Brammer Standard Company, Inc.

REVISED Certificate of Analysis

B.S. 718B

Reference Material for 718 Nickel Alloy

	Certified Value[1]	Estimate of Uncertainty[2]		Certified Value[1]	Estimate of Uncertainty[2]
		Analysis listed as percent by weight			
C	**0.036**	0.003	**Ti**	**0.95**	0.03
Mn [4]	**0.124**	0.006	**Fe** [4]	**19.66**	0.10
S	**0.001**	0.0004	**B**	**0.0042**	0.0004
Si	**0.12**	0.007	**Al**	**0.57**	0.02
Cu	**0.044**	0.006			
Cr [4]	**17.62**	0.08	Informational Values[3]		
Mo [4]	**2.92**	0.03	Mg	(0.002)	
Co	**0.19**	0.015	P	(0.008)	
Ni	**52.1**	0.3	W	(0.022)	
Nb [4]	**5.30**	0.05	V	(0.03)	
Sn	**0.002**	0.0005			

[1] The certified value listed is the present best estimate of the true value based on the results of an interlaboratory testing program.

[2] The uncertainties listed are based on value judgments of the material inhomogeneity and possible bias in the determined analytical values. No attempt is made to derive exact statistical measurements of imprecision because several methods were used in the determination of most constituents.

[3] Data in parentheses are not certified and are provided for information only.

[4] Values revised on January 1, 2000.

The requirements of ISO Guide 31 and ISO Guide 35 were generally followed for the preparation of this reference material and certificate of analysis. This is a reference material as defined by ISO Guide 30.

See page 2 for more information. **Certificate Number REV-718B-012100-p1**

Brammer Standard Company, Inc., 14603 Benfer Road, Houston, TX 77069-2895
Telephone (281) 440-9396 Fax (281) 440-4432

BS 718B **Certificate number REV-718B-012100-p2**

Analysis	C	Mn	S	Si	Cu	Cr	Mo	Co	Ni	Ni*	Nb
1	0.034	0.12	0.0006	0.11	0.038	17.74	2.90	0.17	51.82	Nickel	5.22
2	0.034	0.120	0.0010	0.12	0.039	17.53	2.91	0.18	51.90	by	5.27
3	0.037	0.120	0.0010	0.12	0.040	17.57	2.91	0.18	51.99	difference	5.30
4	0.038	0.121	0.0011	0.12	0.043	17.58	2.92	0.19	52.18		5.31
5	0.039	0.130		0.120	0.050	17.62	2.94	0.20	52.19		5.32
6		0.130		0.126	0.050	17.70	2.94	0.20	52.35		5.33
7		0.130			0.050		2.95		52.55		5.34
Average	0.0364	0.1244	0.0009	0.119	0.0443	17.623	2.924	0.187	52.140		5.299
Std Dev	0.0023	0.0052	0.0002	0.005	0.0056	0.081	0.019	0.012	0.258		0.041
Certified	0.036	0.124	0.001	0.12	0.044	17.62	2.92	0.19	52.1		5.30
t	2.7764	2.4469	3.1824	2.5706	2.4469	2.5706	2.4469	2.5706	2.4469		2.4469
C(95%)	0.0029	0.0048	0.0004	0.005	0.0051	0.085	0.018	0.013	0.238		0.0383

Analysis	Sn	Ti	Fe	B	Al	Mg	P	W	V	Ta
1	0.0019	0.92	19.53	0.0037	0.53	0.0017	0.0050	0.018	0.012	0.039
2	0.0019	0.93	19.57	0.0040	0.56	0.0020	0.0060	0.018	0.029	
3	0.0020	0.93	19.63	0.0042	0.56	0.0025	0.0080	0.02	0.03	
4	0.0028	0.95	19.68	0.0042	0.57		0.0080	0.022	0.030	
5		0.96	19.70	0.0044	0.58		0.0090	0.030	0.037	
6		0.96	19.74	0.0045	0.58		0.011			
7		1.01	19.76		0.58					
Average	0.00215	0.951	19.659	0.00417	0.567	0.0021	0.0078	0.0216	0.0276	
Std Dev	0.00044	0.030	0.086	0.00029	0.018	0.0004	0.0021	0.0050	0.0093	
Certified	0.002	0.95	19.66	0.0042	0.57	(0.002)	(0.008)	(0.022)	(0.03)	
t	3.1824	2.3646	2.4469	2.5706	2.4469	4.3027	2.5706	2.7764	2.7764	
C(95%)	0.00069	0.028	0.079	0.00030	0.0017	0.0010	0.0022	0.0062	0.0115	

Data in parentheses are not certified and are provided for information only.

C(95%) = (t x sd)/√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.

* Nickel calculated by difference.

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. Methods of analysis used were a combination of ASTM Standard methods for classical wet chemistry, ICP and AA spectrometric methods, and combustion instrument procedures for carbon and sulfur. The values listed above are the average of each analyst's results.

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

Allegheny Ludlum Steel Corp., Brackenridge, Pennsylvania
Allegheny Ludlum Steel Corp., Lockport, New York
ALLVAC, Monroe, North Carolina
Brammer Standard Co., Inc., Houston, Texas
Crucible Specialty Metals, Syracuse, New York
Jessop Steel, Washington, Pennsylvania
Turret Alloys Ltd., Analytical Services, Sheffield, England
Vac Air Alloys, Frewsburg, New York

REVISION: The original certificate of analysis for BS 718B was produced on October 5, 1988. This certificate of analysis is revised due to additional testing. A table on page 4 lists the original and revised values.

Homogeneity: This Reference Material was tested for homogeneity using ASTM Standard Practice E 826 and found acceptable.

Source: This material was produced by Cytemp Specialty Steel Division of Cyclops Corporation, Titusville, Pennsylvania. This material has been heat treated at 1750 °F for one hour and water cooled.

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.

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:

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Houston, Texas 77069-2895 USA Fax: (281) 440-4432

Certified by: _____ on January 21, 2000.
G. R. Brammer

Original and Revised Values

Element	Original 10-05-88	Revised 01-21-00
Mn	0.124	0.125
Cr	17.60	17.62
Mo	2.93	2.92
Nb	5.29	5.30
Fe	19.64	19.66

Referenced Documents

ASTM documents available from ASTM, 1916 Race Street, Philadelphia, PA, 19103.

E 826 - 85 Standard Practice for Testing Homogeneity of Materials for the Development of Reference 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 35 (Second edition, 1989), Certification of reference materials - General and statistical principles.