

**Brammer Standard Company, Inc.**

**Data Sheet for Setting-up Material**

**BS SU LF-2**

**ASTM A350 (LF2) Carbon Steel**

(UNS Number K03011)

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

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Analysis<sup>1</sup>**

Analysis listed as percent by weight

<b>C</b>	<b>0.17</b>	<b>Co</b>	<b>0.014</b>
<b>Mn</b>	<b>1.13</b>	<b>N</b>	<b>0.0074</b>
<b>P</b>	<b>0.007</b>	<b>O</b>	<b>0.002</b>
<b>S</b>	<b>0.008</b>		
<b>Si</b>	<b>0.24</b>		
<b>Cu</b>	<b>0.19</b>		
<b>Ni</b>	<b>0.115</b>		
<b>Cr</b>	<b>0.12</b>		
<b>Mo</b>	<b>0.035</b>		
<b>Al</b>	<b>0.040</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 SU-LF-2-091201p1**

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**Analytical data:** This material was used as an unknown test specimen number 3991 in a nationally recognized Proficiency Testing Program (PTP) for low alloy steel. Most of the participating laboratories used one or more of the ASTM Standard Test Methods E 322, E 415, E 1019, and E 1085. 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	51	46	38	29
Grand Average	0.1756	0.0069	0.0074	0.0018
Standard Deviation	0.0057	0.0008	0.0004	0.0007

Optical Emission Spectrometric Analysis using ASTM Standard Test Method E 415

	C	Mn	P	S	Si	Cu	Ni	N
Number of Labs	70	71	73	67	74	73	71	22
Grand Average	0.1727	1.1322	0.0067	0.0080	0.2364	0.1884	0.1147	0.0073
Standard Deviation	0.0076	0.0236	0.0010	0.0011	0.0086	0.0077	0.0056	0.0008

	Cr	Mo	Al	Co
Number of Labs	72	71	70	33
Grand Average	0.1181	0.0346	0.0399	0.0112
Standard Deviation	0.0049	0.0031	0.0030	0.0010

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

	Mn	Cu	Ni	Cr	Mo
Number of Labs	6	6	6	6	6
Grand Average	1.1370	0.1901	0.1151	0.1165	0.0356
Standard Deviation	0.0145	0.0062	0.0040	0.0039	0.0005

X-ray Emission Spectrometric Analysis using ASTM Standard Test Method E 1085

	Mn	P	Si	Cu	Ni	Cr	Mo	Co
Number of Labs	6	3	6	6	6	6	6	4
Grand Average	1.1356	0.0066	0.2382	0.1908	0.1180	0.1144	0.0338	0.0128
Standard Deviation	0.0068	0.0016	0.0103	0.0028	0.0034	0.0019	0.0017	0.0015

Other Analytical Methods such as AA, ICP, and GDOES spectrometric analysis and combustion methods

	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
Number of Labs	5	8	5	5	10	10	8	7	6
Average	0.1738	1.1400	0.0062	0.0077	0.2383	0.1891	0.1161	0.1168	0.0343
Standard Deviation	0.0069	0.0193	0.0010	0.0022	0.0051	0.0076	0.0061	0.0077	0.0008

	Al	Co	ASTM E 350 →	Mn
Number of Labs	6	4		4
Average	0.0398	0.0118		1.1449
Standard Deviation	0.0029	0.0018		0.0128

**Overall Summary**

	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
Robust Mean	0.1740	1.1342	0.0066	0.0076	0.2369	0.1887	0.1151	0.1176	0.0346
Robust. Std. Deviation	0.0069	0.0209	0.0011	0.0012	0.0083	0.0072	0.0054	0.0049	0.0026

	Al	Co	N	O
Robust Mean	0.0399	0.0144	0.0074	0.0018
Robust. Std. Deviation	0.0029	0.0011	0.0005	0.0007

**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: SS 433/1, 454/1; CKD 165D, 181A; BS 13B, 50D, 61D.

**Source:** This material was melted by Operadora de Industrias CH, S.A. de C.V., Tlalnepantla, Edo. de Mexico, Mexico. It was melted by an electric arc furnace, vacuum degassed, bottom poured into ingots, aluminum killed, hot rolled, and annealed.

**Form:** This Setting-up Material is in the form of a disc, approximately 38 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 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 setting-up samples as you use for production specimens. Avoid overheating the bar during surface preparation.

**Data Sheet Number:** The unique identification number for this data sheet is SU-LF-2-091201-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 322 - 96 Standard Test 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 1999) Standard Test Method for Optical Emission Vacuum Spectrometric Analysis of Carbon and Low-Alloy 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 1085 - 95 Standard Test Method for X-Ray Emission Spectrometric Analysis of Low-Alloy Steels

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