MBH ANALYTICAL LTD

HOLLAND HOUSE • QUEENS ROAD • BARNET • EN5 4DJ • ENGLAND • TEL: +44 (0)20 8441 2024 • FAX: +44 (0)20 8449 0810
email: info@mbh.co.uk web: www.mbh.co.uk

CERTIFICATE OF ANALYSIS

13X NSB2 (batch D)

Reference Material Information

Type:	HIGH NITROGEN STAINLESS STEEL (WROUGHT)
Form and Size:	Disc 40mm Diameter x 15mm Thickness
Supplied by:	MBH Analytical Limited
Produced by:	British Steel Technical

Certified Analysis

Percentage element by weight

Element	C	Si	Mn	Ni	Cr	Mo	N
%	0.06	0.66	0.62	11.1	18.2	0.21	0.095

Usage

Intended use: With optical emission and X-ray fluorescence spectrometers.

Recommended method of use: Steels are generally prepared by linishing, milling, turning or polishing, avoiding contamination with abrasives or lubricants. However, users are recommended to follow the calibration and sample preparation procedures specified by the relevant instrument manufacturer.

Preparation should be the same for reference materials and the samples for test.

When using OE, a minimum of three consistent replicate analyses is recommended to optimise precision and accuracy. Users are advised to check against possible bias between reference materials and production samples due to differences in metallurgical history, and be aware of possible inter-element effects.

Certified by:

on 4th November 1997

MBH ANALYTICAL LIMITED _____

Method of Preparation

This reference material was produced from pure metals, ferro alloys and master alloys. The discs are the product of one melt cast as a single ingot, which was forged and rolled into a single bar.

Sampling

Milled samples for chemical analysis, and discs for homogeneity checks, were taken from each end of the rolled bar.

Chemical Analysis Data

Percentage element by weight

Sample	C	Si	Mn	Ni	Cr	Mo	N
1	0.061	-	0.61	11.1	18.1	0.21	-
2	0.063	0.63	0.63	11.04	18.37	0.20	-
3	0.07	0.70	0.62	11.0	18.3	0.22	0.095
4	0.057	0.63	0.64	11.15	18.37	0.21	0.090
5	0.057	0.712	0.615	11.11	18.09	0.196	0.100
6	0.066	0.65	0.63	11.09	18.08	0.23	0.094
Mean	0.062	0.664	0.624	11.082	18.218	0.211	0.095
Std Dev	0.005	0.039	0.011	0.053	0.143	0.013	0.004

Confidence Limits

These are the upper and lower values between which the actual measurements will fall, with the stated probabilities, assuming a Gaussian distribution.

68.3% of the results will fall within $\pm$ 1 x Standard Deviation of the mean.

95.4% of the results will fall within $\pm$ 2 x Standard Deviation of the mean.

99.7% of the results will fall within $\pm$ 3 x Standard Deviation of the mean.

Homogeneity

Two discs were taken, one from each end of the rolled bar; these were analysed on the face and back using an optical emission spectrometer.

Multiple measurements were taken from each surface, and averaged.

The mean value of the material was then calculated from these averages.

For each of the four surfaces checked, the differences between the averaged result for each surface and the overall mean value are tabulated below. Results are in % concentration for each element:

Disc from top of mould

	C	Si	Mn	Ni	Cr	Mo	N
Face 1	0.000	-0.016	-0.007	-0.02	-0.02	-0.002	-0.001
Face 2	+0.001	-0.004	+0.002	-0.01	+0.03	0.000	-0.002
Ave	0.000	-0.010	-0.003	-0.015	+0.005	-0.001	-0.001

Disc from bottom of mould

	C	Si	Mn	Ni	Cr	Mo	N
Face 1	0.000	+0.019	+0.008	+0.015	+0.01	+0.002	+0.001
Face 2	0.000	+0.001	-0.002	+0.015	-0.02	0.000	+0.001
Ave	0.000	+0.010	+0.003	+0.015	-0.005	+0.001	+0.001

Participating Laboratories

Metals Technology (Testing) Ltd	Sheffield, England	NAMAS Approval 0963
JB Elds Ltd	Stoke, England	NAMAS Approval 1173
Commercial Testing Services Ltd	Sheffield, England	NAMAS Approval 1385
Bodycote Materials Testing	Middlesbrough, England	NAMAS Approval 0239
IncoTest Ltd	Hereford, England	NAMAS Approval 0281
Sheffield Test Laboratories	Sheffield, England	NAMAS Approval 0136

Analytical Methods Used

Carbon:	Combustion (IRD)		
Silicon:	FAAS	ICP	Gravimetric
Manganese:	FAAS	ICP	Photometric (periodate)
Nickel:	FAAS	ICP	Volumetric (dimethyl glyoxime)
Chromium:	FAAS	ICP	Volumetric ($Fe^{II}.NH_4.SO_4$)
Molybdenum:	FAAS	ICP	
Nitrogen:	Inert Gas Fusion (Thermal conductivity)		

Results overchecked by OES

Notes

This certificate of analysis is prepared in accordance with the guidelines given in ISO Guide 31-1981.

The material to which this certificate of analysis refers is supplied subject to our general conditions of sale.