



## Hot-dip galvanized steel strip

# corrender for the automotive industry

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### 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 result in special processing properties that lead to considerable increases in production and processing efficiency.

### Convincing advantages:

- Best workability
  - Increased process reliability and excellent processing properties
  - Reduced abrasion in component manufacturing
- Improved corrosion protection
- Thinner coating results in increased processing reliability during laser and arc welding

## corrender

corrender (hot-dip galvanized steel strip with a zinc-magnesium coating) is manufactured in continuous hot-dip coating lines. corrender is manufactured 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 1600 mm and thicknesses ranging from 0.5 to 2 mm (depending on product specifications such as steel grade).

The following standard grades are available:

- **Mild steels**
  - DX52D
  - DX53D
  - DX54D
  - DX56D
  - DX57D
- **High-strength IF steels**
  - HX160YD
  - HX220YD
  - HX260YD
- **Bake-hardening steels**
  - HX180BD
  - HX220BD
  - HX260BD
  - HX300BD
- **Micro-alloyed steels**
  - HX260LAD
  - HX300LAD
  - HX340LAD
  - HX380LAD
  - HX420LAD
- **Carbon-manganese steels**
  - HT440CMD
- **Dual-phase steels**
  - HCT450XD
  - HCT500XD
  - HCT600XD

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 recommended coating layers for automotive applications range between 90 and 200 g/m<sup>2</sup>. The production of thinner or thicker layers can be specified during technical consultation upon request.

## Coating

	Coating weight [g/m <sup>2</sup> ]	Layer thickness [μm] <sup>1)</sup>
Zinc-magnesium coating	90 – 200	7 – 15

<sup>1)</sup> Thickness of the zinc-magnesium coating is determined at a density of 6,6 g/cm<sup>3</sup>.

## Surface

### Coating surface

The surface of corrender is determined by the design, type and surface treatment. corrender is supplied in conformity with hot-dip galvanized steel strip surfaces NA, MA and MB. MC surface design is currently under development.

### Roughness

As a standard, Surface type B is delivered with a medium roughness value ranging between 0.6 and 1.9 μm. Determination of the mean Ra 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.

## Roughness

Design	Median roughness value Ra [μm]
Standard	0.6 – 1.9
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. Corrosion protection oil is used as a standard. Other oil types are available upon request. The oil layer can be removed with suitable zinc-sparing degreasing agents. Depending on the intended treatment stress, the following standard coatings can be ordered: slightly oiled as a temporary form of corrosion protection and as a forming aid for medium forming stress, oiled for very heavy forming stress.

Although the oil is distributed evenly, a certain degree of oil will invariably spread across the length and width of the strip, and some oil from heavily oiled strip will be shed from the surface during transportation and storage. This is technically unavoidable.

## Oil amounts

Slightly oiled	Approx. 0.7 g/m <sup>2</sup> per side
Oiled	Approx. 1.2 g/m <sup>2</sup> per side

## APPLICATION AND PROCESSING INSTRUCTIONS

Because of its specific range of properties, corrender is excellently suited to applications in the automotive industry. Because of its increased corrosion resistance, it is highly recommended in highly corrosive environments. In many applications, corrender demonstrates improved processing properties when compared to standard material designs. Minimized abrasion during forming and the improved coefficient of friction are especially noteworthy when compared to zinc. corrender can easily be pretreated with typical phosphating processes and it performs similarly to zinc in conventional joining processes. Specialists at voestalpine will be pleased to provide consultation and other assistance to interested customers.

### 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.

## APPENDIX

### Pertinent standards

- 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
- SEW 022: Continuous hot-dip coated steel flat products, zinc-magnesium coatings, Technical Terms of Delivery
- VDA 239-100: Flat products made of steel for cold forming.

**Please find further information and downloadable files at**  
[www.voestalpine.com/corrender](http://www.voestalpine.com/corrender)

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### voestalpine Steel Division

voestalpine-Straße 3  
4020 Linz, Austria  
T. +43/50304/15-8018  
produktmanagement@voestalpine.com  
[www.voestalpine.com/steel](http://www.voestalpine.com/steel)