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WHITE PAPER

Routine Maintenance of Centrifuges

Cleaning, Maintenance and Disinfection of Centrifuges, Rotors and Adapters

Scientiquipp Pvt. Ltd | Mumbai, India

Executive summary

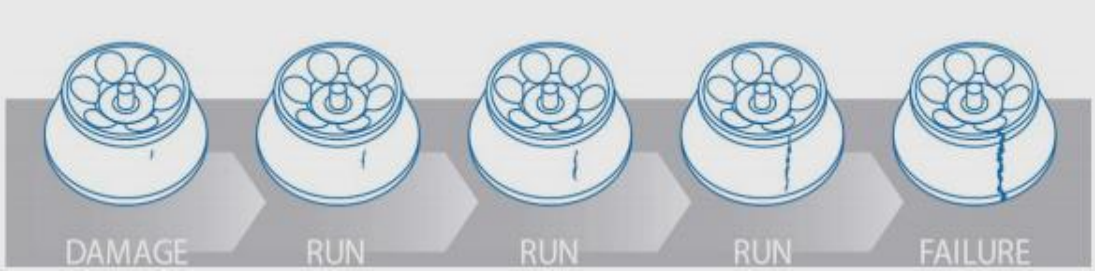
The operation of centrifuges is safe, as long as high quality accessories and components are used, such as anodized or PTFE coated aluminium rotors for instance, and the following conditions are met: the centrifuges and their equipment are used properly, are in an undamaged condition and maintained as recommended here. Prevention from long-term exposure to residues like salts or aggressive chemicals through routine maintenance by customers themselves can help in avoiding extensive corrosion incidents and to achieve the full lifetime of the instrument. Therefore, instructions on how centrifuges and their accessories can be cleaned, autoclaved, lubricated and decontaminated by the user himself are presented here. Finally, information is given in case professional inspection and certification services are required in labs with the highest safety demands.

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Introduction

Centrifuge maintenance is an everyday tool to maintain optimal condition and safety of your instrument. Scientiquipp's cleaning and maintenance standard operating procedures are highly important in case of contamination with salts and chemicals. In case of long-term exposure aggressive chemicals can develop corrosive spots on rotors and rotor buckets, which may constantly grow to form small holes if ignored **(Fig.1)**. If small scratches and cracks are already present on the rotor surface, this further facilitates corrosion processes as protective coatings are missing on those spots. In case of advanced corrosion, rotors or buckets could be damaged in a wat that makes centrifugation processes unsafe. In the worst-case scenario, damaged rotors can even lead to a crash **(Fig.2).**



Scientiquipp's centrifuges are manufactured according to IEC standards and ensure no harm will be done to persons operating the centrifuge or surrounding lab equipment, if used in accordance with the operating instructions. However the centrifuge and rotor themselves may be destroyed.

High quality aluminium rotors and buckets are protected against corrosion caused by commonly used laboratory chemicals, for instance by means of an anodized coating. Nevertheless, aggressive chemicals can still damage the equipment! Such chemicals include concentrated and mild alkalis, concentrated acids, solutions containing mercury ions, copper ions and other heavy-metal ions, chlorinated hydrocarbons, and concentrated saline solutions.

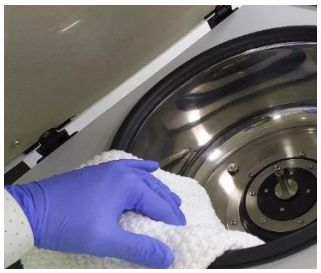
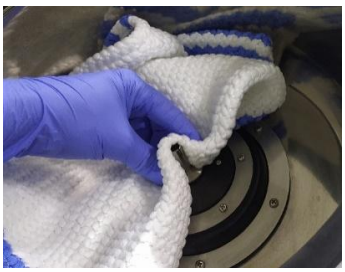
We recommend checking the rotors and rotor bores visually for residue and corrosion on a weekly and monthly basis. Rotors, buckets, lids or adapters, which have been subject to chemical or mechanical damage, or which have exceeded their maximum operating life, should not be used any longer. Damaged tubes or plates should not be centrifuged **(Fig.3).**

Important information regarding cleaning and maintenance can not only be found in this paper, but also in the operating manual of your centrifuge. If you are unsure about the cleaning or decontamination methods of the centrifuge or rotor, one should contact the service team at Scientiquipp for their recommendation. If in doubt whether a rotor is still safe, an authorized service technician should be contacted.

Cleaning, Maintenance and Disinfection

Remove the buckets and the rotor from the centrifuge. For refrigerated centrifuges: Leave the centrifuge lid open and defrost the ice on the rotor chamber surface. Wipe the rotor chamber with a moist cloth. The outside of the centrifuge and the rotor chamber should be cleaned regularly with a moist cloth and neutral detergents (Fig. 2). Switch off the centrifuge, before you do so.

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In the event of contamination caused by high-risk substances (bio-hazardous or aggressive chemical reagents and radioactive reagents) wear a laboratory coat, gloves and goggles. If there is broken glass: Retrieve the bigger broken glass with forceps, remove small and powder shards with a damp lint free cloth. Absorb blood with gauze or paper towel and subsequently, seal the material in a biohazard bag for safe disposal **(Fig.4)**. Wipe the contaminated parts with neutral agents for cleaning and disinfection (e.g. diluted neutral alcohol-based disinfectant or 70% isopropanol mixture). Use soaked gauze or lint-free cloth.

If necessary, remove the contaminated rotor, rotor lid, buckets, adapters out of the centrifuge to decontaminate areas which are difficult to access. Following decontamination, the instrument and accessories should be thoroughly cleaned using distilled water or Type 3 laboratory-grade water.

Rotors, adapters, buckets and rubber seal

User neutral cleaning solutions (alcohol or alcohol-based disinfectant) and a soft cloth to clean your rotors and accessories. Wipe contaminated parts with neutral agents for cleaning and disinfection (e.g. diluted neutral alcohol-based disinfectant or 70% isopropanol mixture). Use a lint-free cloth. In case of spilling some aggressive liquid on the centrifuge chamber, please clean it immediately. If there is a stubborn stain, clean with a plastic scrub pad and rinse the area with distilled water or type 3 water.

Avoid immersing the rotor in water as liquid could flow into rotor cavities, and dry thoroughly with a soft cleaning cloth. As salt crystals located on the metal surface will corrode the surface, we strongly recommend cleaning rotors and buckets immediately. If there is a need to clean the rotors tube cavities or boreholes, use a stiff test-tube brush that has bristles and a non-metallic tip. For swing-bucket rotors ensure the grooves in which the buckets are fitted are free of contamination. Take care to ensure that the buckets can still swing freely.




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After decontamination, the instrument should be wiped with distilled water. If needed, autoclave the rotor, rotor lids at 121°C for 20 minutes as recommended. Never use UV, beta, gamma radiation or any high energy radiation source. Place the parts on a dry cloth upside down to dry.

Caution

Do not use acetone, caustic detergents, or detergents that contain chlorite ions. Corrosion is most frequently caused by using chlorite ion solutions, such as sodium hypochlorite (household bleach). Do not use steel wool, wire brushes, abrasives, or sandpaper, since they may damage the rotor coating (anodized coating) and thus increase the risk for corrosion. We do not recommend usage of dishwashers for rotors or lids due to the aggressive cleaning agents used in these devices. These agents may result in corrosion.

Autoclaving

In order to protect human beings from pathogens or samples from contamination, sterilization of rotors and accessories is recommended. Sterilization is a term referred to a process that eliminates all forms of microbial life, including transmissible agents such as bacteria, viruses, fungi, spore forms etc. A widely used method for heat sterilization is autoclaving, where hot steam sterilizes equipment and other objects. We recommend autoclaving be performed at 121°C and 2 bar atmospheric pressure for 15-20 minutes for rotors and rotor lids.

Scientiquipp's aluminium rotors have been vigorously tested for autoclaving at 121°C and approved within this setting. They possess a special anodized coating which protects the metal from deeper corrosion effects. If you are in doubt about your rotor, please contact a member of the Scientiquipp service team.

In order to achieve an outstanding chemical resistance against phenol, acetonitrile, DMSO, acetone, trichloroacetic acid and sodium hypochlorite, Scientiquipp offers the option of PTFE coated aluminium fixed angle rotors. This coating is applied on top of the actual anodic coating.

However, prions, such as those associated with Creutzfeldt Jakob disease, may not be destroyed by autoclaving at the typical 121 °C for 20 minutes. Some manufacturers state that autoclaving at 134 °C for at least 18 minutes should usually be sufficient [1]. But in some cases this also is not enough to deactivate the agent of disease, especially if you use material with very high infectiousness. The prions are generally quite resistant to heat, although their infectivity can be reduced by such a treatment. To destroy prions, rotors which are only tested to be autoclaved at a max temperature of 121 °C are therefore not suitable for such an application. According to available marketing material, only a few rotors in the market are allowed to be autoclaved at higher temperatures. But are the rotors really tested within this setting? Only very few companies can provide customers with rotors really being tested with higher temperatures than 121 °C. In this field, customers have limited rotor options, including Scientiquipp's high-quality aluminum rotors. Selected Scientiquipp rotors were extensively tested at 142 °C for 2 hours. Scientiquipp's rotors can be used with confidence for such an application.

Decontamination / Disinfection

Even when working accurately, a contamination of the rotor by biological (for example blood) or radioactive material may happen. Please consult your laboratory safety officer first about suitable methods of cleaning and disinfecting any hazardous spill within the centrifuge/ rotor. Successful disinfection can only be granted by the suppliers of the chemicals. Before using any cleaning or disinfection method other than the one recommended by the centrifuge manufacturer, please check that the intended method will not damage the rotors, accessories, or other parts of the centrifuge. For decontamination, disinfection with alcohol-containing liquids and autoclaving are the recommended methods. Scientiquipp recommends the following disinfectants.

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Table 1: Recommended Disinfectants

Disinfectant	Supplier	Anodized Rotors	Anodized Buckets	Stainless Steel	Metal Chassis
Sterillium™	Bode-Chemie	S	S	S	S
Sodium Hypochloride		S	S	S	S
Isopropanol		S	S	S	S

About Scientiquipp. Pvt.Ltd.

Since the 1980's Scientiquipp (formerly known as Plasto Crafts) has been synonymous with customer-oriented processes and innovative products, such as laboratory devices. Today, we serve as experts and advisors, using our unique knowledge and experience to support laboratories and research institutions around India. The foundation of the company's expertise is its focus on its customers. Scientiquipp's exchange of ideas with its customers results in comprehensive solutions that in turn become industry standards. Scientiquipp will continue this path in the future, to the standard set by the company's founders: that of *enabling the future of medicine.*

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