EN 1.4301, AISI 304
EN 1.4307, AISI 304L

Product Information
April, 2009

Austenitic stainless steel

Type X5CrNi18-10 stainless steels
EN 1.4301, AISI 304
EN 1.4307, AISI 304L, low carbon

Applications

- These are the most commonly used stainless steels, those resistant against corrosion is utilized e.g. in chemical, paper and food industry. These steels are also popular in household wares, architecture and transportation.
- Can be used at low temperatures down to -196°C even as welded structures.
- Moderate strengths can be reached at elevated temperatures (~550°C). Temperatures for excessive scaling are close to 850°C.

Welding

- Weldability is good. The thermal expansion is 1,5-times larger compared with carbon steels.
- Chromium and nickel contents of the filler metal have to match or to be higher than the composition of the base metal, e.g. type 19-9.
- In welded plates with wall thickness exceeding 6 mm, steels with low carbon content (1.4307, AISI 304L) or (1.4541, AISI 321) are recommended.
- Cleaning the weld seam has a significant importance for corrosion resistance. Pickling is recommended.

Forming and machining

- Formability is good, thus forces needed and the elastic return is bigger compared with carbon steels.
- Because of a high ductility and a strong work hardening it is recommended to use sharp tools, an effective cooling and adequate feed of tool.
- Higher austenite stability and a lower work hardening rate can be achieved by an increase of nickel and some other alloying elements.

Corrosion resistance

- Resistance to atmospheric corrosion is adequate for several applications. Special attention should be paid on surface finish and regular cleaning procedures in marine and industrial environments.
- These steels have a good resistance against oxidizing acids. Corrosion resistance in non-oxidazing acids like sulphuric acid, hydrofluoric acid and hydrochloride acid is limited.
- Can be used e.g. in the following chemically pure, boiling solutions: acetic acid (≤5%), acetone, ammonia, ammonia sulphate, benzene, benzene, citric acid (≤10%), copper sulphate, ethanol, ethylic ether, formaldehyde, fruit juice, HNO_3 (≤45%), lactic acid (≤10%), NaOH (≤30%), Na_2SO_3 (≤50%), oil, phosphoric acid (≤20%), potassium- and sodium-carbonate, tartaric acid (≤15%), toluene, wine (when SO_2 used for preservation grade 1.4404, AISI 316L or 1.4432 is recommended), xylene and yeast.
- In chloride containing solutions pitting and crevice corrosion is possible depending on various parameters like chloride concentration, temperature, pH value, redox potential, crevice geometry and others. For instance in drinking water supply systems chloride concentration up to 200 mg/l are usually tolerable.
- When the temperature of chloride containing solutions exceeds 50°C and the construction is loaded, stress corrosion cracking is possible.
- The best material performance is reached usually with the help of adequate design, correct post-weld treatment and regular cleaning during use (if applicable).

Physical properties

- Austenitic crystal structure, non-magnetic as soft annealed.
- Density: 7,9 g/cm^3
- Coefficient of thermal expansion: 16x10^{-6}1/K T=20…100°C
- Thermal conductivity at 20°C: 15 W/(m x K)

Mechanical properties

- According to EN 10088-2:2005

EN	AISI	Proof strength $R_{p0,2}$ (N/mm^2)	Tensile strength R_m (N/mm^2)	Elongation after fracture A (%)
1.4301	**304**	min. 230	540...750	min. 45
1.4307	**304L**	min. 220	520...670	min. 45

- Minimum values of 0,2 % proof strength ($R_{p0,2}$, N/mm^2) at elevated temperatures, EN 10088-2:2005

EN	100	150	200	250	300	350	400	450	500
1.4301	157	142	127	118	110	104	98	95	92
1.4307	147	132	118	108	100	94	89	85	81

Chemical composition (typical)

EN	C wt-%	Cr wt-%	Ni wt-%	Fe wt-%
1.4301	Max. 0,07	18,1	8,2	Bal.
1.4307	Max. 0,030	18,1	8,2	Bal.

Further information

- Standard Specification EN 10088-2:2005
- Standard Specification ASTM A-240-06c
- Corrosion Handbook, Outokumpu
- Technical Customer Service

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