



*Train in Nuremberg after its first clean with LoClean-Nplus (diluted 1 : 200).*

## Sustainable vehicle exterior cleaning

# Cleaning that pays - right down to the bottom line

The use of a new generation of organic, highly efficient cleaning agents is fundamentally changing the exterior cleaning of trains and buses. The "LoClean-Easy-to-Clean" cleaning range, developed by specialists Reinwerk Solutions and based on functional proteins and mildly alkaline surfactants, is enabling the transport industry to dispense with problematic chemicals. Operators also benefit from reduced costs resulting from longer periods between cleaning, lower personnel expenditure and elimination of costly and time-consuming wastewater treatment.

For decades, the exterior cleaning of buses and locomotives has been characterized by the use of strongly alkaline and strongly acidic cleaning agents; for example, sodium or potassium hydroxide solutions. Hydrochloric acid, nitric acid and even the particularly aggressive hydrofluoric acid were all used for cleaning purposes in wash facilities. Transport companies had to accept that, not only did these solutions attack the paintwork, they also attacked vehicle panels and even components. This resulted in significant consequential costs: from replacement parts

to re-spraying, whilst the vehicles concerned stood idle, to say nothing of the impact this was all having on the environment. In the meantime, for everyone who has switched to using LoClean-Easy-to-Clean products, these issues have become a thing of the past. Since the new products appeared on the market, a trend has emerged which has seen a move away from aggressive cleaning agents to products that are neutral and gentle, with pH values in some cases less than 8.0. Reinwerk Solutions GmbH and Gelita AG, world market leader

for collagen proteins, have prepared the way for this turnaround. The result of this collaboration is a new generation of cleaning agents – going by the name of LoClean-Easy-to-Clean – that use an innovative combination of functional proteins and environmentally friendly surfactants. These products feature a mildly alkaline cleaner and long-lasting surface protection. This is because the functional proteins form an invisible dirt-repellent protective film on the surface of the vehicle, as detailed in SAUBER 1/2016.

## Success with neutral cleaning agents

Sold under the brand name of LoClean, this product range comprises neutral protein cleaning agents approved by railway operators, paint manufacturers and the railway industry. All relevant environmental standards

and the respective discharge regulations for operators are satisfied with ease, as the products do not contain any aggressive substances registered as hazardous. Furthermore, they do not attack the track or the technical installations of the railway infrastructure. Thus cleaning is tremendously effective.

The range is based on the products LoClean-Nplus and LoClean-Cara, whose diluted formulations can be used for both maintenance cleaning and deep cleaning. The range is complemented with a finisher, LoClean-Glanz, which is highly diluted in concentrations up to 1: 25,000 prior to use. This is what makes clean vehicles shine "like new". LoClean-NGU was recently added to the product range. This neutral cleaning agent with a pH value of just 7.4 is already being used in both public and long-haul transport and, by increasing the application concentration whilst ensuring it remains within permissible limits, can even be used to eliminate inorganic defilement, which previously had to be removed using acidic cleaning products.

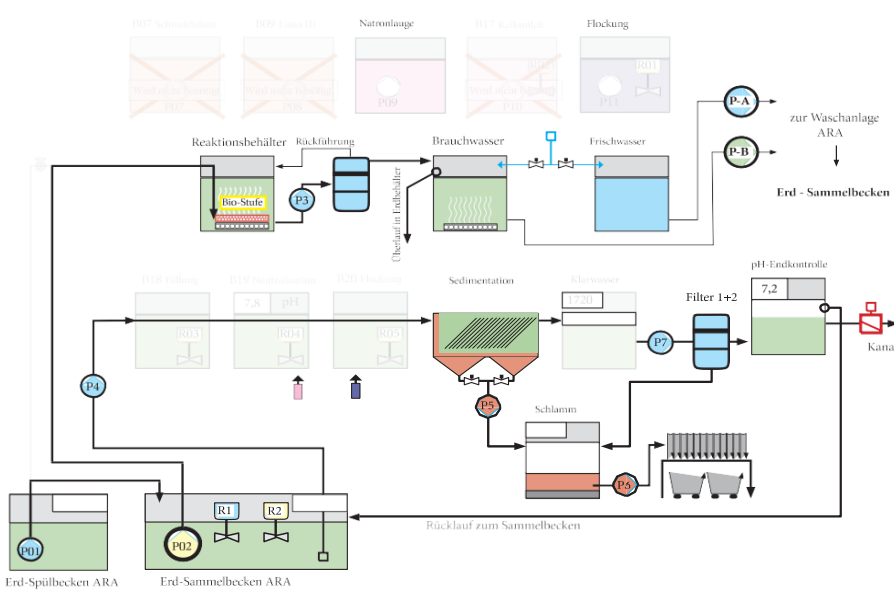
In parallel, Reinwerk Solutions has also developed a dry cleaning concept with the tried and tested Easy-to-Clean effect based on functional proteins. Dry cleaning is ideal for spot cleaning, for example, the door area, during breaks in operation (also see SAUBER 2/2015).

## So clean that you can see your own reflection

The switch to the new process pays off immediately. Regular maintenance cleaning with the LoClean-Easy-to-Clean range of cleaning products also dispenses with the need for costly and time-consuming manual deep cleaning in depots, usually done twice a year. This is because there is no longer any need for expensive, yet ultimately limited, durable permanent finishes on new vehicles. The functional NOVO-TEC proteins contained in the cleaners form a protective film, invisible to the naked eye, which lends the cleaned surface hydrophilic properties. That means that it repels water. The effect of this is that dirt can no longer penetrate the paintwork. Instead, it swims on the protective film and is simply washed away next time it rains or the next time it is cleaned. The fleet therefore always looks at its best, as vehicles get less dirty in day-to-day operation. In time, vehicle parts that brushes cannot reach are also cleaned, for example, the flexible corridor connection. This self-cleaning effect considerably lengthens the period between cleans by up to eight weeks. Although the protective film is only microscopically thin, it protects the paintwork from the effects of weather and intense sunlight. It smooths over rough surfaces, making them shine.

Applications thus far in rail transport companies at home and abroad have provided evidence that the protective film lasts for three to four months and that it is automatically renewed with each subsequent wash. Another positive feature from the operator's point of view is that windows are so clean that they sparkle, at no extra cost.

Extreme dirt resulting from operation or graffiti does not stand a chance. The LoClean range's protective film is resistant to solvents, such as, for example, cellulose thinners, acetone, aromatic compounds or ether. Likewise, organic substances, such as bird droppings, dead insects, tree sap or corrosive salts, do not penetrate the paintwork. With each clean, they are simply removed from the protective coating and washed away. This effect occurs not only on surfaces that brushes cannot reach directly, but also in areas that brushes do not penetrate. In particular, water-repellent graphite contamination, resulting from contact between pantographs and overhead cables, often results in unattractive discoloration of paintwork on trams and multiple unit trains. Thanks to the new Lo-Clean-Cara protein formula, this type of vehicle defilement permanently removes itself after the first three or four regular washes - powerful cleaning with a pH value of just 8.0.



## Good for people and machinery

As well as costs, the benefits to human beings and nature are particularly worthy of consideration. For example, when using conventional cleaning agents, it was previously forbidden to enter the wash facility whilst trains were being cleaned. This was because the air could contain vapors that are hazardous to human health. The introduction of LoClean products renders these safety precautions unnecessary. No specific chemical odors are produced - a feature much appreciated by fleet managers and line managers. Many operators have also noticed that plant and machinery are no longer damaged as much as they were before. In particular, dispensing with strong acids and alkaline solutions reduces the risk of operating personnel experiencing skin or eye irritations and avoids vehicles and the washing facility sustaining corrosion damage. Thus, the turnaround in vehicle cleaning not only pays off in the company's balance sheet, it also protects people and machinery.

**Diagram showing a biological washing facility cycle:** After cleaning the vehicle in the ARA, the dirty water is collected in a ground reservoir and pumped to the reaction container. This is where the dirty water is cleaned by means of a biological reaction and continuously recirculated with the ground reservoirs. There is no need for conventional wastewater treatment (shown as semi-transparent in the above diagram). The infrastructure for the removal of sand/silt can be used in existing wastewater treatment facilities.

## Considerable savings potential

The efficient and environmentally friendly cleaning agents based on functional proteins enable significant cost savings: firstly, cleaning agents can be highly diluted for use without any loss of impact. Recent experiences of rail transport companies at home and abroad are testimony to this. Even when highly diluted in the ratio of 1: 200, the functional proteins achieve uncompromised high quality cleaning, at the same time reducing surfactants—a highly desirable benefit from an environmental point of view. Secondly, cleaning with proteins brings huge economic advantages as regards the infrastructure required, the exterior cleaning facilities (ARAs) and the wastewater facilities (ABAs). If vehicles are cleaned exclusively using the LoClean-Easy-to-Clean procedure, it is possible to fully dispense with conventional wastewater treatment with its costly and time-consuming process technology. It can be replaced by a biological wastewater treatment in a closed system, which is also protected by a selective filter for heavy metals and the improved recirculation of washing water used achieves a

level of effectiveness exceeding 90 percent. The operator can even use the Lo-Clean products where water hardness is high, up to 40 German degrees (°dH), without the need for any softeners or higher doses of the cleaning agent. Consequently, the application of the protein protective coating brings considerable savings potential with regard to both ongoing operating costs and capital investment. Thus, when comparing biological wastewater treatment with conventional treatment using chemicals, operating costs can be reduced by up to 60 percent, including costs for waste management, maintenance and repair. Newly constructed exterior cleaning facilities immediately bring savings running into six figures. This is because, with less space being required and with no need for expensive technology for complex wastewater facilities, investment for buildings and technology reduces by around 20 percent compared with the overall investment that is usually required. If you add to that cost savings and low capital investment, a new ARA construction brings a cost reduction of around 80 percent, over a lifespan of 20 years.



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