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General Information

All steel grades are a mixture of iron, with a maximum of 2% carbon. By addition of chemical elements such as phosphorus, sulphur, manganese, nickel and chromium to the raw steel will change the properties of the new steel, and as such, its behaviour during subsequent processing steps. Steels are the most commonly used material as they feature good ductibility, stress resistance, excellent heat transfer and high tensile strengths. The melting point of steel depending on the alloy contents can be up to 1536°C.

Distinction in ferrous metals:

- Cor-Ten steel
- Quality steel and stainless steel – higher purity than structural steel and alloyed.
- Structural steel – mostly non alloy or low alloy steel / grade steel.
- Cast iron – The carbon content of cast iron is at 2.06 till 6.64%.
  It will not deform, neither cold or hot.

Steels according to EN 10025 and DIN 17100 are organized by letters and numbers, for example.

Example:

S For structural steel, the follow-on number represents the tensile strength/yield strength in N/mm² (e.g. S355 = structural steel with 355 N/mm²).

C Is used for carbon contents and the number of the mass percentage, e.g. C45 = non-alloy grade steel with a carbon contents of 0.45 mass percent

K (low) phosphorus- and sulfur content

The letters and numbers also give information about quality, manufacturing process, the addition of chemical elements, etc.

Cor-Ten steel (with patina)	Low alloy steel with small quantities of copper, chromium, nickel and phosphorus. Through weathering, these steels form a patina layer (rust), on the surface, but below this layer there is an especially tight barrier which inhibits further corrosion. This insensitivity to weather commends its use in art and architectural (e.g. facades, monuments, statues, sculptures, etc..
Stainless steel and grade steel (alloyed / non-alloy)	For quality steel/grade steels there are specific requirements regarding ductibility, toughness and welding properties. High quality steel grades have better purity and more uniform structuring than structural steel grades. For stainless steel the requirements are even higher than for quality steels. Stainless steel contains at least 10.5% chromium and not more than 1.2% carbon. Other alloy components are manganese, nickel, molybdenum and niobium. The results feature better corrosion resistance and some favorable mechanical properties. A dense, protective passive layer of chromium oxide is formed on the material surface. However, the smooth surface provides some problems for painting, mostly adhesion problems. With suitable blasting systems or abrasives there is a possibility to increase the effective contact surface for improved adhesion of coatings.

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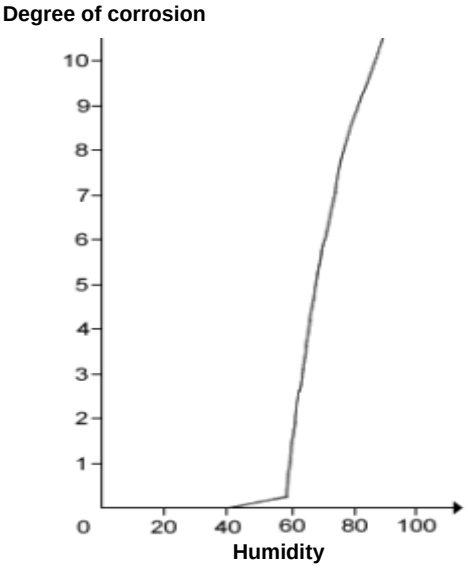
Substrate: Steel TI – S 1 / USA

Structural steel - Construction steel - Tool steel	Usually non-alloyed steel; minute additions of chemical elements yield the desired properties. The cold steel ingots are heated again until reaching the yellow-red-hot condition at about 1000°C till 1200°C and then they rolled into the desired profile shape. The spontaneous oxygen consumption at temperatures above 570°C causes mill scale and scales. This hard and brittle layer forms a galvanic voltage difference and expands at a rate other than that of the steel. Therefore, mill scale and scale are always removed before coating. Structural steel corrodes by numerous environmental effects, and for that matter, it should be coated. Unalloyed steel/structural steel (grade steel) have a carbon contents of 0.2 to 0.65%.

Corrosion is a reaction of metal material with its environment.

Corrosion is a process that occurs when oxygen, water, acids and salts act directly. The temperature must be above 0°C. When the relative humidity is below 40% almost no corrosion occurs, from 40-60% the risk of corrosion increases proportional, and above 60% relative humidity significant corrosion is to be expected.
Corrosion stress loads are considerably increased through the exposure to polluted atmospheres, hygroscopic salts, by the type of use and by the position of the components.



The Corrosion rate of steel layers (EN ISO 12944-2) with the criteria of the ambient atmospheric conditions each year:

Corrosivity category	**Typical Environments**		Average Steel mining
	Exterior	**Interior**	
C1 Negligible		Heated buildings with clean atmospheres; Offices, schools, shops, hotels	Around 1.3µm/year
C2 Slightly	Low level of pollution, mostly rural areas	Unheated buildings, where condensation may occur; depots, warehouses, sports hall	1.3 till 25µm/year
C3 Moderately	City and industrial atmospheres, moderate sulfur dioxide pollution. Coastal areas with low salinity.	Production rooms with high humidity and some air pollution; breweries, dairies, food processing plants	25 till 50µm/year

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C4 Strong	Industrial areas and coastal areas with moderate salinity.	Chemical plants, swimming pools, coastal shipyards over sea level	50 till 80µm/year
C5 – I Very strong (Industrial)	Industrial areas with high humidity and aggressive atmosphere.	Buildings or areas with almost permanent condensation and high pollution.	80 till 200µm/year
C5 - M Very strong (Sea)	Coastal and offshore areas with high salinity.	Buildings or areas with almost permanent condensation and high pollution.	80 till 200µm/year

Surface preparation of steel parts

Components have to be checked to ensure their suitability for coating. Depending on the condition of the surface, user need to decide which cleaning system, blasting system, grinding system and so on should be applied.

Possibilities for the steel surface preparation are:

Contamination / Residues	**Possible common method**
Grease and Oil Grease and oil / water-soluble contaminants e.g. salt	Cleaning with thinners Cleaning with water, steam cleaning Cleaning with emulsions or alkalis
Mill scale and scale	Acid pickling, dry blasting, wet blasting, flame descaling
Corrosion / Rust (depends of the rust level)	Same procedure as for mill scale and scale, In addition, clean/grind with mechanically driven devices, pressure water jet cleaning, spot beams
Old/existing coatings	Grid cutting, layer thickness measurement performance DIN Pickling, dry blasting, wet blasting, pressure water jet cleaning, sweep blasting, spot blasting, grindling

For detailed information and recommendations contained on our preparation information page.