FINAL ADVANCED MATERIALS

DATA SHEET

Rev. N° 0 - 25.05.2023

7MG.001
Stainless steel

Summary

Physical variables included in this documentation are provided by way of indication only and do not, under any circumstances, constitute a contractual undertaking. Please contact our technical service if you require any additional information.

Final Advanced Materials Sàrl
4 avenue de Strasbourg
68350 Didenheim – France
Tel : +33 (0) 3 67 78 78 78

Final Advanced Materials GmbH
Basler Strasse 115
79115 Freiburg – Deutschland
Tel: + 49 (0) 761 47 87 336

Overview

Stainless steel is a family of steels mainly alloyed with chromium (minimum 10.5%) and with nickel. Additional chemical elements enable its properties to be varied depending on the required constraints. Its chromium content, which is higher than 10.5%, naturally creates a protective film on the surface of the metal.

Stainless steel products have excellent mechanical, chemical and thermal properties, thus providing a broad range of technical solutions in a large number of fields of application. They have the property of resisting corrosion and attacks related to the use of chemical agents or natural environmental stresses. They are also particularly durable, 100% recyclable, and hygienic (inert, no contamination).

Stainless steels can attain a resistance/weight ratio equivalent to aluminium alloys.

Applications

- General mechanical parts
- Parts for chemical & hydrocarbon process lines
- Parts for food production lines
- Parts of medical equipment
- Industrial screws and bolts in the construction industry
- Sanitary parts and equipment
- Boat parts or other equipment subject to marine salt
- Furnace parts

info@final-materials.com

www.final-materials.com

Benefits

- A wide range of sizes
- A wide of shapes and profiles
- High corrosion resistance (durability and safety)
- Ease of use by traditional processes: welding, machining, bending, folding, drawing
- High mechanical performance characteristics
- Attractive surface state
- Satisfactory creep resistance
- Satisfactory ductility
- Magnetic or non-magnetic

Main families of stainless steels

Martensitic steel

These steels contain a least 12% chromium and a maximum of 10% nickel. The carbon content is very low, 0.1% to 1.5%. The main advantage of this type of steel is its excellent hardenability by heat treatment. They are used when the mechanical resistance requirements are high. Due to the entirely martensitic structure, these steels have high elasticity, breakage resistance and hardness. However, this steel is not suitable for use at very low temperature.

Ferritic steels

The basic composition has a chromium rate higher than 12%, a nickel rate of under 2% and a carbon rate of under 0.2%. These steels have good ductility, offering satisfactory cold shaping properties. The corrosion resistance of these steels is far greater than that of martensitic steels. The best corrosion properties are obtained after heat treatment. However, this steel is not suitable for use at very low temperature.

Austenitic and superaustenitic steels

They are by far the most common stainless steels, due to their ductility, which is comparable to that of copper, and their high mechanical performance characteristics. The high nickel content (> 10%) appreciably improves corrosion resistance and resistance to aggressive environmental conditions. The chromium content is higher than 19%, and the carbon content is very low. Stability can be improved by elements such as titanium or niobium. Superaustenitic stainless steel has excellent general or localised corrosion resistance, in particular in highly oxidising environments. It should however be noted that there is a risk of corrosion under stress in certain chlorinated environments (e.g.: swimming pools).

The austenitic structure, and the malleability relating to it, result in excellent stiffness, even at low temperature. However, good stiffness results in poor machinability of the material. Austenitic steels are non-magnetic and cannot be treated by quenching.

Heat-resistant steels

Stainless steel

Heat-resistant steels have high chromium and nickel contents. They resist corrosion, oxidisation and warm creep, and are principally used in heating or treatment furnaces. Service temperatures are between 900°C and 1,150°C. These steels retain satisfactory mechanical properties at high temperatures, but their plastic deformation is limited.

Main characteristics

Families	EuroNorm	Corrosion resistance	Machinability	Weldability
Martensitic steel	1.4006	★★★★★	★★★★	★★★
	1.4021	★★★	★★★	★★
	1.4028	★★★	★★★	★
	1.4057	★★★	★★★	★
Ferritic steel	1.4016	★★★★	★★★	★★★
Austenitic steel	1.4305	★★★★★	★★★★★	★
	1.4306	★★★	★★	★★★★
	1.4401	★★★★★	★★	★★★★
	1.4404	★★★★	★★	★★★★
	1.4541	★★★★	★★★	★★★★★
	1.4571	★★★★★	★★	★★★★
Superaustenitic steel	1.4539	★★★★★	★★★	★★★★
Heat-resistant steel	1.4841	★★★★★	★★	★★★★

In certain cases the names can be completed by the following letters, which concern heat treatments:
+ QT = Quenching, Tempering
or AT (hyperquenching)

Examples of cross-references of standardised designations

EuroNorm	AISI	Afnor	Composition
1.4006	410	Z 10C13	X12Cr13
1.4021	420	Z 20C13	X20Cr13
1.4028	420B	Z 30 C 13	X30Cr13
1.4057	431	Z15 CN 16-02	X17CrNi16-2
1.4305	303	Z8 CNF 18 09	X 8 CrNiS 18 9
1.4306	304L	Z2 CN 18 10	X 2 CrNi 19 11
1.4401	316L	Z 6 CND 17 11	X 5 CrNiMo 17 12 2
1.4404	316L	Z 2 CND 17 12	X 2 CrNiMo 17 12 2
1.4541	321	Z6CNDT 18-10	X 6 CrNiTi 18-10
1.4571	316Ti	Z6 CNDT 17-12	X 6 CrNiMoTi 17 12 2
1.4016	430	Z8 C17	X 6 CR17
1.4539	904L	Z 2 NC DU 25 20	X 1 NiCrMoCu 25 20 5
1.4841	314	Z 15 CNS 25-20	X15CrNiSi25-21

The dimensions, shapes and technical data are available in the specific data sheets. Physical variables included in this documentation are provided by way of indication only and do not, under any circumstances, constitute a contractual undertaking. The compositions may vary for the same reference depending on the manufacturer. Please contact our technical service if you require any additional information.