



BÖLLINGHAUS STEEL

THE USE OF STAINLESS STEEL IN THE CHEMICAL INDUSTRY



SPECIAL WEEK

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Stainless steel has the property of withstanding attacks from highly corrosive chemicals and is therefore a favorable product for use in the chemical and petrochemical industries. There are austenites, super-austenitic stainless steels as well as duplex, super-duplex stainless steels and nickel-based alloys, which are used in demanding areas of application.

The use of duplex stainless steels began in the first quarter of the 20th century. However, its intensive use arose with the rapid development of requirements in the chemical industry in the 1980s.

The high strength of duplex and its greater resistance to chloride-induced stress corrosion cracking compared to classic austenitic steel led to the increase in applications of and demand for duplex.

Duplex, which is characterised by a structure of ferrite and austenite, offers improved resistance to pitting in harsh environmental conditions. It also shows improved crack resistance as well as good weldability and resistance even in critical temperature ranges and has high strength compared to classic austenitic steels.

Duplex offers an excellent strength-to-weight ratio, so that much weight can be avoided in structures.

This is why duplex stainless steels are often used in the chemical industry in the areas of refineries, gas processing plants, paper and pulp factories and seawater desalination.

They are also installed in environments and industries with the high corrosion-resistant requirements found in the process industry (chemical, petrochemical, offshore, and desalination plants, seawater applications, etc.). In addition, duplex stainless steels are often used in chemical tankers and urea plants. The users of these industries require production of components with tight manufacturing tolerances and high surface quality. Whole ship and bridge structures have already been made from duplex stainless steel.

Due to their special corrosion resistance, stainless steel profiles made of duplex are used for valves and measuring devices as well as for flow monitoring systems. They are also often used in a highly corrosive environment (for example, seawater or road salt) and for the production of machine parts that are exposed to cavitation. Thanks to the very good mechanical properties of duplex stainless steel, smaller components with lower thicknesses can be created because less steel is required.

This can reduce carbon dioxide emissions, an important requirement at present. Due to their two-phase structure, duplex steels meet complex challenges with correct hot forming and heat treatment.

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Duplex stainless steels have high corrosion resistance and good mechanical properties and are easy to use. Duplex successfully combines the hardness of ferrites with the formability and weldability of austenites. The mechanical properties of duplex are therefore unique. Increased strength with less use of nickel is made possible and costs can be reduced.

Duplex stainless steels simultaneously meet a wide range of technical challenges and offer very advantageous operating properties with a favorable cost-benefit ratio, especially for demanding industries such as the chemical industry.

The super duplex stainless steels offer potential applications in extremely corrosive environments, such as nitric, sulfuric or phosphoric acid. In addition, super duplex stainless steels are two-phase high-alloy steels with excellent resistance to pitting corrosion.

The choice of the right duplex alloy, which is distinct in its comparative corrosion resistance, depends on the area of application and environmental factors. The use of stainless steel profiles can offer a permanent and maintenance-free solution to possible corrosion damage to susceptible components in the chemical industry.

In order to achieve a long service life of the application components in the chemical industry and thus to guarantee process reliability, the choice of the appropriate stainless steel grade is of great importance and depends on the ambient conditions and the professional manufacture of the desired component. Taking into account the production of the component and the surrounding media, it is possible to assess whether the use of duplex makes sense in a specific application.

