Corrosion protection

Since July 2014, the new European steel construction regulations EN 1090 have become mandatory. It also regulates corrosion protection for steel structures.

With the binding validity of EN 1090, manufacturers may use steel structural components, such as locksmiths or metal and steel construction companies will only market these construction products in the EU Member States with CE marking. The CE mark documents the conformity of a product with the relevant guidelines and technical specifications. The duties of a manufacturer of construction products also include the implementation of a factory production control (WPK) and proof that the manufacturer has the professionally qualified personnel and documented processes, uses his WPK system and has the necessary technical equipment. The design standard EN 1090-2 "Part 2: Technical rules for the execution of steel structures" also regulates the corrosion protection of steel components. Accordingly, the manufacturer, who confirms the conformity of the product with the technical specifications by issuing the CE mark, is also responsible for the correct execution of the corrosion protection. This means that the manufacturer, normaly the executing metal or steel construction company, also must ensure the conformity of the corrosion protection work with the valid technical rules.

In order for the manufacturer to be able to fulfill its responsibility for the proper performance of corrosion protection in accordance with EN 1090, it must either internally implement all necessary measures internally or obtain the necessary evidence from the subcontractor (hot dip galvanizing company or coating company).

The corrosion protection for steel is regulated in Annex F of EN 1090 Part 2. According to Annex F, the requirements for corrosion protection in the design documents must be met by the manufacturer, i.e. be determined by the metal or steel construction company. The protection period of the corrosion protection and the category of corrosivity must be determined.

The coating must be carried out in accordance with EN ISO 12944-7. If the protection period of the corrosion protection is to be greater than 5 years with a corrosivity category of C3 or higher, e.g. in Germany, the rule is, the steel structure must have rounded or beveled edges according to EN 12944-3.

Since July 2014, the new European steel construction regulations EN 1090 have become mandatory. It also regulates corrosion protection for steel structures.

Attachment

Table 1: Corrosion load / Corrosivity category - Classification of atmospheric corrosivity categories and examples of typical environments according to DIN EN ISO 12944-2

Table 2: Overview of required levels of preparation to achieve the required protection periods for a given corrosivity category (Source: DIN EN 1090-2)

Table 3: Specification of the preparation levels (source DIN EN ISO 8501-3)

Corrosivity category	Thickness loss 1. year [µm]		Examples of typical environments (informativ only)	
	C-steel	Zinc	Exterior	Interior
C1 very low	≤ 1,3	≤ 0,1	-	Heated buildings with clean atmospheres, e.g. offices, shops, schools, hotels
C2 low	> 1,3 – 25	> 0,1 – 0,7	Atmospheres with low level of pollution: mostly rural areas	Unheated buildings where condensation can occur, e.g. depots, sports halls
C3 medium	> 25 – 50	> 0,7 – 2,1	Urban and industrial atmospheres, moderate sulphur dioxide pollution; coastal area with low salinity	Production rooms with high humidity and some air pollution, e.g. food-processing plants, laundries, breweries, dairies
C4 high	> 50 – 80	> 2,1 – 4,2	Industrial areas and coastal areas with moderate salinity	Chemical plants, swimming pools, coastal ship and boatyards
C5-I very high	> 80 – 200	> 4,2 – 8,4	Industrial areas with high humidity and aggressive atmosphere and coastal areas with high salinity	Buildings or areas with almost permanent condensation and high pollution
C5-M extreme	> 80 – 200	> 4,2 – 8,4	Offshore areas with high salinity and industrial areas with extreme humidity and aggressive atmosphere and sub-tropical and tropical atmospheres	Industrial areas with extreme humidity and aggressive atmosphere

Table 1: Corrosion load / Corrosivity category - Classification of atmospheric corrosivity categories and examples of typical environments according to DIN EN ISO 12944-2

Required protection periods	Corrosivity category	Level of preparation
> 15 years	C1	P1
	C2 to C3	P2
	> C3	P2 or P3 as specified
5 to 15 years	C1 to C3	P1
	> C3	P2
	C1 to C4	P1
< 5 years	C5 - Im	P2

Table 2: Overview of required levels of preparation to achieve the required protection periods for a given corrosivity category (Source: DIN EN 1090-2)

In transport facilities and steel hydraulic constructions, including et all shipbuilding, wind turbine construction or bridge construction, the corrosion protection with protection times> 25 years has a very high priority. Therefore, the surface preparation must have at least the pre-treatment degree P3. In the offshore sector, a service life of> 25 years is defined for the entire structure and thus the preparation level P3 is prescribed here as well. In addition, the preparation degree P3 should be produced if the specified warranty period is longer than five years.

Type of imperfection	Level of preparation		
	P1 light preparation	P2 thorough preparation	P3 very thorough preparation
Rolled edges	No preparation	No preparation	Edges shall be rounded with a radius of not less than 2 mm (DIN EN ISO 12944-3)
Edges made by punching, shearing, sawing or drilling	No part of the edge shall be sharp, the edge shall be free from fins	No part of the edge shall be sharp, the edge shall be free from fins	Edges shall be rounded with a radius of not less than 2 mm (DIN EN ISO 12944-3)
Thermally cut edges	Surface shall be free of slag and loose slag	No part of the edge shall have an irregular profile	Cut face shall be removes and edges shall be rounded with a radius of not less than 2 mm (DIN EN ISO 12944-3)

Table 3: Specification of the preparation levels (source DIN EN ISO 8501-3)