

Brammer Standard Company, Inc.

Data Sheet for Setting-up Material

BS SU LF-3

ASTM A350 (LF3) Alloy Steel

(UNS Number K32025)

**Estimated
Analysis¹**

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Analysis¹**

Analysis listed as percent by weight

C	0.17	Co	0.010
Mn	0.83	Sn	0.005
P	0.008	Ti	0.002
S	0.011	V	0.0024
Si	0.22	N	0.0067
Cu	0.07	O	0.002
Ni	3.25		
Cr	0.11		
Mo	0.017		
Al	0.021		

¹ 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-3-091201p1

Analytical data: This material was used as an unknown test specimen number 2981 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	57	53	43	31
Grand Average	0.1697	0.0101	0.0067	0.0020
Standard Deviation	0.0053	0.0007	0.0003	0.0006

Optical Emission Spectrometric Analysis using ASTM Standard Test Method E 415

	C	Mn	P	S	Si	Cu	Ni	N
Number of Labs	75	85	84	81	86	75	72	8
Grand Average	0.1673	0.8277	0.0078	0.0112	0.2204	0.0730	3.2344	0.0071
Standard Deviation	0.0055	0.0137	0.0011	0.0013	0.0092	0.0041	0.1491	0.0002

	Cr	Mo	Al	Co	Sn	Ti	V
Number of Labs	84	84	88	46	65	66	70
Grand Average	0.1100	0.0170	0.0209	0.0106	0.0053	0.0023	0.0024
Standard Deviation	0.0043	0.0025	0.0022	0.0012	0.0006	0.0006	0.0012

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

	Mn	Cu	Cr	Mo
Number of Labs	7	7	7	7
Grand Average	0.8278	0.0734	0.1079	0.0156
Standard Deviation	0.0116	0.0039	0.0028	0.0018

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

	Mn	P	S	Si	Cu	Ni	Cr	Mo	Co
Number of Labs	12	9	5	10	9	11	9	9	3
Grand Average	0.8277	0.0074	0.0110	0.2256	0.0743	3.2745	0.1070	0.0142	0.0095
Standard Deviation	0.0112	0.0011	0.0018	0.0120	0.0035	0.0421	0.0058	0.0030	0.0007

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	2	5	4	2	5	5	5	5	5
Average	0.1663	0.8222	0.0074	0.0095	0.2188	0.0703	3.2807	0.1098	0.0153
Standard Deviation	0.0004	0.0166	0.0018	0.0002	0.0116	0.0027	0.0615	0.0054	0.0016

	Al	Co	Sn	Ti	V	N
Number of Labs	5	3	3	4	4	2
Average	0.0196	0.0095	0.0054	0.0010	0.0020	0.0067
Standard Deviation	0.0031	0.0007	0.0004	0.0003	0.0006	0.0012

ICP Spectrometric Analysis

	Mn	P	Si	Cu	Ni	Cr	Mo	Al	Co
Number of Labs	4	5	4	5	6	5	4	4	5
Average	0.8275	0.0072	0.2283	0.0700	3.2801	0.0178	0.0155	0.0197	0.0091
Standard Deviation	0.0075	0.0016	0.0086	0.0020	0.0347	0.0044	0.0012	0.0038	0.0010

Overall Summary

	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
Robust Mean	0.1683	0.8273	0.0078	0.0107	0.2207	0.0729	3.2502	0.1095	0.0165
Robust. Std. Deviation	0.0055	0.0131	0.0012	0.0012	0.0095	0.0039	0.1197	0.0045	0.0025
	Al	Co	Sn	Ti	V	N	O		
Robust Mean	0.0208	0.0104	0.0053	0.0023	0.0024	0.0067	0.0020		
Robust. Std. Deviation	0.0024	0.0012	0.0006	0.0007	0.0012	0.0003	0.0006		

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 SRM C1173, 1261A, 1262A, 1263A, 1264A, 1265A, 1761, 1762, 1763, 1764, 1765, 1766, 1767; ECRM 186-1, 191-1; SS 457/1, 458/1; JSS 169-4, 170-6, 171-4.

Source: This material was melted by Copperweld Steel Corporation, Warren, Ohio. 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 44 mm (1.75 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.

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-3-091201-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.

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:

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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

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 Website: www.astm.org

E 322 - 96 Standard Test Method for X-Ray Emission Spectrometric Analysis of Low-Alloy Steels and Cast Irons

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