

## riag PMn 922

### Acidic phosphating agent generating manganese phosphate coatings in immersion processes

The **riag PMn 922** is a phosphating process which produces uniform coatings of manganese phosphate on steel and ferrous materials.

#### Properties

- Easy to operate, broad working area
- Excellent corrosion protection
- Excellent absorption of anticorrosion agents
- Produces uniform micro- or coarse crystalline coatings
- Coating weight of up to 40 g/m<sup>2</sup> possible

#### Make-up

	Range	Optimum
<b>riag PMn 922 Additive</b>	80 – 140 mL/L	100 mL/L
Total acid (TA)	12 – 13 points	12.5 pts
Free acid (FA)	1.5 – 2.5 points	2.0 pts
Ratio	6 – 9	7.5
Iron (II)-content	0.1 – 0.4 %	0.2 %
Temperature	93 – 100 °C	as required
Dip time	15 – 30 min.	as required

Fill tank with water up to  $\frac{3}{4}$  of the final volume. Add the required amount of **riag PMn 922 Additive** and fill up with water to the final volume. Heat the agent up to a working temperature of 70 – 75 °C. By adding steel wool (120 g/100 L bath) or steel scraps (600 g/100 L bath) the iron content is increased to a minimum amount. This takes about 30 – 60 minutes. The ratio of total acid to free acid is being determined by analysis and adjusted to the optimum. After heating up to the minimal temperature the electrolyte is ready for use.

## Operating parameters

Temperature	93 °C (93 – 100 °C)
Make-up	Typically 100 mL/L <b>riag PMn 922 Additive</b>
Total acid (TA)	12.5 points (12 – 13 points)
Free acid (FA)	2.0 points (1.5 – 2.5 points)
Ratio	7.5 (6 - 9) The ratio is determined by the amount of total acid compared to free acid
Iron content	0.2 % (0.1 – 0.4 %) The correct amount of iron is very important in order to get satisfying coatings. During longer shutdown times the iron content has to be checked before start-up.
pH - Value	2.0 – 2.4 Phosphating processes are usually controlled by TA, FA and / or the ratio of TA to FA
Agitation	Not essential but beneficial (involves continuous sludge removal)
Tank	Stainless steel or lined steel tanks. The bottom of the tank should either have a slope, a sludge channel or a disc valve.
Heating	Stainless steel heaters or PTFE lined. Optimal heating results can be achieved by heating alongside the tank without locally overheating. Thermostatic temperature control is necessary.
Cooling	Not necessary
Exhaustion	Absolutely necessary

## Replenishment

To increase the total acid by 1 point add 9.5 mL/L **riag PMn 922 Additive**. This will increase the free acid by 0.35 points. Should the content of free acid get too high adjust it by adding small amounts of sodium hydroxide (Caution!). Ideally replenishment is done with a dosing pump.

## Procedure

1. Cleaning and degreasing
2. Rinsing
3. Pickling (only necessary if parts are very rusty)
4. Rinsing / Activation in **riag PMn 920**
5. Phosphating in **riag PMn 922**
6. Rinsing
7. Neutralising
8. Anti-corrosive oil and / or drying

## **Desludging**

Phosphating processes produce sludge which has to be removed regularly. After desludging or a partial electrolyte loss water has to be added. The electrolyte has to be analysed and replenished accordingly.

## **Corrosion protection**

Ask for our non-committal advice

## **Waste water treatment / Environmental protection**

All concentrates, rinse waters and waste solution must be treated and discharged in accordance with local effluent control regulations. The product contains acids; please consider your own safety. Information can be gleaned from the material safety data sheets.

## **Safety instructions**

For further information please consult the material safety data sheets. Chemicals must not be stored below 10°C.

## **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](http://www.riag.ch) (link "terms and conditions", document "General Terms and Conditions for Delivery", version 3/2018), which we gladly send 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.

riag Oberflächentechnik AG  
Murgstrasse 19a  
CH-9545 Wängi  
T +41 (0)52 369 70 70  
F +41 (0)52 369 70 79  
[riag.ch](http://riag.ch)  
[info@riag.ch](mailto:info@riag.ch)

## Analysis (Analytical methods)

### Sample preparation:

The sample must be taken from a well-mixed location and allowed to cool down to 25 °C. If needed the sludge has to be removed by decantation.

### Free acid in riag PMn 922

Reagents: Sodium hydroxide solution 0.1 mol/L  
Bromophenol blue (1 % in ethanol)

Procedure: 10 mL phosphate solution are transferred via pipette into a  
250 mL beaker, add  
50 mL deion. water, add  
5 drops bromophenol solution

Titrate with sodium hydroxide solution from red to blue.  
The colour change is rather dragging.

Calculation: Use of NaOH in mL : 5 = free acid (FA points)

### Total acid in riag PMn 922

Reagents: Sodium hydroxide solution 0.1 mol/L  
Phenolphthalein (1 % in ethanol)

Procedure: 2 mL phosphate solution are transferred via pipette into a  
250 mL beaker, add  
10 mL deion. water, add  
3 drops phenolphthalein solution

Titrate with sodium hydroxide solution from colourless to pink.

Calculation: Use of NaOH in mL = total acid (TA points)

Use of NaOH in mL x 9.6 = mL /L **riag PMn 922**

Ratio = total acid (points) : free acid (points)

## Iron (II) in riag PMn 922

Reagents: Potassium permanganate 0.02 mol/L  
Sulfuric acid (1:1)

Procedure: 10 mL phosphate solution are transferred via pipette into a  
250 mL beaker, add  
50 mL deion. water, add  
1 mL sulfuric acid

Titrate with potassium permanganate from colourless to purple. Purple colour has to stay for 15 seconds.

Calculation: Use of potassium permanganate in mL x 0.05 = % Iron (II)