

Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al	As
1	0.292	0.761	0.007	0.0100	0.316	0.198	0.410	0.480	0.162	0.019	0.0056
2	0.293	0.77	0.0078	0.0101	0.324	0.200	0.41	0.484	0.165	0.019	0.006
3	0.295	0.773	0.008	0.0105	0.325	0.201	0.415	0.489	0.167	0.0198	0.0064
4	0.296	0.777	0.008	0.0106	0.327	0.201	0.42	0.489	0.168	0.021	0.0074
5	0.298	0.782	0.010	0.0106	0.328	0.202	0.421	0.49	0.168	0.021	
6	0.298	0.782	0.010	0.011	0.330	0.202	0.422	0.490	0.17	0.0220	
7	0.300	0.783	0.0107	0.012	0.332	0.202	0.424	0.496	0.17	0.022	
8	0.301	0.79		0.012	0.333	0.21	0.425	0.50	0.170		
9	0.302			0.012		0.21	0.43	0.51	0.174		
10	0.307						0.431	0.51	0.181		
11	0.310						0.436				
Average	0.2993	0.777	0.0088	0.0110	0.3269	0.203	0.422	0.494	0.170	0.0205	0.0064
Std Dev	0.0056	0.009	0.0014	0.0008	0.0054	0.004	0.008	0.010	0.005	0.0013	0.0008
Certified	0.30	0.78	0.009	0.011	0.33	0.20	0.42	0.49	0.17	0.020	0.006

Analysis	Co	Sn	Ti	V	Ca	N	O
1	0.006	0.0070	0.002	0.003	0.00068	0.0090	0.0017
2	0.007	0.0076	0.0022	0.003	0.00068	0.0091	0.0018
3	0.0070	0.0076	0.0026	0.003	0.00098	0.0092	0.0022
4	0.0070	0.0085	0.0027	0.0031			0.0022
5	0.0077	0.009	0.003	0.004			
6	0.008	0.009	0.004	0.0040			
7		0.0091		0.0040			
8				0.0045			
Average	0.0071	0.0083	0.0028	0.0036	0.0008	0.0091	0.0020
Std Dev	0.0007	0.0008	0.0007	0.0006	0.0002	0.0001	0.0003
Certified	0.007	0.008	0.003	0.004	(0.0008)	(0.0091)	(0.002)

Data in parentheses are not certified and are 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 350, E 415, and E 1019, plus additional ICP and AA spectrometric methods.

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

Analytical Associates, Inc., Detroit, Michigan
 Brammer Standard Co., Inc., Houston, Texas
 Coleman Testing Laboratories, Riverside, New Jersey
 Copperweld Steel Company, Warren, Ohio
 Crucible Specialty Steel, Syracuse, New York
 J. Dirats and Co., Inc., Westfield, Massachusetts
 Laboratory Testing Inc., Dublin, Pennsylvania
 LECO Corporation, St. Joseph, Michigan
 Shiva Technologies, Inc., Cicero, New York
 Spectrochemical Laboratories, Inc., Pittsburgh, Pennsylvania
 VHG Laboratories, Inc., Manchester, New Hampshire

Source: This material was produced by North Star Steel Company - Michigan Division, Monroe, Michigan.

Available Forms: This Reference Material is available in the form of a disc, approximately 38 mm (1.50") in diameter and 19 mm (0.75") thick.

Additional analytical data: This material was used as an unknown test specimen in a nationally recognized Proficiency Testing Program (PTP) for low-alloy steel. Most of the participating laboratories used 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	N	O
Number of Labs	40	35	31	25
Grand Average	0.3018	0.0117	0.0094	0.0041
Standard Deviation	0.0085	0.0014	0.0005	0.0021

Optical Emission Spectrometric Analysis using ASTM Standard Test Method E 415

	C	Mn	P	S	Si	Cu	Ni
Number of Labs	48	54	54	48	56	52	53
Grand Average	0.3093	0.7765	0.0081	0.0121	0.3110	0.2000	0.4254
Standard Deviation	0.0104	0.0144	0.0012	0.0012	0.0119	0.0066	0.0158

	Cr	Mo	Sn	Al
Number of Labs	55	56	47	57
Grand Average	0.4887	0.1687	0.0088	0.0215
Standard Deviation	0.0122	0.0061	0.0010	0.0029

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

	Mn	Cu	Ni	Cr	Mo
Number of Labs	10	10	12	12	12
Grand Average	0.7861	0.2035	0.4227	0.4916	0.1710
Standard Deviation	0.0086	0.0029	0.0163	0.0142	0.0039

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 to 1265A, 1761 to 1767.

The following Certified Reference Materials were used to validate the analytical data listed on page 2: NIST SRM 14a, 32e, 33d, 36b, 100b, 125b, 131e, 293, 361 to 365; BAM 039-2, 044-1; BCS 405/1, 455/1, 456/1, 458/1; ECRM 085-1, 088-1, 096-1, 184-1, 481-1; IMZ 1.22, 1.74.

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. Phone: (281) 440-9396
14603 Benfer Road
Houston, Texas 77069-2895 USA Fax: (281) 440-4432

Certified by: _____ on May 31, 1995.

Beau R. Brammer

Certificate Number 1951-053195

References:

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 1995) 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 from NIST, U.S. Department of Commerce, Gaithersburg, MD 20899.

NIST 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

Certificate Number 1951-053195