BONDERITE®

Henkel Two-Step Surface Treatment

The Enhanced Mixed Metal Zinc Phosphating Solution

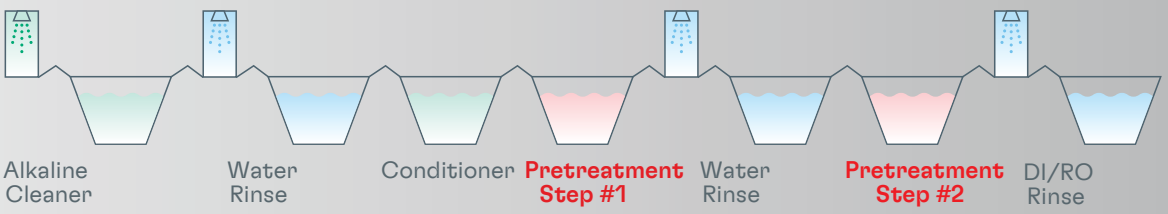
To achieve improved fuel economy and extended EV range, automotive OEMs are using ever-increasing levels of aluminum. At the same time, they are seeking ways to implement safer, more sustainable manufacturing practices.

To deliver on global automotive customer demands, Henkel is offering highly capable surface treatment solutions that are safer and more sustainable than ever – both now and in the future.

Henkel Two-Step Surface Treatment Features

- **Pretreatment Step 1:** Effective zinc phosphate pretreatment for steel and zinc substrates
  - Phosphating of aluminum is effectively inhibited by specific chemical process parameters
  - High-quality zinc phosphate coating on all steel substrates, including cold-rolled (CRS), hot-dipped galvanized (HDG) and electro-galvanized (EG)
- **Pretreatment Step 2:** Aluminum pretreatment and improved corrosion protection for steel and zinc surfaces
- **Process Enhancements:** For improved sustainability, low-temperature and low-sludge performance boosters
  are available

Henkel Two-Step Process Integration



- Zinc phosphate pretreatment for steel and zinc substrates
- Lower free F- reduces sludge generation and ZnPh layer formation on aluminum substrates
- High-quality corrosion protection for steel and zinc
- Environmentally friendly

- Nano-ceramic pretreatment for aluminum substrates
- Complete corrosion protection for Al substrates
- Passivation for ZnPh coating
- Additional corrosion protection for steel and zinc

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Henkel Two-Step Surface Treatment Advantages

Process Efficiency

- Compatible with existing metal pretreatment lines
  - Familiar process setup
  - No changes in other process steps
- Less fluoride consumption in total
- Less equipment wear by fluoride
- Less maintenance

Technical Performance

- Up to 85% aluminum content
- Improves final rinse performance
- Less chemical usage for free fluoride
  - Conventional process: 160 g/vehicle*
  - Two-Step Process: 65 g/vehicle*

Sustainability

- Low-sludge process option
  - Conventional process: 0,350 kg/vehicle*
  - Two-Step Process: 0,160 kg/vehicle*
- Low-temperature process option
- Less sludge disposal

*Based on 100 m^2 (70% zinc, 25% aluminum, 5% CRS)

Less Sludge: More Efficient, More Responsible Metal Processing

To minimize environmentally harmful sludge, conventional zinc phosphating solutions are limited to a maximum of 15% aluminum in the mix. In contrast, Henkel's Two-Step process with low-sludge chemistry enables up to 85% aluminum processing – while reducing waste treatment and extending bath life for a more environmentally responsible pretreatment process.

- Step 1: Aluminum etching is held to a minimum in the zinc phosphate conversion bath, which significantly reduces sludge
- Step 2: Aluminum is treated in the 2nd step with a high quality nanoceramic coating. This bath also provides added protection to steel and zinc substrates

PROCESS	FREE F- (PPM)	ETCH (g/m^2)
Conventional Zinc Phosphate	150 – 250	~ 1,3 – 1,5
Henkel Two-Step Process	40 – 60	~ 0,4 – 0,6

Lower Temperature Capability: More Sustainable Metal Processing

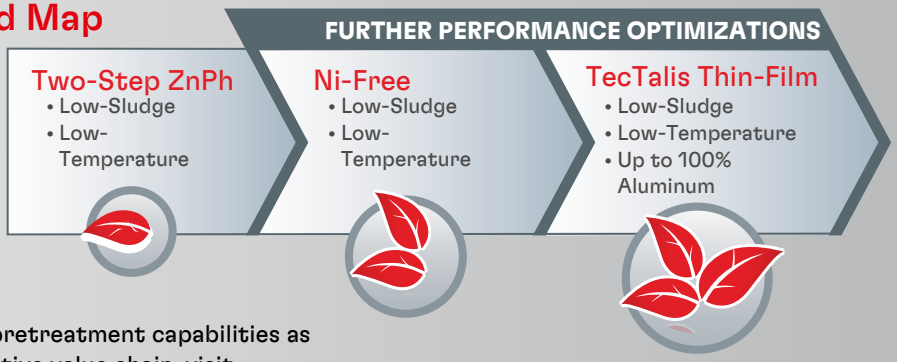
Typical zinc phosphate solutions require maintaining the conversion bath at 48°-52°C. Henkel offers low temperature options for the conventional zinc phosphate process and the BONDERITE Two-Step process – providing reliable surface treatment while delivering energy savings.

LOW-TEMPERATURE CONVERSION OPTION	REDUCED ENERGY USE	ENVIRONMENTAL IMPACT
May reduce conversion bath temperature by up to 12°C – from as high as 52°C to as low as 40°C.	Direct Process Energy Savings: 810 MWh/Year	CO2 Equivalent Savings: 153 Tons per Year

*Energy source: Natural gas. **300.000 vehicles per year; 100 m^2 surface area per car; metal mix 10% aluminum, 10% cold rolled steel, 80% galvanized

Henkel Technology Road Map

Modular ZnPh performance boosters are available to maximize your process advantage.



GET IN TOUCH WITH US

For more information on our metal pretreatment capabilities as our other services along the automotive value chain, visit:
www.henkel-adhesives.com

Or contact us directly at:
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