Instytut Techniki Budowlanej
Building Research Institute

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TECHNICAL OPINION

Technical opinion with regard to corrosion resistance of ZM310 and ZM430 zinc-magnesium coatings, applied as anti-corrosion protection for AGS substructur es to mount ventilated façades, in the corrosion environment of category C5, pursuant to PN-EN ISO 12944-2:2018

02865/19/Z00NZM

Warsaw, November 2019

RESEARCH | OPINIONS | EXPERTISE

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1. FORMAL GROUNDS OF THE OPINION

The opinion was drawn up at the request of AGS Sp. z o.o. limited liability company, pursuant to contract no. 02865/19/Z00NZM.

2. OPINION OBJECT AND SCOPE

The object of the opinion was the AGS construction for mounting ventilated façades, made of steel sheets protected against corrosion with ZM310 or ZM430 zinc magnesium coating. The steel load-bearing substructure consists of brackets and a grid made of profiles.

The scope of the opinion covered:

- An analysis of laboratory test results,
- The evaluation of laboratory tests of corrosion resistance with regard to the environment of the object's application,
- assessment of possible application of the ZM310 and ZM430 zinc magnesium coatings as anti-corrosion protection for the AGS steel substructure to mount ventilated façades, in the corrosion environment of category C5, pursuant to PN-EN ISO 12944-2:2018.

3. LEGAL GROUNDS OF THE OPINION

The legal grounds for the opinion were as follows:

- Test report by the Building Research Institute no. LZM00-02865/19/Z00NZM, with regard to the tests of corrosion resistance of ZM310 and ZM430 zinc-magnesium coatings,
- Test report by the Precision Mechanics Institute entitled "Evaluation of corrosion resistance of construction elements made of GD350 steel, coated with Magnelis ZM430, in combination with elements made of 304 stainless steel, applied to mount brackets",

- Allgemeine bauaufsichtliche Zulassung / Allgemeine Bauartgenehmigung nummer Z-30.11-51 of 17.09.2019, published by the German Building Technology Institute, Steel strips to manufacture thin-walled, cold-formed construction elements, protected against corrosion with the metal "Magnelis®" coating
- Swedish Technical Approval no. SC0559-13, 05 June 2014, "Magnelis ZM310, Corrosion protection coating",
- PN-EN 10346:2015 "Flat steel products, hot-dipped continuously, for cold-forming. Technical conditions for delivery",
- PN-EN ISO 9223:2012 "Corrosion of metals and alloys. Corrosivity of atmospheres - Classification, determination and estimation"
- PN-EN ISO 12944-1:2018 "Paints and Varnishes - Corrosion Protection of Steel Structures by Protective Paint Systems - Part 1: General Introduction",
- PN-EN ISO 12944-2:2018 "Paints and Varnishes - Corrosion Protection of Steel Structures by Protective Paint Systems - Part 2: Classification of environments",
- PN-EN ISO 9227:2017 "Corrosion tests in artificial atmospheres - Salt spray tests"
- PN-EN ISO 3231:2000 "Paints and Varnishes. Determination of Resistance to Humid Atmospheres Containing Sulphur Dioxide",

4. ZM310 and ZM430 coatings pursuant to PN-EN 10346:2015

Pursuant to PN-EN 10346:2015 standard, the composition of bath to apply zinc-magnesium coating consists of aluminium and magnesium from 1.5% up to 8%, containing at least 0.2% of magnesium and the remaining amount is zinc. The weight of ZM310 and ZM430 zinc-magnesium coatings and the admissible deviations of thickness pursuant to PN-EN 13046:2015 are presented in Table 1.

Table 1. Weight and thickness of ZM310 and ZM430 zinc-magnesium coatings pursuant to PN-EN 10346

Type of coating	Minimum mass of coating, on both sides [g/m^2]		Thickness of coating, per side [µm]		Density of coating [g/cm^3]
	Test in three places	Test in One place	Typical value	Scope	
ZM310	310	265	24	18-31	6,2-6,6
ZM430	430	365	35	26-46	

5. EVALUATION OF LABORATORY TEST RESULTS

Tests of resistance to neutral salt spray referred to in the test report of the Precision Mechanics Institute have shown that the ZM430 zinc-magnesium coating is an effective protection measure against red corrosion on the surface of sheet metal, after 1500 hours of exposure.

Tests of resistance to humid atmosphere, containing 2l SO_2, referred to in the test report of the Building Research Institute no. LZM00-02865/19/Z00NZM showed that the ZM310 and ZM430 zinc-magnesium coating is an effective protection measure against red corrosion on the surface of sheet metal, after 15 cycles of exposure.

The rusty discolouration observed at the edges of metal sheets after the neutral salt spray test and the test of humid atmosphere, containing SO_2, do not pose a threat of further corrosion due to cathodic protection of zinc-magnesium coatings.

6. CONCLUSIONS

1) The AGS steel substructure for mounting ventilated façades, made of steel sheets protected against corrosion with ZM310 zinc-magnesium coating, can be applied in an environment of corrosion category and usability period of C5 M pursuant to PN-EN ISO 12944-1:2018 and PN-EN ISO 12944-2:2018.

2) The AGS steel substructure for mounting ventilated façades, made of steel sheets protected against corrosion with ZM310 zinc-magnesium coating, can be applied in an environment of corrosion category and usability period of C5 H pursuant to PN-EN ISO 12944-1:2018 and PN-EN ISO 12944-2:2018.

3) Cutting edges which were cut by way of so-called zinc pulling over the edge, with a grinder without overheating, and by means of other available technologies (with a steel-cutting saw, milling, etc.) up to the sheet thickness of 3 mm, can remain unprotected since their zinc-magnesium coating provides a cathodic protection. It is admitted for the unprotected cut edges of sheets to have rusty discolourations.

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I, Ewa Łozińska-Małkiewicz, Sworn Translator of English, do hereby certify that the above document is a true and lawful translation of the document drawn up in Polish.
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