

## TECHNICAL DATA SHEET

2092 008 | Nanorestore Gel®, PG5 Pen Peggy

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# NANORESTORE Gel® PG5 Pen PEGGY

## OVERVIEW

Nanorestore Gel® Peggy are hydrogel for cleaning and/or controlled humidification of surfaces characterized by strong intermolecular bonds, which guarantee their physical consistency (they have their shape) and the absence of gel residues after cleaning. Thanks to their retentive network, the liquid contained in them are slowly released to the surface. Nanorestore Gel® Peggy is highly flexible and elastic, allowing for the application even on rough and/or irregular surfaces. Nanorestore Gel Peggy are sold loaded with water, but they can also be loaded with hydro alcoholic mixtures (water/ethanol, etc.) or water-based nanostructured fluids of the Nanorestore Cleaning® series.

## AVAILABLE FORMULATIONS

### Nanorestore Gel® Peggy 5:

Opalescent hydrogel based on poly (vinyl alcohol) polymeric network. The gel, flexible and elastic, adheres well even on rough and irregular surfaces. Each package contains a water-loaded sheet (approx. 10 cm x 15 cm x 2 mm), which can be reused up to 5 times, depending on the specific case.

### Nanorestore Gel® Peggy 6:

Opalescent hydrogel based on poly (vinyl alcohol) polymeric network. The Peggy 6 gel is even more flexible, elastic, having lower retention of loaded liquid than Peggy 5; this is why it adheres particularly well to very rough and irregular surfaces. Each package contains a water-loaded sheet (approx. 10 cm x 15 cm x 2 mm), which can be reused up to 5 times, depending on the specific case.

### Nanorestore Gel® Peggy 5 Gum:

Opalescent hydrogel based on poly (vinyl alcohol) polymeric network. The gel is supplied in parallelepiped shape (approx. 12 cm<sup>3</sup>). It allows associating controlled and localized humidification with a light mechanical action and can be used as a sort of ultra-delicate rubber for the removal of surface dirt.

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### Nanorestore Gel® Peggy 5 Pen:

Opalescent hydrogel based on poly (vinyl alcohol) polymeric network. The gel has a pen shape of about 8 cm length and 1.5 cm in diameter. It allows for a controlled and localized humidification with a light mechanical action and can be used as a sort of ultra-delicate rubber for the removal of surface dirt.

### Nanorestore Gel® Peggy 6 Pen:

Opalescent hydrogel based on poly (vinyl alcohol) polymeric network. The gel has a pen shape of about 8 cm length and 1.5 cm in diameter. It allows for a controlled and localized humidification with a light mechanical action and can be used as a sort of ultra-delicate rubber for the removal of surface dirt.

## WHEN ARE THEY USED?

The Nanorestore Gel® Peggy is useful when a controlled release of cleaning/detergent systems on a surface is necessary. Limiting the action of the cleaning systems used (water, solvents, micellar solutions, microemulsions, etc.) to the interphase gel/surface allows a more selective and controlled action during the removal of grime, dust and/or aged varnishes, reducing the risk of damaging the original materials and/or the underlying pictorial layer. Unlike the most common thickeners, used to increase the viscosity of liquids, gels can be

considered as „containers,“ which allows putting the cleaning fluid in contact with the surface to be treated. Moreover, the gel can be removed from the surface by using tweezers or by delicately peeling the gel without the need to perform a potentially harmful mechanical action on the substrate.

### OK to be used for...

- ... Removal of hydro soluble dirt, grime or dust from canvas painting and in particular from irregular surfaces.
- ... Removal of hydro soluble dirt, grime or dust from painting on wood.
- ... Removal of hydro soluble dirt, grime or dust from textile articles.
- ... Removal of stains and patches from paper.
- ... Removal of aged varnishes from canvas paintings (in this case, Nanorestore Gel® Peggy should be loaded with solvents or Nanorestore Cleaning® formulations).

**More detailed information on the use and application of gels are provided in the following sections of this technical data sheet.**

## HOW DO THEY WORK?

They are used as a vehicle (containers) for the liquid cleaning agent. They prevent the cleaning agent from fast evaporation and free penetration into porous materials, making the cleaning safer. Moreover, thanks to their formulation, they do not leave residues on the treated surface.

## HOW ARE THEY USED?

### General features

Nanorestore Gel® Peggy can be used loaded with water, aqueous solutions, or water-based nanostructured fluids of the Nanorestore Cleaning® series.

### Storage

Nanorestore Gel® Peggy is shipped immersed in a small volume of demineralized water. The gels are stable and can be conserved at room temperature for several months before the use. When gels are removed from the original packages, they should be stored immersed in water in closed containers, kept in the dark. Wait at least 24 hours before the first usage. It is advisable to check gels after long storage time, to verify that no alteration has occurred. Though the gels should be quite resistant to microorganisms, they can be subjected to biological contamination if not properly handled. In case a biological attack is noticed, the gels can be washed with a 1 % sodium hypochlorite solution for 1 - 2 minutes, carefully rinsed with water to remove the Hypochlorite, and stored in clean water. Before the use, make sure that biological contamination was completely removed from the gels. However, it is advisable to handle the gels with clean gloves and carefully separate gels for long period storage and gel for immediate use (it may be useful for this purpose to take the amount of gel intended for daily use and store it in dedicated containers).

### Safety

Nanorestore Gel® Peggy are non-toxic; thus, they can be handled with standard laboratory gloves according to common laboratory practice. When solvent-loaded gels are used, we recommend following all the standard precautions related to the use of organic solvents.

### Loading of solvents or other liquids

Loading Nanorestore Gel® Peggy with aqueous solutions (TAC, chelating agents), water/alcohol blends (e.g., water/ethanol) or Nanorestore Cleaning® aqueous formulations can be carried out by immersing the original water-loaded gel into the desired cleaning fluid for at least 12 hours (Fig. B1). The gel can be reused up to 4 - 5 times by re-immersing it into the solvent or Nanorestore Cleaning® formulation. Please note that once loaded with a different liquid than water, gels cannot be immersed in water or other cleaning fluids (i.e., they should be stored in the loaded cleaning formulation).

**Attention: for the hydro alcoholic mixtures, the alcohol content can not exceed 50 % v/v.**

## Application

When Nanorestore Gel® Peggy are removed from their container (or their original package), they can be cut down and shaped in the desired size and form (Fig. A2 / B2). Then, before application, water excess on the gel surface has to be removed by placing the gel between two sheets of absorbent material (e.g., absorbing paper) and exert a light pressure with hands (Fig. A3 / B3). After this operation, the gel surface will be dry, and the gel can be applied on the surface to be treated. Just lay the gel on the surface that has to be cleaned, apply a little pressure with a finger or a suitable laboratory tool to optimize the adhesion of the gel and remove any air bubbles between the gel and the surface (Fig. A4 / B4).

## Application time

Application time strongly depends on the type of gel, the materials to be removed, and the surface from which they should be removed. In general, the application time can vary from a minute up to several hours (Fig. 1a. 4 or Fig. 2a. 5). In the case of lengthy application, it is mandatory to protect the gel from water evaporation to avoid the drying of Nanorestore Gel® Peggy (Fig. A5 / B5).

**To evaluate the optimum application time, it is recommended to perform some preliminary tests on small areas. In many cases, repeated short applications can be more productive and ensure greater control than a single prolonged application.**

## Reducing evaporation (optional)

If needed, a plastic film can be placed over Nanorestore Gel® Peggy to keep the gel wet during the cleaning operation, reducing the evaporation of water (Fig. A4 / B4). It is worth noting that in the case of standard operations, this procedure is not needed, as the application time is short if compared to the evaporation time of water confined in the gel network.

## Removal

Nanorestore Gel® Peggy can be removed from the treated surface by using tweezers or by delicately peeling the gel (Fig. A4 / B4).

## Removal of unwanted materials

Depending on the type of material to be removed from the surface and on the cleaning fluid used, various phenomena may occur after the application of Nanorestore Gel® Peggy:

- The unwanted material is solubilized and migrates directly into the gel (Fig. A7.1 / B7.1 ).
- It is observed swelling of grime, dirt and/or aged varnishes; in this case, the removal of swollen and soft materials can be carried out employing a gentle mechanical action (e.g., using a swab) (Fig. A7.2 / B7.2).

## Repeated applications

Nanorestore Gel® Peggy can be used in a single application or short repeated applications. In this case, it is important to check if the gel is still humid before re-applying it. If not, it is advisable to use another piece of gel, following the procedure described in the “Application” section.

## Reusing the gel

During cleaning operations, Nanorestore Gel® Peggy can be used on both sides. In addition to that, Nanorestore Gel® Peggy can be used several times after the first application, provided that they are immersed in water overnight or at least for 12 h, to re-load pure water and release dirt/grime (Fig. A9 / B9). For instance, Nanorestore Gel® Peggy can be used up to 4 - 5 times for the removal of dirt and dust. However, it is worth noting that the cleaning effectiveness might decrease after each application. Long-term storage of Nanorestore Gel® Peggy following the first use is not advisable.

## Final clearance

After the application of Nanorestore Cleaning®-loaded gels, a final clearance can be carried out using Nanorestore Gel® loaded with water, aimed at removing water-soluble non-volatile components (surfactants), which in some cases might remain as residue over the treated surface. This operation generally requires a short application of a few minutes.

## APPLICATION GUIDELINES AT A GLANCE

Goggles	No
Gloves	Yes
Ventilated hood or environment	Only if loaded with solvents
Application time	1-5 minutes to a 3-4 hours, depending on the specific case
Residues after cleaning	Possibly surfactants, only if loaded with Nanorestore Cleaning® formulations
Final clearance	Rinse with water (or apply a water-loaded gel) if surfactant residues can be present.

### Figure A: Application of Nanorestore Gel® Peggy for the removal of hydrosoluble dirt.

- A1 Provide the hydrogel placed in water.
- A2 Remove the hydrogel from the container.
- A3 Water excess on the gel surface has to be removed by gently placing the gel between two sheets of adsorbing paper. The surface of the gel should appear dry.
- A4 Place the gel over the surface. Optional: Use a plastic film to avoid evaporation.
- A5 Application time ranges from a minute to 3 - 4 hours.
- A6 Remove the gel.
- A7 When the unwanted material is solubilized, a mechanical action is not needed, being the dirt/grime entrapped into the gel network (Fig. 7.1). If the application leads to the swelling of grime or dirt, the removal of swollen and soften materials should be carried out by gentle mechanical action (e.g. using a swap) (Fig. 7.2).
- A8 The treated area is now clean
- A9 - A11 the gel can be reused up to 5 times, by reimmersing it in water.

### Figure B: Application of Nanorestore Gel® Peggy (loaded with solvents or Nanorestore Cleaning® formulations) for the removal of polymeric coatings or aged varnishes.

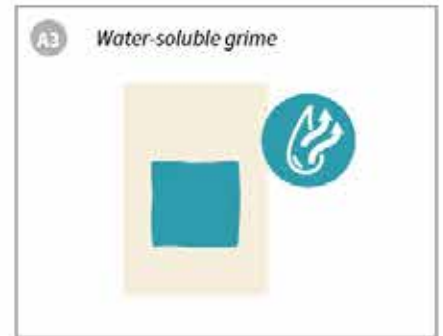
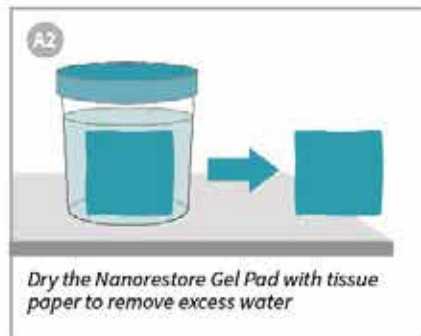
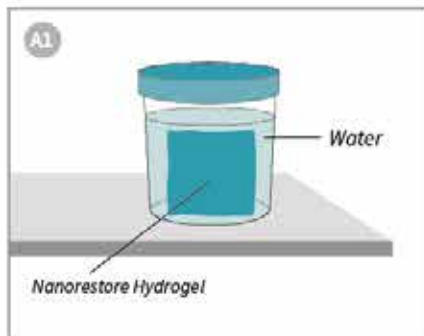
- B1 Loading Nanorestore Gel® Peggy with water/alcohol blends or Nanorestore Cleaning® aqueous formulations can be carried out by immersing the original water-loaded gel into the desired cleaning fluid for at least 12 hours.
- B2 Remove the hydrogel from the container.
- B3 Water excess on the gel surface has to be removed by gently placing the gel between two sheets of adsorbing paper. The surface of the gel should appear dry.
- B4 Place the gel over the surface. Optional: Use a plastic film to avoid evaporation.
- B5 Application time ranges from a minute to 3-4 hours.
- B6 Remove the gel.

- B7 When the unwanted material is solubilized, a mechanical action is not needed, being the dirt/grime entrapped into the gel network (B7.1). If the application leads to the swelling of grime or dirt, the removal of swollen and soften materials should be carried out by gentle mechanical action (e.g. using a swap) (B7.2).
- B8 The treated area is now clean.
- B9 - B11 The gel can be reused up to 5 times, by re-immersing it into the solvent or Nanorestore Cleaning® formulation.

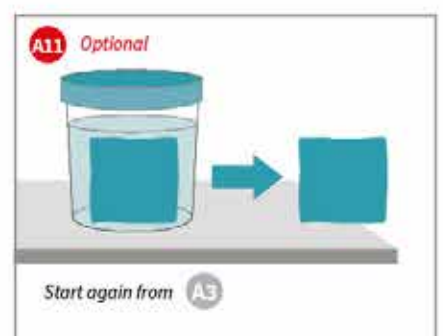
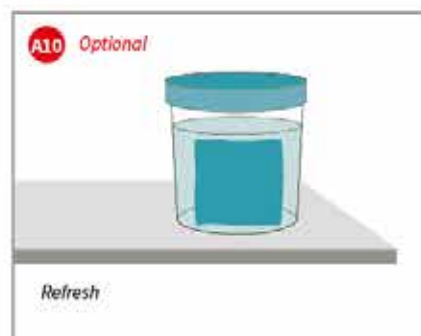
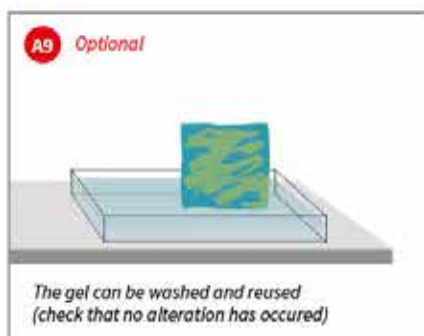
## FREQUENTLY ASKED QUESTIONS

- Q I forgot to put back into the container the Nanorestore Gel® Peggy, and now it is completely dried. Can I reuse it, if rehydrated?
- A No, completely dried gel cannot be reused, even if rehydrated. As a matter of fact, the complete drying of Nanorestore Gel® Peggy could affect the cleaning effectiveness of the system.

## A: Cleaning a surface by using a Hydrogel

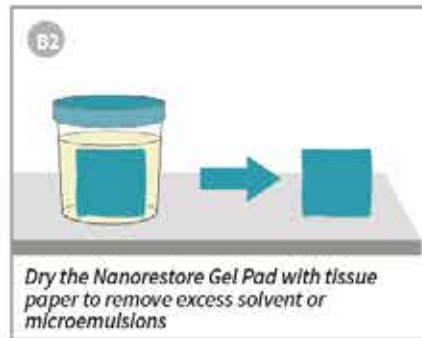
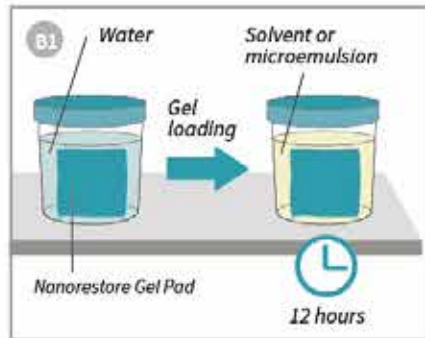


Store the Hydrogel 24 hrs in Aqua Dest. before loaded again with solvent or microemulsion.

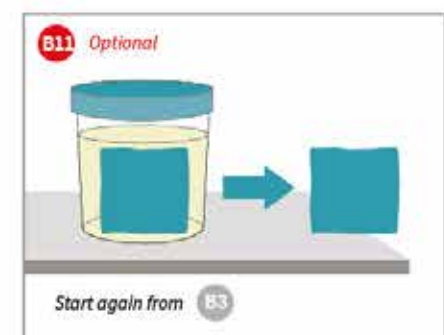
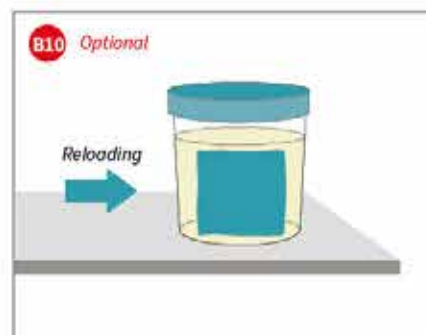
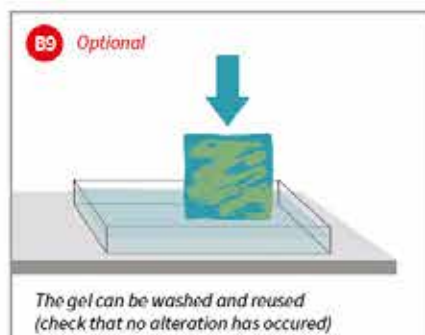




## B: Cleaning a surface or removing a coating by using a Hydrogel



Store the Hydrogel 24 hrs in Aqua Dest. before loaded again with solvent or microemulsion.





## REFERENCES

Further information can be found in the following textbooks: :

1. Piero Baglioni and David Chelazzi. Nanoscience for the Conservation of Works of Art. Royal Society of Chemistry, 2013.
2. Piero Baglioni, David Chelazzi, and Rodorico Giorgi. Nanotechnologies in the Conservation of Cultural Heritage: A Compendium of Materials and Techniques. Springer, 2014.

## ICONOLOGIE - EXPLANATION OF THE SYMBOLS



Trocknen / *Drying*



Komprimieren, Zusammenfalten /  
*Compress, fold together*



Schwamm / *Sponge*



Mit Schwamm trocknen /  
*Dry with sponge*



Scalpell oder Cutter benutzen /  
*Use scalpel or cutter*



Mit trockenem Wattestäbchen reinigen /  
*Clean with dry cotton swab*



Zeit beachten / *Watch time*



Sprühen / *Spray*



Aufquellen / *Swelling, soaking*



Messen, Analysieren /  
*Measuring, analysing*



Richtig, fertig / *right, finished*