Shandong Sino Metal Co., Ltd

# Zinc Aluminum-Magnesium coated steel

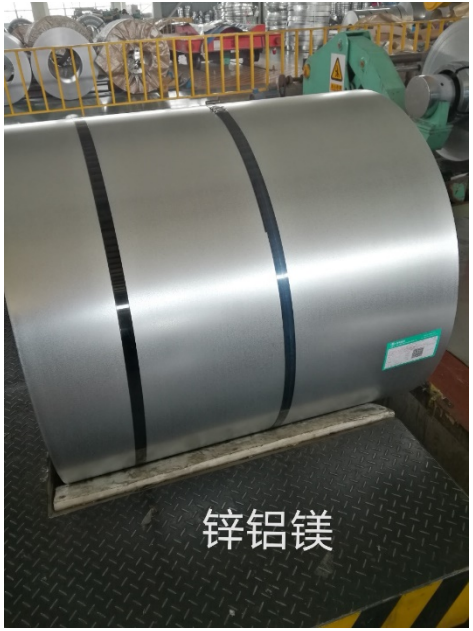
The Zinc Aluminum-Magnesium coated steel is a new product in the global steel trading industry. It is a result of various extensive steel manufacturing researches done to enable steelmakers to produce coated steel that is better than galvanized steel.

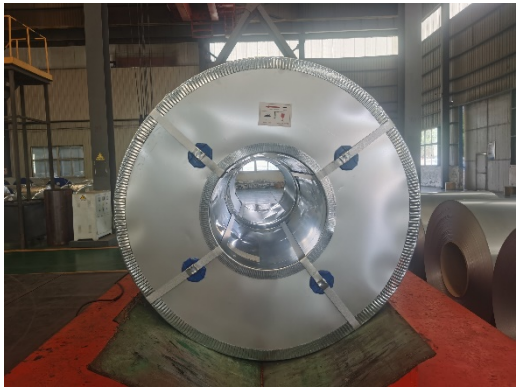
This type of coated steel is a highly improved version of a corrosion-resistant steel plate which is made mostly of zinc (Zn), combined with a set amount of aluminum (Al) and magnesium (Mg). ZAM coated steels are widely used in different types of construction and can be formed in any kind of steel parts or shape.

# Production description

The zinc-aluminum-magnesium coated steel sheet is a new type of steel material, which can be mass-produced by the existing hot-dip galvanizing process. The zinc-aluminum-magnesium coated steel plate has good corrosion resistance and self-healing properties of the film, and can adapt to various harsh environments.

Coating Types:
Zn+6%Al+3%Mg+Re
Zn+11%Al+3%Mg+Si+Ni+rare earth



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# Main product grades and mechanical properties

| Steel Type/Grade | Yield Strength (Mpa) | Tensile Strength (Mpa) | Elongation $A_{80mm}$(%) | $BH_2$(Mpa) | $r_{90}$ | $n_{90}$ |
|---|---|---|---|---|---|---|
| DC51D+ZM | - | 270-500 | ≧22 | - | - | - |
| DC52D+ZM | 140-300 | 270-420 | ≧26 | - | - | - |
| DC53D+ZM | 140-260 | 270-380 | ≧30 | - | ≧1.5 | ≧0.17 |
| DC54D+ZM | 120-220 | 260-350 | ≧36 | - | ≧1.6 | ≧0.18 |
| S280GD+ZM | ≧280 | ≧360 | ≧18 | - | - | - |
| S350GD+ZM | ≧350 | ≧420 | ≧16 | - | - | - |
| S450GD+ZM | ≧450 | ≧510 | ≧14 | - | - | - |
| S550GD+ZM | ≧550 | ≧560 | - | - | - | - |
| HC260LAD+ZM | 260-330 | 350-430 | ≧26 | - | - | - |
| HC340LAD+ZM | 340-420 | 410-510 | ≧21 | - | - | - |
| HC220YD+ZM | 220-280 | 340-410 | ≧32 | - | 1.5 | 0.17 |
| HCT590X+ZM | 340-420 | 590-700 | ≧20 | 30 | - | 0.14 |

# Main performance of color coated board

| Number | Project Name | Indicator Requirements | Standard |
|---|---|---|---|
| 1 | Positive Gloss | 30-45 | GB/T 12754-2019 |
| 2 | Gloss on the back | ≤40 | GB/T 12754-2019 |
| 3 | T bend | 3T(No cracks on 5T, no peeling off on 3T tape) | GB/T 12754-2019 |
| 4 | Shock | ≧12J | GB/T 12754-2019 |
| 5 | Pencil Hardness | ≧HB | GB/T 12754-2019 |
| 6 | Chromatic Aberration | AE≤1.0,Under normal light conditions, there is no obvious color difference visually (side light) | GB/T 12754-2019 |
| 7 | Neutral Salt Spray | ≧1200 hour | GB/T 12754-2019 |
| 8 | MEK | ≧100 | GB/T 12754-2019 |
| 9 | UVB-313 | ≧700 | GB/T 12754-2019 |

Note 1: The pencil hardness standard uses Zhonghua 101 drawing pencil
Note 2: If the customer puts forward other coating performance requirements, it can be added to the business contract after negotiation between the two parties

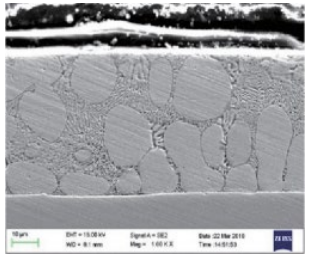
# Product Features and Advantages

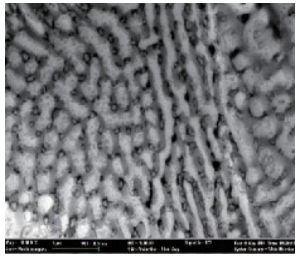
## 1. Coating structure, composition characteristics

Coating composition: Zn+11%Al+3%Mg+Si+Ni+rare earth

This product belongs to the low-aluminum, low-magnesium + rare earth component system. The advantages of this component are:

1) Give full play to the anti-corrosion effect of aluminum and magnesium elements, and at the same time, the addition of rare earth elements refines the coating grains, improves the coating structure, and further improves the corrosion resistance of the coating.
2) Aluminum and magnesium elements are relatively active, and oxidation is easy to form the largest amount of suspended slag and scum. Compared with higher aluminum-magnesium alloy elements, controlling them within an appropriate range can effectively reduce zinc slag, bright spots, and missing plating defects caused by zinc-aluminum-magnesium slag.
3) The addition of aluminum and magnesium elements increases the hardness and brittleness of the coating. Compared with higher aluminum-magnesium alloy elements, controlling it within an appropriate range can reduce the microscopic cracks of the coating that appear during the processing of the engraved layer.





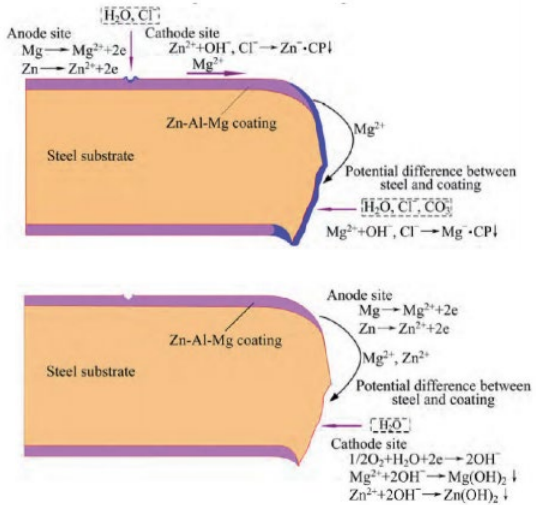
## 2. Corrosion resistance

Anti-corrosion principle:

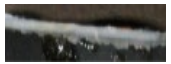
In the early stage of corrosion of Zn-Al-Mg coating, $MgZn_2$ is preferentially dissolved in the eutectic structure, forming $Zn(OH)_2$ and $Mg(OH)_2$ deposition surfaces, cuts and scratches, and then forming stable alkaline zinc chloride ( $Zn_5(OH)_8CI_2 \cdot H_20$), inhibiting further corrosion. Under the same corrosive environmental conditions and the same coating, the corrosion resistance of the zinc-aluminum-magnesium coating is several times that of the pure zinc coating.

Scratch and cut anti-corrosion principle:

In the early stage of corrosion of Zn-Al-Mg coating, $MgZn_2$ is preferentially dissolved in the eutectic structure, forming $Zn(OH)_2$ and $Mg(OH)_2$, which are deposited on the incision of the blaster and scratched, and then form a stable alkaline chloride Zinc ($Zn_5(OH)_8CI_2 \cdot H_2O$), inhibits further corrosion.

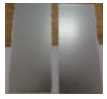
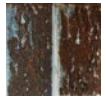
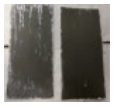


# Notch Corrosion Test

| TIME(h) | 500h | 1000h | 1500h | 2000h |
|---|---|---|---|---|
| Pure Zinc Z275 |  |  |  |  |
| Zinc Aluminum Magnesium ZM275 |  |  |  |  |

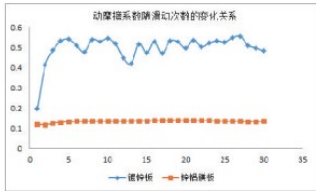
3. Corrosion resistance of zinc-aluminum-magnesium-based color-coated sheet

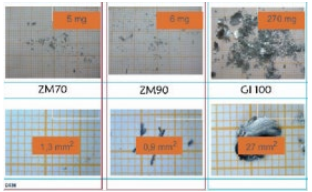
# Plane salt spray test

| TIME(h) | | 0h | 800h | 1500h | 2000h | 2500h |
|---|---|---|---|---|---|---|
| Coating weight80g/m² | galvanized |  |  | | | |
| | Zinc Aluminum Magnesium |  |  |  | | |
| Coating weight120g/m² | galvanized |  |  |  | | |
| | Zinc Aluminum Magnesium |  |  |  |  | |
| Coating weight180g/m² | galvanized |  |  |  |  | |
| | Zinc Aluminum Magnesium |  |  |  |  |  |

## 4. Coefficient of friction and wear resistance

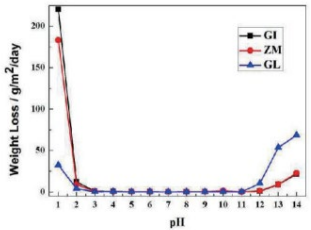
The coefficient of dynamic friction is small and basically stable with the increase of friction times, so the processing performance of the material is very good. The coating has good wear resistance, less powder removal and smaller size during processing and use, which reduces the cleaning and maintenance of the mold, improves the continuous stamping ability of strip steel, and prolongs the service life of the mold.




## 5. Acid and alkali resistance

When the pH is between 2 and 11, there is little difference in the weight loss of the three coatings; when the pH value exceeds 11, the weight loss of M is basically the same as that of GI, which is obviously better than that of GL products. Zinc-aluminum-magnesium products have better acid and alkali resistance, and perform better than aluminum-plated sheets in a strong alkali environment.




不同pH值GI、ZM、GL的失重量

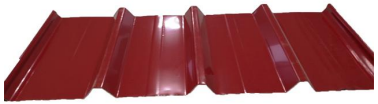
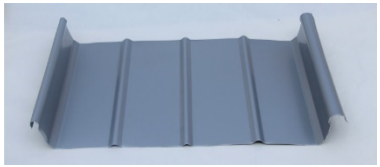
# ZAM coated steel application

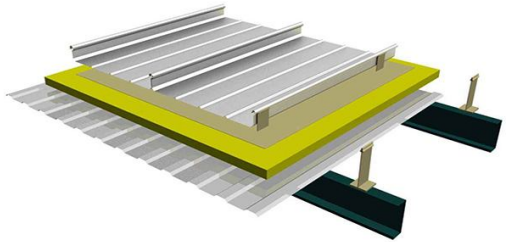
Zinc-aluminum-magnesium products are widely used, mainly used in civil construction (keel ceiling, perforated board, cable bridge), agricultural and livestock production (agricultural feeding greenhouse steel structure, steel structure accessories, greenhouse, feeding equipment), railway road, power communication (transportation Power distribution high and low voltage switchgear, box-type substation outer body), photovoltaic brackets, automotive motors, industrial refrigeration (cooling towers, large outdoor industrial air conditioners) and other industries, the application field is very wide.

# USED FOR ROOFING SYSTEM







The 270 ° occlusion process of this roofing system is an automatic occlusion machine that snaps and bites both sides of the single support. It is fully automatic and professionally operated. Physical displacement caused by shrinkage. This advantage is reflected in the fact that the longitudinal and long-span roof system is not deformed by internal and external forces. At the same time, the complete supply of accessories for this roof system can meet the requirements of various building forms

# USED FOR ROOFING SYSTEM

The Zinc Aluminum-Magnesium coated roofing system has many advantages such as corrosion resistance, beautiful appearance, and easy processing and molding.