Brammer Standard Company, Inc.

Certificate of Analysis

HIGH MANGANESE STEELS

	BS 17	BS 18	BS 19	
C	0.63	1.14	1.48	C
Mn	19.59	11.20	8.52	Mn
P	0.047	0.032	0.030	P
S	0.007	0.026	0.062	S
Si	0.21	0.63	1.44	Si
Cu	0.075	0.035	0.52	Cu
Ni	0.03	0.29	1.48	Ni
Cr	1.46	0.20	3.93	Cr
Mo	0.46	0.018	2.08	Mo
V	(0.02)	0.33	(0.045)	V
Al	(0.02)	(0.02)	(0.012)	Al
Sn	(0.012)	(0.006)	(0.027)	Sn

COOPERATING LABORATORY ANALYSIS provided by:

Alpha Research Labs., Stevensville, MI
Analytical Consulting Laboratories, Houston, TX
Analytical Process Laboratories, Milwaukee, WI
Anderson Laboratories, Milwaukee, WI
Baird Corporation, Bedford, MA
Bowser-Morner Laboratories, Dayton, OH
Chicago Spectro Service Laboratories, Chicago, IL
Midstates Analytical Laboratories, Tulsa, OK
Spectrochemical Laboratories, Pittsburgh, PA

Data in parentheses are not certified but provided for information only.

SEE REVERSE SIDE FOR ADDITIONAL INFORMATION

Certificate No. 17-19-031192

The specimens were chill cast by a rapid unidirectional solidification procedure. They were given a stress relief heat treatment for one hour at 590°C and slow cooled.

The certification portion for each specimen is the portion extending upward 10 mm from the larger diameter surface. Shrinkage cavities may appear in the top portion of some specimens that will not affect the certified portion.

CAUTION:

1. These chill cast materials are made for the calibration of X-ray fluorescence and optical emission spectrometers in the analysis of specimens similar in composition and prepared for testing in the same manner.

2. Because of the higher alloy composition of the specimens, an averaging of two or three analytical runs may be required.

3. Beware of interelement effects.

Chemical analyses were made on millings from cross-sections of the bars. The individual values listed above are the average of each analyst's results.

Methods of analysis used were a combination of ASTM Standard Methods E 350, E 352, E 415 (modified), E 1019, plus additional ICP, and AA spectrometric methods. The following Certified Reference Materials were used to validate the analytical data listed above: NIST SRM 32e, 125b, 361 to 365; BAM 039-2, 044-1, 230-1; BCS 455/1, 456/1, 458/1, 491, 494, 495; ECRM 085-1, 088-1, 096-1, 184-1, 253-1, 481-1; GBW 01402; IMZ 1.22, 1.74

This Reference Material was tested for homogeneity using ASTM Standard Method E 826 and found acceptable. It was also examined by optical emission spectrometry and found to be compatible with the following British Certified Reference Materials: SS 290/2, 490/1 through 490/5

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. Inquires concerning this Reference Material should be directed to:

Brammer Standard Co., Inc.
14603 Benfer Road
Houston, Texas 77069-2895 USA

Phone: (713) 440-9396
Fax: (713) 440-4432

Certified by: _____ on March 11, 1992.
G. R. Brammer

The original certificate was certified on May 20, 1987. The certificate was revised on March 11, 1992 to give additional information. No data was changed.