National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 345a

15 Chromium-4 Nickel Steel
(Cu Precipitation Hardening)

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

This Standard Reference Material (SRM) is in the form of chips and is intended for use in chemical methods of analysis.

Constituent	% by wt.[1]	Estimated Uncertainty[2]
Carbon[a]	0.040	0.001
Manganese[b,c,d,e,f]	0.79	0.02
Phosphorus[c,d,e,f]	0.024	0.001
Sulfur[a]	0.012	0.001
Silicon[b,c,d,e,f,g]	0.61	0.01
Copper[b,c,d,f,h,i]	3.39	0.03
Nickel[c,f,i,j]	4.27	0.02
Chromium[c,f,i]	15.52	0.05
Vanadium[b,c,d,f]	0.080	0.003
Molybdenum[b,c,d,f]	0.43	0.01
Cobalt[b,c,d,f]	0.099	0.003
Niobium[b,c,d,f]	0.27	0.01
Tungsten[c,d,f]	0.309	0.003
Nitrogen[k]	0.031	0.001

[1] The 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.

[2] The 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 - Atomic Absorption Spectrometry
c - Inductively Coupled Plasma Spectrometry
d - DC Plasma Spectrometry
e - Spectrophotometry
f - X-ray Fluorescence Spectrometry
g - $HClO_4$ Gravimetry
h - Electrogravimetry
i - Titrimetry
j - Ion Exchange - Gravimetry
k - Combustion-Thermal Conductivity

Gaithersburg, MD 20899
June 26, 1992

William P. Reed, Chief
Standard Reference Materials Program

(over)

The overall coordination of the technical measurements leading to certification were performed under the direction of J.I. Shultz, Research Associate, 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:

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

Cooperative analyses for certification were performed in the following laboratories:

-Allegheny Ludlum Steel Corporation, Technical Center, Brackenridge, Pennsylvania, R.M. Crain, G.L. Bergstrom, C. Bottegal-Farrell, and C.C. Gabrielli.

-Armco Research and Technology, Middletown, Ohio, H.P. Vail, G.R. Doebler, T.M. Minor, G.D. Smith, and R.L. Swigert.

-Carpenter Technology Corporation, Carpenter Steel Division, Reading, Pennsylvania, R.R. Buehrer, R.R. Bixler, T.R. Dulski, and A.A. Mattiuz.

-Crucible Research, Division of Crucible Materials Corporation, Pittsburgh, Pennsylvania, C.J. Byrnes, and W.E. Kirk.

-Crucible Specialty Metals, Division of Crucible Materials Corporation, Syracuse, New York, H.P. Mortimer, R.J. Stone, and J. Barrett.

-Howmet Corporation, Operhall Research Center, Whitehall, Michigan, C.J. Ritchard.

-Kawasaki Steel Corporation, Techno-Research Corporation, Chiba 260, Japan, Y. Matsumura.

Elements other than those certified are present in this material as indicated below. These are not certified, but are given as additional information on the composition.

Element	% by weight
Aluminum	(<0.01)
Antimony	(0.002)
Arsenic	(0.005)
Boron	(<0.001)
Lead	(<0.001)
Tantalum	(<0.01)
Tin	(<0.01)
Titanium	(<0.01)