



Analysis	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Co
1	0.054	0.436	0.019	0.0012	0.610	0.050	0.41	25.81	0.189	0.110	0.039
2	0.0546	0.450	0.023	0.0012	0.612	0.055	0.418	25.84	0.191	0.117	0.040
3	0.055	0.45	0.024	0.0021	0.62	0.055	0.425	25.84	0.198	0.119	0.041
4	0.057	0.45	0.025	0.0025	0.628	0.056	0.427	25.88	0.20	0.126	0.042
5	0.060	0.460	0.025	0.0030	0.63	0.059	0.43	25.89	0.201	0.127	0.043
6	0.064	0.462	0.025	0.0030	0.633	0.059	0.430	25.98	0.202	0.127	0.043
7		0.471	0.0255		0.64	0.059	0.435	26.04	0.204	0.129	0.046
8			0.027				0.44		0.21		
9							0.44				
10							0.446				
Average	0.0574	0.454	0.0242	0.0022	0.625	0.0561	0.430	25.897	0.199	0.1221	0.0420
Std Dev	0.0039	0.011	0.0024	0.0008	0.011	0.0033	0.011	0.083	0.007	0.0070	0.0023
Certified	0.057	0.45	0.024	0.002	0.62	0.056	0.43	25.90	0.20	0.12	0.042

Analysis	Al	Ca	N	Nb	O	Sn	B	W
1	0.0038	0.0008	0.0635	0.031	0.0058	0.005	0.0005	0.023
2	0.0040	0.0008	0.0643	0.032	0.0058	0.0050	0.0006	0.03
3	0.004	0.00080	0.0648	0.032	0.0061	0.0054		0.034
4	0.005	0.00080	0.06505	0.032	0.00633	0.007		
5		0.00085	0.0659	0.033	0.0066	0.0080		
6				0.035				
Average	0.0042	0.00081	0.06471	0.0325	0.00613	0.0061	0.00053	0.0290
Std Dev	0.0005	0.00002	0.00089	0.0014	0.00035	0.0014	0.00004	0.0056
Certified	0.004	0.0008	0.065	0.032	0.0061	0.006	(0.0005)	(0.03)

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

**Analysis:** Chemical analyses were made on chips prepared by a lathe from the certified portion of the discs. The laboratories participating in the testing normally followed the requirements of ISO Guide 25. 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 353, E 572, E 1019, E 1086, plus additional ICP, and AA spectrometric methods. The following Certified Reference Materials were used to validate the analytical data listed above: NIST SRM 73c, 101g, 121d, 125b, 126c, 133a, 133b, 160b, 344, 345, 348a, 2167, 2168; ECRM 284-1, 286-1, 292-1; BCS 341, 466/1, 467/1, 475; JK 37

**Co-operating Laboratories:** Some of the co-operating laboratories were:

Allegheny Ludlum Steel Corp., Brackenridge, Pennsylvania  
Analytical Associates, Inc., Detroit, Michigan  
Brammer Standard Co., Inc., Houston, Texas  
Coleman Testing Laboratories, Riverside, New Jersey  
Crucible Specialty Steel, Syracuse, New York  
J. Dirats and Co., Inc., Westfield, Massachusetts  
Jessop Steel Company, Washington, Pennsylvania  
Metals Analysis, Inc., Huntington Park, California  
Andrew S. McCreath & Son, Inc., Harrisburg, Pennsylvania  
Midstates Analytical Laboratories, Tulsa, Oklahoma  
Shiva Technologies, Inc., Cicero, New York  
VHG Laboratories, Inc., Manchester, New Hampshire



## References:

*ASTM documents available from ASTM, 1916 Race Street, Philadelphia, PA, 19103.*

E 350-90 Standard Test Methods for Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

E 353 - 93 Standard Test Methods for Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

E 572 - 88 Standard Test Method for X-Ray Emission Spectrometric Analysis of Stainless Steel

E 826 - 85 (Reapproved 1990) Standard Practice for Testing Homogeneity of Materials for the Development of Reference Materials

E 1019-93 Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel and in Iron, Nickel, and Cobalt Alloys

E 1086 - 85 Standard Method for Optical Emission Vacuum Spectrometric Analysis of Stainless Steel by the Point-to-Plane Excitation Technique

*ISO Guides available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.*

ISO Guide 25 (Third edition, 1990), General requirements for the competence of calibration and testing laboratories.

ISO Guide 30 (Second edition, 1991), Terms and definitions used in connection with reference materials.

ISO Guide 31 (First edition, 1981), Contents of certificates of reference materials.

ISO Guide 33 (First edition, 1989), Uses of certified reference materials.

ISO Guide 35 (Second edition, 1989), Certification of reference materials - General and statistical principles.

*Other useful documents available at no cost from NIST, U.S. Department of Commerce, Gaithersburg, MD 20899.*

NBS Special Publication 260-100, Handbook for SRM Users

NIST Special Publication 829, Use of NIST Standard Reference Materials for Decisions on Performance of Analytical Chemical Methods and Laboratories

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