

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 72g

Low-Alloy Steel, AISI 4130

(In cooperation with the American Society for Testing and Materials)

This Standard is in the form of chips sized between 0.50 and 1.18 mm sieve openings (35 and 16 mesh). It is intended for use primarily in chemical methods of analysis.

(Similar material for use in spectrometric methods of analysis is planned as SRM 1225.)

Constituent	C	Mn	P	S	Si	Cu	Ni	Cr	V	Mo
Certified Value, % by wt ¹	0.278	0.492	0.009	0.014	0.223	0.011	0.016	0.905	0.003	0.170
Estimated Uncertainty ²	0.005	0.008	0.001	0.001	0.004	0.001	0.003	0.005	-----	0.004
Method	Combustion-Infrared	Peroxydisulfate Arsenite	Photometric	Combustion-Infrared	Perchloric Acid Dehydration	Atomic Absorption	Atomic Absorption			Atomic Absorption
Lab										
1	.274 a.278	b.485	0.009 c.010	0.014	0.220	d.009	e.014 f.016	g.910	-----	h.0.166 i.0.174
2	i.283	-----	.007	k.013	.235	.010	.014	l.898	-----	.166
3	.282	l.500	m.010	.014	.227	.012	n.017	.910	m.0004	m.168
4	i.275	.494	.008	.015	.221	.012	.021	.906	-----	.173
5	.276	l.490	.009	.015	l.222	.012	.013	n.908	i.003	.169
6	.279	.493	-----	.014	.225	-----	e.014	o.903	p.003	h.168

¹The certified value listed for a constituent is the *present best estimate* of the "true" value based on the results of the cooperative program for certification.

²The estimated uncertainty listed for a constituent is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability for samples 0.5 g or more. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

Note: Laboratory 5 reported a value of 0.041% soluble Al and 0.008% N.

- a. Combustion-thermal conductivity
- b. Same value obtained by oxidation with sodium bismuthate
- c. Alkali-molybdate
- d. Neocuproine spectrophotometric
- e. Weighed as nickel dimethylglyoxime
- f. Dimethylglyoxime precipitate titrated with KCN
- g. Perchloric acid oxidation-FeSO₄-KMnO₄ titration
- h. Spectrophotometric
- i. Alpha benzoinoxime-MoO₃ gravimetric
- j. Combustion-chromatographic

- k. Combustion-iodate titration
- l. Atomic absorption
- m. DC plasma emission spectroscopy
- n. Peroxydisulfate oxidation-FeSO₄-KMnO₄ titration
- o. Chromium separated from the bulk of the iron in a 10-g sample by hydrolytic precipitation with NaHCO₃, oxidized with peroxydisulfate, and titrated potentiometrically with ferrous ammonium sulfate
- p. Vanadium separated as in (o), oxidized with HNO₃, and titrated potentiometrically with ferrous ammonium sulfate

The overall coordination of the technical measurements leading to certification was performed under the direction of J. I. Shultz, Research Associate, ASTM-NBS Research Associate Program.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

PLANNING, PREPARATION, TESTING, ANALYSIS:

The material for this standard was provided by the Bethlehem Steel Corp., Lackawanna, New York.

Homogeneity testing was performed at NBS by E.R. Deardorff and by R.K. Bell, Assistant Research Associate, ASTM-NBS Research Associate Program.

Cooperative analyses for certification were performed in the following laboratories:

Climax Molybdenum Company of Michigan, Ann Arbor, Michigan, R.C. Binns.

Foster-Wheeler Development Corp., Livingston, New Jersey, M.M. Fornoff and G. Lantos.

Jones and Laughlin Steel Corp., Youngstown, Ohio, L.E. Chalker.

Lukens Steel Co., Coatesville, Pa., J.H. Morris.

National Bureau of Standards, Inorganic Analytical Research Division, B.I. Diamondstone and R.K. Bell, ASTM-NBS Assistant Research Associate.

The Timken Co., Canton, Ohio, V.M. Chapman.