

MAGPASS-COAT®

Electroless chrome-free process for the production of corrosion-resistant passivation layers on magnesium-based materials

MAGPASS-COAT® is a process for the electroless production of chrome-free conversion layers on magnesium-based materials. This process guarantees temporary corrosion resistance, which can be considerably improved by means of the following sealing and/or paint finishes. The conversion layer consists of oxide products of the base material (MgO , $\text{Mg}(\text{OH})_2$) and oxides from the passivation solution (MnO_2 , Mn_2O_3 and other metal oxides). The process and products are both patented.

Mechanical characteristics of coating

Coating adhesion > 14.2 MPa (DIN EN 24624) (equivalent to chromate layers)

Coating thickness: depending on alloy, 0.3 – 1.0 μm

Dimensional stability: not affected (see “Pretreatment”)

Physical characteristics of layers:

Surface resistance: depending on alloy, 0.3 – 0.6 Ω / cm

Temperature resistance: Retains surface quality throughout 6-month duration test (90 °C, dry heat)

Colour/Appearance: depending on alloy, from yellow to brown

Corrosion resistance (according to DIN EN ISO 9227 NSS)

without sealant:	5 – 10 hours
with sealant (DE-PS 4138218):	450 – 600 hours
with epoxy powder coating (80 – 100 µm):	530 – 600 hours

Tank and equipment

MAGPASS-COAT® can be applied using existing chromating equipment. Heat-resistant, opaque plastic tanks must be used. The bath can be heated via a heat-exchanger or with the help of immersion-heating elements (glass, PTFE). The circulation pump should be capable of circulating one bath volume per hour. Filtration should be provided by cartridge filters with a penetrability of 5 µm.

The tank should be kept covered when not in use, in order to prevent evaporation loss, the entry of impurities and premature decomposition of the bath components due to the action of UV light.

Delivery

MAGPASS® Electrolyte will be delivered as a two-component system:

MAGPASS® Salt	Solid matter for the solution preparation and replenishing
MAGPASS® Solution	Liquid, for the solution preparation and the replenishing

Operating conditions

Solution preparation for 100 Liter

1. 60 %	of the bath volume are filled with distilled or fully-desalinated water with a conductance value of < 20 µS/cm and heated up to 35 °C
2. 25 %	MAGPASS® Solution are added (by constant agitation)
3. 300 g	MAGPASS® Salt are added (by constant agitation)
4.	Top up bath volume to 100 % with distilled or deionized water with a conductance value of < 20 µS/cm
pH value setup	7.5 – 8.0 (measured at 20 °C), reduce with phosphoric acid (75 %), increase with caustic soda (10 %). Both chemicals should be of low chloride content.
Replenishing	The amount of replenishing depends on the base material and drag out. We recommend for each 10'000 dm ² passivated surface:
	MAGPASS® Salt: 90 – 110 g
	MAGPASS® Solution: 14 – 18 L

Operating temp.	25 – 35 °C
Treatment time	Immerse parts for five minutes
Agitation	Agitation of parts can be useful, but is not absolutely vital, no air-injection
Rack material	Plastic (PP, PE)

Base materials

All technologically useful cast, die-cast or wrought alloys can be coated using this process. These include magnesium alloys with the following component parts:

Al up to 9.5 %, rare earths up to 3.0 %, Ag up to 3.0 %, Zn up to 1.0 %, Zr up to 1.0 %, Mn up to 0.6 %

Pretreatment

RIAG Oberflächentechnik will be pleased to supply pretreatment instructions designed for specific applications. Pretreatment of the Mg parts is generally carried out in conc. phosphoric acid (75 %) at room temperature with a standing time of 30 s. The concentrated phosphoric acid must be rinsed off quickly to avoid dimensional problems with the Mg part. The pretreated Mg- parts should be neutralized by immersing them in 10 % caustic soda for 30 s at room temperature and then rinsed clean.

Solution monitoring

An analysis sample should be taken from the agitated tank (solution temperature 30 °C ± 5 °C) at intervals of 100 dm²/L of surface treatment. The sample is analyzed to determine one of its main components. For each gramme of **MAGPASS® Salt** we recommend to add at the same time 160 mL **MAGPASS® Solution** to the electrolyte for maintenance.

Main component of **MAGPASS-COAT®** electrolyte (target value):

MAGPASS® Salt 3.0 g/L ± 0.5 g/L

Waste-water disposal

Waste electrolyte and water used for rinsing should be disposed off according to the relevant regulations.

Potential hazards and safety instructions

These details can be found in the material safety data sheet supplied with **MAGPASS-COAT®**. The relevant safety data sheets for the handling of phosphoric acid and caustic soda should be obtained from the suppliers concerned.

Storage

Keep **MAGPASS®** chemicals tightly sealed, in a dry place and away from inflammable materials, at a temperature between + 15 and + 25 °C. Chemicals stored under these conditions have a shelf-life of six months.

Liability

This instruction manual was compiled with reference to the state of the art and all current standards, and is based on the long-term knowledge and experience of RIAG. However, RIAG cannot monitor compliance with this instruction manual and the methods described herein at the customer/end-user's premises. Work carried out with RIAG products must be adapted accordingly to meet local conditions. In particular, RIAG cannot accept liability for damage, loss or cost incurred due to a failure to adhere to this instruction manual, improper application of the methods, unauthorised technical modifications, insufficient maintenance or the absence of maintenance in respect of the requisite technical hardware or equipment, or in the event of use by unqualified personnel. RIAG is not liable for damage or loss caused by RIAG or its employees except where intention or gross negligence can be proved. RIAG furthermore reserves the right to make changes in relation to products, methods and the instruction manual without prior notice.

Our goods and services are subject to the General Terms and Conditions for Delivery of the Association of Surface Technology Suppliers (VLO), which can be viewed at www.riag.ch (link "General Terms and Conditions", document "RIAG Oberflächentechnik AG (Wängi, Switzerland) 50 KB", version 1/2014), which we would be glad to send to you on request.

This transaction is governed by material Swiss law (Law of Obligations), excluding private international law (conflict of laws) and intergovernmental treaties, specifically the CISG.

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Analytical Control

Determination of Potassium permanganate (KMnO₄)

Reagents: Sulfuric acid 1 mol/L
Oxalic acid 0.05 mol/L
deionized water

Procedure: 10 mL Pipette
50 mL **MAGPASS[®] Electrolyte** (working solution) into 250 mL
20 mL Erlenmeyer flask, add
deionized water and
Sulfuric acid 1 mol/L. Heat the solution to 70 °C and
titrate immediately with Oxalic acid 0.05 mol/L until the solution
becomes colourless

Calculation: mL titrated Oxalic acid 0.05 mol/L x 0.316 = g/L **MAGPASS[®] Salt**

Additions Additions only if **MAGPASS[®] Salt** is less than 3.0.
For each g of **MAGPASS[®] Salt** we recommend to add at the same time
160 mL **MAGPASS[®] Solution** to the electrolyte for maintenance.

We recommend you to send an analysis sample, taken from the agitated tank,
every 300 dm²/L of surface treated.