

1 Description

Nanoman Solar is a nanotechnology enabled coating specially formulated for use on solar panels. Once applied it becomes part of the surface giving the surface hydrophobic and self / easy cleaning properties. The coating's self-cleaning effect stops dust, pollen, pollution and bird faeces from sticking to solar panels, keeping them clean, maintaining their efficiency, ensuring the maximum amount of electricity is produced.

Less contaminants on solar panels means less maintenance and higher overall energy production. Dirty solar panels can reduce their efficiency by over 30%. Nanoman Solar effectively repels liquids and particles of contamination from environmental pollution that would otherwise adhere to the solar panels effectively creating cleaner, more energy efficient panels.

Nanoman Solar imparts hydrophobic and oleophobic properties. This creates a self cleaning effect which negates the need for repeated cleaning and the use of chemical cleaning agents.

Once water (from rain or a hose in dryer climates) comes in contact with solar panels the water droplets simply roll off the surface taking dust and dirt with them.

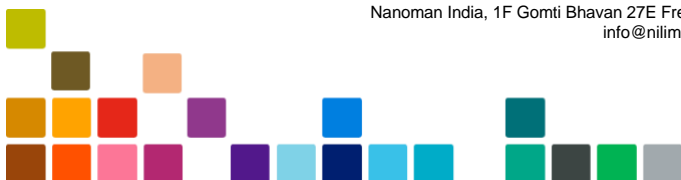
With Nanoman Solar, panels stay cleaner for longer, ensuring maximum efficiency is maintained. They incur much lower cleaning costs and produce more electricity than the equivalent non-coated panels.

2 Feature Benefits

- Reduces cleaning frequency saving energy, time and cost
- Enables panels to work at quoted performance levels and improve efficiency and return on investment.
- Ensure maximum light transmittance onto the solar panel
- Strong hydrophobicity (water pearls off washing away contaminants)
- Strong non-stick properties (prevents the build up of dirt, dust algae etc)
- Easy to clean / self-cleaning effect as water rolls off the surface
- Invisible to the human eye (coating thickness: 50 - 60 nm)
- UV-stable, very resistant to abrasion, stable at varying temperatures
- Quick and easy to use
- Simple application; cures at atmospheric temperature
- Protects against etching, dirt and environmental pollutants
- Effective in salty environments.

3 Application

- Suitable for all residential, commercial industrial solar panel installations
- Solar arrays and farms
- Fixed solar panels
- Solar powered water pumps



- Solar powered signs
- Mobile solar panels
- Hard to reach solar panels
- Remote solar panels
- Solar arrays and farms

** Do not use on thin film flexible or polymer solar panels.

4 Surface Preparation

The most important step in the application process is preparing the solar panels. To ensure the coatings maximum performance the solar panel must be completely clean, dry and free of all grease, dirt, oils, scale residue and other contaminants prior to application.

We recommend the use of Nanoman Pre Cleaner to remove grease, dirt and other staining. However if the solar panel is particularly stained, a stronger cleaner may be required prior to the use of the pre-cleaner.

Nanoman Pre Cleaner should be used as a final step in the cleaning process to rid the solar panel of any residues and will also evaporate any moisture from the panel to ensure it is completely dry prior to application. Do not use abrasive cloths to clean solar panels as this may result in damage or scarring to the panel face.

To ensure maximum performance, it is important that the surface is completely clean, dry and free from dust and grease prior to application.

5 Directions for Use

Ensure surface has been prepared properly and is clean and dry. We recommend using Nanoman Pre-Cleaner to properly prepare the surface prior to applying the Nanoman Solar. If applying in situ (outdoors), make certain the temperature is between 5°C and 35°C with 90% relative humidity or less. Do not apply in wet conditions or where there is a likelihood of rain. Avoid windy conditions, if possible, when applying outside.

Shake the container before use and re-shake every 15-20 minutes to ensure the nano particles are fully suspended.

Apply the coating via spray to the solar panel surface. Then, using a lint free clean cloth, wipe into the surface using circular motions or a figure eight pattern to ensure total coverage of the surface. Let dry for 2-5 minutes (depending on temperature) then buff any slight hazing out using a clean lint free micro fibre cloth. If there is any residues remaining it indicates more coating than necessary was applied and this can be removed by being wiped down or polished (using the pre-cleaner) to remove residue. The surface should be allowed to dry for up to one hour (longer if in high humidity).

Nanoman Solar is available in DIY coating kits, and is designed for use by both consumers and professional applicators. You don't need to be an expert to apply the products. Comes with simple to follow instructions and it is quick and easy to apply.



Specific application instructions:

- The wearing of gloves is recommended.
- Prepare surface with Nanoman Pre Cleaner to ensure it's clean, free of dirt and grime.
- Shake bottle before applying to a clean & dry surface.
- Avoid application in direct sunlight or to hot solar panels.
- Working in small areas from top to bottom spray the surface and using a clean lint free cloth rub in thoroughly in circular motions. Repeat until the entire area has been treated.
- Avoid applying too much coating. The recommended usage rate is 10ml/M².
- Allow to dry/cure for 60mins.
- Ensure surface stays dry and untouched during this hour.
- After drying, lightly buff the surface with a clean microfibre cloth to remove any residues.
- Protective coating will reach its optimal performance after 24hrs. Keep dry (if possible) during this period.

Cautions

- Do not use if air or surface temperature is below 45°F / 5°C or above 95°F / 35°C.
- Do not apply to external surfaces in rain or when rain is expected within 12-24 hours.
- DO NOT THIN. Shake contents thoroughly prior to use.
- For best results, apply in the shade and out of direct sunlight.
- Do not use with other waterproofing products.
- Apply in a dust-free environment to avoid surface contamination.

Working Conditions:

- The wearing of protective gloves/protective clothing/eye protection/face protection is recommended when using this product. Final choice of personal protective equipment will depend upon individual circumstances and/or according to risk assessments undertaken.
- Consult SDS for proper handling, clean-up, disposal, and use of personal protective equipment.
- Please ensure the area being treated is well ventilated.
- Avoid breathing in spray.
- Store in a sealed container and keep away from children.
- Clean equipment immediately after using.
- Protection of adjacent porous areas from overspray and runoff is recommended but not necessary for non-porous surfaces.
- Ensure any overspray be wiped off adjacent with a dry cloth as soon as possible to avoid crystallisation.

6 Coverage

Nanoman Solar should be used sparingly as only 8-10ml per M² is required.

Due to the strong bond with the surface, Nanoman Solar has a life span of 5+ years in ideal conditions and when applied to unweathered solar panels. If used on older panels and/or in an environment that produces a lot of friction against the glass i.e. a windy desert or seaside location, its life span will be shortened to 3-4 years. However, to maintain maximum performance we recommend monitoring the surface performance



and a reapplication as necessary. To re-apply, simply follow the steps as set out previously in this document.

Surfactants in cleaning agents and strong consistent mechanical abrasion will affect the coatings life. If the performance of the coating starts to deteriorate, another application coating should be applied.

7 Cure Time

Nanoman Solar 30 – 60 minutes to cure during which time the surface should remain completely dry and untouched. In more humid conditions, curing time will be longer. After curing, the coated surface should be polished or wiped down with a soft cloth and if necessary use Nanoman Pre Cleaner to remove any remaining silans or residue. The surface will be at its most effective after 24 hours and should be kept dry in this time if possible.

8 Physical Properties

Look:	Transparent liquid
Base:	SiO ₂ •
Solvent:	Ethanol
Rel. Density:	at 20°C: 0.822 kg/l •
Flashpoint:	11°C •
Active Agent:	0.5 Gew. %
Thinning:	Ready to use
Handling:	Refer to SDS
Application:	5-15 ml/sqm (dependent on surface/application)

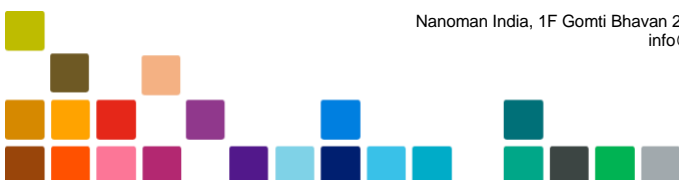
9 Packaging

Nanoman Solar is available in the following pack sizes:

- 125ml, 250ml, 750ml & 1L with appropriate application sprayers
- 1L, 2L, 5L, 20L

10 Shelf Life and Storage

- Store in its sealed container and keep away from children.
- Unopened original containers can be stored for up to 12 months.
- Used/opened containers can be stored for approximately 6 months.
- Recommended storage and transport temperature: +5 to +25°C.
- Store out of direct sunlight and in a dry environment.



11 Safety Instructions

The instructions on the Nanoman Solar Safety Data Sheet must always be followed.

- The wearing of gloves is recommended.
- Please ensure the area being treated is well ventilated.
- Avoid breathing fume/gas/mist/ vapours/spray.
- Store in a sealed container and keep away from children.
- In the event of eye contact, wash out immediately with cold water. Seek medical advice if necessary.
- Do not swallow.
- Avoid applying in windy conditions.
- Wash hands after application
- Highly flammable, do not store in hot conditions or apply to hot surfaces.
- Keep ignition sources away – Do not smoke
- Keep out of reach of children.

** This product contains ethanol and so appropriate care should be taken when transporting. Please refer to product SDS for further details on handling and transporting.

12 Surface Maintenance / Cleaning

With Nanoman Solar applied, there is no need to use expensive and environmentally unfriendly cleaners and detergents. To maintain the hydrophobic effect, simply spray with fresh water and the water will bead and roll off the solar panel taking dirt and contaminants with it. In areas with higher / heavy rainfall that maybe all that is required.

For annual maintenance or when output drops a wetting down and a wipe down using a soft cloth or squeegee may be required.

For areas with exceptionally hard water, high silica levels or bore water, the nano coating may need more frequent maintenance and top up re-applications.

Do not use paper towels or abrasive cloths that are likely to scratch the surface.

13 Disclaimer

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. Users should satisfy themselves that it is suitable for their needs. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. As we cannot control or anticipate the conditions under which this product may be used, each user should review the information in specific context of the planned use. To the maximum extent permitted by law, Nilima Nanotechnologies will not be responsible for damages of any nature resulting from the use or reliance upon the information contained in this data sheet. No express or implied warranties are given other than those implied mandatory by law.

Users should always refer to the most recent issue of the Technical Data Sheet available from www.nanoman.co.in

