



# What are the Differences between Carbon Steel and Stainless Steel?

Just because two products are made of steel does not indicate they are made of the same sort of Steel Casting. Steel comes in a variety of forms, the most prevalent of which are stainless steel and carbon steel. While both varieties appear to be the same, there are certain crucial differences that separate one from the other.

## Stainless Steel

Stainless steel, also known as inox steel, lives true to its name by being highly resistant to corrosion-induced discoloration. When iron-based metals, such as steel, are exposed to oxygen, they undergo a chemical shift known as oxidation, which alters their characteristics.

The iron oxidizes, transforming ordinarily hard iron into a reddish-brown metal. Stainless [Steel Casting](#) is designed to resist oxidation. It has a chromium concentration of at least 10.5% by mass. This is significant because, unlike iron, chromium does not oxidase. Chromium can be exposed to oxygen without rusting or corroding, making it a crucial component in the production of stainless steel.

## Carbon steel

Carbon steel, on the other hand, has a high carbon content, often up to 2.1% by weight. Carbon steel is further defined by the American Iron and Steel Institute (ASISI) as satisfying the following criteria:

There is no need for a minimum content of chromium, cobalt, nickel, titanium, tungsten, vanadium, or other corrosion-resistant metals.

- The minimum copper content necessary is 0.40%.
- The maximum manganese concentration shall not exceed 1.65%.
- The maximum copper concentration shall not exceed 0.6%.
- The maximum silicon concentration must not exceed 0.6%.

So, what advantages can carbon steel provide? The usage of steel with a high carbon content alters its properties. It grows stronger and tougher in particular.



# Carbon Steel VS Stainless Steel

The following are the distinctions between carbon and stainless steel:.

## **Corrosion Protection**

The most visible variation between carbon steel and stainless steel is their corrosion resistance. Stainless steels, as the name implies, are the more corrosion-resistant of the two steels. Carbon and stainless steels both contain iron, which oxidises when exposed to air and causes rust.

Because of the inclusion of chromium, stainless steel is more corrosion-resistant than carbon steel. The chromium binds to oxygen more easily than iron. When chromium binds to oxygen, it generates a chromium oxide covering that prevents degradation and corrosion of the remaining material.

## **Mechanical Characteristics**

Because of the many diverse types and grades of each, it is difficult to make broad assertions regarding the differences in mechanical qualities between carbon steels and stainless steels. Because stainless steels include more nickel, they can be more ductile than carbon steels.

However, there are stainless Steel Casting grades that are extremely brittle, such as martensitic grades. Due to the alloying components that many stainless steel grades include,

carbon steels with very low quantities of carbon may not meet the tensile strengths of some stainless steels.

### **Appearance**

The look of the metal must be considered if the project demands an aesthetic appeal. When it comes to visual appeal, stainless Steel Casting with certain treatments are often selected.

Although both may be sanded and polished to get a brilliant, lustrous appearance, carbon steel requires a clear coat or paint shortly after polishing. Without treatment, the carbon steel would discolour and eventually rust.

### **Cost**

Another factor to consider is the price difference between carbon and stainless steels. Stainless steels are typically more expensive than carbon steels, however costs vary by grade. This is mostly owing to the addition of alloying elements such as chromium, nickel, manganese, and others to stainless steel.

### **Conclusion**

Choosing between carbon steel and stainless steel for a certain application will require careful evaluation of all of these considerations. If the metal will be hidden from view, it makes little sense to spend more money on stainless Steel Casting just for its beauty. However, if it will be concealed from view but exposed to a corrosive environment, stainless steel may be the ideal solution. Finally, the decision will be determined by the details of the work or project.