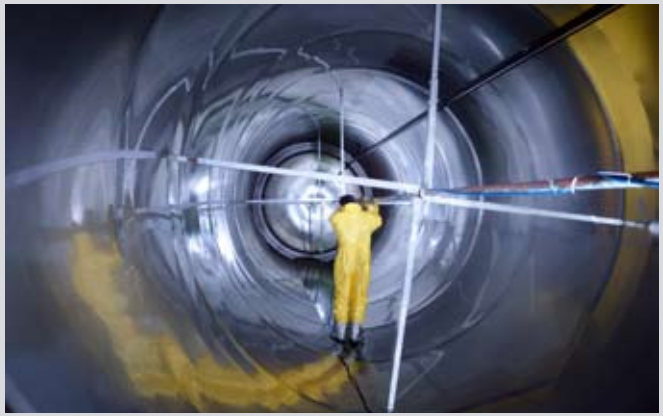
Vessel Maintenance

Surface treatment of
stainless steel vessels.

Types of Vessel Maintenance.

Stainless steel containers in practical use are often marked by signs of usage such as scratches, corrosion and coatings. In the long term, this leads to vessel surfaces that are no longer within the specifications. Depending on the maintenance requirements, we offer various processing options in the factory and also directly on site:

| Electropolishing
| Derouging
| Anodic and chemical cleaning
| Chemical pickling
| Passivation
| Refurbishment of defective and corroded surfaces even with localised damage



Internal electropolishing of a 150 cubic meter tank at the Waidhofen/Thaya plant with flexible wiping cathode.

Electropolishing.

Under the action of direct current, metal in the micrometre range is removed from the workpiece surface in a solution with high conductivity. The component forms the positive pole (anode) and the cathode the negative pole, which completes this electric cell. When current is applied, metal dissolves on the anode surface and enters into solution. A feature of electrochemical material removal is that the process is initiated only under the influence of current, so that the polishing can be carried out precisely to meet the objectives.

Processing options depending on geometry:

| Fixed cathode, mainly in factory service
| Wiping cathode, mainly on site at the customer and for complex geometries

Derouging.

Systems such as WFI distillers, storage tanks, purified steam systems, etc. usually consist of austenitic stainless steels (e.g. 1.4404/1.4435/316L, etc.). After only a short period of operation, the inner surfaces often show reddish-brown contamination. These are usually heavy metal particles resulting from a change in the stainless steel surface, so-called rouging. Downstream production systems can be contaminated by carryoverof the rouge particles.
Derouging operations are carried out by our GMP-trained on-site teams. Only state-of-the-art equipment and safety technologies are used. The cleaning chemicals have been specially developed for use on sensitive equipment. All work is thoroughly documented and the chemical solutions used are processed in an environmentally responsible and professional manner with certificate.

Pharmaceutical tank before and after derouging treatment by HENKEL.

Our Service Range.

| On-site and factory service
| Electrochemical polishing
| Anodic cleaning
| Chemical polishing / deburring
| Chemical pickling and passivation
| Professional cleaning (also in clean room)
| Derouging and repassivation
| Process- and cleaning chemicals
| Documentation
| Construction

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Anodic Cleaning.

Similar to electropolishing, anodic cleaning is an electrochemical material removal process. However, only minor material removal depths of 3 to 5 µm are achieved. These are already sufficient to sustainably remove stubborn deposits from the stainless steel surface and to obtain a morphologically pure and passive stainless steel surface. The advantages compared to the classic chemical removal of coatings are the short processing time and the considerably reduced use of chemicals. In addition, the surface is micro-smoothed, which results in a reduced tendency to form deposits. These advantages are particularly appreciated by many plant operators during on-site operations.

Wet-chemical Passivation.

The characteristic passive layer of the stainless steel is removed in the course of the surface treatment. Repassivation of the stainless steel surface is therefore highly recommended after every chemical surface treatment, such as pickling, as a final processing step.

Passivation supports the stainless steel surface during the renewal of the chromium oxide layer. With wet-chemical passivation, the layer structure is also more homogeneous. After this kind of repassivation treatment, the surface is completely passive and ready for use again.

Materials.

Every material has particular characteristics. The composition of the metallic alloy has a considerable effect on the workability. The HENKEL chemicals support the following materials, amongst others:

All austenitic Cr/Ni steels (e.g. 1.4404, 1.4435/316L, 1.4539/904L, 1.4571), Duplex (e.g. 1.4462), Hastelloy®, copper, titanium, niobium, etc.

Components.

Due to the various processing options, there are almost no limits to our chemical and electrochemical vessel maintenance treatment. The following components, amongst others, are typical:

- *Storage tanks, fermenters, reactors, cryostats*
- *Mixing and batch tanks*
- *Agitators and other internals*

Your Benefits.

Having vessels processed by HENKEL has many advantages for you and your products:

- *Over 40 years of experience*
- *Method and result tailored to your product*
- *Component/surface inspection through extensive quality assurance*
- *Additional services from a single source e.g. final cleaning in the clean room, customer-specific marking and packaging, etc.*
- *GMP-trained staff*
- *GMP-compliant processing documentation for system requalification*
- *Comprehensive safety and chemicals management (also on site)*

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