

## GRADES OF STAINLESS STEEL USED IN FASTENERS

The most common grade of Stainless Steel for general usage are the "300" series. These are austenitic non-magnetic resistant to most acids, and offer greatest-corrosion resistance. They cannot be hardened by heat treating, but do work hardened. In this condition they become slightly magnetic.

The various types most generally used in the production of fasteners are listed below, together with their principal elements.

**Type 302** – 17–19 % Chrome, 8–10 % Nickel, .15% maximum Carbon

\*Generally used for Washers, Cotter Pins, and stamped parts.

**Type 303** – 17–19 % Chrome, 8–10 % Nickel, .15 % maximum Carbon with elements of Selenium or Sulphur.

\*Either of the last two elements are added to the metal to improve the machining qualities.

Items milled from bar, such as Hexagon Nuts, are generally produced from this alloy.

**Type 304** – 18–20 % Chrome, 8–12 % Nickel, .08 % maximum Carbon.

\*This is a superior grade of 18–8 and is used for Machine Screws, Cap Screws, Sheet Metal Screws, and other items that are cold headed or hot forged.

**Type 305** – 17–19 % Chrome, 8–10 % Nickel, .12 % maximum Carbon.

\*This grade has been developed specifically to improve the cold heading qualities of 18–8. This grade does not work hardened as readily as the three grades above. Most cold headed products are actually made from this grade even though they are referred to as being made from Type 304. Corrosion resistance and physical qualities are equal to Type 304.

**\*\*All the above items are commonly referred to as "18–8", from their chrome (nominal 18 %) and nickel (nominal 8%) content\*\***

In addition to the above, fasteners can be supplied to order in other grades in the 300 series, such as Type 304 ELC, Type 310, Type 316 ELC, Type 321, Type 347.

Many fasteners can also be supplied in the 400 series of Stainless. These grades are magnetic.

The 400 series will discolor, but will not progressively rust. This series does not equal the corrosion resistant properties of the "300" series, but is usually less expensive.

**Type 410** – 11.5–13.5 % Chrome, .15 % maximum Carbon

\*This grade can be bright hardened up to approximately 40 Rockwell C. It is particularly used for Sheet Metal Screws.

**Type 416** – 12–14 % Chrome, .15 % max Carbon with Sulfur or Selenium for freer machining.

\*This grade is similar to Type 410, but the added elements improve its machining qualities. Items such as Hex Nuts and milled from bar items are made from this type. It can also be bright hardened.

**Type 309** – 22–24 % Chrome, 12–15 % Nickel, .20 % maximum Carbon

\*This grade has excellent corrosion resistance and is primarily used for high temperature work. It resists oxidation temperatures up to 2,000°.

**Type 316** – 16–18 % Chrome, 10–14 % Nickel, .08 % maximum Carbon, 2.00 % maximum Molybdenum.

\*The grade has greater corrosion resistance when used with certain acids as compared to the general range of 18–8. This is due to the addition of Molybdenum and the higher percentage of Nickel.

**Carpenter 10** – 15.5–16.5 % Chrome, 17.5–18.5% Nickel, .08 % maximum Carbon.

\*This grade also is similar to Type 304 and is accepted equal in corrosion resistance and physical characteristics. It is an improvement on Type 305 since the cold working qualities are better. All 18–8 Phillips Head Screws are made from this grade.

**Carpenter 20** – 20 % Chrome, 29 % Nickel, .08 % maximum Carbon, 2 % minimum Molybdenum, 3 % minimum Copper.

\*This is a very special alloy and has superior resistance to Sulfuric Acid.

**Type 430** – 14–18 % Chrome, .12 % maximum Copper

\*Corrosion resistance of this grade is somewhat superior to Type 410. It cannot, however, be hardened. It is the least expensive grade of Stainless that is normally used in production of fasteners. Its work hardening qualities are comparatively low. It is generally used in the production of Phillips Head fasteners and where cost is an important factor—sheet metal screws.