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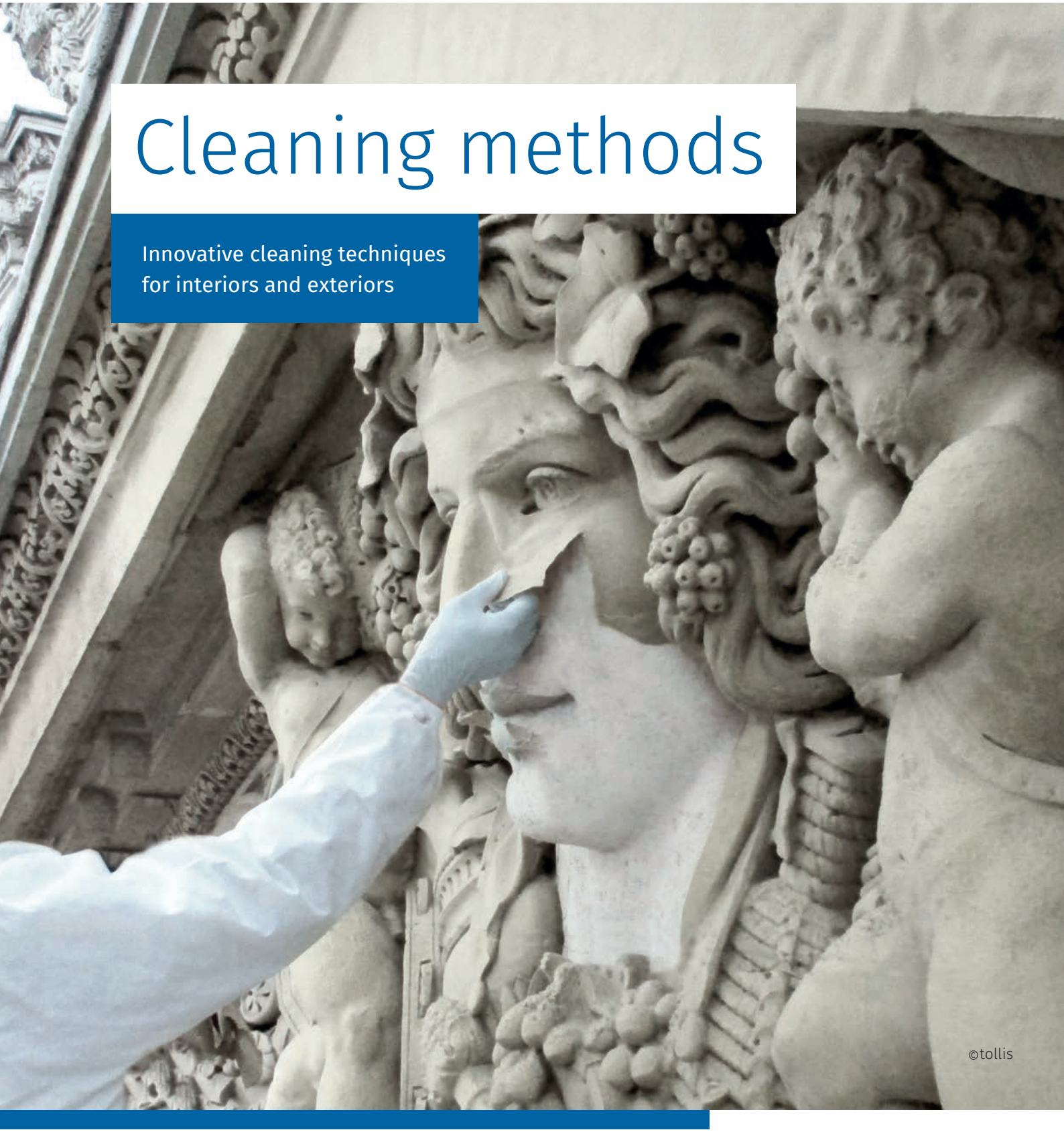
Cleaning methods

Innovative cleaning techniques
for interiors and exteriors



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Clean Galena

An extraordinary cleaning method

There may be aesthetic or technical reasons why a building needs to be cleaned. While the aesthetic reasons play a major role in deciding to go ahead with cleaning, they are difficult to evaluate from an objective standpoint. But the technical reasons are a different story. The main issue is that dirt deposits tend to act as reservoirs for damp and harmful substances, reducing the speed at which the subsurface can dry out. This means that the stone surface stays damp for longer, which amplifies the impact of the damage over time.

Any time cleaning is carried out, it is important to remember that this activity itself is not without risks – such as damage to the building substance or the release of deposited harmful substances. Clean Galena makes it possible to minimise these risks.

The typical urban dirt that needs removing from facades is generally made up of deposits of particles suspended in the atmosphere, such as dust, diesel soot, tyre and brake wear particles, iron dust from railways, and so on. These particles often contain heavy metals, and can react with the stone and destroy the original surface. Another problem with many types of natural stone is that the dirt particles are bound in gypsum, which is a secondary product that forms on the stone surface.

Whatever the situation, carefully planned cleaning is essential. The processes used must reduce or even completely remove the dirt, release as few harmful substances as possible, and protect the original substance of the building‘s surface.

It‘s a challenging task – but Clean Galena is up to the job.

In 2019, Clean Galena won a prize at the BAKA award ceremony for product innovation.

BAKA Award

BAKA Award

Prize for product innovation

Clean Galena

Innovative building technology that serves people, the environment and cultural heritage

In recent years, there has been a growing awareness of the emissions that can occur during facade cleaning. One particularly important question is whether cleaning can cause heavy metals to enter the environment in any form.

One good way of trapping hazardous substances during cleaning is to use cleaning compresses.

These are paste-like cleaning agents that contain a carrier material and active cleaning ingredients. Applying the compress causes the impurities to be dissolved and, together with the solvents used, they migrate into the compress where they are trapped. Once the compress has almost entirely dried out, this means that the cleaning process is complete.

Cleaning and metal ions

The active agents most commonly used for cleaning purposes are surfactants. In many cases, their surface-active properties can be impaired by metal ions which cause hardness. Metal ions make it easier for dirt to cling to surfaces and strengthen the bonds between dirt particles.

Positive metal ions can act as a go-between for the negatively polarised surface and negatively polarised dirt particles. Here‘s another way of explaining it: Metal ions can form a complex compound with the dirt, in which they act as the central atom. This inhibits the swelling of protein-containing dirt particles, which is an important part of the cleaning process. This is because the negatively polarised molecular groups of the protein are bound to the metal ion and therefore cannot interact with water. Because of this, it‘s easier to clean off dirt if the metal ions have been removed.

Originally, Clean Galena was designed for the complexing and emission-free removal of metal ions, in particular lead ions, from facades. However, a fortunate side effect was observed in many cases: Clean Galena was also having a cleaning action, since removing the metal ions has several knock-on effects that are helpful for cleaning:

- Destabilisation of gypsum and lime deposits
- Improvement of the swelling properties of organic dirt
- Easier dispersion of dirt particles.
  The dispersing effect of certain complexing agents is based not so much on the removal of metal ions from the dirt, but rather on the adsorption of negatively charged ions on dirt particles, which gives the dirt a negative charge. These negatively charged dirt particles readily break down into smaller components and also repel one another. The dirt is also repelled from negatively charged or polarised surfaces.

Clean Galena makes use of all these active mechanisms for cleaning facades. As a result, in addition to the (invisible) complexing and binding of metal ions – in particular lead ions – in the material, a cleaning effect is generally also achieved at the same time.

Before

After

Configuring the cleaning action

In order to adapt the cleaning effect and, if necessary, the drying time of Clean Galena for a specific substrate, the product is available not just in a standard version but also as ‘Clean Galena neutral’, which has a minimal amount of active ingredients (a version with no active agents at all is also possible, but this results in a very different consistency when mixed with the standard material). The two variants can be mixed on site in order to adjust the cleaning intensity of Clean Galena. It is recommended to set up trial areas where you can test the various mixing ratios. Once a suitable mixing ratio has been chosen, the mixture can be produced on site if it is to be used on a small area. For larger areas, Clean Galena can be prepared to the desired mixing ratio at the factory. This special mixture gives this variant the name ‘Clean Galena individual’.

The benefits:

- Very little moisture is applied to the building
- No dust
- No emissions of harmful active substances
- Harmful substances are trapped in the compress for easy disposal
- Clean Galena contains no ammonium carbonate and no EDTA. The active substances used are a range of readily biodegradable complexing agents that are used in the food industry (materials that can bind the various metal ions, such as ions of iron, copper, lead and other heavy metals). They are combined in such a way as to further amplify the cleaning effect of each individual active agent. The carrier material is bentonite, a sheet silicate that binds a variety of dissolved substances and colloids through adsorption and electrochemical processes. It also regulates moisture transport activity during the cleaning process, with the aid of a small amount of cellulose.

The procedure in detail:

- In the first step, any loose substances that could impair adhesion must be removed from the surface. This is generally done by hand using a broom or brush.
- Before the compress is applied, the surface must be pre-wetted so that the capillary-active pores near the surface are filled with water. This prevents the active agents of the compress from penetrating too deep into the building material, which in the worst case could result in them migrating and not returning to the compress.
- Clean Galena should be mixed again until homogeneous immediately before application.
- Application by machine has proved to be the most cost-effective and technically suitable application method. At layer thicknesses of 2 mm or above, there are no further improvements to the cleaning effect, but the drying time and therefore the waiting time until the compress can be removed often increase significantly.
- After one to three days, even at relatively low temperatures, the compress dries out and detaches from the surface.
- Once the dry compress has been removed, the surface can be rinsed off again if necessary. At this point, any remaining dirt has been destabilised due to the removal of the metal ions and can usually be removed easily.
- Once removed, the dried material must be disposed of according to local regulations. It may be necessary to analyse the level of heavy metals in the compress, but the dried compress material itself is non-critical.

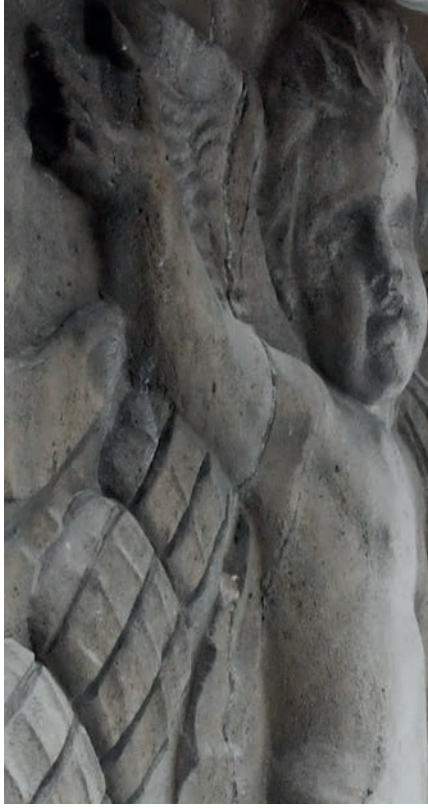
Wet with water

Apply in one or two layers

Drying time (depending on weather conditions)

Remove dried compress

Page 6 and 7 pictures © Valerie Evrard



Cleaning interiors

Arte Mundit – a milestone in cleaning heritage interiors

There is a virtually endless range of products available for cleaning the surfaces of historic and heritage facades. However, despite being in use for decades, none of these has proved that it's got what it takes for the systematic cleaning of large interior surfaces. There are several reasons for this: Some of these methods require large amounts of water, which naturally leads to problems indoors. Meanwhile, other methods generate a lot of dust, making them just as bad. Methods that avoid both of these drawbacks are rare, or – in the case of laser technology, for example – so inefficient that cleaning large interior surfaces in this way would not be feasible from a cost perspective.

To date, the only product that has been commercially produced and widely used for cleaning interior surfaces is, essentially, an EDTA-based paste. This can be used to remove thin layers of gypsum and to reduce the discolouration caused by copper, nickel and iron.

But now a new way of cleaning these surfaces has been developed – peel-off pastes that are based on a specially formulated natural latex dispersion. While the water evaporates, the polymer crosslinks to form an elastic film that clings to the surface being cleaned. This film is easy to remove mechanically, without the need for any water. The cleaning effect is based on two different principles that act in very distinct ways depending on the type of dirt present and the product formulation. Firstly, dirt on the surface clings to the film that is produced, and secondly, special components dissolve and complex very specific compounds on the surface being cleaned, which are then in turn trapped in the latex film too. When the product is peeled off, a cleaned surface remains. Arte Mundit® can be used to clean natural stone surfaces, including marble, as well as other mineral substrates such as brick, render or concrete.

Before and after

Selected references:

- New York State Capitol, Albany (USA)
- Cathedral of St. John the Divine, New York (USA)
- St. Patrick's Cathedral, New York (USA)
- Royal Palace, Brussels (Belgium)
- St Paul's Church, Antwerp (Belgium)
- UNESCO headquarters, Paris (France)
- Musée du Louvre, Paris (France)
- Château Chambord (France)
- Chartres Cathedral (France)
- St Paul's Cathedral, London (UK)
- Westminster Hall – Houses of Parliament, London (UK)
- Palacio del Rey, Madrid (Spain)

The different types of Arte Mundit

Arte Mundit® type I

- Specially formulated latex dispersion without active cleaning additives
- One component

Arte Mundit® types II, III and V

- Specially formulated latex dispersion with an increasing concentration of active cleaning additives
- Two components

Arte Mundit® Eco
Free from EDTA, inorganic salts, surfactants and organic solvents

- Eco-friendly cleaning paste based on natural raw materials
- For interior and exterior use
- Contains no volatile neutralising agents
- Long-term protection against moss and algae growth
- One component

The success of an Arte Mundit type (I, II, III, V or Eco) depends on the substrate and on the type and intensity of dirt present; it is very difficult to make predictions about its performance. For this reason, different types should always be tested out on small trial areas.

Configuring the cleaning action

Five different variants of Arte Mundit® are available for various substrates and dirt levels. The basic product Arte Mundit® type I is a specially formulated aqueous dispersion based on natural rubber. If the dirt present is more stubborn than just adhering dust particles, meaning that chemical removal is required, the basic material is mixed with low quantities of different complexing agents. Since adding these components affects the viscosity of the latex dispersion, the end product must be re-adjusted to achieve the desired working properties. Different types of Arte Mundit® are therefore available depending on the type and amount of active cleaning substances present.

- Arte Mundit® type I
- Arte Mundit® types II, III and V
- Arte Mundit® Eco

Advantages:
Unlike many other methods, Arte Mundit makes it possible to carry out cleaning with ease while the building is in use.

- Virtually no water is needed
- No dust is generated
- Noise pollution remains within acceptable limits
- Almost all surfaces can be cleaned, even sensitive and valuable substrates
- Easy to apply by brushing or spraying
- Odourless
- No chemical after-effects and no “contamination” of the substrate by constituents of Arte Mundit
- Ammonia content < 0.005%
- User-friendly and highly efficient
- Any salts present are not activated
- Also cleans deeper pores and profiled sections

The procedure in detail:

- Before starting cleaning, all surfaces that are not to be treated should be protected, along with any surfaces that are gilded, varnished or made of decorative metal.
- The surface to be treated must be clean, dry and dust-free.
- Arte Mundit® can be applied with a brush or with airless spraying equipment. As the material dries, the water evaporates and the dispersed polymer crosslinks to form a solid, highly elastic film.
- Once the film is completely dry, it can be carefully removed. At temperatures between 10 and 30°C and in moderate humidity, Arte Mundit® is virtually dry after 2 to 3 hours. At 95% relative humidity, the drying time can be up to 22 hours. Arte Mundit® can normally be removed with ease the day after application.
- Once the latex film has been removed, it is not uncommon for a fine layer of dust to remain on the surface. This can be cleaned off with a slightly damp sponge.

Subject to change. The current version of the applicable Technical Data Sheet is relevant for legal matters. Colour variations are possible. Global contacts: www.remmers.com/remmers-worldwide

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