aluminum	0.004
Manganese	0.29	Arsenic	0.03
Phosphorus	0.026	Cobalt	0.39
Sulfur	0.022	Nitrogen	0.025
Silicon	0.28	Niobium	(0.002)
Copper	0.10	Lead	(0.002)
Nickel	0.27	Tin	0.021
Chromium	4.19	Titanium	0.002
Molybdenum	0.35	Vanadium	1.09
Tungsten	17.58		

(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
Brammer Standard Co., Inc., Houston, Texas
Crucible Specialty Steel, Syracuse, New York
J. Dirats and Co., Inc., Westfield, Massachusetts
Hoesch Stahl AG, Dortmund, Germany
Charles C. Kawin Company, Broadview, Illinois
VHG Laboratories, Inc., Manchester, New Hampshire

See reverse side for more information.

Certificate Number 30C-031392

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

BS 30C

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Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	W
1	0.751	0.28	0.024	0.020	0.278	0.098	0.251	4.16	0.344	17.56
2	0.76	0.28	0.026	0.020	0.28	0.10	0.266	4.17	0.347	17.58
3	0.76	0.285	0.0268	0.022	0.28	0.102	0.268	4.17	0.349	17.59
4	0.764	0.294	0.027	0.0238	0.285	0.105	0.27	4.18	0.35	17.61
5	0.768	0.297	0.028	0.0239	0.288	0.109	0.27	4.22	0.35	
6		0.298				0.11	0.28	4.22	0.359	
7		0.30				0.11	0.284	4.24	0.36	
8									0.365	
Average	0.761	0.291	0.0264	0.0219	0.282	0.105	0.270	4.194	0.353	17.585
Std Dev	0.006	0.009	0.0015	0.0019	0.004	0.005	0.011	0.032	0.007	0.021
Certified	0.76	0.29	0.026	0.022	0.28	0.10	0.27	4.19	0.35	17.58

Analysis	Al	As	Co	N	Nb	Pb	Sn	Ti	V
1	0.0028	0.021	0.38	0.0245	0.0006	0.0009	0.017	0.001	1.07
2	0.003	0.025	0.381	0.0245	0.001	0.0010	0.020	0.0019	1.07
3	0.004	0.027	0.382	0.0247	0.001	0.0013	0.0205	0.002	1.08
4	0.0042	0.030	0.39	0.026	0.002	0.0019	0.021	0.003	1.09
5	0.0042	0.033	0.401	0.0261	0.003	0.002	0.023	0.003	1.09
6	0.0043	0.0335	0.405	0.0262		0.0021	0.0234		1.10
7	0.0059					0.0027			1.11
Average	0.0041	0.0283	0.390	0.0253	0.0015	0.0017	0.0208	0.0022	1.087
Std Dev	0.0010	0.0049	0.011	0.0008	0.0010	0.0007	0.0023	0.0008	0.015
Certified	0.004	0.03	0.39	0.025	(0.002)	(0.002)	0.021	0.002	1.09

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 354, 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, 50c, 125b, 132b, 361 to 365; BAM 039-2, 044-1; BCS 455/1, 456/1, 458/1, 481, 482; ECRM 085-1, 088-1, 096-1, 184-1, 481-1; GBW 01402; 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 March 13, 1992.
 G. R. Brammer