



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 2171

Low-Alloy Steel, (Ni-Cr-Cu-Mo) (HSLA 100)

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

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

Similar material for use in spectrometric methods of analysis is available as SRM 1271.

Element	Certified Value, ¹ % by wt.	Estimated Uncertainty ²
Carbon ^a	0.066	0.002
Manganese ^{b,c,d,e,f}	0.73	0.01
Phosphorus ^{b,c}	0.006	0.002
Sulfur ^{a,g}	0.0012	0.0005
Silicon ^{f,h}	0.338	0.005
Copper ^{b,e,f}	1.47	0.03
Nickel ^{b,e,f,i}	3.35	0.08
Chromium ^{b,f,j}	0.550	0.007
Vanadium ^b	0.003	0.001
Molybdenum ^{b,e,f}	0.546	0.008
Aluminum ^{b,e,f}	0.019	0.003
Niobium ^{b,f}	0.024	0.004

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. No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.

Methods/Techniques

a-Combustion-Infrared Detection

b-Inductively Coupled Plasma Spectrometry

c-Spectrophotometry

d-Persulfate-Arsenite Titration

e-Atomic Absorption Spectrometry

f-DC Plasma Spectrometry

g-Combustion-Titration

h-Gravimetry

i-KCN Titration

j-HClO₄ oxidation-Fe(NH₄)₂(SO₄)₂-KMnO₄ Titration

Gaithersburg, MD 20899
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William P. Reed, Chief
Standard Reference Materials Program

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

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Standard Reference Materials Program by P.A. Lundberg.

PLANNING, PREPARATION, TESTING, ANALYSIS:

The material for this standard was provided by Lukens Steel Co., Coatesville, Pennsylvania, courtesy of J.H. Morris.

Homogeneity testing was performed at NIST by J.A. Norris and T.W. Vetter.

Cooperative analyses for certification were performed in the following laboratories:

-Armco Research & Technology, Middletown, Ohio, C.C. Borland, I.C. Henry, J.W. Leeker, T.M. Minor, G.D. Smith, R.L. Swigert, H.P. Vail and D.E. Gillum.

-Inspectorate Samplers & Analysts, Inc., Ambler, Pennsylvania, E.J. McKee.

-Republic Engineered Steels, Canton, Ohio, B.G. Pitts.

-Timken Company, Canton, Ohio, D. Gapen.

-Weirton Steel Corporation, Weirton, West Virginia, E.N. Karabaic and W. Pelican.