

## Introduction to Stainless Steel

### What is Stainless Steel?

The material we know as stainless steel (also commonly referred to as "Inox" or "Rostfrei") is such a common feature of 21<sup>st</sup> century living that there can be few of us who have not seen or handled articles made from it. But how many of us really know what stainless steel is?

### A Very Different Type of Steel

Like all types of steel, stainless steel is not a single metal but an *alloy that* is a material made from two or more separate elements alloyed or "melted" together. What all steels have in common is that their major "ingredient" (alloying element) is the metal iron, to which a small amount of carbon has been added. Stainless steel was invented early in the 20<sup>th</sup> century when it was discovered that a certain amount of the metal chromium (usually a minimum of 11 per cent) added to ordinary steel gave it a bright shiny gloss and made it highly resistant to tarnishing and rusting. This rust-resisting property which we call "corrosion resistance" is what sets stainless steel apart from most other forms of steel.

For more information about the corrosion-resistance of stainless steel, see Corrosion Properties.

### Not a Coating

It is important to appreciate that stainless steel is a solid material and not a special coating applied to ordinary steel to give it "stainless" properties. Conventional steels and, indeed, several other metals, are often coated or "plated" with white metals such as chromium, nickel or zinc to protect their surfaces or to provide other surface characteristics. While such coatings have their own benefits and are still widely used, the danger exists that the coating can be penetrated or damaged in some way, such that its protective effect is undermined.

The appearance of stainless steel can, however, vary and will depend on the way it is made and finished.

For more information about the ways in which stainless steel can be fabricated and finished, see Stainless Steel Fabrication and Surface Treatment



## **Stainless Steel is Everywhere**

It is, of course, the rust-resisting characteristic which gives *stainless* steel its name. However, soon after its discovery, it was realised that the material had many more valuable properties which make it suitable for a vast range of diverse uses. In fact, the number of uses to which stainless steel can be put are almost limitless, a point which can be illustrated with just a few examples:

### *In the home:*

- Cutlery, dishes and other tableware
- Kitchen sinks
- Pans and cookware
- Ovens and barbecues
- Garden equipment and furniture

For more information on the uses of stainless steel in the home and in the office, see Home & Office Uses

### *In the town:*

- Bus shelters, telephone booths and other street furniture
- Building facades
- Lifts and escalators
- Subway trains and station infrastructure

For more information on the uses of stainless steel in the building industry, see Architecture, Building and Construction

### *In industry:*

- Equipment for the manufacture of food products and pharmaceuticals
- Plant for the treatment of potable and waste water
- Chemical and petro-chemical plant
- Components for automotive and aero engines
- Fuel and chemical tankers

For more information on the uses of stainless steel in industry, see Industrial Applications

## **The Stainless Steel Families**

While the original form of stainless steel, (iron with around 12% Chromium) is still in widespread use, engineers now have a wide choice of different types (grades). In all, there are more than 100 different grades but these are usually sub-classified into distinct metallurgical “families” such as the *austenitic*, *ferritic*, *martensitic* and *duplex* families.



For more information on the different types of stainless steel, see [Categories and grades](#).

The proportions of iron to chromium may be varied and other elements such as nickel, molybdenum, manganese and nitrogen may be added to widen the range of capabilities. Each particular grade of stainless steel has its own unique mechanical and physical properties and will usually be produced in accordance with an established national or international specification or standard.

For more information on the various national and international standards which define the various grades, see [Standards](#)

Whether you are an engineer, metallurgist, designer, architect, or simply someone who wishes to know more about this remarkable material called stainless steel, this site aims to provide you with the essential information you are likely to need. In many cases we provide links to other sites where complementary documents and/or publications can be found.

Welcome to the world of stainless steel!