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Description

Stainless Steels are broadly defined as Iron alloys containing from 12 to 30% Chromium and from 0 to 20% Nickel. This analysis is further modified by additions of Carbon and other minor elements which contribute specific effects either to control mechanical properties or to improve corrosion resistance. The corrosion resistance of Stainless Steels is attributed to a surface phenomenon, passivity. When oxygen comes in contact with the surface, it forms an invisible film which protects the underlying metal from rusting and corrosion under severe environment.

Characteristics

The family of Stainless Steels is divided into three general classifications:

"Austenitic" Stainless Steels make up the general group of the 18-8 (or 300) series. They are the Chromium-Nickel type containing upwards of 8% Nickel. They are not hardenable by heat treatment, non-magnetic for practical purposes and offer the greatest degree of corrosion resistance.

"Martensitic" Stainless Steels contain from 12 to 20% Chromium. They are magnetic and hardenable. Type 410 and 416, common fastening alloys, are Martensitic Stainless Steels.

"Ferritic" alloys are also Chromium Stainless Steel alloys. They are magnetic and not hardenable by heat treatment. Type 430 is an example.

Uses

There are almost as many uses for Stainless Steel fastenings as there are problems of corrosion, temperature and strength. Because of its high tensile strength, corrosion resistant qualities and ability to attain a mirror-like finish it is one of the most versatile of all metals.

Applications include its use in the petroleum, chemical, food, plumbing, transportation and oil equipment industries to mention just a few. Listed below are the types of various Stainless Steel alloys which are most frequently used in the manufacture of fastenings.

TYPES

Type 302HQ/XM-7

A general purpose 18-8 chromium-nickel stainless steel. It retains an untarnished surface under most atmospheric conditions and offers high strength at reasonably elevated temperatures.

Type 303

A free machining 18-8 chromium-nickel stainless steel with qualities similar to type 302. Elements have been added to improve its machining characteristics.

Type 304

An 18-8 grade generally used for cold headed products. It is somewhat superior to type 302 in corrosion resistance and for that reason is now the alloy used by ATP for many standard headed fasteners.

Type 304M

This is a modified version of Type 304. Copper has been added in minute amounts to satisfy cold-heading requirements while maintaining all of the corrosion resistant and mechanical properties of Type 304.

Type 309

A chromium-nickel grade with approximate ratio of 12% nickel and 22% chrome. The additional amount of nickel and chrome make it desirable on high temperature applications. It is difficult to machine but can be used for some cold headed products.

Type 310

A chromium-nickel stainless steel with a ratio of 24-26% chromium and 19-22% nickel. It offers the highest heat resisting qualities of any of the chromium-nickel grades.

Type 316

It differs from 304 mainly by its molybdenum content and has qualities which give it superior corrosion resistance to other chromium nickel steels when exposed to sea water and many types of chemical atmospheres. It is also a superior stainless steel for strength at high temperatures.

Type 317

Similar to Type 316 but has a higher molybdenum content and a wider application in corrosive atmospheres than type 316.

Type 321

Similar to the 302, 304 group with the addition of Titanium, which aids in resisting intergranular corrosion when subject to operating or fabricating temperatures in the range of 800 deg. F to 1650 deg. F.

Type 347

A chromium-nickel stainless similar to the 18-8 grade, but containing an additional element of Columbium which functions like Titanium in type 321.

Type 410

A straight chromium alloy containing no nickel. It is a general purpose corrosion and heat resisting, hardenable chromium steel. It can be easily headed and has fair machining properties.

Type 416

Similar to Type 410 but has slightly more chromium and is considered a better machining grade than Type 410. It is used for fabricating studs, nuts and other machined products. It is hardenable.

Type 420

Similar to Type 416 with added silicon to increase the wear resistance. It is used for roll pins, spiral pins, and surgical instruments.

Type 430

Similar to Type 410 but containing additional chromium; it is not hardenable. The corrosion and heat resistance qualities are generally superior to Type 410.