ArcelorMittal

Magnelis® for electrical equipment

High-level protection against corrosion

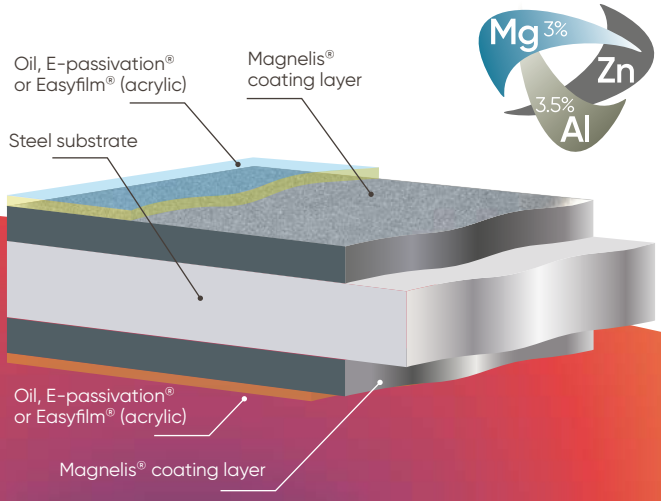
Electrical equipment is often at risk of corrosion due to the aggressive outdoor and indoor environments. This can be due to condensation, industrial or agricultural environments, local climates (e.g. marine or tropical), and the building's location and use. These factors can impact the structural integrity of electrical equipment, electrical safety, aesthetics, and the overall durability and service life of the system. Magnelis® is an effective answer to all of these challenges.

Magnelis® is an exceptional coating which provides superior corrosion protection for electrical equipment in and around many types of buildings including industrial, agricultural, commercial, data centers, hospitals, marine structures, warehouses, waste treatment plants, swimming pools and sports centers.

Magnelis® can be delivered according to ASTM A1046 as Type 2 classified coating. It has similar electrical conductivity to galvanized steels and allows direct grounding contact. Magnelis® can be post-painted with similar painting processes to those used for galvanized steels.

Magnelis® is produced on a continuous hot dip galvanizing line. The molten bath has a unique zinc-based composition, which includes 3.5% aluminum and 3% magnesium.

Thanks to its composition, Magnelis® provides an unprecedented level of surface and cut-edge corrosion protection, even in the most hostile environments.



The coating for high strength steels

Magnelis® can be applied to a full range of high strength steels (HSS) with a yield strength of up to 100 KSI. HSS allow designers to create light and cost-effective structures. ArcelorMittal's HyPer® range of HSS enables structural design to be optimized.

ArcelorMittal has developed several tools to demonstrate the technical and cost-effective benefits of HSS for various load cases and configurations.
Do not hesitate to contact us for more information.

The best alternative to post-galvanizing

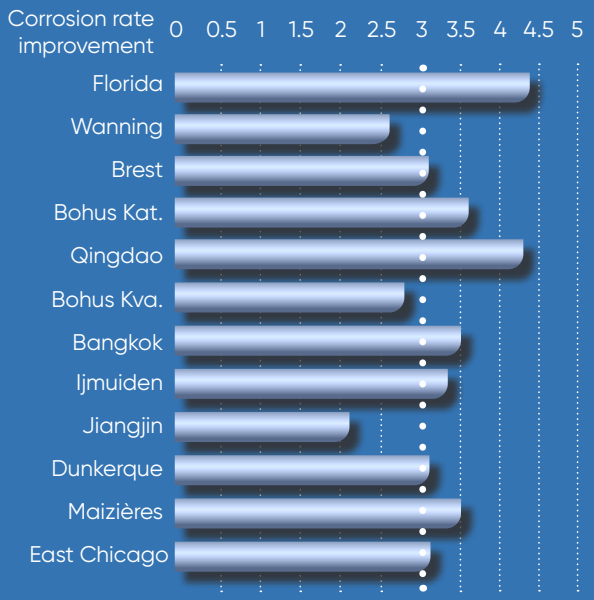
- Lower costs (less zinc usage, transportation, handling and manpower)
- Simplified logistics and less shipping time
- Better geometric tolerance for final parts (especially thin gauges) as there is no deformation of the steel during the coating process
- Lower environmental impact
- Smoother surface

Performance of Magnelis® in field tests

Since 2012, more than a thousand Magnelis® samples have been exposed in a variety of different environments around the world for outdoor corrosion testing.

Every test has confirmed the optimal protection provided by Magnelis® against long-term corrosion. Magnelis® offers at least twice the corrosion resistance of galvanized steel at the same coating thickness in all types of environments. In very aggressive environments, the performance of Magnelis® is even better.

Improvement factor between Magnelis® and regular galvanized steel in field testing



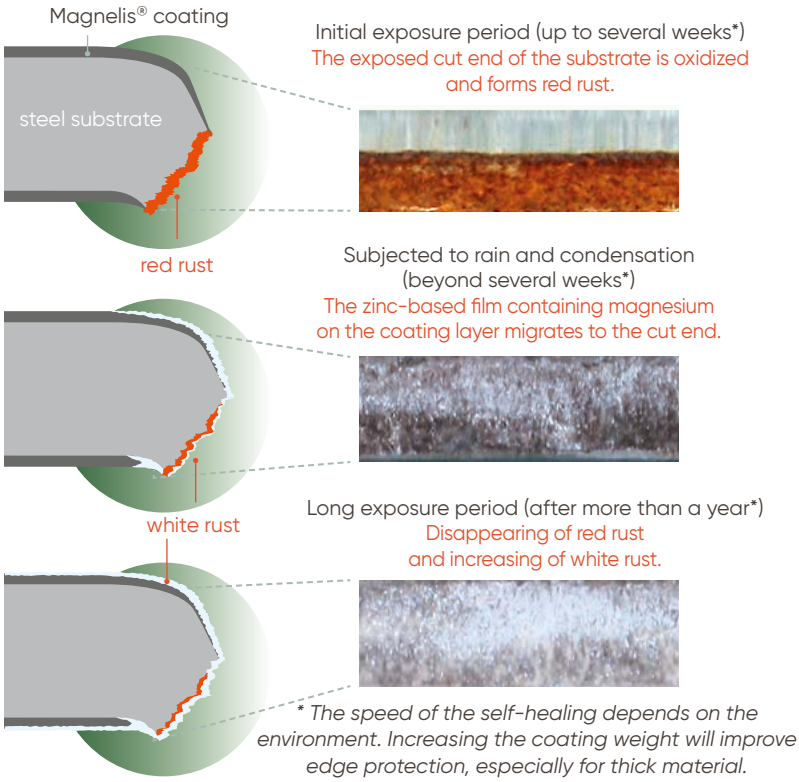
Average improvement:
~ 3 compared to regular galvanized steel

Edge protection with self-healing effect

Steel sheets are typically punched, perforated, and assembled to create complete electrical systems. The self-healing effect of Magnelis® ensures the protection of cut edges, scratches, and perforations.

When exposed to the environment, Magnelis® forms a very dense, protective film, unlike galvanized coatings where the film is very porous. If red rust is present on uncoated zones, it will gradually be covered by a film of Magnelis®. The speed of this effect depends on local environmental conditions and Magnelis® coating thickness.

It is almost impossible for the environment to penetrate this film. The result is perfect protection of the whole structure, even when the coating is scratched, cut, or perforated.



** The speed of the self-healing depends on the environment. Increasing the coating weight will improve edge protection, especially for thick material.*

Technical specifications

Coating designation	ASTM A1046M ASTM A1046	**ZMM90** **ZM30**	**ZMM120** **ZM40**	**ZMM180** **ZM60**	**ZMM300** **ZM100**	**ZMM450** **ZM140**	**ZMM600** **ZM210**
Coating mass (total both sides)	g/m²	90	120	180	300	450	620
	oz/ft²	0.30	0.40	0.60	1.00	1.40	2.00
Coating thickness	µm/per side	7	10	14	24	36	50
	mils/side	0.28	0.38	0.55	0.94	1.41	1.95
Surface treatment		E-Passivation® (CrVI-free), Easyfilm® (acrylic), Oiled					
Thickness		0.018 to 0.236 inches (0.45 to 6.00 mm)					
Width		Up to 66 inches (1680 mm)					
Steel grades*		CS Type A, B and C Grades 50 up to 100 (including high-elongation grades)					

* The coating weight selected must match the environment where the electrical equipment will be installed. ArcelorMittal can advise the appropriate coating weight for each application and location.

Performance against corrosion

ArcelorMittal has conducted salt spray tests of Magnelis® in accordance with the parameters of ASTM B117, as well as field tests around the world in various climate conditions. The results showed that Magnelis® ZMM120 (10 µm coating per side), through ZMM450 (36 µm per side) is an efficient solution to meet the requirements of different corrosive environments. For more details, please contact ArcelorMittal.

Protected by Magnelis®

Advantages of using Magnelis® for electrical equipment

Cable management

Cable trays and ladders

Protective tubes

Benefits of using Magnelis®:

- Improved durability, especially in marine environments (offshore, ship, seashore, wind towers) or aggressive indoor environments (hot and humid conditions such as greenhouses and tunnels, industrial/chemical operations, and agricultural buildings with alkaline environments)
- Improved edge protection, for perforated parts in particular
- Better behavior in roll forming and bending operations thanks to a low friction coefficient
- Cost-effective solution compared to post-galvanized steel, aluminum, or stainless steels

Electric drives

Mobility equipment drives

Building drives (doors, windows, shutters, rollers...)

Engine casings and equipment

Lighting

Exterior poles

Interior and exterior lighting

Industrial lighting and decorative applications

Other metal accessories and holders

Power distribution

Low voltage: cabinets, switches, charging infrastructure, metal accessories.

Medium voltage: stations, transformers...

Transmission poles/towers

Energy management

Batteries (casing, containers)

Metal accessories

Accumulators

Benefits of using Magnelis®:

- Improved durability in harsh outdoor environments, especially when located in marine areas
- Improved durability in aggressive indoor environments (for example, industrial buildings with hot and humid atmospheres, agricultural buildings with alkaline environments, greenhouses, tunnels, swimming pools...)
- Reduction of maintenance costs thanks to
  - Longer durability (for example, avoids maintenance at height for lighting)
  - Better resistance to surface damage and scratches thanks to the harder coating and self-healing effect
- Longer tooling lifetime and reduced maintenance in manufacturing thanks to the harder coating and lower friction coefficient
- Compared with post-galvanizing:
  - More cost effective solution
  - Reduced part deformation
  - Better aesthetics

A certified solution

ArcelorMittal's Magnelis® coating is certified by independent organizations, for its corrosion protection performance. Certification has been received from:

- German Institute for Building Technology (DIBt)
- French Scientific and Technical Centre for Building (CSTB)
- Research Institute of Sweden (RISE).

The durability of Magnelis® in various corrosion environments and categories has been certified by these organizations. DIBt has also validated the cut edge protection of Magnelis® on substrates up to 6.0 mm thick (with ZM310 and ZM430 coatings). These edges do not need to be re-protected unless there are aesthetic requirements for the application. This makes Magnelis® a very attractive coating, especially for perforated parts and cable trays.

Version 1 : 25/10/2017

Company: ArcelorMittal Flat Carbon Europe SA
Address: 24-26 Boulevard d'Avranches, L-1160 Luxembourg
Customer: Marley Eternit

Declaration concerning the classification of fire reaction of Magnelis ® steel product under the Construction Product Regulation

Flat carbon steel production centers:
ArcelorMittal Atlantique et Lorraine SAS, ArcelorMittal Belgium S.A, ArcelorMittal Bremen GmbH, ArcelorMittal Dudelange S.A., ArcelorMittal Eisenhüttenstadt GmbH, ArcelorMittal España S.A., ArcelorMittal Galati SA, ArcelorMittal Méditerranée SAS, ArcelorMittal Ostrava a.s., ArcelorMittal Piombino S.p.a., ArcelorMittal Poland S.A., ArcelorMittal Sestao S.A., ArcelorMittal Skopje, ArcelorMittal Tailored Blanks, ArcelorMittal Technotron s.r.o.

The Commission Delegated Regulation (EU) 2016/364 establishes classes of reaction to fire performance for construction products, in the framework of the Construction Product Regulation pursuant to Regulation (EU) No 305/2011 of the European Parliament and of the Council. The decision 96/603/EC, amended by the decision 2000/605/EC, establishes the list of construction products pertaining to the (Euro)classes "No contribution to fire" A1 and $A1_{FL}$ without prior testing (products equivalent to incombustible products). See appendix in page 2.

Accordingly, Magnelis ®, as a metallic coated steel, is classified in the Euroclasses A1 and $A1_{FL}$ without testing.

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ArcelorMittal Flat Carbon Europe

These certificates are available on request.

Reaction to fire

Magnelis® is classified in the Eurocode classes A1 and A1FL for fire hazards. A declaration showing the performance of Magnelis® in a fire is available on demand.

A lower environmental footprint

The application of a Magnelis® coating ensures the preservation of natural resources as it uses significantly less zinc than pure zinc coatings to achieve equivalent corrosion protection.

Magnelis® is 100% recyclable and does not contain any harmful elements. It is REACH compliant, and an environmental product declaration (EPD) is available.

More information about Magnelis®

Visit the Magnelis® homepage at
industry.arcelormittal.com/magnelis

Any questions?

Ask them via our contact form at:
industry.arcelormittal.com/getintouch

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Credits

Images: Shutterstock.com – Vinokurov Alexandr, Piotr Wytrazek, Nutthapat Matphongtavorn, Maximumm; Safety Product
Magnelis® artwork: Philippe Vandenameele
Magnelis® samples: ArcelorMittal R&D

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