

Brammer Standard Company, Inc.

Certificate of Analysis

BS H 3B Hastelloy Type X

(analysis listed as percent by weight)

Carbon	0.078	Molybdenum	8.84
Manganese	0.11	Vanadium	0.061
Phosphorus	0.013	Niobium	0.28
Sulfur	0.0005	Cobalt	1.96
Silicon	0.63	Titanium	0.020
Copper	0.27	Aluminum	0.14
Nickel	44.9	Iron	19.92
Chromium	22.23	Boron	0.0052
		Tungsten	0.49

Some of the co-operating laboratories were:

Alpha Research Laboratories, Stevensville, MI
Allegheny Ludlum Steel Corp., Brackenridge, PA
Allegheny Ludlum Steel Corp., Lockport, NY
Brammer Standard Co., Inc., Houston, TX
Crucible Specialty Metals, Syracuse, NY
Jessop Steel Co., Washington, PA
Midstates Analytical Laboratories, Tulsa, OK

CAUTION: Because this Reference Material contains a high percent of chromium, iron, and molybdenum, care must be taken in its application. Corrections are likely to be necessary due to element interference.

THIS CERTIFICATE OF ANALYSIS HAS BEEN RECREATED FOR POSTING ON THE WEB.

See reverse side for more information.

Certificate No. RECH3B-110189

Brammer Standard Company, Inc., 14603 Benfer Road, Houston, TX 77069
Telephone (281) 440-9396 Fax (281) 440-4432

BS H-3B

Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
1	0.0736	0.09	0.010	0.00045	0.57	0.26	44.69	22.12	8.73
2	0.075	0.095	0.0134	0.0005	0.58	0.266	44.72	22.15	8.75
3	0.077	0.100	0.014	0.0005	0.61	0.27	44.85	22.21	8.75
4	0.078	0.10	0.014	0.0005	0.632	0.27	45.00	22.22	8.77
5	0.0786	0.104	0.015	0.0006	0.64	0.27	45.02	22.22	8.80
6	0.080	0.116		0.0007	0.656	0.28	45.11	22.24	8.85
7	0.083	0.12			0.66	0.28		22.28	8.85
8	0.12				0.663	0.28		22.30	8.86
9	0.124				0.67	0.29		22.332	8.92
10									8.95
Average	0.0779	0.1077	0.0133	0.00054	0.631	0.274	44.898	22.230	8.835
Std.Dev.	0.0031	0.0125	0.0019	0.00009	0.037	0.009	0.172	0.068	0.083
Certified	0.078	0.11	0.013	0.0005	0.63	0.27	44.9	22.23	8.84

Analysis	V	Co	Al	Nb	Ti	B	Fe	W
1	0.060	1.86	0.13	0.26	0.015	0.0049	19.74	0.46
2	0.060	1.88	0.135	0.27	0.019	0.0050	19.78	0.46
3	0.060	1.91	0.136	0.27	0.020	0.0050	19.87	0.47
4	0.060	1.97	0.14	0.27	0.020	0.0050	19.87	0.48
5	0.06	1.97	0.14	0.27	0.020	0.0059	19.90	0.49
6	0.062	2.00	0.14	0.28	0.021		19.93	0.50
7	0.062	2.02	0.144	0.29	0.024		20.03	0.52
8		2.06	0.145	0.30			20.05	0.52
9				0.30			20.07	
Average	0.0606	1.959	0.139	0.279	0.0199	0.0052	19.916	0.488
Std.Dev.	0.0010	0.070	0.005	0.015	0.0027	0.0004	0.117	0.024
Certified	0.061	1.96	0.14	0.28	0.020	0.0052	19.92	0.49

Chemical analyses were made on millings from cross-sections of the bars. The values listed above are individual laboratory analytical results.

Methods of analysis used were a combination of ASTM Standard Methods E 354, E 1019, and various ICP and AA spectrometric methods.

Inquiries concerning this Reference Material should be directed to:

Brammer Standard Co., Inc.
14603 Benfer Road
Houston, Texas 77069

Phone: (281) 440-9396
Fax: (281) 440-4432

Certified by: Beau R. Brammer on November 1, 1989.

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