

Stainless Steel

8.1 WHAT IS “STAINLESS” STEEL?

By “stainless” is generally meant a large group of types of steel which contain at least 12% chromium (Cr) and often additions of other alloy substances, for example, nickel (Ni) and molybdenum (Mo). The types of steel that BULTEN STAINLESS generally uses can be divided into the following main groups in accordance with their inner construction or structure:

1. Ferritic steel

(partially temperable)
Cr = 12 – 30%
Mo, if used = 1.3 – 2.5%
C = max 0.08%

2. Martensitic steel

(temperable)
Cr = 12 – 18%
Mo, if used 1.3 – 2.0%
C = max 0.25%

3. Austenitic steel

(not temperable)
Cr = 16.5 – 26%
Ni = 7 – 25%
Mo, if used 1.5 – 4.5%
C = max 0.07%

4. Ferritic-austenitic steel

(partially temperable)
Cr = 17 – 27%
Ni = 4 – 6%
Mo, if used = 1.3 – 2.0%
C = max 0.10%



8.2 STAINLESS OR ACID-RESISTANT?

Within various supplier and customer groups, different interpretations of the concepts of stainless and acid-resistant steel are used. In its widest usage, all steel which contains over 12% chromium is designated “stainless”, irrespective of what other alloy substances are included.

In daily usage however, “stainless” primarily applies to the group’s austenitic 18/8 steel (18% Cr, 8% Ni) without Mo, and “acid-resistant” to the Mo-alloyed austenitic and ferritic-austenitic steel types. The designation “acid-resistant steel” is primarily derived from the cellulose industry, and is connected with good resistance to sulphite cooking acid. Although nowadays one is aware of the limitations of acid-resistant steel, it is still true to say that in general, the acid-resistant steel types are more resistant to corrosion than other stainless steel types, i.e., they have a lower dissolving speed. Compared with ordinary steel, for example, low-alloy steel types, stainless and acid-resistant steel have a lower dissolving speed, which means that their corrosion resistance is much better.

8.3 COMMON TYPES OF STEEL

In choosing stainless material, one should strive for the best weighting between corrosion resistance, strength and cost.

Stainless steel SS 14 23333 (A2) has good general strength in moderate corrosion exposure, for example in air except in a coastal climate, in fresh water, in oxidising acids¹⁾ (for example, nitric acid), in organic acids and in a large number of alkali and salt solutions. This steel should, however, not be used in a non-oxidising acid (for example, hydrochloric acid) and agents with a chlorine content that is of brackish water and seawater type.

Acid-resistant steel SS 14 2347 (AISI 316) is included in the A4 group, and is the commonest steel for A4 fasteners. The steel is intended for normal corrosion exposure in a maritime climate. Steel 14 2343 8AISI 316 L Hi Mo), which is used in BULTEN STAINLESS’ new standard BUMAX® 88 and BUMAX® 109 programmes have improved corrosion resistance compared with normal commercial A4. The BUMAX products can therefore be used in somewhat more aggressive environments, for example, water with a chloride content and non-oxidising acids. For severe corrosion conditions in liquids or gases, one must in many cases use other materials.

¹⁾ **NB!** An acid can be oxidising at room temperature and non-oxidising at higher temperatures.

A2	(SS 14 2333-AISI 304)
A4	(SS 14 2347-AISI 316)
BUMAX 88	(SS 14 2343-AISI 316 L Hi Mo)
BUMAX 109	(SS 14 2343-AISI 316 L Hi Mo)

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