



## HOT-DIP GALVANIZED STEEL STRIP: A NEW PERSPECTIVE

corrender is the next evolutionary step in hot-dip metal-coated products. A powerful protective layer with numerous advantages is created through alloying small amounts of magnesium and aluminum in the zinc bath. The coating has numerous advantages in processing and corrosion protection.

The corrosion protection of corrender is significantly higher than that of conventionally galvanized steel strip. Because of the substantially improved protective properties of corrender, the metallic coating layer (zinc) thickness can be significantly reduced while maintaining the same level of corrosion protection.

corrender opens new potential for higher efficiency and thus reduces production costs. The low level of zinc abrasion, excellent deep-drawing properties and very good formability results in special processing properties that lead to considerable increases in production and processing efficiency.

### Convincing advantages:

- » Excellent corrosion protection
- » Improved processing efficiency
- » Conservation of resources and environmental protection



Premium quality  
with reduced carbon footprint

**corrender**  
greentec steel

## corrender

corrender (hot-dip galvanized steel strip with a zinc-magnesium coating) is manufactured in continuous hot-dip coating lines. corrender is produced with magnesium and aluminum alloys in the zinc bath. The use of magnesium and aluminum alloys in the zinc bath (composition of 1.5 weight % Mg and 2.5 weight % Al, each with a deviation of  $\pm 0.25$  weight %) produces a high-performance protective coating characterized by its high degree of corrosion resistance and excellent working properties.

### Available steel grades and dimensions

corrender is supplied in widths up to 1740 mm and thicknesses ranging from 0.4 to 2.3 mm (depending on product specifications such as steel grade). The following standard grades are available:



A detailed list of available steel grades and dimensions is found in the Technical Terms of Delivery for hot-dip galvanized steel strip made by voestalpine Stahl GmbH. Our experts will be happy to answer any of your technical questions.

### Coating groups

The table below contains a list of standard corrender coatings. Additional coatings and coatings above ZM 275 can be specified during technical consultation upon request.

Triple surface test in g/m <sup>2</sup> (both sides)	Zinc-magnesium coating group [EN 10346]						
	ZM 70	ZM 90	ZM 120	ZM 150	ZM 200	ZM 275	ZM 310

## SURFACE

### Coating surface

Corrender can be supplied with the surface variants NA, MA, MB and MC according to EN 10346.

### Roughness

As a standard, Surface type B is delivered with a medium roughness value ranging between 0.6 and 1.9  $\mu\text{m}$ . Determination of the mean  $R_a$  roughness value is subject to a wavelength limit of 2.5 mm in accordance with EN 10049 (standard length of 12.5 mm). Where specially required, the delivery of limited roughness values may be specified. Special qualities include smooth, half mat or mat.

Design	Median roughness value Ra [ $\mu\text{m}$ ]
Standard	0.6 – 1.9
Extremely smooth	0.5 max.
Smooth	0.9 max.
Half mat	0.7 – 1.3
Mat	1.3 – 1.9

### Subsequent surface treatment

corrender is supplied exclusively as a protective surface. The following surface treatment processes are possible:

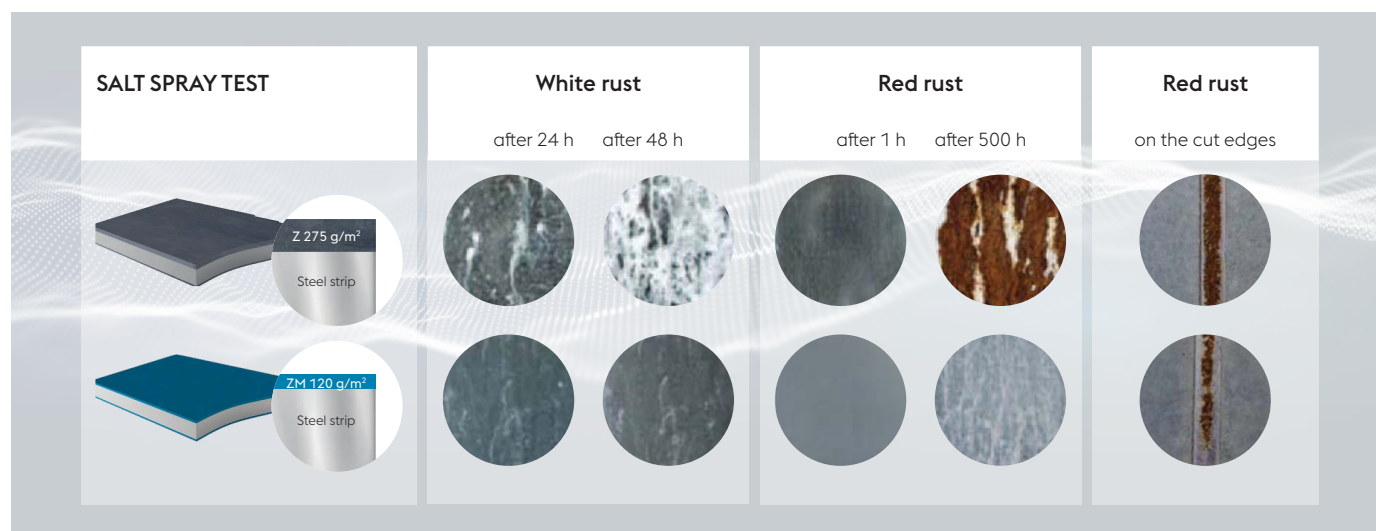
- » Chemical passivation
- » clearcover® (chromium-free passivation)
- » Oiled (corrosion protection oils, pre-lubes, dry lubes)

### Darkening of corrender

A thin oxide layer, only a few atoms thick, is generally formed at the moment of solidification of the hot-dip galvanized coating. Diffusion processes change the structure and thickness of this thin oxide layer over time, even at room temperature. This structural change darkens the appearance (absorption coefficient) of the surface layer. The time and intensity of this darkening depends heavily on environmental influences. Similar phenomena are encountered in other hot-dip galvanized products, such as Galfan, and do affect the properties of corrender.

### Corrosion protection

A striking feature of corrender is the high-performance corrosion protection as opposed to conventionally galvanized steel strip. The significantly higher protective effect of corrender results in a thinner metallic coating of zinc.



The table below provides orientation based on DIN 55634 for selection of the suitable ZM layer thickness:



#### Rural atmosphere (C2)

Atmosphere prevailing in rural areas and small towns that contains almost no corrosive substances such as sulfur dioxide and chlorides.



#### Urban atmosphere (C3)

Polluted atmosphere prevailing in densely populated areas without significant industrial activities. It contains moderate levels of corrosive substances such as sulfur dioxide and chlorides.



#### Industrial atmosphere (C3-C5)

Atmosphere polluted by corrosive emissions from local or regional industrial operations (mostly sulfur dioxide). Industrial atmospheres are divided into three categories according to SO<sub>2</sub> levels (low, medium and high content).



#### Marine atmosphere (C3-C5)

Atmosphere prevailing in coastal regions. Depending on the salt content and distance to the coast, we have defined three categories: low salt content (10–20 km from the coast), medium salt content (3–10 km from the coast), high salt content (0–3 km from the coast).

	Coating class	Coating thickness [µm]	C2	C3	C4	C5-I	C5-M
Zinc	Z100	7	L M				
	Z140	10	L M				
	Z200	14	L M	L			
	Z225	16	L M	L			
	Z275	20	L M	L			
	Z350	25	L M H	L M	L		
	Z450	32	L M H	L M H	L		
	Z600	42	L M H	L M H	L M	L <sup>C</sup>	L
Zinc-Aluminium	ZA130	10	L	L			
	ZA255	20	L M H	L M	L		
	ZA400	30	L M H	L M H	L M	L <sup>C</sup>	L
Zinc-Magnesium	ZM70	5,5	L M				
	ZM120	9	L M	L			
	ZM130	10	L M H	L			
	ZM140	11	L M H	L			
	ZM200	15	L M H	L M	L		
	ZM250	19	L M H	L M H	L		
	ZM275	21	L M H	L M H	L		
	ZM300	23	L M H	L M H	L M	L <sup>C</sup>	L
	ZM310	24	L M H	L M H	L M	L <sup>C</sup>	L

L = low 2-5 years, M = medium 5-15 years, H = more than 15 years, C = Resistance to be coordinated with the voestalpine

During the design of the steel structure, compliance with all relevant instructions pertaining to protecting the structure from corrosion is mandatory (see Reference Sheet 121:2003 of the Steel Information Center, Corrosion Protection Systems for Sheet Steel Components and other instructions). Standing water, dripping moisture, impurities and contact corrosion must be avoided through composite construction.

Please note that no warranty or guarantee against corrosion damage can be derived from this table. Users shall be responsible for the planning and design of their steel structures (and corrosion protection).

## APPENDIX

### Pertinent standards

- » DIN EN-ISO 12944-2: Corrosion protection of steel structures by protective paint systems
- » DIN EN 10143: Continuous hot-dip coated steel sheet and strip, limit dimensions and forming tolerances
- » DIN EN 10346: Continuous hot-dip coated steel flat products, Technical Terms of Delivery
- » DIN 55634: Coating materials and coatings, corrosion protection of supporting thin-walled steel building components

## APPLICATION AND PROCESSING INSTRUCTIONS

In order to achieve optimum results, it is important to follow the instructions for the application, processing and storage of corrender as one would for hot-dip galvanized steel strip. Especially when forming hot-dip galvanized steel strip, conventional emulsions must be used with an alkalinity of not more than 9. The constituents of the emulsion may not have any negative effect on corrosion resistance. Several emulsions have been tested by voestalpine and approved for forming purposes. It is also necessary to ensure that strip be used and stored in a manner that allows water and moisture to be shed and in which periods of dryness are guaranteed so that the material can dry and is not permanently exposed to water. Contact corrosion is to be avoided electrically insulating different types of metals (with different electro-chemical potentials) from each other. The product properties described herein are applicable to the extent that corrender is used and processed in accordance with the pertinent standards, the Technical Terms of Delivery published by voestalpine and the information contained herein.



Premium quality with reduced carbon footprint

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greentec steel

Hot-dip galvanized steel strip – greentec steel Edition

Max. carbon footprint 2.30 kg CO<sub>2</sub>e per kg of steel <sup>1)</sup>

<sup>1)</sup> per worldsteel CML 2001-2016 (system expansion) cradle to gate

All products, dimensions and steel grades listed in each voestalpine supply range are available as greentec steel Edition.

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To find out more about corrender,  
please visit us at  
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