Steel Alloy Designation

Standard Designation System for Steel	
1. Numbers are used to designate different chemical compositions. A four digit number series designates carbon and alloying steels according to the types and classes. This system has been expanded, and in some cases five digits are used to designate certain alloy steels.	
2. Letters are often used as a prefix to the numerals. No Prefix for basin open hearth alloy steel (B) Acid Bessemer Carbon Steel (C) Basin open hearth Carbon Steel (E) Electric Furnace Steel (H) Steels manufactured to meet hardenability limits	
3. The first two digits indicate the major alloying metals in steel.	
4. The last digits indicate the approximate middle of the carbon content range in percent. For example, 0.21 indicates a range of 0.18 to 0.23 percent carbon. In a few cases, the system deviates from this rule, and some carbon ranges relate to the ranges of manganese, sulfur, phosphorous, chromium, and other elements.	
Series Designation	**Key Alloying Elements**
Carbon Steels	
10xx	Plain Carbon (Mn 1.00% max)
11xx	Resulfurized
12xx	Resulfurized and Rephosphorized
15xx	Plain Carbon (Mn 1.00% to 1.65%)
Manganese Steels	
13xx	Manganese 1.60-1.90%
Nickel Steels	
23xx	Nickel 3.5%
25xx	Nickel 5.0%
Nickel - Chromium Steels	
31xx	Nickel 1.25% - Chromium 0.65% or 0.80%
32xx	Nickel 1.25% - Chromium 1.07%
33xx	Nickel 3.50% - Chromium 1.50 or 1.57%
34xx	Nickel 3.00% - Chromium 0.77%
Molybdenum Steels	
40xx	Molybdenum 0.20 or 0.25%
44xx	Molybdenum 0.40 or 0.52%
Chromium - Molybdenum (Chromoly) Steels	
41xx	Chromium 0.50, 0.80 or 0.95% - Molybdenum 0.12, 0.20, 0.25 or 0.30%
Nickel - Chromium - Molybdenum Steels	
43xx	Nickel 1.82% - Chromium 0.50 or 0.80% - Molybdenum 0.25%
47xx	Nickel 1.05% - Chromium 0.45% - Molybdenum 0.25 or 0.35%
81xx	Nickel 0.30% - Chromium 0.40% - Molybdenum 0.12%
86xx	Nickel 0.55% - Chromium 0.50% - Molybdenum 0.20%
87xx	Nickel 0.55% - Chromium 0.50% - Molybdenum 0.25%
88xx	Nickel 0.55% - Chromium 0.50% - Molybdenum 0.35%
93xx	Nickel 3.25% - Chromium 1.20% - Molybdenum 0.12%
94xx	Nickel 0.45% - Chromium 0.40% - Molybdenum 0.12%
97xx	Nickel 0.55% - Chromium 0.20% - Molybdenum 0.20%
97xx	Nickel 1.00% - Chromium 0.80% - Molybdenum 0.25%
Nickel-Molybdenum Steels	
46xx	Nickel 0.85% or 1.82% - Molybdenum 0.20% or 0.25%
48xx	Nickel 3.50% - Molybdenum 0.25%
Chromium Steels	
50xx	Chromium 0.27% or 0.40% or 0.50% or 0.65%
51xx	Chromium 0.80% or 0.87% or 0.92% or 1.00% or 1.05%
50xxx	Chromium 0.50% - Carbon 1.00% min
51xxx	Chromium 1.02% - Carbon 1.00% min
52xxx	Chromium 1.45% - Carbon 1.00% min

Chromium-Vanadium Steels	
61xx	Chromium 0.60% or 0.80% or 0.95% - Vanadium 0.10% or 0.15% min
Tungsten-Chromium Steels	
72xx	Tungsten 1.75% - Chromium 0.75%
Silicon-Manganese Steels	
92xx	Silicon 1.40% or 2.00% - Manganese 0.65% or 0.82% or 0.85% - Chromium 0.00% or 0.65%
High-Strength Low-Alloy Steels	
9xx	Various SAE grades
xxBxx	Boron steels
xxLxx	Leaded steels
Tool Steels	
Tool Steels are wear resistant, ferrous alloys based on iron and carbon with high levels of alloying (hardenability and property modifying) elements such as chromium, molybdenum, tungsten, and vanadium. Specific tool steel grades are available for die or cold work, hot work, high speed and shock resistance applications. Tool Steel alloys are used in a wide variety of applications that require wear resistance.	
Ax	Cold working, air hardening, medium alloy
Dx	Cold working, high carbon, high chromium
Fx	Special purpose, carbon tungsten
Hx	Hot working, H1-H19-Chromium base, H20-H39-Tungsten base, H40-H59-Molybdenum base
Lx	Special purpose, low alloy
Mx	High speed, molybdenum base
Ox	Cold working, oil hardening
Px	Plastic mold
Sx	Shock resisting, tungsten base
Tx	High speed, tungsten base
Wx	Water hardening