VETRO POWER | NANO EVERO ADVANCED CONFORMAL NANOCOATINGS | PFAS FREE

Technical Datasheet

Vetro Power NANO-EVERO Dry Plate Protection

Basis: modified polymers, complex builders, corrosion protection additives

• Insulating and protective coating for printed circuit boards/printed circuit boards and electronic components

• Free from aromatic solvents (e.g. without benzene, toluene and xylene)

• Lead-free, meets the requirements of the "Lead-free directive" (EU end-of-life vehicle directive 2000/53/EG)

• Does not contain any of the substances specified in the RoHS Directive 2002/95/EG

1. General

Vetro Power NANO-EVERO Dry Plate Protection is a room temperature curing 1-K corrosion protection coating which also protects electronic devices from humidity and moisture. The coating will leave a dry protecting layer on the coated parts.

2. Application

Vetro Power NANO-EVERO Dry Plate Protection coatings are being used as protection and isolation coatings. They:

• Protect PCB´s from humidity, mainly against damage from condensation water

• Isolate electric devices , connections, circuit boards etc.

• Can be used for repair with soldering irons. Repaired areas can easily be protected by re-applying Vetro Power NANO-EVERO Dry Plate Protection.

The top coats of the Vetro Power LIN Protection are used as protective and insulating coatings; they

• Protect printed circuit boards from moisture even under increased climatic stress, especially against the effects of condensation.

• Insulate electrical equipment, connections, switchgear, terminal boards, etc.

• Can be soldered through for repair work at soldering iron temperature and reapplied after the work is completed.

The finishing varnishes of the Vetro Power NANO-EVERO Dry Plate Protection series are used to protect printed circuit boards that have to meet high quality and service life requirements.

This applies above all to assembled printed circuit boards or printed circuit boards for:

• Automotive industry
• Household appliances (hobby tools, washing machines and others)
• Electronic/electrical measuring and control devices
• Electrical devices that are equipped with electronic controls
(industrial scales, medical devices, industrial robots, etc.)
• Military sector
• Shipbuilding and off-shore engineering
• Devices for telecommunications.

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General advice: Do not inhale atomised spray and the liquid product.

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3. Special Notices

With the top coat of **Vetro Power NANO-EVERO Dry Plate Protection**, environmentally friendly insulating and protective coats are available that are completely free of aromatic solvents (including benzene, toluene and xylene), chromium and lead. They also meet the requirements of the "lead-free directive" (EU end-of-life vehicle directive 2000/53/EG). Furthermore, they contain neither free or volatile isocyanate nor free isocyanate groups.
The wetting of critical points such as sharp-edged component pins is also achieved without the addition of a wetting agent, since the solvents used have a lower surface tension.

4. Safety Instructions

Read our safety data sheets according to EWG 91/155. There you will find detailed information and key figures on occupational safety and environmental protection as well as on transport, storage, handling and disposal. Observe the generally accepted precautionary measures when handling chemicals. Also observe the operating instructions and the technical rules for flammable liquids (TRbF) and their successor regulations.

5. Properties

The finishing varnishes of the Vetro Power NANO-EVERO Dry Plate Protection series are particularly characterized by the following properties:

- Good adhesion to all substrates without pre-treatment.
- Good corrosion protection
- Moisture resistance and insulation resistance
- Non-combustibility (in the evaporated state)
- Easy and safe processing

6. General characteristics

- Free from aromatic solvents (e.g. benzene, toluene and xylene)

- Meet the requirements of the "lead-free directive" (EU - end-of-life vehicle directive 2000/53/EG): free of lead, cadmium, chromium (VI) and mercury compounds

- Do not contain any of the substances specified in the RoHS Directive 2002/95/EC*

- Due to the special composition of the solvent, there is almost no risk of components and identification colors being dissolved

- After the application of the paint, there is a very good flow and after hardening an even, non-porous film

- Safe covering, e.g

- High surface hardness of the cured paint film;

- This significantly reduces the risk of mechanical damage during further processing

- Very good aging resistance

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• Excellent corrosion protection due to the very good resistance to moisture, especially to condensation water with excellent dewatering properties as well as antioxidants and metal deactivators.

• Free from halogenated flame retardants

• can be soldered with soldering iron for repairing purposes

• can be removed and re-applicated for repair/maintenance purposes

** Lead, mercury, cadmium, chromium (VI), polybrominated biphenyl (PBB) or polybrominated diphenyl ether (PBDE); RoHS Directive 2002/95/EG on the restriction of the use of certain hazardous substances in electrical and electronic equipment (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment)

7. Processing

The top coats of the **Vetro Power NANO-EVERO Dry Plate Protection** series can be applied by dipping, brushing, spraying or with the help of automatic, selective coating systems. Make sure the surface to be painted is clean, grease free and dry.

Note that any kind of ionic contamination has a negative effect on the electrical properties, especially under severe climatic conditions. Therefore, clean the assembly of flux and other contaminants or ensure by appropriate testing that you achieve the properties you want.

In principle, when processing top coats, the goal should be an even coat of paint that is not too thick . The dry layer thickness on surfaces should be between 10 - 50 µm and on component pins no more than max. 20 µm. These values can be achieved with professional processing and drying/curing.

After coating and drying/curing, it is essential that you test your assembly group manufactured under series conditions under your operating conditions.

During processing, it is essential to observe the safety instructions in the accident prevention regulation "Processing of coating materials" (VGB 23, in future BGV D 25) and in the explosion protection rules (BGR 104).

7.1 Viscosity adjustment

Each application method requires a special processing viscosity in order to achieve an optimal coating result. The processing viscosity is adjusted by adding the appropriate thinner. Processing in the delivery condition is generally possible.

• Keep to the recommended processing temperature.
Processing temperature range: 15 – 25°C

In case a protective coating is processed below the specified temperatures, the drying time may be longer and the viscosity increases significantly, making the coating very difficult to process.

Temperatures above the specified temperature range cause the viscosity to drop sharply and the coating takes too long to dry. This means that the film starts to form too quickly and the coating no longer runs optimally.

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7.2 Cleaning of Equipment

For cleaning the workplace and equipment, we recommend the use of aromatic free special petrol.

Do not use the detergent to clean your hands. Solvents remove the natural fat from the skin.

7.3 Manual Application

Vetro Power NANO-EVERO Dry Plate Protection can be applied with a brush/spray gun. This process is particularly suitable for repair work and small series, as the paint can be applied selectively. However, uneven layer thicknesses can result here.

7.4 Automatic/Machine Application

7.4.1 Spraying using compressed air spraying

Recommended processing parameters:

Air pressure	Spray nozzle diameter
2.5 - 3 bar	0.8 - 1.4 mm

When working with the compressed air spray method, you must observe the safety instructions in the accident prevention regulation "Processing of coating materials" (VGB 23, in future BGV D 25), especially Section IV Operation (§§ 17 - 22) and in the explosion protection rules (BGR 104).

When processing by spraying or splashing, you must take protective measures to prevent the formation of explosive solvent-vapour mixtures. During the drying/curing of hardening paint systems, reaction heat is generated which can ignite filter mats soaked with paint and solvent residues in paint booths. Use water-sprinkled spray booths to avoid the risk of self-ignition in the filter mats.

Also observe the condition and maintenance instructions of the spray booth and filter mat manufacturers.

7.4.2 Dip coating

• The prerequisite for dip painting is that the object to be painted can be fully or partially immersed. The layer thickness achieved depends on the flow behavior and the viscosity of the paint, but also on the geometry of the components and the exchange speed. The immersion speed and the dwell time in the dip tank depend on the assembly geometry: Reduce the immersion speed or set a dwell time in the dip tank if air bubbles can form between the circuit board and the components.

• The risk of air bubbles forming is increased by high paint viscosity. You should therefore always adjust the top coat to the immersion viscosity. If necessary, reduce the exchange speed, so that less paint is used.

• If necessary, reduce the dip speed so that less paint drips off and the thickness of the paint layer is more even.

• After the dip, allow excess paint to drip off by rotating and tilting the PCBs 30° if possible.

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• In this way, a drip tip is created so that drip residues remain only there. Make sure the plunge pool is protected from contamination: Only use clean auxiliary equipment. Cap or seal the plunge pool when not in use.

• Clean the dip tank regularly, as e.g. flux also accumulates in the dip tank.

• Replace the paint with fresh paint if you have to add increasing amounts of thinner in order to adjust the processing viscosity (e.g. after longer periods of non-use).

7.4.3 Automatic selective coating

By using automatic selective coating systems, it is possible to cover defined areas of the printed circuit board with an even film of paint. We would be happy to give you the names of efficient manufacturers of such systems and job coaters.

7.5 Double Coating

In general, you will achieve optimal layer thicknesses if you process the coating according to the conditions given above. Thick layers, such as those that occur when processing the undiluted medium, should be avoided for the following reasons: Thick layers dry very slowly. In addition, inclusions of solvents can occur, which can have a negative effect on the final properties, such as adhesion and electrical insulation. Also, when the temperature changes, cracks can form in the paint layer, which significantly impairs the function of the flat assemblies, particularly under the influence of moisture. There is a particular risk of too thick paint layer when using brushing and spraying or when processing in the delivery viscosity.

• When processing in the as-delivered condition, make sure in any case by carrying out preliminary tests that you achieve the desired paint properties.

7.6 Protective coating and increased exposure to moisture

Depending on the type of pre-treatment/cleaning before painting, residues may remain on the assembly. In case of increased moisture is to be expected, osmosis phenomena can occur. In the worst case, this can lead to loss of adhesion and/or blistering.

• Carry out preliminary tests if you expect increased exposure to moisture.

8. Drying/Curing

Drying/hardening takes place at room temperature or in warm air drying systems and takes place in two steps. The first step is physical drying (evaporation of the solvents) and the second step is oxidative hardening (“oxidative drying”, absorption of atmospheric oxygen).

• Physical drying

The following values apply to a wet film thickness of max. 50 µm (corresponds to a dry film thickness of around 25 - 30 µm).

At room temperature (approx. +23°C)	in circulating air drying systems with circulating air
approx. 0,5-1 hours	0,5-1 hours

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• Curing

Due to the necessary absorption of oxygen, curing at room temperature is completed at the earliest 4-6 hours after the material has become non-tacky.

Once tack-free, wait at least 12 hours to cure at room temperature before testing electrical properties or hermetically encapsulating the components.

Hardening can be accelerated in a circulating air oven at a maximum of 20 °C. Higher temperatures can cause hairline cracks in the coating. Alternatively, the substrate can also be cooled.

Please also check the temperature resistance of the printed circuit board and the assembly.

Check electrical properties to ensure curing is complete. The time required for curing in the convection oven depends, among other things, on the component geometry, layer thickness, oven load, etc.

9. Standard Packing

The **Vetro Power NANO-EVERO Dry Plate Protection** series finishing varnishes are supplied in the following packaging:

- 10 liters PE canister
- 30 liters PE canister
- 200 liters tin barrel

On special request, it is also possible to provide a concentrate.

10. Shelf Life

Cool and dry storage is recommended. Shelf life in unopened original containers is at least 12 months. Storage temperatures below +5 °C or above +25 °C impair storage stability.

11. Miscellaneous

Due to its 100% biodegradable features (in cured state) , foodstuff / foodsafe/ drinkwater certification is generally possible.

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