

Brammer Standard Company, Inc.

# Certificate of Analysis

B.S. 58D

**AISI 9310 Grade Low Alloy Steel**

Carbon	0.127	Aluminum	0.042
Manganese	0.45	Tin	0.012
Phosphorus	0.010	Cobalt	0.009
Sulfur	0.005	Nitrogen	0.0147
Silicon	0.32	Oxygen	0.0022
Copper	0.156	Niobium	0.001
Nickel	3.02	Titanium	0.002
Chromium	1.35	Vanadium	0.005
Molybdenum	0.14		

*(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 Metals, Syracuse, New York  
J. Dirats and Co., Inc., Westfield, Massachusetts  
VHG Laboratories, Inc., Manchester, New Hampshire

See reverse side for more information.

Certificate Number REV58D-032092

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

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Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
1	0.122	0.448	0.008	0.0039	0.31	0.15	2.97	1.33	0.13
2	0.125	0.448	0.009	0.0041	0.32	0.156	3.00	1.34	0.138
3	0.126	0.449	0.010	0.005	0.32	0.156	3.00	1.34	0.14
4	0.126	0.449	0.010	0.0055	0.337	0.157	3.03	1.34	0.14
5	0.127	0.45	0.0101	0.006	0.337	0.16	3.04	1.34	0.14
6	0.130	0.45	0.011	0.006		0.16	3.04	1.36	0.15
7	0.135	0.452	0.011	0.007			3.05	1.37	0.151
8							3.05	1.373	
Average	0.1273	0.449	0.0099	0.0054	0.325	0.156	3.023	1.349	0.141
Std Dev	0.0042	0.001	0.0011	0.0011	0.012	0.004	0.029	0.016	0.007
Certified	0.127	0.45	0.010	0.005	0.32	0.156	3.02	1.35	0.14

Analysis	Al	Sn	Co	N	O	Nb	Ti	V
1	0.0383	0.010	0.0079	0.0142	0.0017	0.001	0.0019	0.0045
2	0.0389	0.011	0.0082	0.0146	0.0021	0.0012	0.002	0.005
3	0.040	0.011	0.009	0.0150	0.0023	0.002	0.003	0.005
4	0.044	0.0118	0.009	0.0150	0.0027		0.003	0.006
5	0.044	0.012	0.0097					0.006
6	0.046	0.012	0.010					0.006
7		0.0144						
Average	0.0419	0.0117	0.0090	0.01470	0.00220	0.0014	0.0025	0.0054
Std Dev	0.0032	0.0014	0.0008	0.00038	0.00042	0.0005	0.0006	0.0007
Certified	0.042	0.012	0.009	0.0147	0.0022	0.001	0.002	0.005

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 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 20, 1992.  
 G. R. Brammer

This is a revision of the original certificate of analysis dated July 20, 1988. The material was retested by additional laboratories in 1991 and 1992. Additional elements are now certified. Also, as a result of the retesting, the certified analysis has been revised slightly for S, Cu, Sn, Al, and V.