Standard Operating Procedures for Routine Maintenance of Centrifugal Equipment

**This is an SOP template and is not complete until:**

1. **Lab and equipment specific information is entered into the box below**
2. **Lab and equipment specific protocol/procedure is added to the protocol/procedure section**
3. **Lab and equipment specific information (highlighted in RED) is added to each section, and**
4. **SOP has been signed and dated by the Principal Investigator/Responsible Party and relevant lab personnel.**

# Heading/Approval

**Building/Room(s)/Centrifuges covered by this SOP:**

**Department:**

**Principal Investigator/Responsible Party Name:**

**Principal Investigator/Responsible Party Signature/Date:**

**This SOP was created by (if not PI): Name/Title/Date/Signature/Date:**

# Section 1 - Purpose and Scope

This document describes the procedures and policies for routine maintenance of the centrifuge. The scope of this document is to establish user routine maintenance procedures. This SOP is not a substitute for detailed routine inspection of centrifugal equipment by trained certified/qualified service personnel as specified by the instrument manufacturer. Instrument use and repair are outside the scope of this document.

# Section 2 - Responsibilities

This document is maintained by the Principal Investigator (PI), Responsible Party (RP), or a designee. The PI/RP or the designee is responsible for general maintenance and repairs of the equipment. If a user feels that the equipment needs repair or is not operating correctly, please notify the PI/RP or designee immediately.

All users must read this document and obtain training and approval and from the PI or designee prior to performing maintenance of the equipment.

Users are responsible for following laboratory procedures after training is completed and documented.

This SOP describes routine maintenance of centrifugal equipment. Do not attempt repair or service of damaged equipment. If service is required, Contact the PI/RP or designee immediately.

# Section 3 - Definitions

Electric Motor/Motor Drive Function:The electrical software that runs the centrifuge. This part of the centrifuge runs the rotors (both the run and stop functions).

Rotor**:** The part of the centrifuge where your sample is spun.

Inner Chamber:The area containing the rotor and the spindle.

Rotor Lid**:** The lid that covers the top of the rotor and protects from possible sample fragments and aerosolized particles that may be produced.

Electrical Panel:The control panel of the centrifuge.

Ventilation System:The ventilation system keeps constant airflow within the centrifuge.

O-rings:O-rings are rubber rings that are found on the centrifuge rotor lid. These keep the centrifuge sealed during use.

Aerosol containment safety cups: Safety devices to contain potential aerosols that could be generated when centrifuging biohazards.

Centrifuge Lubricant:A lubricant that you can apply to the centrifuge rotor lid if it is not attaching properly to the rotor.

# Section 4 - Precautions [Insert/edit to include Lab Specific Information]

Ensure that all necessary routine maintenance has been performed prior to centrifuge use.

## Equipment Manual

Always have a copy of the equipment users/operation manual available when performing routine maintenance. If there is any type of error or system failure, refer to the manual and PI/RP for guidance. Do not attempt to repair the equipment.

## Electrical Shock Warning

To avoid any sort of electrical shock incidences when working with centrifugal equipment, always make sure the power cord is firmly attached to an outlet source and never attempt to pull the cord while touching the electrical prongs.

When servicing/maintaining your equipment, always make sure to unplug the equipment before maintenance to avoid any hazards of electrical shock. During service/maintenance, the plug must remain under exclusive control of the individual performing the work. Exclusive control means that the authorized person is a position to prevent other individuals from re-energizing or starting the centrifuge while performing the service/maintenance activity. In the event the centrifuge is not under the exclusive control of the individual while performing maintenance (e.g. they need to leave to leave the equipment unattended) hazardous energy control (lockout/tagout) procedures are required.

## Rotor Compatibility

Ensure that the rotor is intended for and compatible with the centrifuge in use.

## Rotor Speed Hazards

Do not exceed the maximum rotor speed of a specific rotor type. Always make sure that your samples are properly balanced along the sample chambers to avoid unnecessary vibrations (which could cause your rotor to tilt during a run and cause internal damage to the inner chamber).

## Unbalanced Rotor

Unbalanced rotors can be a catastrophic event for the centrifuge and possibly the user. An unbalanced rotor can cause unnecessary vibrations which could lead to damage to both the electrical motor and the inner chamber. When an unbalanced rotor occurs, use the breaking system to stop the centrifuge if possible. Turn off the centrifuge and cut the power source to the equipment. To avoid an unbalanced rotor, make sure to evenly distribute the weight of your samples (e.g., place two samples that weigh the same across from one another).

## Ventilation

Centrifugal equipment’s have a built-in system allowing constant airflow in and out of the inner chamber. Do not block the ventilation system of your equipment. This could lead to restricted airflow into the centrifuge.

## Spills

In the event a sample becomes compromised during a centrifuge run and a spill occurs, refer to your lab specific protocol [specify here] on PPE and procedures required to manage specific chemicals or biohazard spills. Always allow the centrifuge to sit for 30 minutes prior to opening to allow bioaerosols to dissipate. In addition to lab-specific protocol, refer to the [UW EH&S Spill Response Poster](https://www.ehs.washington.edu/system/files/resources/spill-response-poster.pdf).

# Section 5 - Personal Protective Equipment (PPE)

Use the proper PPE as required by user SOP [specify here] when performing routine maintenance on the centrifuge.

# Section 6 – Required Tools [Insert/edit to include Lab Specific Information]

# Section 7 - Routine Maintenance Procedure

The following is a step-by-step description of a general routine maintenance procedure on centrifugal equipment.

[Insert/edit to include Lab Specific Information]

Note: Each piece of equipment has unique features. Some steps may not be required, additional steps may be required, or the order may vary.

1. Turn off your centrifuge by shutting down the equipment.
2. Unplug the equipment from its power source.
3. Start by removing the rotor from the inner chamber and setting it aside in a safe spot.
4. Take a cleaning cloth or a paper towel and use a neutral detergent to clean off any residues or dust from the chamber and the inside of the centrifuge lid.
	1. If using aerosol containment safety cups, wipe out with 10% bleach or another appropriate disinfectant. Follow with an ethanol or water rinse to remove any residues.
5. Once you have cleaned out the chamber and lid, clean your rotor using a neutral detergent and Inspect the rotor and sample chambers for any signs of physical wear or damage. If you detect any wear or damage, contact your PI/RP or designee and record the wear or damage in the comment section of your maintenance log. Lockout/tagout the centrifuge until further notice and communicate the centrifuge’s offline status to affected persons.
6. If the rotor lid is difficult to screw back on top of the rotor, apply a pea size amount of centrifuge lubricant on the attachment grooves.
7. Once the centrifuge has been fully cleaned, commence a standard test run of various centrifuge speeds from 100, 500, 1000, and 2000 rpm [Edit test rpms specific to your equipment make and model]. Make sure to record whether the runs were a success on the maintenance log (These increments may vary depending on make and model of centrifugal equipment).
8. For centrifugal equipment with temperature control capabilities, test the equipment by setting the centrifuge at a lower than room temperature and waiting five minutes. If there are any extreme temperature fluctuations or if the temperature is being overshot or undershot, notify your PI/RP or designee and record this in the comments section of the maintenance log. Lockout/tagout the centrifuge until further notice and communicate the centrifuge’s offline status to affected persons. If the first test is successful, repeat this test at a higher than room temperature.
9. Once you have finished steps 1-8, record required information within the laboratory maintenance log. (Remember: Do not hesitate to ask any questions concerning centrifuge use and maintenance).

# Section 8 - Emergency Procedures [Insert/edit to include Lab Specific Information]

If the centrifuge malfunctions, immediately stop the run and allow the centrifuge break system to stop the rotor. Open the centrifuge and unplug it from its power source. Clear any type of debris present. Use proper tools (e.g., tongs for sharp objects/broken glass) and wear proper PPE specified in lab’s SOP for centrifugal equipment. Always be mindful of fire exits and fire extinguisher locations as specified in EH&S’s Fire Extinguisher Training. Never try to fix the equipment yourself. Contact your PI/RP or designee. Lockout/tagout the centrifuge until further notice and communicate the centrifuge’s offline status to affected persons.

# Section 9 - Related Documents

Appendix A: Instrument User Manual

Appendix B: Instrument Use SOP

Appendix C: User Log (example)

Appendix D: Maintenance Log (electronic link and paper example)

# Section 10 - Implementation and Training [signature of all users is required]

* Prior to performing routine maintenance procedures described in this SOP, laboratory personnel must be trained on the hazards described in this SOP, how to protect themselves from the hazards, and emergency procedures.
* Ready access to this SOP, to the instrument user manual, and to any applicable Safety Data Sheet for each hazardous materials described in the SOP must be made available in the lab space(s) where these procedures are performed.
* The Principal Investigator (PI), or Responsible Party (RP), if the activity does not involve a PI, must ensure that their laboratory personnel have attended appropriate laboratory safety training (and refresher training where applicable).
* Training must be refreshed following any revision to the content of this SOP.
* Training must be documented. *This training sheet is provided as one option; other forms of training documentation (including electronic) are acceptable, but records must be accessible and immediately available upon request.*

 **I have read and understand the content of this SOP:**

| **Name** | **Signature** | **Date** |
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