

# ISOTEC ENERJİ / TECHNICAL REPORT

## Corrosion Performance and Warranty Report for ZM / Magnelis per C1-C5 Classes

This report has been prepared for the evaluation of ZM-coated products under atmospheric corrosion classes and for separating the official Magnelis® design-life and warranty declarations from generic ZM performance.

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Usage Note	This report is based on standards uploaded by the user, manufacturer publications, EN 10204 Type 3.1 certificates, and publicly available sources verified as of 16.04.2026.

**Critical terminology note:** "Magnelis" is a registered trademark. For technical accuracy, the generic term "ZM (Zn-Al-Mg) coated steel" is used wherever possible in this study; manufacturer-specific data are separated accordingly.

### Executive Summary

- C1-C5 classes define environmental severity; actual service life depends not only on the coating class, but also on design, water-retention behavior, cut edges, the maintenance regime, and local microclimate.
- The Magnelis technical publication provides expected design-life ranges for ZM310 / ZM430 / ZM620 under C2-C5 classes. These values are manufacturer-specific, indicative, and non-binding design-life figures.
- The generic warranty statement in official manufacturer publications is "up to 25 years" for specified applications; this cannot be interpreted as a universal warranty across all C classes and all ZM brands.
- The atmospheric design-life table does not cover soil contact, continuous moisture, continuous concrete contact, or abrasion-prone sites. Such situations require separate field data and project-specific approval.
- Practical conclusion for ISOTEC: ZM310 is technically viable for C2-C3 inland sites; for corporate standardization, ZM430 is a safer baseline; for C5 and soil-contact scenarios, supplier-specific advanced verification is mandatory.

### 1. What Do the C1-C5 Classes Represent?

Class	Typical Environment	PV Plant Interpretation
C1	Heated dry indoor environments; very low corrosivity	Not typical for open-field PV installations
C2	Rural atmosphere with low pollution; low severity	Many inland ground-mount PV sites may approach the lower end of this band
C3	Urban / light industrial / low-salinity coastal	Many standard sites in Turkey are classified here
C4	Moderate-to-severe industrial or moderate-salinity coastal	Critical threshold for humid, polluted coastal sites

Class	Typical Environment	PV Plant Interpretation
C5	Very high salinity / high humidity / aggressive industrial environment	Project-based approval required for standard ZM usage

These classes are the starting point for surface-protection-system selection. Even within the same class, a ponding detail, a sharp edge, a covered water pocket, fertilizer/ammonia exposure, windblown sand, or soil contact can materially change service life.

## 2. Design Life, Warranty, and Actual Field Life Are Not the Same

Term	Correct Meaning	ISOTEC Interpretation
Expected design life	Forecast based on average coating consumption under a defined environment	Used in project pre-design
Warranty	The commercial / technical commitment made by the manufacturer under defined applications and conditions	Must be read project- and brand-specifically
Actual field life	The realized life shaped by detail design, installation, maintenance, and microclimate	Managed through corporate experience and field feedback

*Using non-binding design-life values as "warranty duration" is a technical error. A warranty is meaningful only in combination with the brand, project location, distance from shoreline, slope, detail geometry, and operating condition.*

## 3. Official Magnelis Design-Life Table

Corrosion Class	ZM310	ZM430	ZM620*
C2	> 50 years	> 50 years	> 50 years
C3	30 to > 50 years	40 to > 50 years	> 50 years
C4	15 to 30 years	20 to 40 years	30 to > 50 years
C5	8 to 15 years	10 to 20 years	15 to 30 years

\\* Per manufacturer note, as of June 2023, ZM620 is a special class not included in EN 10346:2015. Therefore it must be defined explicitly in the contract.

*Figure 1. Visualization of the C2-C5 design-life ranges in the Magnelis publication.*

## 4. How to Read Official Warranty Statements

- The official promotional and warranty publications of ArcelorMittal include an "up to 25 years" warranty statement for ZM310 under specified applications.
- This statement applies to specific applications such as inland roofing/facade, solar structures, and light structural components, and is conditional on the environment and the application.
- The same publication explicitly implies that the warranty is application-specific and environment-specific. Therefore, the conclusion "every ZM310 product carries a 25-year warranty" cannot be drawn.

- For in-soil behavior, desert abrasion, coastal salt, fertilizer/ammonia, or concrete contact, separate manufacturer-specific data sets must be evaluated.

## 5. Practical Classification and Recommendations for PV Sites

Site Type	Approximate Environmental Class	Recommended Baseline Solution	Note
Inland, rural, low pollution	C2-C3	ZM310 technically feasible; ZM430 preferable as corporate baseline	ZM430 is safer for long-term supply standardization
Near-urban / moderate humidity / moderate pollution	C3-C4	ZM430	Check cut-edge and water-pocket details
Near-coastal, high salt and humidity	C4-C5	ZM620 or supplier-approved equivalent; alternatively HDG/duplex	Brand and project approval mandatory
Elements in soil contact	Outside atmospheric C classes; special case	For Magnelis, ZM430/ZM620 data exists; for other brands, separate evidence required	EN 10346 design-life table does not cover this case
Desert / abrasion-prone sites	Abrasion-critical special case	ZM430 and above + abrasion data	Not only corrosion class, but also hardness and abrasion are determinant

## 6. Limits of Extending Magnelis Data Directly to Generic ZM Class

The 3.1 certificates you have uploaded point to the PosMAC family. Therefore, although Magnelis's official design-life and warranty data are highly valuable for technical benchmarking, they must not be transferred automatically to PosMAC or any other ZM brand.

- Even within the same ZM310 class, coating chemistry, process settings, and field data can vary by manufacturer.
- When switching brands, field life / cyclic test / soil data / warranty letter must be requested together.
- For critical projects, supplier equivalence must be approved through a performance dossier, not the certificate alone.

## 7. The Single Recommended Path for ISOTEC

**From a corporate standardization standpoint, the correct path is: adopt ZM430 as the baseline for atmospheric projects; for C5, soil contact, and heavy-abrasion sites, use only products supported by supplier-specific evidence. Only in low-risk C2-C3 inland sites — where cost optimization is required — may ZM310 be retained subject to project-based evaluation.**

## References

- ArcelorMittal Magnelis® technical brochure – in particular pp. 19, 23, 27, 29, 39, 41, 43, and 49.
- ArcelorMittal official warranty / promotional documents – pages verified as publicly available on 16.04.2026.
- ISO 12944-2:2017 – official summary page for environmental corrosivity classification.

- TS EN 10346:2015 – ZM definition and coating classes.
- Uploaded 3.1 certificates (POSCO / PosMAC) – critical internal source for brand differentiation.