


LOW TEMPERATURE ZINC PHOSPHATATION




Harmony in Chemistry

Balanced option to conventional zinc phosphates

SURFACE CAMPUS 13th to 15th November 2018
Trade Fair for Surface Technology, Den Bosch, The Netherlands


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Pre-Treatment

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Set the trend!

**Low-temperature zinc phosphating
easy on the budget AND the environment.**



COMPARISON OF ZINC PHOSPHATE TECHNOLOGIES

New processes based on zirkonium have been established in many applications due to considerable cost savings.
Nevertheless: Zinc phosphatation systems have specific power!

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COMPARISON: CONVENTIONAL ZINC PHOSPHATE VERSUS LOW TEMPERATURE ZINC PHOSPHATE

Conventional zinc phosphate

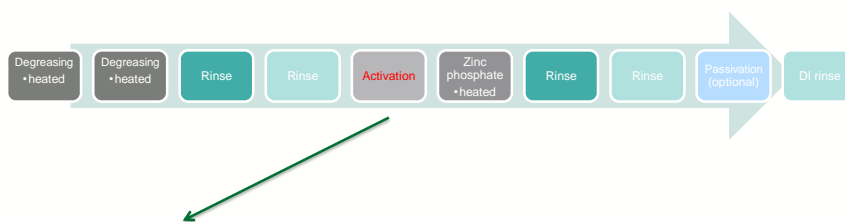
pH-value of bath: 2,8 – 3,2
 el. conductivity: >5.000 µS/cm
 temperature: 45 – 55 °C
 coating composition: crystalline zinc phosphate, iron phosphate, nickel-, manganese phosphate
 coating weight: 2 – 4 g/m²
 sludge: 5 g/m² dry and more
 substrates: steel, zinc coated steel, aluminium

Low temperature zinc phosphate

pH-value: 2,8 – 3,2
 el. conductivity: > 5.000 µS/cm
 temperature: 35 °C
 coating composition: crystalline zinc phosphate, iron phosphate, nickel-, manganese phosphate
 coating weight: 1,5 – 3,5 g/m²
 sludge: around 3 g/m² dry
 substrates: steel, zinc coated steel, aluminium

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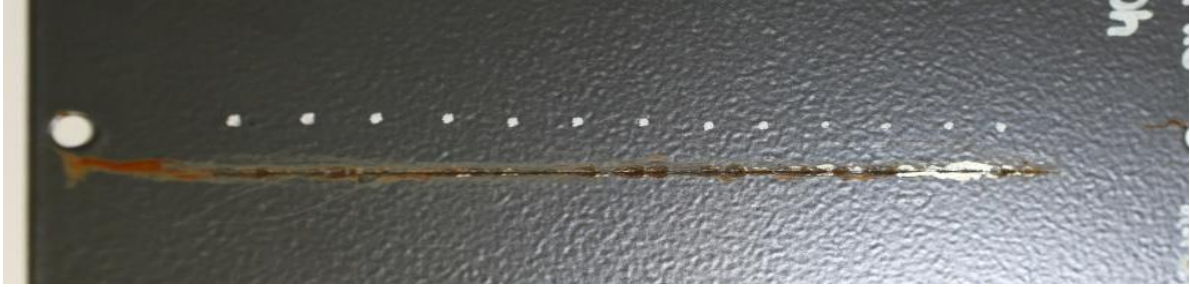
ZINC PHOSPHATATION PROCESS



ACTIVATION

- Low temperature zinc phosphate is preferably combined with AKTIVATOR 3
- AKTIVATOR 3 is a liquid, zinc phosphate-based activator
- The excellent activation supports the phosphate process to generate small crystals, resulting in a low phosphate coating weight
- This produces considerable savings in phosphate replenisher consumption

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LOW TEMPERATURE ZINC PHOSPHATE INSTEAD OF A COSTLY APPROVAL PROCESS FOR THIN FILM TECHNOLOGY

Approvals

- Change in technology may need new approvals
- Filing of approval procedure and test runs generate expenses
- Time loss until process change

Alternative low temperature zinc phosphate

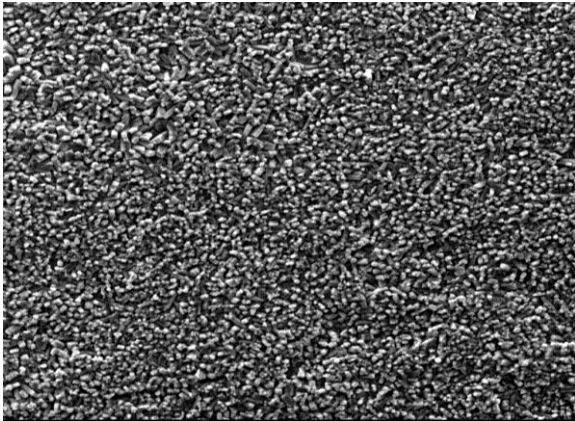
- Similar process as before
- Cost savings due to lower energy consumption, less sludge disposal and less maintenance
- Performance equal to conventional zinc phosphate

ADVANTAGES OF LOW TEMPERATURE ZINC PHOSPHATE

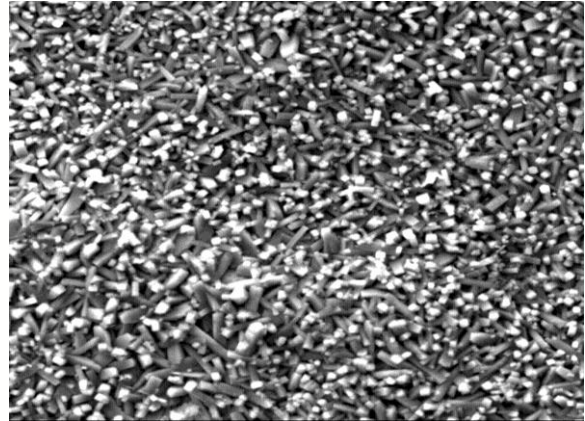
- Less energy consumption ($\Delta 10 - 15 \text{ K}$)
- Less water evaporation in PT spray lines
- Lower risk of pre-passivation
- Less replenisher consumption
- Considerably less maintenance work (line descaling, nozzle cleaning)
- Sludge separation / -disposal



COMPARISON LT-PHOSPHATE AND CONVENTIONAL PHOSPHATE



LT-zinc phosphate at 35°C bath temperature



Conventional zinc phosphate at 50°C bath temperature

TEST RESULTS

Mechanical testing

Mandrel test (DIN EN ISO 6860)	√
Ball impact test (DIN EN ISO 6272-1)	√

Corrosion testing

VDA – test (VDA 621-412, 10 cycles)	1 – 2 mm
Neutral salt spray test (DIN EN ISO 9927, 1008 h)	< 1mm

Functional testing

Coating weight	1,5 – 3 g/m ²
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Test chamber neutral salt spray test



COMPARISON OF BATH PARAMETERS

Parameter	Zn-Phos	LT-Zn Phos
Temperature	45 – 50	35
Free acid	1,5 – 2,1	1,5
Total acid	23 – 30	26
Accelerator (Nitrite)	1,5 – 2,0	2,5
Zinc (g/l)	1,2 – 1,8	1,5



Bath analysis



SAVINGS

	Zn-Phos	LT-Zn Phos*
Energy	100%	70 – 75%
Sludge volume	100%	65 – 75%
Bath maintenance	100%	75 – 80%
Chemical consumption	100%	85 - 90%



* Values from trials in technical center and field applications



PRODUCT PORTFOLIO

Process step	Product name Low Temperature zinc phosphate
Degreasing	Individual selection
Rinse conditioning / activation	AKTIVATOR 1 (for spraying application) AKTIVATOR 3 (for immersion application)
Phosphating bath	DECORRDAL 307 LT A DECORRDAL 201 LT DECORRDAL 330 LT DECORRDAL 560 LT A DECORRDAL 570 LT BESCHLEUNIGER 111 (sodium nitrite) BESCHLEUNIGER 110 (sodium nitrite / non toxic labelling)
Passivation	DECORRDAL 25-1 (non chrome passivation) DECORRDAL 25-3 (non chrome passivation)

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SUMMARY:
LT-PHOSPHATATION AS INTERMEDIATE STEP TO THIN FILM TECHNOLOGY

- Zinc phosphatation is the well-known state-of the-art process for high end quality requirements
- LT-zinc phosphate offers process cost reduction, especially in combination with an innovative activator
- Applied in spray and dip
- High quality – well known
- Coating formation visible
- No additional chemicals needed for the phosphate bath
- Nickel-free system available

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