

**Brammer Standard Company, Inc.**

**Data Sheet for Setting-up Material**

**BS SU 321**

**AISI Grade 321 Stainless Steel Alloy**

(UNS Number S32100)

**Estimated  
Analysis<sup>1</sup>**

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Analysis<sup>1</sup>**

**Analysis listed as percent by weight**

<b>C</b>	<b>0.055</b>	<b>Co</b>	<b>0.16</b>
<b>Mn</b>	<b>1.67</b>	<b>Sn</b>	<b>0.004</b>
<b>P</b>	<b>0.016</b>	<b>Ti</b>	<b>0.45</b>
<b>S</b>	<b>0.023</b>	<b>V</b>	<b>0.13</b>
<b>Si</b>	<b>0.63</b>	<b>N</b>	<b>0.012</b>
<b>Cu</b>	<b>0.21</b>	<b>O</b>	<b>0.002</b>
<b>Ni</b>	<b>10.15</b>		
<b>Cr</b>	<b>17.18</b>		
<b>Mo</b>	<b>0.22</b>		
<b>Al</b>	<b>0.19</b>		

<sup>1</sup> The above chemistry is supplied as an approximate guide to the composition and must not be regarded as the certified analysis. The analysis is based on the results of a Proficiency Testing Program. According to ASTM Standard Practice E 2027, the data from proficiency testing programs must never be used to assign certification values to the materials used in the program. This material may be used for instrument drift control. It must not be used for instrument calibration.

See the following pages for more information.

**Data Sheet Number SU321-091201p1**

**Analytical data:** This material was used as an unknown test specimen number 9911 in a nationally recognized Proficiency Testing Program (PTP) for stainless steel. Most of the participating laboratories used one or more of the ASTM Standard Test Methods E 327, E 572, E 1019, and E 1086. The data shown below are the results from the PTP.

Combustion Instrument Analysis using ASTM Standard Test Method E 1019

	C	S	N	O
Number of Labs	33	30	19	18
Grand Average	0.0550	0.0237	0.0116	0.0019
Standard Deviation	0.0037	0.0016	0.0013	0.0010

Optical Emission Spectrometric Analysis using ASTM Standard Test Method E 1086

	C	Mn	P	S	Si	Cu	Ni		
Number of Labs	17	21	23	18	21	21	21		
Grand Average	0.0543	1.6722	0.0163	0.0219	0.6343	0.2188	10.2508		
Standard Deviation	0.0031	0.0337	0.0014	0.0026	0.0183	0.0122	0.2076		
	Cr	Mo	Al*	Co*	Nb*	Sn*	Ti*	V*	
Number of Labs	18	20	6	9	6	5	10	8	
Grand Average	17.1422	0.2230	0.1919	0.1602	0.7783	0.0035	0.4448	0.1255	
Standard Deviation	0.0973	0.0096	0.0100	0.0021	0.0222	0.0015	0.0116	0.0054	

\* The elements listed are not within the scope of the cited ASTM Standard Test Method but were reported by the testing laboratories.

X-ray Emission Spectrometric Analysis using ASTM Standard Test Method E 572

	Mn	P*	Si*	Cu	Ni	Cr	Mo	Co	Nb	Sn*
Number of Labs	19	10	9	17	21	21	19	16	15	5
Grand Average	1.6718	0.0159	0.6225	0.2089	10.0985	17.2018	0.2180	0.1583	0.7920	0.0034
Standard Deviation	0.0173	0.0011	0.0108	0.0028	0.0585	0.0894	0.0060	0.0050	0.0162	0.0014
	Al*	Ti*	V*							
Number of Labs	5	8	10							
Grand Average	0.1926	0.4481	0.1274							
Standard Deviation	0.0126	0.0045	0.0052							

\* The elements listed are not within the scope of the cited ASTM Standard Test Method but were reported by the testing laboratories.

Other Methods such as AA, GDMS, and ICP spectrometric analysis

	C	Mn	P	S	Si	Cu	Ni**	Cr	Mo
Number of Labs	3	12	7	6	10	11	7	11	7
Average	0.0550	1.6735	0.0177	0.0232	0.6279	0.2082	10.1651	17.1773	0.2216
Standard Deviation	0.0019	0.0636	0.0028	0.0031	0.0347	0.0070	0.1941	0.2150	0.0033
	Al	Co	Sn	Ti**	V**	** ICP analysis not included but listed below			
Number of Labs	7	7	5	4	5				
Average	0.1933	0.1599	0.0046	0.4412	0.1283				
Standard Deviation	0.0219	0.0057	0.0026	0.0272	0.0070				

ICP Spectrometric Analysis

	Ti	Ni	V
Number of Labs	4	4	4
Average	0.4505	10.1882	0.1259
Standard Deviation	0.0490	0.2535	0.0055

## Overall Summary

	C	Mn	P	S	Si	Cu	Ni	Cr
Robust Mean	0.0548	1.6729	0.0163	0.0230	0.6296	0.2123	10.1548	17.1781
Robust. Std. Deviation	0.0034	0.0314	0.0014	0.0023	0.0203	0.0092	0.1407	0.1132
	Mo	Al	Co	Sn	Ti	V	N	O
Robust Mean	0.2202	0.1926	0.1594	0.0037	0.4453	0.1271	0.0116	0.0019
Robust. Std. Deviation	0.0071	0.0149	0.0046	0.0015	0.0132	0.0057	0.0012	0.0010

**Homogeneity:** This Setting-up Material was tested for homogeneity using ASTM Standard Method E 826 and found acceptable. It was also examined by optical emission spectrometry using ASTM Standard Test Method E 1086 and found to be compatible with the following Reference Materials: SRM C1152, C1153, C1154, 1171; BS 81G, 85D, 321A, 321C.

**Source:** This material was melted by Carpenter Technology Corporation, Reading, Pennsylvania. It was melted by an electric arc furnace, cast into ingots, hot rolled, and annealed.

**Form:** This Setting-up Material is in the form of a disc approximately 39 mm (1.50 inches) diameter and 40 mm (1.57 inches) thick.

**Use:** This material is intended for use in optical emission and x-ray spectrometric methods of analysis.

**Analytical area:** The entire depth of the disc may be used.

**Caution:** As with any bar material, avoid optical emission spectrometric bumps in the center of the disc (5 mm radius), as some segregation may be present.

Because this Material contains a high percent of nickel and chromium, care must be taken in its application. Make certain that corrections are made for possible element interference and dilution effects.

**Sample Preparation:** For best analytical results, use the same method for preparing the analytical surface on all setting-up samples as you use for production specimens. Avoid overheating the disc during surface preparation.

**Data Sheet Number:** The unique identification number for this data sheet is SU321-091201-px, where x indicates the page number. Refer to future Brammer Standard Company catalogs for information on any revisions to this or other Brammer Standard materials. You may also obtain information on revisions from the internet at [brammerstandard.com](http://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 Setting-up Material should be directed to:

Brammer Standard Co., Inc. 14603 Benfer Road Houston, Texas 77069-2895 USA	Phone: (281) 440-9396 Fax: (281) 440-4432	web <a href="http://brammerstandard.com">brammerstandard.com</a> e-mail <a href="mailto:bramstan@netropolis.net">bramstan@netropolis.net</a>
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Prepared by: \_\_\_\_\_ on September 12, 2001.  
G. R. Brammer

**Brammer Standard Company, Inc., is accredited to ISO Guide 34 as a Reference Material Producer for the production of Certified Reference Materials and Reference Materials by A2LA (Certificate Number 656.02) The scope of accreditation is listed on the website: [www.brammerstandard.com](http://www.brammerstandard.com)**

**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 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](mailto:service@astm.org) Website: [www.astm.org](http://www.astm.org)*

E 327 - 94 Standard Test Method for Optical Emission Spectrometric Analysis of Stainless Type 18-8 Steels by the Point-to-Plane Technique

E 572 - 94 Standard Test Method for X-Ray Emission Spectrometric Analysis of Stainless Steel

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 1086 - 94 Standard Test Method for Optical Emission Vacuum Spectrometric Analysis of Stainless Steel by the Point-to-Plane Excitation Technique

E 2027 - 99 Standard Practice for Conducting Proficiency Tests in the Chemical Analysis of Metals, Ores, and Related Materials