

Technical Guidance Note 008: Cold Storage Management in Laboratories

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PLEASE DO NOT PRINT UNLESS NECESSARY	



1 Introduction

This Technical Guidance Note (TGN) seeks to assist laboratory users with managing cold storage (including Ultra Low Temperature [ULT]) in their workspaces. Cold storage may include:

- Fridges
- Freezers (domestic, -20°C, -40°C, -80°C, -120°C)

Laboratories use high amounts of energy, it has been estimated labs use between five and 10 times more energy than a conventional office space. Bristol University have estimated that laboratories use 6% of floor space but consume 40% of all energy at the University. By using our cold storage facilities more efficiently we can support Swansea University’s targets for Scope 1, 2 and 3 carbon emissions¹.

These guidelines provide advice on how you and your research group/laboratory can manage your fridges and ULT freezers more effectively to save money, reduce carbon emissions, prolong equipment life and safeguard samples.

This TGN is to be read in conjunction with other laboratory guidance, including:

- [8.1.05 Chemical Waste Store User Procedure](#)
- [8.1.14 Departure and Decontamination of Laboratory and Workshop Space and Equipment](#)
- [8.1.16 Specialist Equipment Removal and Sales](#)
- [8.1.20 Accessing Sustainable Labs Fund](#)
- [8.1.21 Lab Waste and Recycling Innovations](#)
- [Top Tips For Laboratory Purchasing](#)

2 Responsibilities

Faculty Management	<ul style="list-style-type: none"> • Define the level of support they can offer their research and teaching teams for cold storage e.g. <ul style="list-style-type: none"> ○ Central resources including back-up fridges and freezers ○ Financial assistance through servicing contracts etc.
Laboratory Owner/Lead/Coordinator PIs Equipment Owner	<ul style="list-style-type: none"> • Assign tasks and manage the cold storage in the laboratory • Raise cold storage associated issues in the appropriate forum e.g. laboratory meeting, departmental meeting, local CR Committee, Equipment Committee etc. • Raise awareness of lab users responsibilities during induction and any other appropriate training • Consider cold storage management in Safety and Sustainability inspections • Ensure servicing of cold storage, especially ULTs
All lab users	<ul style="list-style-type: none"> • Understand cold storage access and use requirements e.g. how to label samples, where to store samples etc. • Involvement in the cleaning/defrosting process, as required

¹ Source: Sustainability and Climate Emergency Strategy 2021-2025
<https://online.flippingbook.com/view/898157623/>

**H&S Team /
Sustainability
team**

- Support during tenders
- Annual internal audits where sample management may be captured

If further guidance is required, laboratory users can contact their Laboratory Manager, local H&S Lead or Environment Officer with any queries.

3 Whole life management

3.1 Faculty operations

Faculty operations across the University differ in compliance requirements and levels of support. You must consider the following during the operation of cold storage:

- Be aware of what material is contained in the cold storage as there may be special conditions about how to manage the samples e.g. Human Tissue Act (HTA), Genetically Modified (GM) material etc.
- Know if your Faculty has any back-up fridges/freezers, how access to these is managed, where they are located and the types of material they can hold. Contact your local Technical Operations/Services Team to find out more.

3.2 Procurement

The following is recommended during the procurement process of cold storage equipment:

- Understand whether you need to purchase:
 - Is there space in shared cold storage facilities in the lab you could use instead?
- Incorporate whole-life costing into the purchase of each cold storage unit, this may include:
 - Racking requirements
 - Any additional cooling required in the room where the cold storage equipment will be located (especially if purchasing a ULT freezer)
 - Filter cleaning and replacement
 - Servicing and maintenance
 - Disposal
 - F gas management (if applicable)
- Be aware of your research and related risk assessments, ensuring you include whether spark-free equipment is required if you need to store flammable materials
- Review capacity required and likely increase over the next five years (where possible)
- Review energy efficiency rating of the appliance, with the most efficient model purchased within the cost constraints of the group
- Use the University framework suppliers
- Check electrical requirements in the area for safety and sustainability, do not overload or daisy chain equipment

- Review location and how this may impact the efficiency of the cold storage e.g. do not locate next to heating equipment or a sunny window, if possible

3.3 Maintenance

The following actions are recommended to increase efficiency of cold storage and potentially extend the lifespan of equipment:

- Defrost cold storage, where practicable, every 12 to 18 months. This may include:
 - Full defrost where alternative storage space is available for short periods
 - Partial defrost ice is scraped from the interior (particularly in areas which can compromise seals) where alternate storage is not available
- Servicing of ULT freezers

3.4 Disposal

The following process must be followed during the disposal of any cold storage equipment at Swansea University

- Disposal of equipment to be undertaken in line with '[Waste Management Guidance Note 17: Waste Electrical and Electronic Equipment \(WEEE\)](#)' with the Waste and Recycling Officer based in the Sustainability Team. If further information is required contact estates-waste@swansea.ac.uk

4 Actions

4.1 Daily

4.1.1 Fridges and freezers

- Allocate space in cold storage to different research groups and clearly mark who the areas belong to
- Label samples in a clear and consistent manner. Agree as a lab what essential information this may include, for example:
 - Date
 - Researcher/research group
 - Sample type
 - Reference number
 - Associated hazards
- Close doors properly
- Ensure no flammable materials are stored in units that are not spark proof

4.1.2 ULT freezers only

- Close internal doors before shutting the main door.
- Close all doors as quickly as possible.
- Keep an up to date inventory on the outside of the freezer, clearly showing which groups use which parts. It is the research group's responsibility to keep the information up to date and their areas clean and orderly.

- Where possible use racking and containers that are suitable to maximise space used in the freezer.
- Do not connect more than one ULT freezer to a standard 13A extension socket. This has the potential to overload the socket and increase the risk of fire.
- Do not overfill freezers. Samples should not:
 - Block grills
 - Block vents
 - Obstruct the airflow to and from the coolers, as this will compromise temperature control
- Use the space efficiently by avoiding leaving large empty spaces in freezers. If there are gaps you can fill them temporarily with polystyrene boxes etc. to reduce energy use.
- Consider running ULT freezers at a higher temperature e.g. -70°C.
- Use an alarm to alert users when the freezer goes above an agreed temperature. Develop a local procedure so the correct people are contacted in the event of an alarm.

4.2 Periodic maintenance

- Undertake periodic checks to remove any samples not labelled and dispose accordingly, give users at least one week's notice prior to completing this.
- Regular maintenance checks (monthly to every three months) by laboratory staff, items to consider include:
 - Level of ice in freezer
 - Whether doors can shut
 - Operating temperature
 - Ambient temperature of room
 - Filters cleaned (every 3-6 months)
- If ice is recorded during the regular maintenance check, staff to follow-up by:
 - Clear away any ice build-up with a soft cloth, dustpan and brush, or rubber mallet.
 - Avoid sharp tools and be cautious to avoid damaging the rubber seals and gaskets.
 - Removing the ice regularly can also extend freezer life.
- If the ice layer is too hard and thick to remove perform a full defrost. Annex A provides information on how to defrost your ULT freezer. To avoid injury and damage to the freezer or samples, only nominated a staff members should carry out the actions described in Annex A.
- Review the position of the freezer:
 - Store ULT freezers in a well-ventilated space away from sources of heat such as sunlight or warm rooms.
 - Ambient temperature of the area the ULT is stored to be between 15°C and 22°C. The higher the ambient temperature the more energy the freezer will use and the more likely to develop faults.

- ULTs to have a minimum of 15 cm clearance around the freezer and no items to be stored on top of them.
- If a backup ULT is available, run the backup at -60°C and pack with empty containers to reduce energy use.

4.3 Sample management

- Develop a local strategy with the other lab owners on how to approach these samples, for example:
 - Disposal
 - Reallocating to existing researcher or research group
- Use the periodic laboratory inspection process to identify any gaps in cold storage management or labelling samples/chemicals
- Prevent the build-up of unknown/expired samples from happening in the future by using the SOP for '[8.1.14 Departure and Decontamination of Laboratory Space and Equipment](#)'

4.4 Other

- Ensure the way in which cold storage is managed in the space is included in the induction process.

5 Additional support

For additional support, you can contact your:

- [Local Environment Officer](#)
- [Local H&S Lead](#)

6 Document control

Version	Date	Changes
1	Sep-21	New document

Annex A: How to Fully Defrost Your Freezer

1. Notify all lab users in advance *via* email: minimum notice is two weeks
2. Place a notice on the front of the freezer stating:
 - a. Date of defrost
 - b. Locations and contacts for alternative storage
 - c. State that any samples not moved will be relocated by the defrosting staff (location of freezer to be added and staff involved in defrosting)
3. Before unplugging the freezer, manually remove as much ice as possible. Doing this will help reduce pools of water forming.
4. Ensure you have absorbent material available prior to defrosting to eliminate pools of water forming in the lab. These will need to be disposed of in-line with the University's waste requirements. Speak to your local Technical Operations/Services Team to obtain material.
5. If the freezer is on an alarm system, inform the person(s) that is/are alerted that the freezer has been turned off so they know that no action is required.
6. Unplug the freezer, leave the door open and wait for the ice to melt. This may take several hours.
7. Think health and safety! If the floor becomes wet, set up warning screens, to alert other lab users.
8. Once thawed out, remove any pools of water and wipe the internal surfaces and doors dry. Check that all doors, door clips, hinges and seals are in good condition to help reduce the build-up of ice. Report any faults to the lab manager or to maintenance.
9. Switch the freezer back on and allow 24 hours for the freezer to chill down and stabilise to the desired temperature before putting it back to use.