

Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 57F

**AISI Grade 1020
Plain Carbon Steel**

Certified Elements			Uncertified Elements	
	Certified Value ¹	Estimate of Uncertainty ²	Information values	
C	0.196	0.005	Al	0.002
Mn	0.554	0.008	As	0.006
P	0.009	0.001	Ca	0.0003
S	0.027	0.002	O	0.006
Si	0.202	0.006	Pb	0.002
Cu	0.197	0.008		
Ni	0.070	0.002		
Cr	0.120	0.005		
Mo	0.018	0.002		
Co	0.007	0.001		
N	0.0077	0.0005		
Sn	0.008	0.001		
V	0.063	0.003		

Analysis listed as percent by weight

¹ The certified value listed is the present best estimate of the true value.

² The uncertainties listed are based on value judgments of the material inhomogeneity and possible bias in the determined analytical values.

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
VHG Laboratories, Inc., Manchester, New Hampshire

See reverse side for more information.

Certificate Number 57F-111892

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

Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
1	0.193	0.547	0.007	0.025	0.193	0.189	0.066	0.112	0.015
2	0.193	0.549	0.008	0.025	0.200	0.190	0.070	0.116	0.016
3	0.194	0.552	0.0084	0.027	0.202	0.193	0.070	0.116	0.017
4	0.194	0.552	0.0086	0.027	0.202	0.193	0.070	0.118	0.018
5	0.196	0.554	0.009	0.028	0.202	0.195	0.070	0.121	0.018
6	0.200	0.554	0.0092	0.028	0.202	0.196	0.070	0.121	0.018
7	0.200	0.554	0.010	0.029	0.204	0.197	0.0708	0.122	0.019
8		0.557	0.010		0.211	0.199	0.071	0.122	0.020
9		0.560				0.202	0.072	0.124	0.020
10		0.560				0.203	0.073	0.125	0.021
11						0.206			
Average	0.1957	0.5539	0.0088	0.0270	0.2020	0.1966	0.0703	0.1197	0.0182
Std Dev	0.0031	0.0043	0.0010	0.0015	0.0049	0.0054	0.0018	0.0041	0.0019
Certified	0.196	0.554	0.009	0.027	0.202	0.197	0.070	0.120	0.018

Analysis	Al	As	Ca	Co	N	O	Pb	Sn	V
1	0.0009	0.004	0.0002	0.0055	0.0074	0.0050	0.0006	0.0069	0.059
2	0.0009	0.004	0.00026	0.0067	0.0074	0.0051	0.0015	0.0069	0.060
3	0.001	0.0054	0.00035	0.0067	0.0076	0.0066	0.0015	0.008	0.061
4	0.0015	0.0058		0.0068	0.0080		0.0018	0.008	0.062
5	0.0017	0.006		0.007	0.0082		0.0024	0.008	0.064
6	0.0018	0.0066		0.0075				0.0080	0.064
7	0.0020	0.0078		0.0078				0.0082	0.0646
8	0.002							0.0084	0.0648
9	0.0025							0.009	0.0651
10								0.0102	
Average	0.0016	0.0057	0.0003	0.0069	0.00772	0.0056	0.0016	0.0082	0.0627
Std Dev	0.0006	0.0014	0.0001	0.0007	0.00036	0.0009	0.0007	0.0010	0.0023
Certified	(0.002)	(0.006)	(0.0003)	0.007	0.0077	(0.006)	(0.002)	0.008	0.063

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

Analysis: Chemical analyses were made on chips prepared by a lathe 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

Homogeneity: 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

Source: This material was produced by North Star Steel Company, Monroe, Michigan. The material was melted in an electric arc furnace and continuous cast into bar form.

Description and Use: This Reference Material is in the form of a disc, approximately 44 mm (1.75") in diameter and 19 mm (0.75") thick. It is intended for the 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.

Preparation: Use the same method for preparing the analytical surface on all reference materials and specimens for best results.

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

Certified by: G. R. Brammer on November 18, 1992.