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## Centrifuge Rotors and Buckets: Care and Cleaning

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## Cleaning and Disinfection Reagents and Lubricants

	Supplier:
Solution 555	Beckman, catalogue number: 339555
Silicone vacuum grease	Beckman, catalogue number: 335148
Paint- On graphite lubricant	Beckman, catalogue number: 977212
Spinkote lubricant	Beckman, catalogue number: 306812
70% alcohol or industrial methylated spirits (IMS)	Fisher Scientific or VWR
Virkon	Fisher Scientific or VWR
Hydrogen peroxide (6%)	Fisher Scientific or VWR

## Risk Assessment

The risks associated with cleaning rotors are:

- Manual handling: some of the rotors are heavy, others are difficult to remove from centrifuges because of the height they have to be lifted for removal. If you cannot manage to remove a rotor easily ask someone else to do it for you.
- Chemical/biological: spills can cause a chemical or biological hazard. Ensure you are aware how to clean up spills of any substances you will be using. There must be a risk assessment in place for the procedure being undertaken before work commences; this risk assessment should include information on dealing with spills.

## Types of Centrifuge Rotor

Centrifuge rotors fall into three categories: swinging-bucket (swing-out) rotors, fixed angle rotors and vertical or near vertical rotors. Each type is designed to address three key factors:

- type of centrifugation - differential, rate-zonal or isopycnic (equal density or density gradient);
- speed
- volume.

Fixed angle and swing-out rotors are the most common; vertical and near vertical rotors are used mainly in ultracentrifugation.

## Care of Rotors

Proper rotor care is essential for ensuring safety and longevity; it can reduce the risk of accidents and greatly extend the life span of a rotor. Properly maintained rotors rarely fail. The integrity of rotors can be compromised by corrosion or fatigue.

The majority of rotors in OCDEM are made of aluminium with the exception of most of those used in the ultracentrifuges, which are made of titanium.

Manufacturer's instructions for care and maintenance must be adhered to; some general guidelines are listed below:

- Keep rotors and buckets clean and dry.
- Be gentle when cleaning rotors, especially aluminium ones. Avoid harsh detergents or bottle brushes with sharp wire ends; use those that are plastic coated.
- When reinstalling rotors after cleaning lightly lubricate the drive hole with Spinkote to stop the rotor sticking.
- When using swing-out rotors do not grease the bowl gasket.
- Inspect rotors and buckets regularly (at least monthly). If there are rough spots, pitting, white powder deposits, or heavy discolouration, do not run the rotor. Have it checked by the manufacturer's representative.
- Maintain rotor logs. Eventually every rotor must be retired and as ultra rotors age their maximum speed must be de-rated. It is imperative to keep diligent logs.
- **Swing-out rotors only** (but not those on the ultra centrifuges)  
Approximately every 400 runs or monthly (whichever is sooner), or after cleaning or autoclaving perform the following:
  - wipe the rotor pins and the bucket sockets with a paper towel;
  - coat the bucket sockets with a 'paint on graphite lubricant';
  - allow the lubricant to dry for about five minutes before replacing the rotor or buckets in the centrifuge;
  - do not grease the bowl gasket when using swing-out rotors.

## Cleaning

- Rotors and buckets should be cleaned weekly if in regular use and after each use if only used occasionally. They should be cleaned after every use when used with corrosive materials, which includes phenol.
- Remove O-rings from rotor lids or aerosol lids before cleaning.
- Wash immediately if spills occur or if salts or other corrosive materials have been used.
- Do not use metal implements to remove debris.
- If debris is firmly lodged on the rotor use a mild detergent or Solution 555, available from Beckman (cat number 339555), diluted 1 to 10 before use. Leave in contact for as short a time as possible and rinse thoroughly with tap water.
- The final rinse should be with deionised water.
- Dry the rotor, lids or buckets as thoroughly as possible using paper towels or tissue – do NOT use acetone; store upside down until completely dry.
- Dry and grease O-rings with silicone vacuum grease before replacing into rotor lid.
- Rotors and buckets should be completely dry before use.

## Spills

### Biohazards and Disinfection

If you discover a spill in a centrifuge bucket or rotor (usually caused by a broken tube), where the contents are body fluids or pathogens:

- Allow any aerosols to settle.
- Remove the centrifuge bucket/lid assembly from a swing-out rotor, or remove the whole rotor if fixed angle, and transport it to the nearest sink, if the spill is a hazard group 2 pathogen then deal with the spill in a class II microbiological safety cabinet.
- Remove the lid.
- Sprinkle Virkon powder into the bucket or rotor so that it completely covers the spill.
- Leave until the liquid is completely absorbed.
- Remove the contents into a sharps bin.
- To remove any residue that might contain glass fragments, fill the bucket or rotor with water and drain it through a sieve into the sink. Put the contents of the sieve into a sharps bin and wash the bucket or rotor out thoroughly. Wash the sieve.
- Flush any residue from the sink with copious amount of water.
- Soak the centrifuge bucket or rotor in clean water to ensure all the Virkon is removed and then rinse with running water.
- Dry the bucket or rotor and return to the centrifuge.
- If the spill was in a swing-out rotor wipe over the surface of the rotor and the inside of the drum with 70% alcohol before replacing the bucket; ensure the alcohol has evaporated before use.
- If the spill was of a highly infectious agent then the rotor or buckets should be autoclaved. Most rotors and buckets are suitable for autoclaving but check with the manufacturer guidelines before doing so.

### Chemical spills in the centrifuge except organic solvents:

- Remove the bucket or rotor to the nearest sink and treat the spill according to the chemical, collect any hazardous liquids into a beaker and transfer to a bottle for disposal. Clean as for 'biohazards' above using a mild detergent instead of Virkon.
- Be very careful if there are glass or sharp plastic fragments in the bucket; these fragments must be wrapped well in paper and then transferred to a sharps bin.
- Most buffers can be disposed of via the sink, but check with the Safety Data Sheet or ask the DSO for advice first. Disposal of hazardous liquids is via the Safety Office.
- If the spill was in a swing out rotor wipe over the surface of the rotor and the inside of the drum with a mild detergent solution, then wipe off the detergent thoroughly with clean water, followed by de-ionised water, and dry before replacing the bucket.

### **Organic solvent spills in the centrifuge:**

- Remove the bucket or rotor to the nearest fume cupboard and tip as much of the contents as possible into a large glass beaker.
- Leave the beaker in the fume cupboard until the solvent has evaporated.
- Let the residue solvent in the bucket or rotor also evaporate in the fume cupboard, when dry wash out well with mild detergent and water and then rinse well with clean water.
- When the beaker is dry tip the contents into a sharps bin and rinse the beaker with water before placing in the washing up system.
- Be very careful if there are glass or sharp plastic fragments.
- If the spill was in a swing out rotor wipe over the surface of the rotor and the inside of the drum with a mild detergent solution, then wipe off the detergent thoroughly with clean water, followed by deionised water, and dry before replacing the bucket.

### **Additional Maintenance**

In addition to the body of the rotor, most rotors contain other parts that require regular attention, including O-rings, lid threads and locking mechanisms.

#### **O-rings**

O-rings provide the main source of protection against sample leakage and are often completely neglected. They must be checked monthly for signs of wear and tear and must be replaced if stretched, cracked or damaged.

O-rings must be lubricated with vacuum grease:

- on installation of a new rotor;
- after cleaning or disinfection (they need to be dried and re-lubricated);
- routinely once a month;
- when fitting a new one.

#### **Lid Threads**

The lid threads on bucket or rotor lids must be cleaned weekly with a soft lint free cloth to remove built up debris. Once a month apply a coat of manufacturer approved grease on the rotor lid threads, do not over grease. For Beckman rotors use Spinkote.

#### **Locking mechanisms**

Locking mechanisms, which hold the lid to the rotor or bucket can wear with time and can become damaged when attaching and removing lids. If the mechanisms is threaded it should be checked before each use for damage to the threads. Clean the threads monthly with a soft cloth to remove debris.

## Review History

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1	2 <sup>nd</sup> August 2010	New document	SMH	August 2013
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