**Standard Operating Procedures for Routine Maintenance of Diaphragm Vacuum Pumps**

**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)/Equipment covered by this SOP:** | Click here to enter text. |
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| **Department:** | Click here to enter text. |
| **Principal Investigator Name:** | Click here to enter text. |
| **Principal Investigator Signature/Date:** | Click here to enter text. |
| **This SOP was created by (if not PI): Name/Title/Date/Signature/Date** | Click here to enter text. |

# **Section 1 - Purpose and Scope**

This document describes the procedures and policies for routine maintenance of vacuum pumps. The scope of this document is to establish user routine maintenance procedures. This SOP is not a substitute for detailed routine inspection of vacuum pump 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 vacuum pump equipment. Do not attempt repair or service of damaged equipment. If service is required, Contact the PI/RP or designee immediately.

# **Section 3 - Definitions**

**Vacuum gauge:** A device attached onto the vacuum pump equipment that measures the relative vacuum (strength) during a session.

**Pressure gauge:** A device attached onto the vacuum pump equipment that measures the pressure of the interior pump mechanism (be mindful that specific equipment could read different units of pressure so being well versed in pressure unit conversion is recommended)

**Pump head:** The outer protective cap of the vacuum pump.

**Vacuum valve:** A knob or a valve that controls the strength of the vacuum.

**Pressure valve:** A knob or a valve that controls the pressure within the vacuum pump.

**Diaphragm:** A flexible material that is found within the pump equipment that creates a temporary vacuum space during operation.

**O-ring:** A rubber seal found within the pump which is used to seal the interior.

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

**(For diaphragm pumps) Do not lubricate the equipment.**

Diaphragm vacuum pumps do not need to be lubricated due to the nature of how the equipment was constructed. Any sort of lubrication on the equipment (e.g., on within any of the interior mechanisms) could result in the airflow becoming contaminated.

**Do not obstruct the cooling fans.**

To avoid any obstructions which may cause a faulty operation of the vacuum pump, make sure to clear any sort of obstructions or debris from the cooling fan (give at least a 1-inch barrier between the fans and any wall).

**Cleaning with neutral substances**

Do not attempt to clean any portion of the vacuum pump with any corrosive material or hard cleaning substances. Corrosion of inner pipelines could lead to airflow becoming contaminated and thus impact the efficiency of the vacuum pump.

**Broken or Faulty parts**

If you detect any broken parts or faulty pieces within the vacuum pump (e.g., you detect air is leaking out of a specific piping), stop using the vacuum pump and discontinue future use until the problem has been resolved. Consult with your PI or Responsible Party on scheduling possible repairs or posting a notice to abstain from using the equipment. Place a notice that specifies notice must specify that the equipment is “out of service”.

Do not attempt repair or service outside of the general maintenance procedure below. If service is required, Contact the PI or Responsible Party immediately. When it comes specifically to vacuum pumps, specialists who are qualified for brand specific vacuum pump repair must be called in for any repairs. Hazardous energy control (lockout/tagout) procedures are required.

**Section 5 - Personal Protective Equipment (PPE)**

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

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

**Section 7 - Routine Maintenance Procedure**

Following is a step-by-step description of a general routine maintenance procedures.

Prior to routine maintenance or usage, note the location of fire extinguishers and the nearest exits in the case of equipment fires.

This specific procedure will detail a maintenance/cleaning of the diaphragm vacuum pump equipment. Each piece of equipment can be unique, and some steps may not be required, additional steps may be required, or the order may vary. When in doubt, consult your equipment specific user manuals on how to go about conducting a safe and successful maintenance.

[Insert/edit to include Lab Specific Information]

1. Shut down the vacuum equipment by switching the on/off switch to off
2. Unplug the equipment from the power source.
3. Remove the pump apparatus from the cabinet and/or containing equipment.
4. Unscrew the bolts that are holding the pump head from the rest of the pump equipment (Note: take care not to break the screw heads, this could cause some inconvenience both during reassembly and for future maintenance).
5. Continue to unscrew and remove components until you can safely extract the diaphragm from the inner chamber of the vacuum pump equipment.
6. Replace the diaphragm with a new one (if needed) and clean the parts you have extracted using a neutral cleaning substance.
7. Place the necessary components back into the vacuum pump (including all the screws you have unscrewed).
8. Conduct any sort of pressure and vacuum tests (as recommended by your specific equipment manufacturer’s user manual).
9. Record all your maintenance records and comments on either your online maintenance log or a physical maintenance log.

Note: Do not use any sort of lubrication if you are maintaining a diaphragm vacuum pump).

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

Do not attempt to repair or service the equipment yourself. Notify your PI/RP or designee about equipment issues and any equipment repairs needed. In the case of an exposure to any chemical or biological hazards, follow emergency procedures specified in the material SOP. Individuals must successfully complete/submit an accident report via the OARS (Online Accident Reporting System). Accident reporting information can be found here: <https://www.ehs.washington.edu/workplace/accident-and-injury-reporting>.

**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, 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 repeated 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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