



Standard Test Methods for Chemical Analysis of Cast Iron—All Types¹

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This standard has been approved for use by agencies of the Department of Defense.

ε¹ NOTE—Editorial changes were made in November 2000.

1. Scope

1.1 These test methods² cover the chemical analysis of pig iron, gray cast iron (including alloy and austenitic), white cast iron, malleable cast iron, and ductile (nodular³) iron having chemical compositions within the following limits:

Element	Concentration Range, %
Aluminum ⁴	0.003 to 0.50
Antimony	0.005 to 0.03
Arsenic ⁴	0.02 to 0.10
Bismuth ⁴	0.001 to 0.03
Boron ⁴	0.001 to 0.10
Cadmium ⁴	0.001 to 0.005
Carbon	1.25 to 4.50
Cerium ⁴	0.005 to 0.05
Chromium	0.01 to 30.00
Cobalt ⁴	0.01 to 4.50
Copper	0.03 to 7.50
Lead ⁴	0.001 to 0.15
Magnesium	0.002 to 0.10
Manganese	0.06 to 2.50
Molybdenum	0.01 to 5.00
Nickel	0.01 to 36.00
Phosphorus	0.01 to 0.90
Selenium ⁴	0.001 to 0.06
Silicon	0.10 to 6.0
Sulfur	0.005 to 0.25
Tellurium ⁴	0.001 to 0.35
Tin ⁴	0.001 to 0.35
Titanium ⁴	0.001 to 0.20
Tungsten ⁴	0.001 to 0.20
Vanadium ⁴	0.005 to 0.50
Zinc ⁴	0.005 to 0.20

1.2 The test methods in this standard are contained in the sections indicated below⁴:

¹ These test methods are under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and are the direct responsibility of Subcommittee E01.01 on Iron, Steel, and Ferroalloys.

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² These test methods represent revisions of methods covered by Test Methods E 30, which appear in this publication. Typical alloy specification numbers for this category are listed in the Appendix.

³ As typified by compositions listed in *Cast Metals Handbook*, 1957, pp. 196–197.

⁴ a Discontinued.

Sections

Carbon, Graphitic, by the Direct Combustion Gravimetric Method (1 to 3 %)	108
Carbon, Total by the Combustion Gravimetric Method (1.25 to 4.50 %)	97
Cerium and Lanthanum by the D-C Plasma Optical Emission Method (Ce: 0.003 to 0.5 %; La: 0.001 to 0.30 %)	237
Chromium by the Atomic Absorption Method (0.006 to 1.00 %)	208
Chromium by the Peroxydisulfate Oxidation—Titrimetric Method (0.006 to 1.00 %)	218
Chromium by the Peroxydisulfate-Oxidation Titrimetric Method (0.05 to 30.0 %)	4a
Cobalt by the Ion-Exchange—Potentiometric Titration Method (2.0 to 4.5 %)	53
Cobalt by the Nitroso-R-Salt Photometric Method (0.01 to 4.50 %)	61
Copper by the Neocuproine Photometric Method (0.03 to 7.5 %)	116
Copper by the Sulfide Precipitation-Electrodeposition Gravimetric Method (0.03 to 7.5 %)	81
Lead by the Ion-Exchange—Atomic Absorption Method (0.001 to 0.15 %)	126
Magnesium by the Atomic Absorption Method (0.002 to 0.10 %)	71
Manganese by the Periodate Photometric Method (0.10 to 2.00 %)	8
Manganese by the Peroxydisulfate-Arsenite Titrimetric Method (0.10 to 3.5 %)	152
Molybdenum by the Ion Exchange—8-Hydroxyquinoline Gravimetric Method	257
Molybdenum by the Photometric Method (0.01 to 1.5 %)	196
Nickel by the Dimethylglyoxime Gravimetric Method (0.1 to 36.00 %)	168
Nickel by the Ion Exchange-Atomic Absorption Method (0.005 to 1.00 %)	176
Phosphorus by the Alkalimetric Method (0.02 to 0.90 %)	160
Phosphorus by the Molybdenum Blue Photometric Method (0.02 to 0.90 %)	18
Silicon by the Gravimetric Method (0.1 to 6.0 %)	46
Sulfur by the Gravimetric Method	30
Sulfur by the Combustion-Iodate Titration Method (0.005 to 0.25 %)	37
Sulfur by the Chromatographic Gravimetric Method	4b
Tin by the Solvent Extraction-Atomic Absorption Method (0.002 to 0.10 %)	186
Tin by the Sulfide-Iodometric Titration Method (0.01 to 0.35 %)	89
Titanium, Total, by the Diantiprylmethane Spectrophotometric Method (0.006 to 0.35 %)	246
Vanadium by the Atomic Absorption Method (0.006 to 0.15 %)	227

1.3 Methods for the determination of several elements not included in this standard can be found in Test Methods E 30 and Test Methods E 1019.

4b Discontinued as of April 29, 1988.