

Brammer Standard Company, Inc.

Data Sheet for Setting-up Material

BS SU 316L

AISI Grade 316L Stainless Steel Alloy

(UNS Number S31603)

**Estimated
Analysis¹**

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Analysis¹**

Analysis listed as percent by weight

C	0.021	Co	0.21
Mn	1.70	V	0.044
P	0.035	N	0.091
S	0.025	O	0.005
Si	0.39		
Cu	0.405		
Ni	12.27		
Cr	17.58		
Mo	2.09		
Al	0.005		

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-316L-091201p1

Analytical data: This material was used as an unknown test specimen number 0031 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	18	18	14	13
Grand Average	0.0209	0.0259	0.0910	0.0048
Standard Deviation	0.0016	0.0019	0.0024	0.0006

Optical Emission Spectrometric Analysis using ASTM Standard Test Method E 1086

	C	Mn	P	S	Si	Cu	Ni
Number of Labs	16	15	18	16	16	15	15
Grand Average	0.0206	1.6987	0.0347	0.0245	0.3955	0.4065	12.3060
Standard Deviation	0.0036	0.0147	0.0023	0.0030	0.0155	0.0080	0.0797

	Cr	Mo	Al*	Co*	V*	N*
Number of Labs	13	15	9	8	8	6
Grand Average	17.5873	2.0977	0.0052	0.2085	0.0443	0.0909
Standard Deviation	0.0857	0.0164	0.0034	0.0071	0.0022	0.0029

* 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	V*
Number of Labs	12	9	9	12	13	13	13	14	9
Grand Average	1.6961	0.0349	0.3949	0.4072	12.2470	17.5893	2.0936	0.2119	0.0433
Standard Deviation	0.0147	0.0010	0.0128	0.0093	0.0606	0.0901	0.0210	0.0089	0.0029

* 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 and ICP spectrometric analysis

	Mn	P	S	Si	Cu	Ni	Cr	Mo
Number of Labs	6	6	6	7	6	6	7	6
Average	1.7050	0.0333	0.0227	0.3915	0.4004	12.1972	17.5450	2.0973
Standard Deviation	0.0225	0.0042	0.0022	0.0196	0.0068	0.0281	0.0488	0.0586

	Co	Al	V
Number of Labs	5	4	6
Average	0.2079	0.0056	0.0455
Standard Deviation	0.0042	0.0037	0.0033

Overall Summary

	C	Mn	P	S	Si	Cu	Ni	Cr
Robust Mean	0.0207	1.6987	0.0347	0.0248	0.3946	0.4054	12.2740	17.5796
Robust. Std. Deviation	0.0021	0.0153	0.0022	0.0027	0.0137	0.0082	0.0818	0.0812

	Mo	Al	Co	V	N	O
Robust Mean	2.0944	0.0054	0.2101	0.0442	0.0911	0.0049
Robust. Std. Deviation	0.0224	0.0034	0.0076	0.0026	0.0025	0.0008

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 C1151, C1152, C1153, C1154, 1155; BS CA316-1, CA316-3.

Source: This material was melted by Sammi Steel Co., Ltd., Changwon Works, Changwon, Korea. It was melted by an electric arc furnace, bottom poured into ingots, hot rolled, annealed and centerless ground .

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 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 SU-316L-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

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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 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