

# MSP MAGNA-SHIELD PRO™

Future-Ready Advanced Coated Steel



## TECHNICAL SPECIFICATION GUIDE

- High corrosion resistance
- Concrete compatible
- Attractive finish
- Powder coat compatible







With the strength of steel, Millform is dedicated to building a better Australia. We provide quality products, ensure efficient delivery standards, and offer proven solutions for commercial, construction, industrial, and government clients.

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**MSP** **MAGNA-SHIELD PRO™**

# What is MAGNA-SHIELD PRO™ (MSP)

**MAGNA-SHIELD PRO™ (MSP)** is a highly corrosion-resistant coated steel with a special alloy composition.

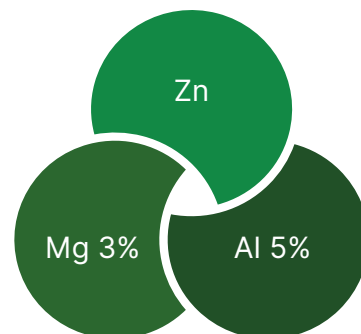


**MAGNA-SHIELD PRO™ (MSP)** is a superior steel coating layer combining zinc, aluminium and magnesium with outstanding results. It offers incredible corrosion resistance, impressive scratch resistance, among other benefits.

**MAGNA-SHIELD PRO™ (MSP)** with its unique coating layer of Zinc, 5% Aluminium and 3% Magnesium provides a breakthrough solution in surface corrosion protection and self healing properties on cut edges, making it possible to be applied even in the most severe environments such as livestock, chemicals and marine areas.

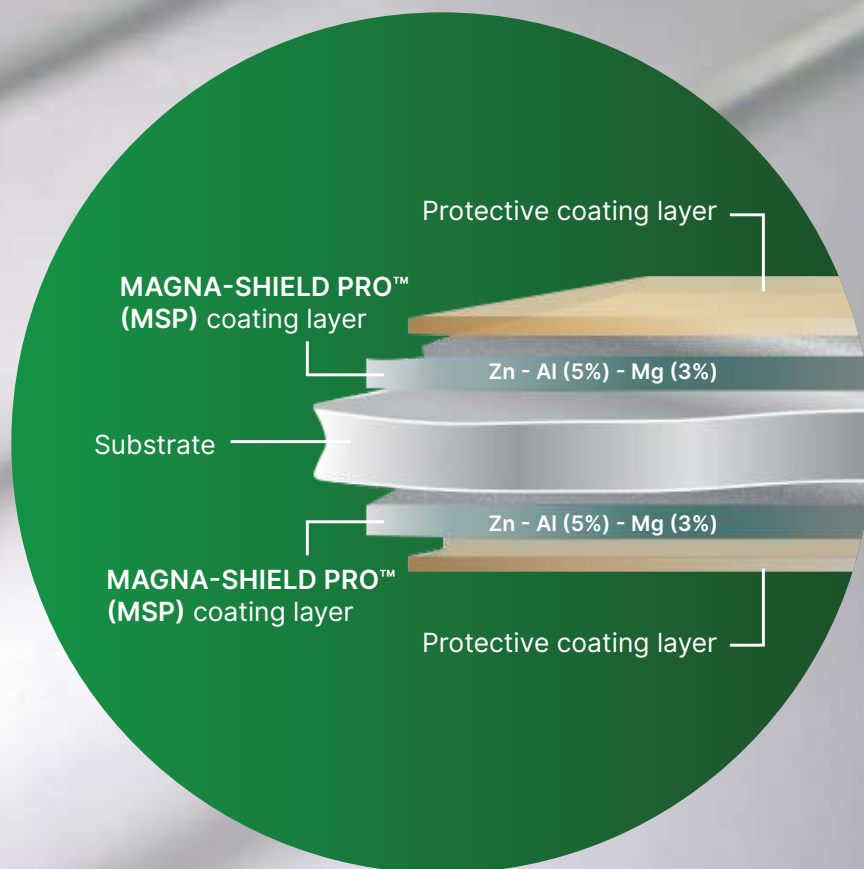
**MAGNA-SHIELD PRO™ (MSP)** coated steel has a longer lifespan than comparable zinc coated steel products. It provides improved durability and longevity, with a higher level of corrosion resistance than traditional heavier weighted zinc coated steel products. With numerous benefits and superior performance, **MAGNA-SHIELD PRO™ (MSP)** can be a suitable cost effective alternative to replace stainless steel and aluminium in many applications.

**MAGNA-SHIELD PRO™ (MSP)** has three to five times the lifespan of traditional galvanised steel for comparable applications and coating thicknesses.



Unique coating layer of Zinc, 5% Aluminium and 3% Magnesium provides surface corrosion and metal cut edge protection.

# What is MAGNA-SHIELD PRO™ (MSP)



# Advantages of MAGNA-SHIELD PRO™ (MSP)

1

**MAGNA-SHIELD PRO™ (MSP)** is three to five times more durable than galvanised products (Galvanised Z350) with the same level of coating.

2

**MAGNA-SHIELD PRO™ (MSP)** provides extraordinary resistance to abrasion and friction at the surface of steel coil.

3

**MAGNA-SHIELD PRO™ (MSP)** maintains structural integrity and corrosion resistance in elevated temperatures, making it ideal for industrial applications.

4

**MAGNA-SHIELD PRO™ (MSP)** self healing properties on cut edges provide greater protection than other alloy coated steel products.





# Advantages of **MAGNA-SHIELD PRO™ (MSP)**

5

Able to be easily powder coated for enhanced aesthetic finish.

6

Highly resistant to white rust.

7

With significant corrosion resistance in harsh environments such as ammonia, chemical, salt water or marine environments, **MAGNA-SHIELD PRO™ (MSP)** is perfectly suited for use in C5 environments.

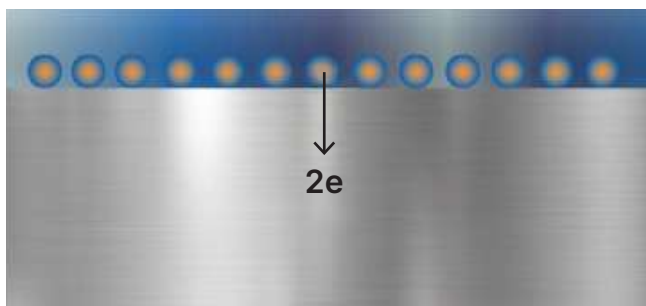
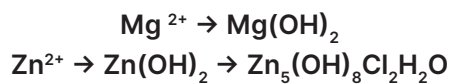
8

Reduced Initial cost versus post galvanised steel. Overall reduction on initial investment, ongoing maintenance and replacement cost.

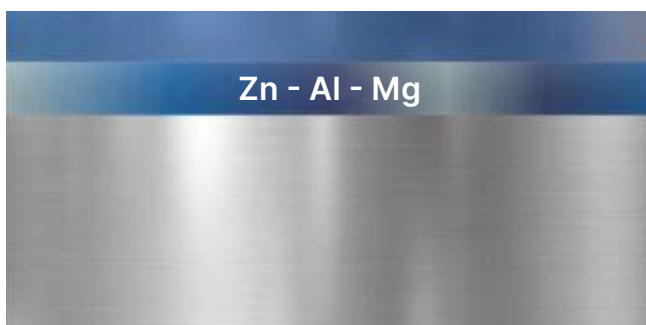
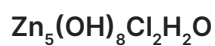


# MAGNA-SHIELD PRO™ (MSP)

## Anti-Corrosion Mechanism



Substrate



Substrate

The magnesium in the **MAGNA-SHIELD PRO™ (MSP)** coating is a catalyst that accelerates the formation of a highly resistant crystalline film / a dense corrosion product which is extremely stable and officially called Simonkolleite  $[\text{Zn}_5(\text{OH})_8\text{Cl}_2\cdot\text{H}_2\text{O}](\text{SKT})$ .

When Simonkolleite is formed, it gradually moves outward to seal the entire substrate's surface and prevent it from corrosive environmental substances and plays an important role as a corrosion inhibitor for the base metal.

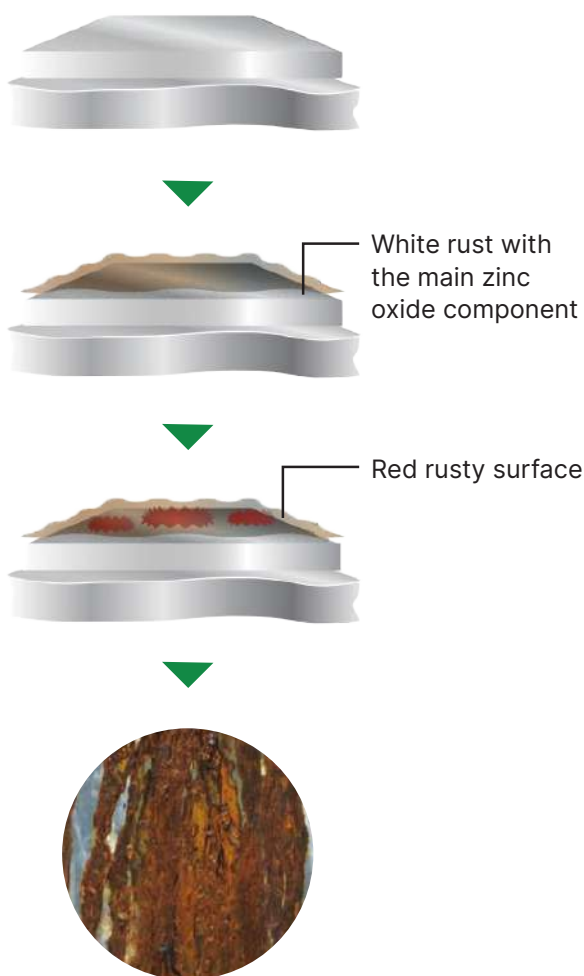


# MAGNA-SHIELD PRO™ (MSP)

## Anti-Corrosion Mechanism - Flat Surface

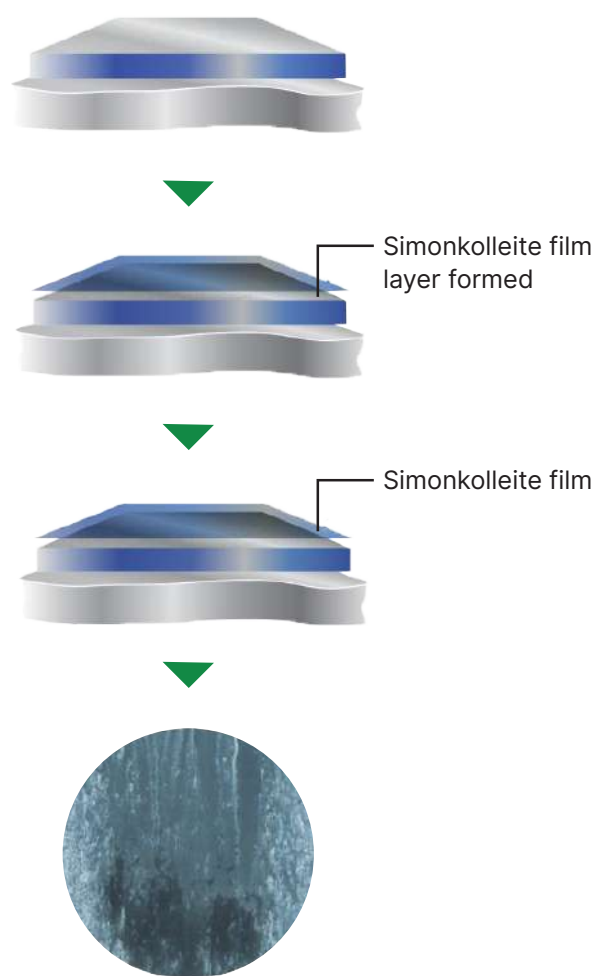
### Galvanised Z350

In a galvanised product corrosive substances combine to break into the zinc oxide layer to cause red rust.



### MAGNA-SHIELD PRO™ (MSP)

Simonkolleite chemical formula works to prevent the penetration of corrosive substances.



Coating layer



Substrate



Rust



Simonkolleite film

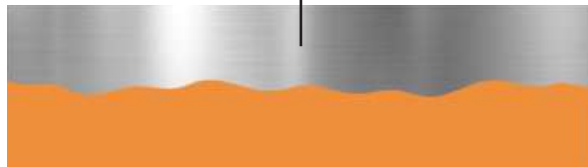
# MAGNA-SHIELD PRO™ (MSP)

## Anti-Corrosion Mechanism - Cut Edge

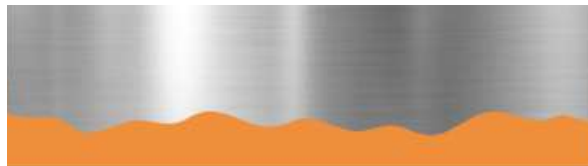


Cut edges are protected  
due to the osmosis effect

MAGNA-SHIELD PRO™ (MSP)



Rust appears after exposure



**After Several Weeks:**

Simonkolleite appears and gradually  
coats the rust













**After 1 Year:**

Over a period of time, SKT  
completely coated



# Test Results – Salt Spray Environments

Salt Spray Test		
	Galvanised Z350	MSP ZM350
1800hrs		
2200hrs		
2600hrs		
3400hrs		
4000hrs		

### Test Method:

Salt Spray Test (SST); ISO 9227, JIS Z2371 ASTM B117: 5%NaCl, 35°C.

### Conclusion:

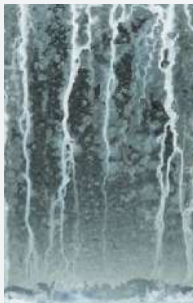
The corrosion resistance on the flat surface of **MAGNA-SHIELD PRO™ (MSP)** is far superior compared to normal Galvanised Z350.

# Test Results – Resistance Ability to White Rust

## Salt Spray Test

Galvanised Z350      MSP ZM350

1000  
hrs

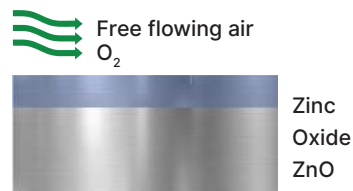


1400  
hrs



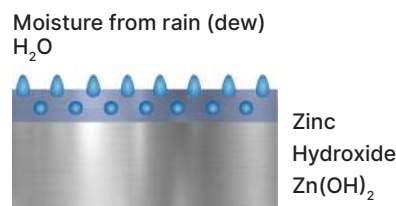
### Step 1:

React with  $O_2$  to produce  $ZnO$



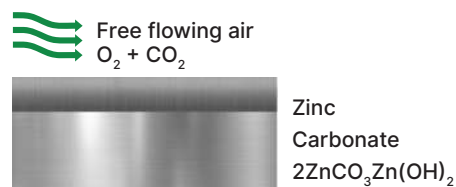
### Step 2:

React with  $H_2O$  to produce  $Zn(OH)_2$



### Step 3:

React with  $CO_2$  to produce  $ZnCO_3Zn(OH)_2$



### Test Method:

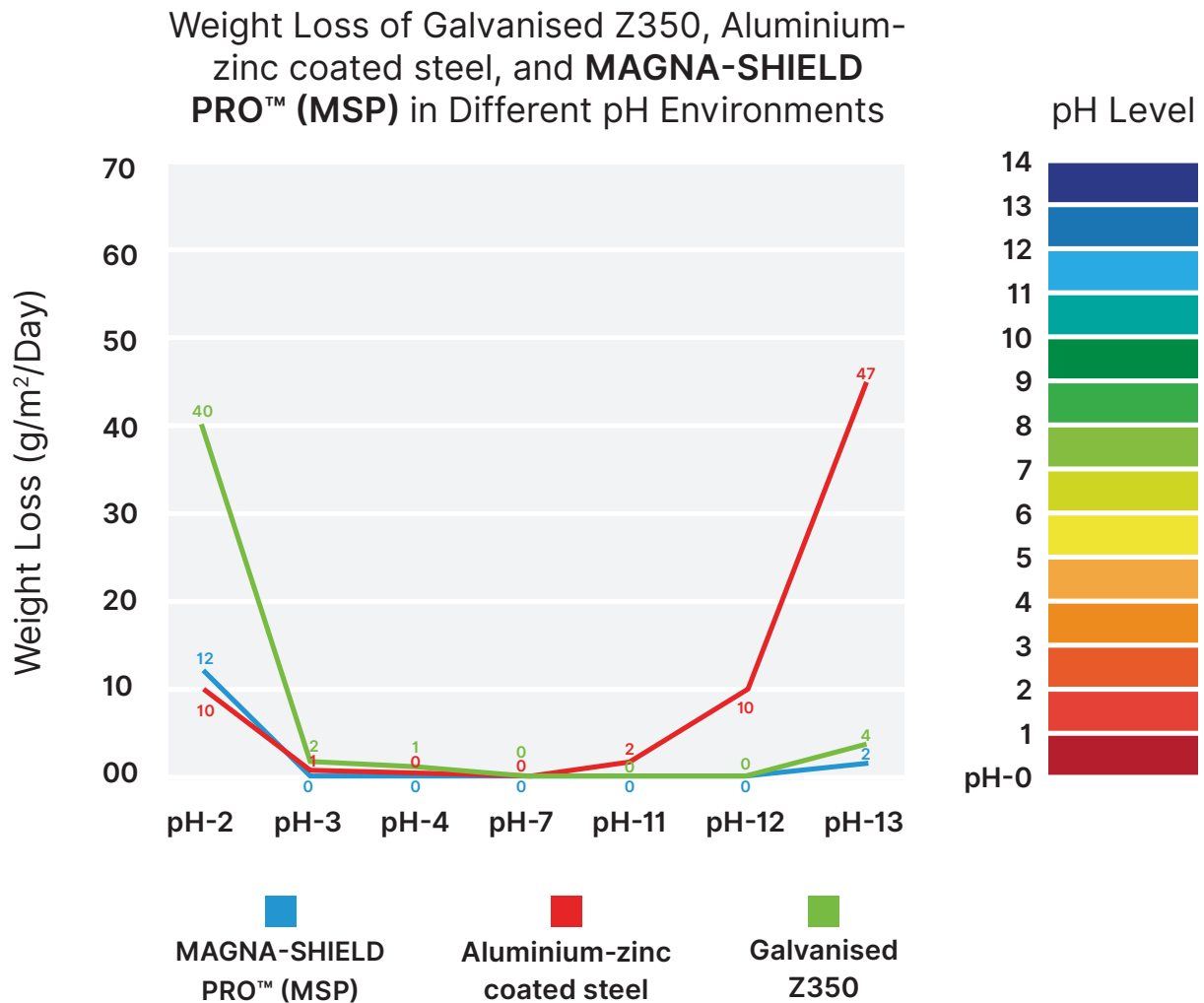
Salt Spray Test (SST); ISO 9227, JIS Z2371 ASTM B117: 5%NaCl, 35°C. Sample surfaces are applied Chromated treatment.

### Conclusion:

**MAGNA-SHIELD PRO™ (MSP)** white rust resistance ability is severely higher than Galvanised Z350. It is clearly seen that the SKT layer formed in inhibiting the white rust formation process of zinc with Oxygen, Carbon Dioxide and water to create a white layer which is caused by a salt mixture of Carbonate ( $ZnCO_3$ ) and Hydroxide ( $Zn(OH)_2$ ).



# Test Results - In Chemical Environment



## Test Method:

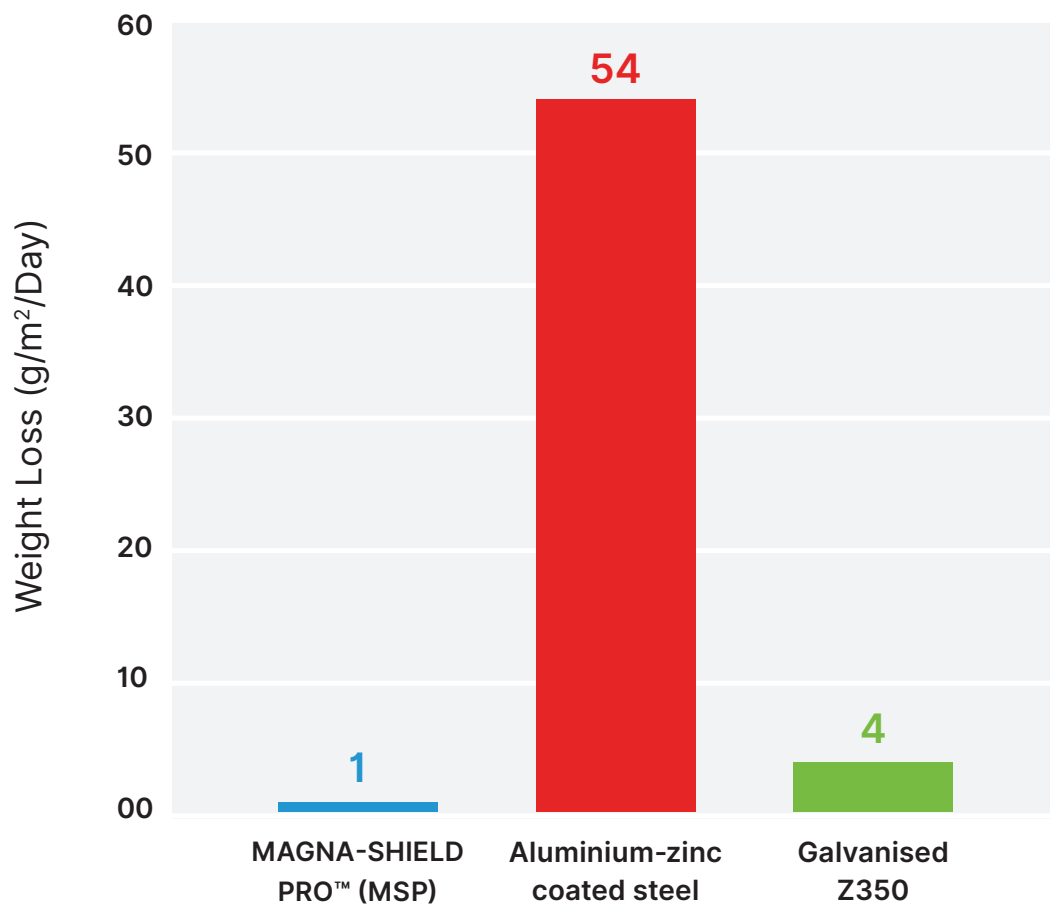
Comparison of the weight before and after soaking Aluminium-zinc coated steel, Galvanised Z350 and **MAGNA-SHIELD PRO™ (MSP)** in Na<sub>2</sub>SO<sub>4</sub> solution at 30 degree Celsius after 24h; potential of hydrogen (PH) concentration increases progressively from 2 to 13 by adding H<sub>2</sub>SO<sub>4</sub> or NaOH solution.

## Conclusion:

In acidic environments, Galvanised Z350 is corroded quite quickly while Aluminium-zinc coated steel and **MAGNA-SHIELD PRO™ (MSP)** are equivalently slower. However, in alkaline environments, corrosion is 50% lower than Galvanised Z350 and far superior than Aluminium-zinc coated steel.

# Test Results - In Ammonia Environment

Weight Loss of Galvanised Z350, Aluminium-zinc coated steel, and **MAGNA-SHIELD PRO™ (MSP)** in Different pH Environments



## Test Method:

Comparison of weight before and after soaking Aluminium-zinc coated steel, Galvanised Z350 and **MAGNA-SHIELD PRO™ (MSP)** in 5% of  $\text{NH}_3$  solution, at 30 degree Celsius after 24h

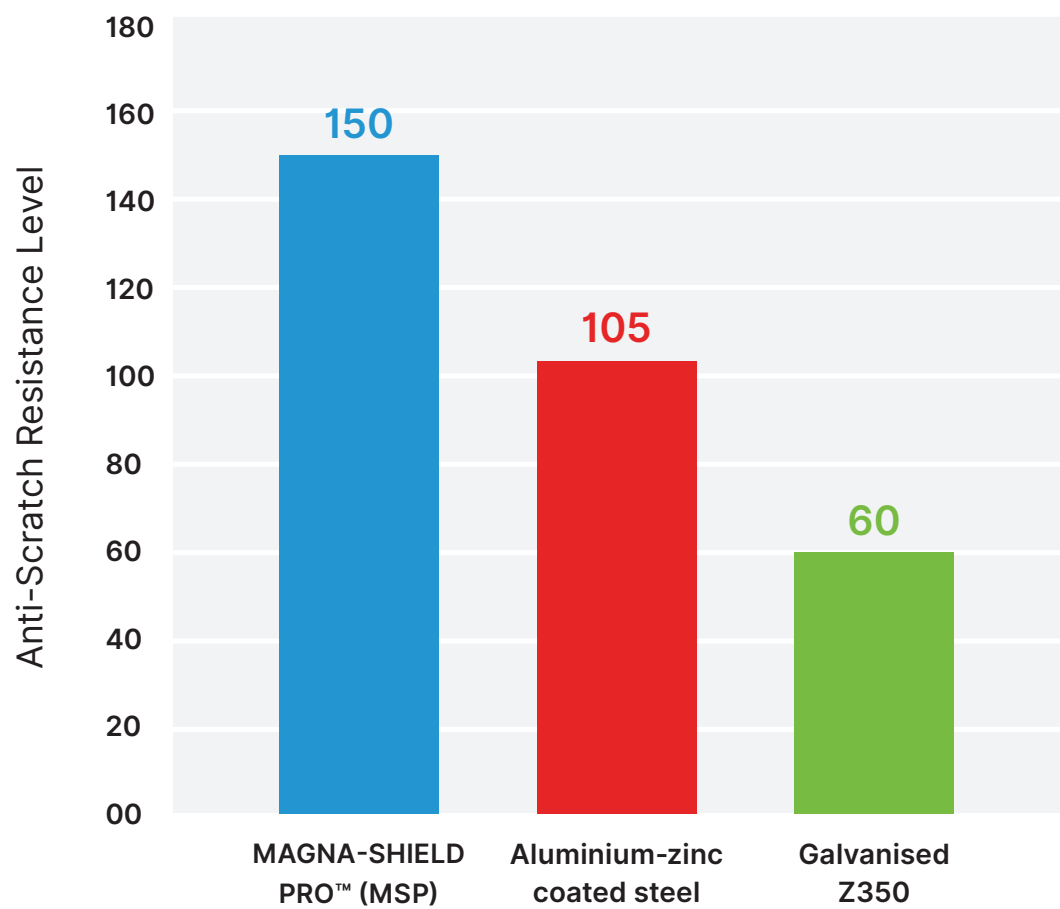
## Conclusion:

In the ammonia (animal breeding) environment, the corrosion resistance of **MAGNA-SHIELD PRO™ (MSP)** is four times more resistant to ammonia attack than that of normal Galvanised Z350 and it is recommended that Aluminium-zinc coated steel should not be used in an ammonia environment due to poor corrosion resistance.



# Test Results - Scratch Resistance Ability

Anti-Scratch Resistance of Galvanised Z350, Aluminium-zinc coated steel, and **MAGNA-SHIELD PRO™ (MSP)** (Hardness Test)



### Test Method:

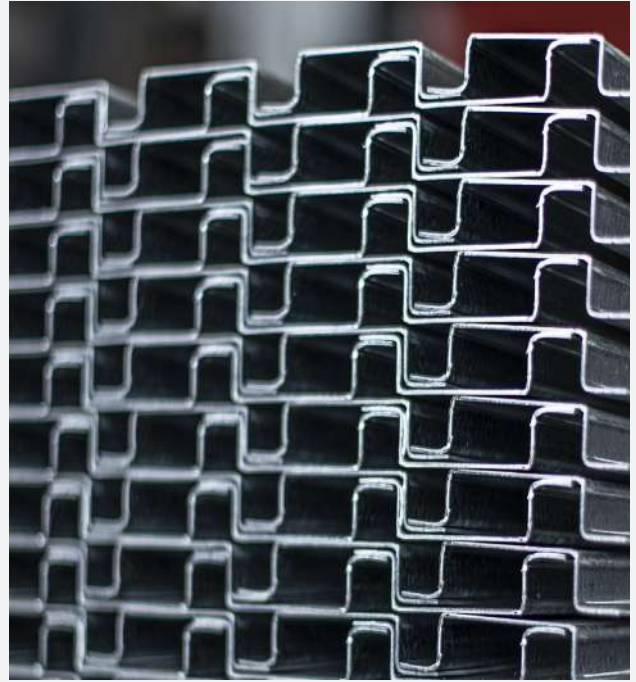
**MAGNA-SHIELD PRO™ (MSP)** has a harder coating layer than Galvanised Z350 and Aluminium-zinc coated steel. As a result, **MAGNA-SHIELD PRO™ (MSP)** offers improved scratch resistance to reduce abrasion caused by processing and forming, transportation, storage or installation.

Vicker Hardness (HV)	
MSP	140-160
Aluminium-zinc coated steel	100-110
Galvanised Z350	55-65

# Specific Application Industrial Constructions



Purlins



Junction Stud



Facade System



Bridging



# Other Building Type Applications



**Agricultural Facilities**



**Coastal Facilities**



**Aquatic Facilities**



**Animal Husbandry Facilities**



**Horticultural Facilities**



**Chemical Storage**



**Marine Facilities**



**Solar Farms**



# Corrosivity of the Environment – A Quick Guide

Corrosivity in Australia as defined in AS/NZS 2312.2 and described in AS 4312				
Environment Definitions	Distance from coast	Distance from source	Examples	
Level	Marine	Industrial	Indoor	Outdoor
C1	In dry, heated or air conditioned building		Heated spaces with low relative humidity and insignificant pollution. Offices, schools, museums	Dry or cold zones with very low pollution or time of wetness. More than 50km from coast
C2	Exterior location, or in non heated, non air conditioned building		Unheated spaces with varying temperature and humidity, low frequency of condensation and low pollution. Storage, sports halls	Atmospheric environment with low pollution. Rural areas or small towns and suburbia
C3	From 1km to 20- 50km from ocean, or 100m to 1km of sheltered water	Several Km downwind of industrial plant	Spaces with moderate frequency of condensation and moderate pollution from industry. Food processing plants, laundries, breweries, dairies.	Medium pollution or some effect of chlorides. Urban areas, sheltered coastal areas
C4	From 200-300m to 1 km from ocean, or closer than 100m of sheltered water	Within 12km of industrial plant, or in damp humid building	High frequency of condensation and high pollution. Industrial processing plants, piggeries, poultry and cattle feedlots, swimming pools	High pollution or substantial effect of chlorides. Polluted urban areas or coastal areas
C5	Offshore or up to 200-300m of ocean	Inside aggressive industrial plant	Spaces with very high frequency of condensation, and/or high pollution from the production process. Mines, Caverns, unventilated sheds in tropical zones	Very high pollution with significant effect of chlorides. Industrial areas, coastal areas

# Indicative Anti-Perforation Warranty Periods

Category	Designlife (years)	Exposure Condition	Warranty (years)
C1	100+	Indoor	50
		Outdoor Washed	50
		Outdoor unwashed	40
C2	100+	Indoor	50
		Outdoor Washed	40
		Outdoor unwashed	30
C3	30 - 100	Indoor	35
		Outdoor Washed	20
		Outdoor unwashed	12
C4	15-30	Indoor	12
		Outdoor Washed	9
		Outdoor unwashed	6
C5	8 - 15	Indoor	6
		Outdoor Washed	4
		Outdoor unwashed	3

## Notes:

The standard warranty is initially only applicable for C1 to C3 environments. For C4 and C5 Environments, please consult with Millform for more information. Warranties for these environments / classifications are applied on a project specific criteria and may be up to the time periods indicated above.

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