Fastener Mart™

GLOSSARY OF TERMS

Fastener Steels:

Alloy Steels Steels alloyed with molybdenum, nickel and chromium (AISI 4037, 4130, 8630) are best where high strength is required.These steels have good cold-forming properties in the annealed condition. Can be heat treated for the best combination of strength, toughness and shock resistance.

Aluminum Alloys Good cold-forming characteristics. Many aluminums can be used (2024, 3003, MM, MM, 6061, 7075), and where secondary machining is required (2011). Aluminum is corrosion resistant and some can be heat treated.

Carbon Steels. Fine grain, fully-killed basic steel with no alloying agent.

Low carbon steel range from .06-.1 8% carbon content (AS 1006-1018) and have good ductility for cold forming.

Medium carbon steel have .1 8-.50% carbon content (AISI 1018, 1038, 1041). /stronger and less ductile, these steels respond well to quench and temper.

High carbon steels .50% carbon and up (AISI 1066,1095). Difficult to cold form unless annealed. High strength, can be heat treated.

Hard drawn MB Spring Wire, ASTM A227 Carbon range .60-.70%. Used for general purpose low-cost spring. Commonly available in diameters .031 to .500. Lower tensile strength than music wire. Leaded Steels. Lead added to steel improves machinability. Identified by an "L", (AISI 12 14) in the AISI/SAE designation, his is most commonly added to 1100 and 1200 series 'screw machine' steels. Leaded steels are not suitable for the treatment of welding.

Music Wire, ASTM A228 Carbon range .80-.95%. High tensile strength can withstand repeated loading. Widely used in small diameter rounds .005 to .125

Resulphurized and Rephosphorized Steels (AISI 117 and 1215) have improved machinability over basic carbon steels. Used commonly for screw machine parts, they are more brittle, less ductile and stronger than equivalent carbon content basic steel. Sulphur acts as an internal lubricant and is the major alloying agent for "1000" series steels. Phosphorous makes the steel more brittle, reducing friction, heat and tool wear. " 1200" series steels have both phosphorous and sulphur as alloys.

Stainless Steels (AISI202, 302, 304, 316) are generally nonmagnetic and the best corrosion resistant due to their large content of nickel and chromium. Good cold-forming characteristics are subject to work hardening and are not heat treatable.

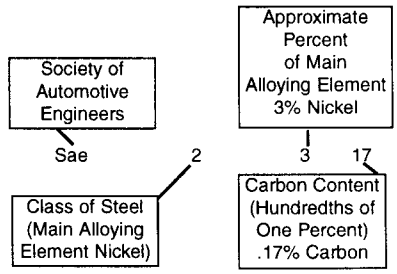
Austenitic stainless steel is a straight chromium steel with little or no nickel (AISA 410, 420). These steels are magnetic and can be heat treated. Higher than austenitic types, lower corrosion resistance and harder to cold form.

Precipitation Hardening Stainless (AISI 17-4PH) is a nickel chromium stainless with cobalt and tantalum. The alloying agents produce high strength and ductility, good machinability and weldability. Hardening is by aging the cold steel at 900° F for 4 hours followed by air cooling. Not used for cold forming but commonly used for high strength, corrosion resistant screw machine parts.

AISI-SAE INDEX SYSTEM FOR CARBON AND ALLOY STEELS

Type of Steel	Series Designation
Carbon Steels	1XXX
Plain carbon	10XX
Free machining, resulfurized (screw stock)	11XX
Free machining, resulfurized, rephosphorized	12XX
Manganese Steels	13XX
High Manganese Carburizing Steels	15XX
Nickel Steels	2XXX
3.5 percent nickel	23XX
5.0 percent nickel	25XX
Nickel-Chromium Steels	3XXX
1.25 percent nickel, 0.60 percent chromium	31XX
1.75 percent nickel, 1.00 percent chromium	32XX
3.50 percent nickel, 1.50 percent chromium	33XX
Corrosion and heat resisting steels	30XXX
Molybdenum Steels	4XXX
Carbon-molybdenum	40XX
Chromium-molybdenum	41XX
Chromium-nickel-molybdenum	43XX
Nickel-molybdenum	45XX and 48XX

Type of Steel	Series Designation
Chromium Steels	5XXX
Low chromium	51XX
Medium chromium	52XXX
Corrosion and heat resisting	51XXX
Chromium-Vanadium Steels	6XXX
Chromium 1.0 percent	61XX
Nickel-Chromium-Molybdenum	86XX and 87XX
Manganese-Silicon	92XX
Nickel-Chromium-Molybdenum	93XX
Manganese-Nickel-Chromium-Molybdenum	94XX
Nickel-Chromium-Molybdenum	97XX
Nickel-Chromium-Molybdenum	98XX
Boron (0.0005% boron minimum)	XXBXX



Alloying Elements In Steel			
Aluminum	Al	Molybdenum	Mo
Carbon	C	Nickel	Ni
Chromium	Cr	Phosphorus	P
Cobalt	Co	Silicon	Si
Copper	Cu	Tungsten	W
Manganese	Mn	Vanadium	V

Chemistry of Element	Steel	Cast Iron
Carbon	.05-1.5%	2.2 - 3.8%
Phosphorus	.04 Max.	.10 -1.00
Sulphur	.05 Max.	.09 -.12
Manganese	.30-.90	.40 -1.00
Silicon	.15-.30	.50 - 3.00

Mechanical Definitions

Cold working Deformation of a metal at room temperature without fracture which changes its shape and produces higher tensile strength and machinability.

Ductility The ability of the metal to be deformed extensively under tension load without rupture or fracture. Ductility is expressed in terms of percent elongation and percent reduction of area (e.g. drawn into wire).

Machinability The condition of property of a metal which allows it to be cut, turned, broached or formed by machine tools.

Malleability The ability of a metal to be deformed permanently under compression load without rupture or fracture (e.g. hammer or rolled into sheets.

Tensile Strength The maximum load in tension (pulling apart or shearing) which a material can withstand before breaking or fracturing. Also known as the ultimate tensile strength (UTS) or maximum strength.

Work Hardening Hardening that takes place through grain alignment when a metal is bent, rolled or hammered at room temperature, Not all metals work harden.

Yield Strength The maximum load at which a material exhibits a specific permanent deformation. Deformation to determine yield varies with material.

Process Definitions:

Alloy Steel A carbon steel to which one or more elements are added to add special properties for a specific use.

Billet A cast section of steel 4 to 6 inches square about 20 ft. long from which dimensional shapes of steel are rolled.

Brass An alloy of copper and zinc which can contain small amounts of aluminum, iron, manganese, or tin to produce specific properties.

Bronze An alloy of copper and tin or an alloy of aluminum and silicon.

Carbon Steel A Steel in which carbon is the only alloying element added to iron.

Killed Steels Molten steel treated with aluminum, silicon, or manganese until no more gas is in the metal and it is in a quiet state.

Pickling The removal of oxide scale from metal by dipping it in a diluted acid bath. The chemically clean surface is then ready for cold rolling or wire drawing.

Rockwell Hardness Test A method of determining metal hardness by indenting with a metal ball or diamond cone under a specified load.

Heat Treating Definitions

Annealing heating and slow cooling to remove stresses,make steel softer,refine the structure, or change its ductility.

Carburizing Adding carbon to the surface of iron-based alloys by heating the metal below its melting point in contact with carbon-rich solids, liquids or gasses.

Case Hardening Carburizing a metal surface followed by quenching to fix a hard outer case in carbon combined with a relatively soft middle or core.

Cyanide Hardening A method of case hardening which brings the metal surface in contact with the molten cyanide salt followed by a quenching.

Decarburization removal of carbon from the surface of steel. This can occur through normal oxidizing action or as the result of heat treatment.

Drawing (Tempering) Reheating after hardening, held at a specific temperature and then quenched, This reduces hardening and increases toughness.

Hydrogen Embrittlement A condition where the surface finishing of metal (plating) results in a brittle outer case due to immersion in acid. Baking immediately following the plating process removes his brittle surface condition.

Nitriding A hardening process which adds nitrogen to a metal surface through contact with ammonia gas. Produces surface hardness (case) without quenching.

Precipitation Hardening A hardening process where certain metals are held at elevated temperature without quenching (age hardening).

Quenching Rapid cooling of steel by immersion in oil or water to fix its structure in a hardened state.

Sphereoidizing (anneal) Any process of heating and cooling steel the produces a rounded or globular form of carbide. This softens the metal, improving ductility.

Stress Relieve A low temperature heat treatment which removes stresses caused by cold working.

Clevis Pin Definitions:

Length Refers to length under head to end of pin.

Effective Length Length under head to the edge of the hole closest to the head. Also known as grip length.

Overall Length Total length of the pin form the top of the head to the opposite end.