



Vetro Power Solar Panel Nano-Shield

Nano Coating For Solar Panels

Anti-soiling liquid glass coating for photovoltaic module glass. Hydrophobic, oleophobic and UV-stable; rain keeps the panel clean.

**Water-repellent**

water beads and runs off

**Oil-repellent**

oil and grease wipe off

**Soil-repellent**

dirt does not bond

**UV-stable**

3500 h

**Food-safe**

certified for food contact

**Invisible finish**

no change in look or feel

Benefits

- Easy-to-clean, soil-repellent layer: dirt and water do not adhere to the glass
- Hydrophobic and oleophobic
- No change in look and feel; transmission of the module glass not reduced, increased values measured
- UV-stable: water-repellent effect retained after 3500 h UV weathering
- Resists commercial cleaners pH 2 to 12 and pressure washers up to 60 bar
- High abrasion resistance: contact angle kept over 5000 cleaning cycles
- Reduces cleaning frequency, water use and cleaning agents
- Passive protection of module, silicone seals and frame against microorganisms, without biocides
- Applied on installed panels or in the module factory; ready to use, spray application
- Food-safe and physiologically harmless (EU 1935/2004), biocompatible, ecologically sound

Performance and testing

- Weather test: significant hydrophobicity after 3500 h UV exposure
- Chemical resistance: commercial cleaners in the pH 2 to 12 range
- Abrasion: contact angle compared with three other coating products over 5000 cleaning cycles
- Transmission measurement on PV module glass: not reduced; increased transmission at the coated sample
- Expert evaluation on PV modules: UV-stable film, less dirt adhesion, removal by rain, passive protection against microorganisms without biocides

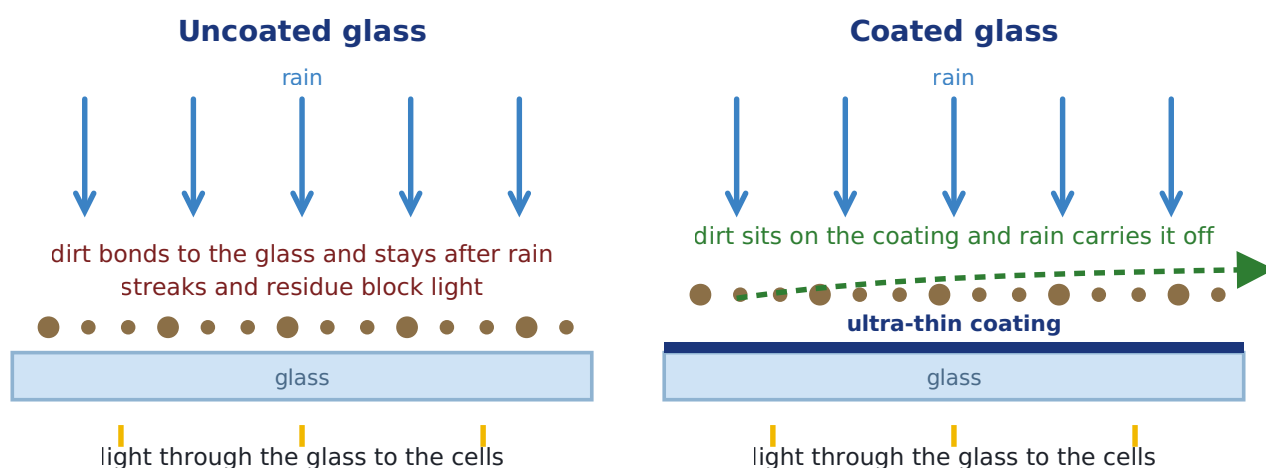
- Facade reference: cleaning four times a year no longer necessary after coating; effect unchanged after one year
- Temperature resistance up to 450 °C peak; pressure and vapour cleaners up to 60 bar

Vetro Power Solar Panel Nano-Shield is a ready-to-use liquid glass coating for the glass of photovoltaic modules. It cures to an ultra-thin, invisible layer that stops dirt and water sticking to the glass, so rain carries dust, pollen and bird droppings off the surface instead of leaving streaks and residue. The result is a panel that stays cleaner between washes, needs considerably less water and cleaning agent, and keeps its light transmission. It is applied by spray to modules already installed on a roof or in a plant, or in the module factory before dispatch.

The coating is silicon dioxide (SiO₂) based and solvent-borne. It does not change the look or feel of the glass, it is UV-stable, and it is resistant to cleaning agents in the pH 2 to 12 range and to pressure washers up to 60 bar. It is the same easy-to-clean glass technology used on glass facades, applied to the surface where dirt costs the most: the front of a solar panel.

How the coating works

Soiling is the layer of dust, pollen, soot and bird droppings that builds up on the glass of a solar panel and blocks light from reaching the cells. On an uncoated panel this layer bonds to the glass and has to be washed off. The coating changes the surface so the layer cannot bond.



Easy to clean, soil repellent

The ultra-thin layer covers the glass and prevents the adhesion of dirt and water on the substrate. Dirt that lands on it is loosely held and washes away.



Hydrophobic and oleophobic

Water and oily deposits bead up and run off rather than spreading and drying onto the glass.



No change in look or feel

The cured layer is invisible. Laboratory tests on PV module glass show the transmission is not reduced by the coating; increased transmission was measured on the coated sample.



UV-stable

The layer keeps its water-repellent effect after 3500 hours of accelerated UV weathering.

On a PV module the layer is applied over the whole front face: the glass, the silicone sealing in which the module is embedded, and the metal frame. The expert evaluation of the coating on PV modules describes this as a passive protection that significantly reduces the adhesion of microorganisms without the use of biocides.

A coating instead of more cleaning

Panels are cleaned because soiling costs output: soiling can cut the output of a dirty panel by over 30%. A cleaning contract, a brush and pole, a water-fed system or a robot all remove the layer after it has formed. The coating stops the layer forming in the first place, so the same panel needs washing far less often, and the need for cleaning agents and water is considerably reduced. The table sets out what changes, taken from the results on a coated three-storey glass facade and from the coating tests.

	Cleaning only	With Vetro Power Solar Panel Nano-Shield
Dirt after rain	Dust, dirt and pollen seize on the glass and dry as streaks and residue	Washed away by the rain, no streaks or residue on the glass
Cleaning frequency	Facade in the reference case was cleaned four times a year	After coating, cleaning of the facade was not necessary; the effect was unchanged after one year
Cleaning agents	Detergents or chemical cleaners	Need for cleaning agents considerably reduced; the layer resists commercial cleaners of pH 2 to 12
Water use	Every wash	Considerably reduced, together with the need for cleaning agents
Access	Climbers, scaffolds or platforms at every clean	Only at the reduced cleaning interval
Disturbance	Staff and site disturbed at every clean	No longer disturbed by cleaning
Pressure washing	As per panel manufacturer	Layer withstands high-pressure and vapour cleaners up to 60 bar, depending on the substrate
Effect over time	None	Water-repellent effect retained after 3500 h UV weathering and 5000 cleaning cycles

What the tests show



3500 hours of UV weathering

Excerpt from the weather test report: significant hydrophobicity even after the completion of weathering of 3500 h UV exposure.



Cleaner resistance, pH 2 to 12

The layer resists commercial cleaners across the pH 2 to 12 range, so routine washing does not strip it.



5000 cleaning cycles

In the abrasion comparison the coating kept a higher water contact angle than three other coating products after 5000 cleaning cycles.



PV module transmission

Excerpt from the transmission measurement: from the medium wave area of the visible light to the UV long wave light, increased values of transmission at the coated sample compared to the uncoated sample could be seen.

Contact angle is the standard measure of how strongly a surface repels water: the higher the angle, the more the water beads up and runs off. In the abrasion comparison the coating was measured against three other coating products over 0, 500, 1000, 2000 and 5000 cleaning cycles and kept the highest contact angle throughout.

Where it is used



Rooftop solar

Residential and commercial rooftop PV where panels are hard to reach for cleaning.



Ground-mounted plants

Utility-scale and industrial PV arrays in dusty, agricultural or coastal locations.



Module factories

Applied to the module glass during production, before dispatch to site.



Glass facades

The same coating on curtain walls and glass fronts of buildings, where it was proven over three floors of glass.



Skylights and greenhouse glass

Overhead glass that is rarely cleaned and collects the same soiling as a panel.



All glass surfaces

Any glass element, during production or after installation, that has to stay clear with the least cleaning.

Application



1. Clean and dry

The glass must be free of dust, grease and residues of cleaning agents, and dry. A long-lasting effect depends on this step.



2. Test area

Before full application, treat an inconspicuous area and check stability and functionality on that panel type.



3. Spray

Ready to use, no dilution. Apply with a spray device with HVLP nozzles, working square metre by square metre on larger surfaces. Industrial spray equipment is suitable for plant-scale work.



4. No ponding

Apply a thin, even film and avoid the liquid pooling on the glass. Leave to dry undisturbed.

Application conditions

Apply at 5 to 35 °C and 90% relative humidity or less, in the shade, on a dry, wind-free day. Do not apply in wet conditions or when rain is expected within 24 hours. The film is touch dry in a few minutes; keep the panel dry and untouched for the first hour, and the coating reaches full performance after 24 hours. In the monsoon this means applying in a dry window and keeping the panel rain-free for a day.

Coverage on glass is about 800 to 1,000 sq ft (75 to 93 m²) per litre.

Coverage and packaging

Pack	Coverage on glass	Typical use
250 ml	200 to 250 sq ft (19 to 23 m ²)	Home rooftop systems and trials
1 L	800 to 1,000 sq ft (75 to 93 m ²)	Rooftop systems and small commercial arrays
5 L	4,000 to 5,000 sq ft (375 to 465 m ²)	Commercial roofs and O&M contractors
Bulk drums and IBC	On request	Utility-scale plants and module factories

Coverage is at 800 to 1,000 sq ft per litre; allow extra for spray loss. Private label and OEM supply are available for solar O&M companies and module manufacturers.

Technical data

Property	Value
Technology	Silicon dioxide (SiO ₂) liquid glass, solvent-borne, ready to use
Appearance	Colourless liquid, alcohol odour; cured layer invisible, no change in look and feel
Density	0.8 g/cm ³
Viscosity	about 1.2 mPas
Flash point	below 15 °C (12 °C on the safety data sheet); highly flammable liquid and vapour
Boiling point	about 80 °C
Coverage	800 to 1,000 sq ft (75 to 93 m ²) per litre
Surface properties	Hydrophobic, oleophobic, soil-repellent, non-stick
UV weathering	Hydrophobicity retained after 3500 h UV exposure
Chemical resistance	Commercial cleaners pH 2 to 12; compatible with disinfectants
Abrasion	Higher contact angle than comparison coatings after 5000 cleaning cycles
Pressure cleaning	High-pressure and vapour cleaners up to 60 bar, depending on the substrate
Temperature resistance	Up to 450 °C peak temperature
Food safety	Food-safe, physiologically harmless (EU regulation 1935/2004), biocompatible
Application	Spray, HVLP nozzles; industrial spray equipment
Application conditions	5 to 35 °C, relative humidity 90% or less, dry weather, no rain expected within 24 hours
Drying	Touch dry in a few minutes; keep dry and untouched for 1 hour; full performance after 24 hours
Service life	Up to 5 years in ideal conditions on unweathered panels; 3 to 4 years in windy, dusty or coastal locations. Surfactant cleaners and mechanical abrasion shorten the life of the layer.

Care of coated panels

Rain does most of the work on a coated panel. When a wash is needed, a soft brush or water-fed pole are enough, and a pressure washer up to 60 bar can be used, depending on the substrate. Cleaners in the pH 2 to 12 range do not harm the layer.

Storage, handling and safety

Highly flammable liquid and vapour, flash point 12 °C. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources; no smoking; use only non-sparking tools. Ground and bond the container and receiving

equipment and take precautions against static discharge. Use only outdoors or in a well-ventilated area, avoid breathing the spray and the vapour, and avoid contact with skin and eyes; the liquid causes serious eye irritation and its vapour may cause drowsiness or dizziness. Wear protective gloves, eye protection and, when spraying, respiratory protection.

Store in a well-ventilated place, cool, with the container tightly closed, away from oxidising agents, heat, frost and sunlight. Do not eat, drink or smoke when using the product and wash hands after handling. The safety data sheet is linked below.

Limitations

- A surface coating on the glass: it reduces soiling and the cleaning needed, it does not remove a layer of dirt already bonded to the glass, so panels are cleaned before coating.
- Performance depends on preparation. Grease, residues of cleaning agents or moisture on the glass at the time of application shorten the life of the effect.
- Test an inconspicuous area on each panel type before full application.
- Drying time varies with temperature and humidity; coverage varies with the substrate and the application method.
- Highly flammable during application; follow the safety data sheet.

Frequently asked questions

How often do solar panels need cleaning after a nano coating?

Far less often. On a coated glass facade that had been cleaned four times a year, cleaning was no longer necessary after the coating was applied; rain washed the dust, dirt and pollen off and the effect was unchanged after one year. On a panel the interval depends on the site, but the layer keeps its water-repellent effect after 3500 hours of UV weathering and 5000 cleaning cycles.

Does a solar panel coating reduce power output or light transmission?

No. Laboratory transmission measurements on coated PV module glass showed that transmission was not reduced; from the medium-wave visible light to the UV long-wave light, increased transmission values were measured on the coated sample compared with the uncoated one.

What is a hydrophobic nano coating for solar panels?

A liquid glass (silicon dioxide) coating that cures to an ultra-thin, invisible layer on the panel glass. The layer is hydrophobic and oleophobic: water and oily deposits bead up and run off instead of drying onto the glass, and dirt cannot bond to the surface, so rain carries it away.

Can an anti-soiling coating be applied to solar panels that are already installed?

Yes. It is applied by spray to modules on a roof or in a plant after installation, and it can also be applied to the module glass in the factory before dispatch. The glass must be cleaned and dried first.

Is Vetro Power Solar Panel Nano-Shield a self-cleaning solar panel coating?

It is an easy-to-clean, soil-repellent coating. The layer stops dirt bonding to the glass so rain removes it; it does not remove soiling already bonded to an uncoated panel, which is why panels are cleaned before coating.

How is a nano coating applied to solar panels?

Clean and dry the glass so it is free of dust, grease and cleaning-agent residue, test an inconspicuous area, then spray a thin, even film with an HVLP spray device, working square metre by square metre and avoiding ponding. The product is ready to use and needs no dilution.

How much area does one litre of solar panel coating cover?

One litre covers about 800 to 1,000 sq ft (75 to 93 m²) of panel glass.

Will pressure washing or solar panel cleaning chemicals damage the coating?

The layer withstands high-pressure and vapour cleaners up to 60 bar, depending on the substrate, and resists commercial cleaners across the pH 2 to 12 range.

Does the solar panel coating protect the frame and seals as well as the glass?

When the whole front face is coated, the PV expert evaluation describes a passive protection of the module, the silicone sealing in which the module is embedded and the metal frame that significantly reduces the adhesion of microorganisms without the use of biocides.

Is the solar panel coating safe to handle?

During application it is a highly flammable liquid (flash point 12 °C) that causes serious eye irritation and whose vapour may cause drowsiness or dizziness, so it is applied outdoors or in a well-ventilated area with gloves, eye protection and respiratory protection, away from ignition sources. The cured layer is food-safe and physiologically harmless under EU regulation 1935/2004.

Can a solar panel coating be applied during the monsoon?

Apply at 5 to 35 °C and 90% relative humidity or less, in the shade, on a dry, wind-free day. Do not apply in wet conditions or when rain is expected within 24 hours. The film is touch dry in a few minutes; keep the panel dry and untouched for the first hour, and the coating reaches full performance after 24 hours. In the monsoon this means applying in a dry window and keeping the panel rain-free for a day.

How long does a nano coating last on solar panels?

Up to 5 years in ideal conditions on unweathered panels; 3 to 4 years in windy, dusty or coastal locations. Surfactant cleaners and mechanical abrasion shorten the life of the layer. The water-repellent effect was retained in tests after 3500 hours of UV weathering and 5000 cleaning cycles.

Documents

Product brochure

<https://www.vetropoweramc.com/uploads/product/brochure/vetro-power-solar-panel-nanoshield.pdf>

Technical Data Sheet

<https://www.vetropoweramc.com/uploads/product/tds/vetro-power-solar-panel-nanoshield.pdf>

Safety Data Sheet (MSDS)

<https://www.vetropoweramc.com/uploads/msds/english-4B0A4862-EBC4-410D-B5C0-496553F4C79E-4DF1A34B-B787-44D4-82B4-0BCCB59F3852.pdf>

Product page

<https://www.vetropoweramc.com/product/nano-coating-for-solar-panels>

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