Brammer Standard Company, Inc.

Certificate of Analysis

REVISION of BS 263

Reference Material for Specialty Nickel Base Alloy Number 263

	Certified Value ¹	Estimate of Uncertainty ²	Informa	Information Values ³		
		Analysis listed as percent by weight				
С	0.071	0.003	В	0.001		
Mn	0.36	0.02	Zr	0.002		
Р	0.005	0.002	Ni	50.65		
s	<0.002					
Si	0.28	0.02				
Cu	0.024	0.003				
Cr	19.84	0.08				
Fe	0.47	0.02				
Al	0.38	0.01				
Co	19.92	0.10				
Мо	5.70	0.08				
Nb	0.04	0.01				
W	0.24	0.01				
Ti	2.21	0.05				
V	0.004	0.01				

¹ The certified value listed is the present best estimate of the true value based on the results of a second interlaboratory testing program.

See reverse side for more information.

Certificate Number REV-263-012601p1

² The uncertainties listed are based on value judgments of the material inhomogeneity and the 95% confidence interval. The half-width confidence interval C(95%) is shown on page 2.

³ Information values are not certified and are provided for information only.

Certified 0.38 19.92 5.70 0.04 0.24 t 2.1448 2.2622 2.2281 2.1604 2.1788 C(95%) 0.004 0.060 0.043 0.0032 0.006 ** Old COA 0.47 19.96 5.66 (0.04) (0.26) Analysis * Ti * V * B * Zr * Ni 1 AIC 2.12 AIC 0.004 AIC 0.0005 AIC 0.0012 3 MTD 2.17 AIC 0.004 AIC 0.0005 AIC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 AIC 0.0014 4 AGX 2.20 AIC 0.004 AIC 0.0010 AIC 0.0005 5 AIC 2.21 AIC 0.004 AIC 0.0010 AIC 0.0014 6 XRF 2.22 AIC 0.004 AIC 0.0013 AIC 0.003 6 XRF 2.22 AIC 0.004 AIC 0.0017 7 XRF 2.237 AIC 0.004 AIC 0.0018 8 AIC 2.24 AIC 0.004 AIC 0.0018 8 AIC 2.25 10 AIC 2.25 Average 2.209 0.0044 0.0011 0.0019 Std Dev 0.041 0.0008 0.0007 0.0012 Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764	BS 263														REV-263		
1 0 0.0668	Analysis	*	C	*	Mn	*	P	*	S	*	Si	*	Cu	*	Cr	*	Fe
1	1		0.0688	AA	0.35	AIC	0.0040	C	<0.0001	AES	0.256	AIC	0.019	XRF	19.75	AIC	
S																	
S																	
AIC 0.36	5																
8																	
9																	
11 12 13 14 15 15 15 15 15 15 15	9																
12										AIC	0.31						
131														TCT	19.94		
Average 0.0708 0.364 0.0653 0.200 0.203 19.008 0.471 Ata Dave 0.0013 0.015 0.0614 0.019 0.0027 0.004 0.618 t 2.7764 2.1788 2.7764 2.2784 2.2022 2.306 2.2291 2.201 t 2.7764 2.1788 2.7764 2.2022 2.306 2.2291 2.201 t 2.7764 0.0014 0.005 0.005 0.002 0.26 0.0024 0.044 0.047 T 2.7764 0.0014 0.005 0.005 0.002 0.26 0.0024 0.044 0.047 Analysis * Al	13			XRF	0.395												
Red Bow 0.0013	Average		0.0708		0.364		0.0053				0.280		0.0243		19.838		0.471
Certified 0.071 0.36 0.005 <0.002 0.28 0.024 19.84 0.47 t	Std Dev		0.0013		0.015		0.0014				0.019		0.0032		0.065		0.015
t 2,7764 2,1788 2,7764 2,009 1,0007 0,0014 0,0024 0,044 0,0016 (1958) 0,0016 0,009 0,0005 0,0002 0,014 0,0024 0,044 0,044 0,016 0,016 0,0014 0,0014 0,0024 0,044 0,016 0,016 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,0014 0,00	Certified		0.071		0.36		0.005		<0.002		0.28		0.024		19.84		0.47
C.93%)	t		2.7764		2.1788		2.7764				2.2622		2.306		2.2281		2.201
** Old COA																	
Analysis * Al	** Old COA		0.071		0.38		0.005		<0.002		0.26		0.029		19.84		0.47
ARABLYSIS * Al																	
1 AIC 0.3663 GCO 19.82 GNO 5.61 ARS 0.0302 AIC 0.222 3 AA 0.37 XRF 19.852 XRF 5.655 AIC 5.63 AIC 0.032 AIC 0.229 4 AA A 0.37 XRF 19.852 XRF 5.655 AIC 0.032 AIC 0.229 5 AIC 0.37 TCT 19.90 XRF 5.67 AIC 0.032 AIC 0.23 5 AIC 0.37 TCT 19.90 XRF 5.67 AIC 0.034 AIC 0.24 7 AIC 0.378 TCC 19.94 AIC 5.70 ACX 5.69 AIC 0.034 AIC 0.24 7 AIC 0.378 TCC 19.94 AIC 5.70 ACX 5.69 AIC 0.034 AIC 0.24 8 ARF 0.38 TCC 19.94 AIC 5.70 ACX 5.69 AIC 0.034 AIC 0.24 10 AIC 0.380 TCC 19.94 AIC 5.70 ACX 5.69 AIC 0.037 AIC 0.24 11 AIC 0.380 TCC 20.07 BM 5.78 MIA 0.038 ADC 0.24 11 AIC 0.380 SM 5.78 AIC 0.040 MM 0.249 12 AOC 0.382 XRF 0.382 XRF 0.042 XRF 0.25 13 XRF 0.382 XRF 0.382 XRF 0.042 XRF 0.25 14 ADC 0.384 AIC 0.044 AIC 0.044 AIC 0.049 15 ACD 0.394 AIC 0.044 AIC 0.044 AIC 0.049 16 ADC 0.384 AIC 0.044 AIC 0.044 AIC 0.049 17 AIC 0.380 SM 19.92 5.70 0.04 0.055 18 ACO 0.394 AIC 0.049 MM 0.249 19 ACO 0.384 AIC 0.049 MM 0.249 10 AIC 0.384 AIC 0.044 AIC 0.049 MM 0.249 10 AIC 0.253 11 AIC 0.380 AIC 0.049 AIC 0.049 MM 0.249 11 AIC 0.380 AIC 0.049 AIC 0.049 MM 0.249 12 AOC 0.384 AIC 0.044 AIC 0.005 AIC 0.049 18 AIC 0.253 19 AIC 0.253 10 AIC 0.253 AIC 0.049 AIC 0.0055 10 AIC 0.253 10 AIC 0.253 AIC 0.049 AIC 0.005 AIC 0.005 AIC 0.005 10 AIC 0.253 AIC 0.049 AIC 0.006	Analysis	*	Al	*	Со	*	Mo	*	Nb	*	W						
2 AIC 0.365 AIC 19.85 AIC 5.63 AIC 0.031 XRF 0.227 3 AA 0.37 XRF 19.85 AIC 5.63 AIC 0.032 AIC 0.239 4 AA 0.37 AIC 19.86 AIC 5.66 AIC 0.032 AIC 0.239 5 AIC 0.377 AR 19.96 AIC 5.66 AIC 0.032 AIC 0.239 6 AES 0.377 AR 19.90 XRF 5.67 AIC 0.034 ACC 0.24 8 AIC 0.377 AR 19.90 XRF 5.67 AIC 0.034 ACC 0.24 9 AIC 0.38 TC0 19.98 AIC 5.79 AIC 0.034 AIC 0.24 9 AIC 0.38 TC0 20.04 MM 5.78 AIC 0.038 AIC 0.24 10 AA 0.38 TC0 20.04 MM 5.78 AIC 0.040 MW 0.247 11 AIC 0.380 TC0 20.04 MM 5.78 AIC 0.040 MW 0.247 11 AIC 0.380 CM 5.79 AIC 0.0408 MW 0.249 12 AIC 0.382 XRF 0.044 AIC 0.042 XRF 0.052 13 XRF 0.382 XRF 0.044 AIC 0.042 XRF 0.253 14 AIC 0.384 AIC 0.049 AIC 0.049 15 AIC 0.394 0.084 0.064 0.065 0.0055 0.010 Certified 0.38 19.92 5.70 0.04 0.022 XRF 0.25 AIC 0.24 XRF 0.044 AIC 0.049 AIC 0.38 19.92 5.70 0.04 0.24 t 2.1448 2.2622 2.2281 2.1604 2.1788 C(95%) 0.004 0.004 AIC 0.005 AIC 0.005 AIR 19.96 5.66 (0.04) (0.26) AIR 19.96 5.66 (0.04) 0.24 t 2.1448 1.27 AIC 0.004 AIC 0.005 AIC 0.003 AIC 0.005 EN 50.65 AIC 0.005 AIC 0.004 AIC 0.005 AIC 0.005 AIC 0.004 AIC 0.003 AIC 0.005 AIC 0.003 AIC 0.005 AIC 0.004 AIC 0.005 AI																	
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12				TCo	20.07												
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Average 0.377 19.920 5.701 0.0374 0.239 Std Dev 0.008 0.084 0.064 0.0055 0.010 Certified 0.38 19.92 5.70 0.04 0.24 t 2.1448 2.2622 2.2281 2.1604 2.1788 C(95%) 0.004 0.060 0.043 0.0032 0.006 **Old COA 0.47 19.96 5.66 (0.04) (0.26) Analysis * Ti * V * B * Zr * Ni 1 AIC 2.12 AIC 0.004 AGD 0.0003 AIC 0.0005 EN 50.65 2 MT 2.17 AIC 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 ADC 0.0012 A AGS 2.20 AIC 0.006 ABS 0.0017 7 XFF 2.237 AIC 0.006 ABS 0.0017 7 XFF 2.237 AIC 0.006 ABS 0.0017 8 AIC 2.24 AIC 0.006 ABS 0.0017 9 AES 2.25 10 AIC 2.25 Average 2.209 0.0044 0.0011 0.0019 Std Dev 0.041 0.0008 0.0007 0.0012 Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764 C(95%) 0.029 0.0008 0.0006 0.0015																	
Std Dev 0.008 0.084 0.064 0.0055 0.010 Certified 0.38 19.92 5.70 0.04 0.24 t 2.1448 2.2622 2.2281 2.1604 2.1788 C(95%) 0.004 0.060 0.043 0.0032 0.006 ** old COA 0.47 19.96 5.66 (0.04) (0.26) Analysis * Ti * V * B * Zr * Ni 1 AIC 2.12 AIC 0.004 AIC 0.0005 AIC 0.0015 2 MT 2.17 AIC 0.004 AIC 0.0005 AIC 0.0014 4 A6X 2.20 AIC 0.004 AIC 0.0005 AIC 0.0014 4 A6X 2.20 AIC 0.004 AIC 0.0010 AIC 0.0015 5 AIC 2.21 AIC 0.004 AIC 0.0010 AIC 0.0030 5 AIC 2.21 AIC 0.004 AIC 0.0013 AIC 0.0033 6 XF 2.22 AIC 0.004 AIC 0.0013 AIC 0.0033 6 XF 2.22 AIC 0.004 AIC 0.0018 8 AIC 2.24 AIC 0.0048 9 AES 2.25 10 AIC 2.25 Average 2.209 0.0044 0.0011 0.0019 Std Dev 0.041 0.0008 0.0007 0.0012 Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764 C(95%) 0.029 0.0098 0.0006 0.0015																	
The control of the co																	
t 2.1448 2.2622 2.2281 2.1604 2.1788 C(95%) 0.004 0.060 0.043 0.0032 0.006 ** Old COA 0.47 19.96 5.66 (0.04) (0.26) Analysis * Ti * V * B * Zr * Ni 1 AIC 2.12 AIC 0.004 AGD 0.003 AIC 0.0005 EN 50.65 2 MT 2.17 AIC 0.004 AIC 0.005 ADC 0.0014 3 MTD 2.19 AA 0.004 AIC 0.0005 AIC 0.0014 4 AGX 2.20 AIC 0.004 AIC 0.0010 AIC 0.0030 5 AIC 2.21 AIC 0.004 AIC 0.0013 AIC 0.0030 6 XRF 2.22 AIC 0.004 AIC 0.0013 AIC 0.0033 6 XRF 2.22 AIC 0.006 AES 0.00177 7 XRF 2.237 AIC 0.0018 8 AIC 2.24 AIC 0.0043 9 AES 2.25 10 AIC 2.25 Average 2.209 0.0044 0.0011 0.0019 Std Dev 0.041 0.0008 0.0007 0.0012 Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764	Std Dev		0.008		0.084		0.064		0.0055		0.010						
C(95%)																	
C(95%)																	
Analysis * Ti * V * B * Zr * Ni 1	C(95%)		0.004		0.060		0.043		0.0032		0.006						
Analysis * Ti	** Old COA		0.47		19.96		5.66		(0.04)		(0.26)						
1 AIC 2.12 AIC 0.004 AGD 0.0003 AIC 0.0005 EN 50.65 2 MT 2.17 AIC 0.004 AIC 0.0005 ADC 0.0012 3 MTD 2.19 AA 0.004 AIC 0.0005 AIE 0.0014 4 ACX 2.20 AIC 0.004 AIC 0.0010 AIC 0.0033 5 AIC 2.21 AIC 0.0043 AIC 0.0013 AIC 0.0033 6 XRF 2.22 AIC 0.006 AES 0.00177 7 XRF 2.237 AIC 0.0018 8 AIC 2.24 AIC 0.0020 9 AES 2.25 10 AIC 2.25 Average 2.209 0.0044 0.0011 0.0019 Std Dev 0.041 0.0008 0.0007 0.0012 Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764 C(95%) 0.029 0.0008 0.0006 0.0015																	
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9 AES 2.25 10 AIC 2.25 Average 2.209 0.0044 0.0011 0.0019 Std Dev 0.041 0.0008 0.0007 0.0012 Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764 C(95%) 0.029 0.0008 0.0006 0.0015	7	XRF	2.237			AIC	0.0018										
10 AIC 2.25 Average 2.209 0.0044 0.0011 0.0019 Std Dev 0.041 0.0008 0.0007 0.0012 Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764 C(95%) 0.029 0.0008 0.0006 0.0015						AIC	0.0020										
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Std Dev 0.041 0.0008 0.0007 0.0012 Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764 C(95%) 0.029 0.0008 0.0006 0.0015	Average		2.209		0.0044		0.0011		0.0019								
Certified 2.21 0.004 (0.001) (0.002) t 2.2622 2.5706 2.3646 2.7764 C(95%) 0.029 0.0008 0.0006 0.0015	Std Dev		0.041		0.0008		0.0007		0.0012								
t 2.2622 2.5706 2.3646 2.7764 C(95%) 0.029 0.0008 0.0006 0.0015																	
C(95%) 0.029 0.0008 0.0006 0.0015																	
	C(95%)																

^{*} Methods of analysis listed below.

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

Data listed as mass fraction expressed as percent.

^{**} Original data certified on March 25, 1988.

Methods of Analysis

Method Code	Element	Method
AA ADC AES AGD AGX AIC AIE		Flame Atomic Absorption Spectrometry AES - DCP - Direct Current Plasma Spectrometry AES - Spark Source Optical Emission Spectrometry AES - GD - Glow Discharge Spectrometry Glow Discharge and X-Ray Fluorescence Spectrometry average AES - ICP -Inductively Coupled Plasma Spectrometry AES - ICP -Inductively Coupled Plasma Spectrometry after ion exchange
C	C, S	Combustion-Infrared Absorption (ASTM E 1019)
EN	Ni	Electroplating
GCo GMo GSi	Co Mo Si	Gravimetry, 1-nitroso2 -naphtole Gravimetry, Benzolnoxime Gravimetry with perchloric acid
MM MNA MnP MT MTD MW	Mo Nb Mn Ti Ti W	MAS - Photometric analysis MAS - Absorptionmetric determination method with (4-(2-pyridylazo))-Resorcinol MAS - Periodate oxidation MAS - Photometric MAS - Diantipyrylmethane photometric MAS - Thiocyanate-chlorpromazine hydrochloride-chloroform extraction photometric
TCo TCr TCT	Co Cr Co	Titrimetry with ferricyanide Persulfate oxidation, ferrous sulfate titrimetric Potentiometric titration
XRF		X-Ray Fluorescence spectrometry

AES = Atomic Emission Spectrometry
MAS = Molecular Absorption Spectrometry (photometric, spectrophotometric methods)

Co-operating Laboratories: The co-operating laboratories were:

Laboratory	Laboratory contact
AK Steel Research, Middletown, Ohio	Howard P. Vail
ANAREM, Prague, Czech Republic	Karel Bičovský
Allegheny Ludlum Technical Center, Brackenridge, Pennsylvania	Sally Bissell-Seymour
Allegheny Ludlum Technical Center, Brackenridge, Pennsylvania	Shawn D. Cooper
Allvac, Lockport, New York	Thomas A. Herdlein
Allvac, Monroe, North Carolina	Patrick M. Cole
Brammer Standard Co., Inc., Houston, Texas	Richard P. Beaumont
China National Analysis Center for Iron and Steel, Beijing, China	Prof. Wang Haizhou
Crucible Specialty Steel, Syracuse, New York	William Mastroe
J. Dirats and Co., Inc., Westfield, Massachusetts	Eric E. Dirats
IncoTest, Huntington, West Virginia	M. G. Staley
LECO Corporation, St. Joseph, Michigan	Dennis Lawrenz
Luvak, Teakneck, New Jersey	
Shiva Analyticals (India) Ltd., Hoskote, Bangalore, India	Dr. T. V. Ramakrishna
VHG Laboratories, Inc., Manchester, New Hampshire	Julie M. McIntosh

Revision information: A new interlaboratory testing program (ITP) was initiated for this material as a result of customer feedback concerning the originally certified aluminum value at 0.47%. A review of the data accumulated in 1988 for the original certificate of analysis preparation revealed that the original ITP did not meet current requirements and procedures used by Brammer Standard Company. The new ITP obtained the services of fifteen laboratories using more diversified methods including definitive methods of analysis. The new certified value for aluminum at 0.38% was the most dramatic change in analysis. The originally values certified on March 25, 1988, using data from six laboratories, are listed on page 2 at the bottom of each table.

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: Chemical analyses were made on chips prepared by a lathe from the certified portion of the discs in accordance with ASTM Standard Practice E 1806. The laboratories participating in the testing normally followed the requirements of ISO Guide 25 and/or ISO Standard 17025. Individual values listed on page 2 are the average of each analyst's results. Methods of analysis used were a combination of ASTM Standard Test Method E 1019 plus ICP, ICP, and AA spectrometric methods.

Outliers: Some outlying data was excluded from the data listed on page 2 due to technical assessment of the cooperating laboratories and statistical evaluation.

Traceability: The following Certified Reference Materials were used to validate the analytical data listed on page 2: NIST SRM 349a, 865, 866, 867; BCS 310/1. Pure metals were used for calibration and/or validation by two laboratories.

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 Certified Reference Materials: NIST SRM 1243; BS 198, 199A, 617; MBH 24X10992D, 11002F, 11005F, 14939F.

Validity: ISO Guide 31 states that the certification should contain an expiration date for all materials where instability has been demonstrated or is considered possible, after which the certified value is no longer guaranteed by the certifying body. Whereas this material is in a solid form and stable, no expiration date is specified.

Source: This material was produced by Cabot Corporation, Kokomo, Indiana. It was melted by an electric arc furnace and vacuum degassed.

Form: This Reference Material is in the form of a disc, approximately 50 mm in diameter and 12 mm thick.

Use: This Reference Material is intended for use in spark optical emission and x-ray fluorescence spectrometric methods of analysis. Refer to ISO Guide 33 for information about the use of Reference Materials.

Certified area: 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. Because this Reference Material contains a high percent of alloying elements, care must be taken in its application. Make certain that corrections are made for possible interference and dilution effects.

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.

Certificate Number: The unique identification number for this certificate of analysis is REV-263-012601-px, where x indicates the page number. Refer to future Brammer Standard Company catalogs for information on any new revisions to this or other Brammer Standard reference materials. You may also obtain information on revisions of certificates from the internet at brammerstandard.com.

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 January 26, 2001.		
G. R. Brammer			

By Certificate Number 10539, the Quality System of Brammer Standard Company, Inc., is registered to ISO 9002:1994 by National Quality Assurance, U.S.A.

Brammer Standard Company's Chemical Laboratory is accredited to ISO Standard 17025 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 826 - 85 (Reapproved 1996) Standard Practice for Testing Homogeneity of Materials for the Development of Reference Materials

E 1019 - 2000 Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel and in Iron, Nickel, and Cobalt Alloys

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

E 1806 - 96 Standard Practice for Sampling Steel and Iron for Determination of Chemical Composition

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 Global Engineering - www.global@ihs.com

ISO Standard 17025 (First edition, 1999), General requirements for the competence of calibration and testing laboratories.

ISO Guide 25 (Third edition, 1990), General requirements for the competence of calibration and testing laboratories.

ISO Guide 30 (Second edition, 1992), Terms and definitions used in connection with reference materials.

ISO Guide 31 (Second edition, 2000), Reference materials -Contents of certificates and labels.

ISO Guide 33 (Second edition, 2000), Uses of certified reference materials.

ISO Guide 34 (Second edition, 2000), General requirements for the competence of reference material producers.

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 REV-263-012601p5