



Analysis	Fe (total)	Si	Al	As	Ca	Cu	Cr	K	Mg	Mn	Ni
1	65.77	2.11	0.0810	0.0010	0.48	0.0008	0.0106	0.011	0.16	0.084	0.003
2	65.87	2.12	0.088	0.0011	0.485	0.001	0.0108	0.012	0.167	0.0863	0.003
3	65.94	2.124	0.0961	0.0012	0.49	0.0010	0.011	0.0124	0.17	0.0877	0.003
4	65.96	2.148	0.097	0.0013	0.490	0.0010	0.0122	0.013	0.174	0.0883	0.0035
5	66.01	2.16	0.0994	0.0013	0.49	0.0011	0.0126	0.014	0.178	0.089	0.0036
6	66.05	2.17	0.107	0.0014	0.49	0.0014	0.013	0.014	0.200	0.089	0.004
7	66.06		0.109	0.0016	0.505	0.0016	0.0137	0.015	0.202	0.0896	0.0042
8			0.114	0.0016	0.516		0.014	0.019	0.205	0.094	0.0048
9			0.119		0.52		0.016		0.212	0.0948	
Average	65.951	2.139	0.1012	0.00131	0.496	0.0011	0.0127	0.0138	0.1853	0.0892	0.0036
Std Dev	0.104	0.024	0.0123	0.00022	0.014	0.0003	0.0018	0.0025	0.0193	0.0034	0.0007
Certified	65.95	2.14	0.10	0.0013	0.50	0.001	0.013	0.014	0.19	0.09	0.004
t	2.447	2.571	2.3060	2.3646	2.306	2.4469	2.306	2.3646	2.306	2.306	2.3646
C(95%)	0.096	0.025	0.0094	0.0002	0.011	0.0003	0.0014	0.0021	0.0149	0.0026	0.0006

continued from above

Analysis	Na	P	Ti	V	Co	S	Pb	Sn	Zn
1	0.0125	0.0062	0.006	0.002	0.0003	0.00067	0.0002	0.0004	0.0005
2	0.013	0.0070	0.007	0.0022	0.0004	0.00088	0.0003	0.0004	0.0005
3	0.0138	0.0078	0.008	0.0024	0.0004	0.0010	0.0005	0.001	0.0007
4	0.0146	0.0082	0.0086	0.0025	0.0005	0.0013		0.001	0.0007
5	0.015	0.0084	0.0086	0.0026		0.0014		0.001	0.001
6	0.019	0.009	0.0090	0.0029		0.002			0.002
7	0.021	0.010	0.009	0.003		0.002			
Average	0.0166	0.0085	0.0080	0.0026	0.00040	0.0014	0.00033	0.0008	0.0009
Std Dev	0.0042	0.0016	0.0011	0.0004	0.00008	0.0006	0.00015	0.0003	0.0006
Certified	0.017	0.008	0.008	0.003	(0.0004)	(0.001)	(0.0003)	(0.001)	(0.001)
t	2.3646	2.3646	2.4469	2.3646					
C(95%)	0.0035	0.0013	0.0010	0.0003					

Data in parentheses are not certified but provided for information only.  
Data listed as mass fraction expressed as percent.

$C(95\%) = (t \times sd) / \sqrt{n}$  The half-width confidence interval, where  $t$  is the appropriate Student's  $t$  value,  $sd$  is the interlaboratory standard deviation, and  $n$  is the number of acceptable mean values. For further information regarding the confidence interval for the certified value see ISO Guide 35:1989 section 4.

**Certification Process:** The requirements of ISO Guide 31, ISO Guide 34, ISO Guide 35, and ASTM Standard Guides E 1724 and E 1831 were followed for the preparation of this reference material and certificate of analysis. This is a reference material as defined by ISO Guide 30.

**Analysis:** Material for chemical analyses were sampled from bulk after mixing. 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 Method E 508, E 738, E 841, E 878, E 1028, and E 1070 plus additional ICP-AES, ICP-MS, and AA spectrometric methods.

**Cooperating Laboratories:** Some of the cooperating laboratories were:

Anarem, Praha, Czech Republic  
Brammer Standard Co., Inc., Houston, Texas  
China National Analysis Center for Iron and Steel, Beijing, China  
J. Dirats and Co., Inc., Westfield, Massachusetts  
Andrew S. McCreath & Son, Inc., Harrisburg, Pennsylvania  
National Steel Corporation, Trenton, Michigan  
VHG Laboratories, Inc., Manchester, New Hampshire

**Homogeneity:** The bulk material was randomly sampled and tested for iron content. The material was found to be homogeneous for the iron content.

**Traceability:** This Reference Material was analyzed by classical wet method, ICP, and AA spectrometric methods and found to be compatible with the following Certified Reference Material: NHKG 1124, 1126; JSS 804-1

The Certified Reference Materials ASCRM 007 and SARM 11 were used to validate the analytical data listed on page 2. These CRMs were sent to the cooperating laboratories for analysis as unknown samples along with the BS 105 material.

**Source:** This material was supplied by the National Steel Corporation, Trenton, Michigan. The material was provided to Brammer Standard Company as iron ore pellets crushed to a -10 mesh. Brammer Standard Company processed the material to a -150 mesh powder.

**Available Form:** This Reference Material is available in the form of 100 gram unit bottles of -150 mesh powder.

**Sample Preparation:** For best analytical results, use the same method for preparing this material for analysis as for routine iron ore analysis. If the material is stored for a prolonged period of time, it is recommended that the material be dried at 105° C for 1 hour.

**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. Use regular precautions as for any work with fine powder material. 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 December 10, 1998.  
G. R. Brammer

**By Certificate Number R-021, the Quality System of Brammer Standard Company, Inc., is registered to ISO 9002 by the American Association for Laboratory Accreditation (A2LA).**

**Brammer Standard Company's Chemical Laboratory is accredited to ISO Guide 25 by A2LA.  
(Certificate Number 656.01)**

## **References:**

*ASTM documents available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959,  
Telephone: 610-832-9500 Fax: 610-832-9555 e-mail: service@astm.org Website: www.astm.org*

E 508 - 93 Standard Test Method for Calcium and Magnesium in Iron Ores by Atomic Absorption Spectrometry

E 738 -95a Standard Test Method for Determination of Aluminum in Iron Ores and Related Materials by Complexometric Titration

E 841 -94 Standard Test Method for Copper in Iron Ores and Related Materials by Atomic Absorption Spectroscopy

E 878 - 96 Standard Test Method for Determination of Titanium in Iron Ores and Related Materials by Diantipylmethane Ultraviolet Spectrometry

E 1028 -93 Standard Test Method for Total Iron in Iron Ores and Related Materials by Dichromate Titrimetry

E 1070 -95 Standard Test Method for Phosphorus in Iron Ores by the Phospho-Molydenun-Blue Photometric Methods

E 1724 - 95 Standard Guide for Testing and Certification of Metal and Metal-Related Reference Materials

E 1831 - 96 Standard Guide for Preparing Certificates for Reference Materials Relating to Chemical Composition of Metals, Ores, and Related Materials.

*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 34 (First edition, 1996), Quality system guidelines for the production of 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 105-121098p4**