

Ultralow Freezer Use & Maintenance Guideline

1. Purpose

Ultralow Temperature (ULT) Freezers are one of the biggest energy consumers in laboratories. It is important that freezer space is well utilised and that the units run efficiently. Stored samples are valuable and may be irreplaceable, therefore regular maintenance is essential to help protect sample integrity.

2. Training

Instruction on Ultralow freezer use should be explained during the laboratory induction process. Laboratory facility managers must ensure that users are trained in the use and maintenance of freezers, related samples and inventories.

3. Preparing the Location

3.1. Location considerations: Before procurement or installation of a new Ultralow freezer the location must be carefully considered. Will the freezer fit through doorways for installation or have any other access issues? Will there be adequate ventilation to the location to cope with the high, humidity and heat load generated by the freezer? Are the location power requirements suitable? e.g. may require 15 Amp power outlet (standard power outlets are 10A). Is there space for refrigeration backup system to be installed? (e.g. gas bottle storage and access). You should also consider foot traffic and slip hazards.

3.2. Alarm System: Automated temperature alarm systems enable detection of loss of refrigeration function. Temperature sensors detect and provide instantaneous warning when freezer compartment conditions exceed set tolerances. These systems require regular testing and maintenance. Griffith University uses a Building Alarm Management Paging System (BAMPS) or similar alarm systems.

- Pre-determined temperature range tolerances are set for each freezer / fridge unit; if tolerances are exceeded an alarm is triggered and email and SMS is sent to Security and the primary freezer/fridge contact.
- Reference: [SOP – General BAMPS Protocol](#)
- It is the responsibility of management of each facility to maintain currency of the BAMPS contact list, including update of details and activation / deactivation of new / old units.

3.3. Backup Cooling System: Ultralow freezers are usually manufactured with options for cryogenic cooling (Liq. CO₂ or N₂). It is highly recommended to incorporate cryogenic backup optional accessories where feasible. It is recommended and to ensure oxygen monitoring for the space has been considered for cooling systems that may lower oxygen saturation levels when triggered.

4. Purchasing Ultralow Freezers

4.1. Considerations

- Avoid purchasing an additional freezer if possible. Can you clean out space in your existing unit to accommodate new samples, or share freezer space with a neighbouring lab? This is a great way to save your lab money and minimise environmental impact.
- Purchase energy efficient models: Seek energy consumption information in the product's technical specifications, and with vendors.
- Ultralow freezer requests are considered a high-risk equipment purchase and must be channelled via the [special approver process](#) prior to financial approval being sought.

5. Storing Items in Freezers

5.1. Organising Items: Organising your freezer will make it easier to find samples and eliminating old materials will free up space for new samples, minimizing the need for a new freezer.

It is the user's responsibility to keep a current inventory of what stock is stored in the freezer. Areas shall audit the contents of all of their freezers annually. There are many inventory templates to choose from or a specific inventory can be created. Ensure the following details are provided in your inventory:

- Name of Principle Researcher
- Building and Room number
- Freezer Number
- Alarm (BAMPS) identifier
- Freezer Asset number
- Shelf, rack and box number
- Organism name, strain, risk group
- OGTR Licence number – if applicable
- Date inventory checked

5.2. Labelling: Label stored items and remove unneeded materials. Dispose of unneeded items using the correct disposal protocol. If users store genetically modified organisms (GMO's) a 'GMOs stored in here and Biohazard' sign shall be displayed on the outside of the freezer. This can be found [here](#).

5.3. Replacement Value: Estimate the monetary value of the contents you are storing. To arrive at a value for chilled items which are not purchased, consideration should include;

- If it were destroyed, would it need to be replaced?
- What activity and associated costs would be required to obtain replacements?
- Would this involve the re-running of research projects?

5.4. Temperature: Assess and adjust optimal temperature levels for your samples. Raising the temperature above -80oC for a -80oC freezer will considerably reduce the energy consumption used. e.g. operating it at -70oC.

5.5. Reducing Spoilage: Spoilage of items in freezers is a risk that should be considered since many items are of great financial value and samples often cannot be replaced. Loss of freezer inventory due to failures can be prevented by good management practices, effective contingency measures and proper monitoring of freezer operating status. An effective risk management strategy should be developed to assist in reducing the frequency and cost of these losses.

6. Ultralow Freezer Maintenance

All units shall be subject to both a regular operational check and routine maintenance schedule. This applies to the refrigeration unit, alarm and associated monitoring and backup systems. These should be regularly tested to ensure they remain fully functional and capable of delivering the service anticipated. By clearing frost build-up, you will reduce energy consumption, improve ease of access, and ensure the longevity of your freezer.

6.1. Managing Ice and Frost: Moisture on the outer door of the freezer leads to ice build-up, which in turn can prevent secure outer-door closure. Wipe down the freezer's outer-door gasket to remove moisture and prevent ice build-up. If ice is already present, you will need to use an ice scraper instead. But be careful: If you have the wrong ice scraper or scrape too hard, you can damage the outer-door gasket, preventing a good seal. It is important to remove moisture from the freezer door regularly. Frequency depends on how often the freezer is used, but the more the door is open, the more ice can build up. Remember to also frequently clean the air filter near the compressors.

In house maintenance (de-ice process)

- Gather cleaning and safety items – anti slip mats, gloves, safety glasses, ice scrapers.
- Lay the anti-slip mats on the floor to collect ice and water.
- Check freezer door seals. Remove ice on and around doors, then inside shelves.
- Implement a cleaning and defrost roster
- Campus Life must conduct BAMPS alarm testing

6.2. Compressors: Compressor efficiency / age can contribute to energy use. Some freezers can monitor the temperature / life of individual compressors which can be alarmed. This can also be used to predict freezer failure.

6.3. External preventative maintenance

- Annual servicing of ultralow freezers should be arranged by the Group / Institute.
- A report shall be provided after each unit is serviced.

6.4. Electrical test and tag schedule

- Testing and tagging of laboratory items must be undertaken annually in order to comply with the requirements of the Queensland Electrical Safety Act and the University's Electrical Safety Policy for teaching, research, clinic and office areas.
- Regular inspection and testing of electrical appliances is required to ensure all persons are free from electrical risk.
- Testing and tagging is arranged by the Group / Institute.
- An electrical "New to Service" tag shall be provided at commissioning.

7. Storage Contingency

Identify appropriate alternate storage facilities, including transit/transfer protocol, for swift relocation of goods in the event of equipment fault or other reason requiring transfer.

Consider separating or splitting stock - don't put all your samples in one freezer.

- Have two master boxes with pure samples / strains stored in different freezers in different buildings so that a reserve is available in the event of a freezer failure.

Share space with neighbouring labs.

- Implement and maintain a spreadsheet outlining available space in neighbouring labs should a failure or incident occur.
- Reserve some free space if feasible.

8. Incidents

Users shall report all incidents of item loss or non-compliance in handling and storage protocol (Strict requirement for regulated items) to their supervisor and lodge a report for investigation on GSafe.

9. Insurance

Please note: the lack of a maintenance program, a working alarm, or backup system significantly decreases an insurance claim payout. Insurance claims are able to be made following an event resulting in damage or loss of inventory. The following information regarding claims applies:

- The standard minimum excess on all freezer/fridge claims is **\$50,000**.

- For Spoilage losses in unalarmed Temperature Controlled Environments (TCE), the retention is 50% of the loss or the Member excess of \$50,000 **whichever is the higher**. For example: where estimated loss is \$200,000 the amount to pay would be 50% of \$200,000 or \$100,000 since this value is the **higher**.
- For Spoilage losses in alarmed Temperature Controlled Environments (TCE), the retention is 20% of the loss or the Member excess of \$50,000 **whichever is the higher**. For example: where estimated loss is \$200,000 the amount to pay would be the Member excess of \$50,000 since this value is the **higher** than 20% of \$200,000 (\$40,000)

In the event stock / samples within an ultralow freezer are damaged or destroyed, advice on whether to lodge an insurance claim should be sought from the Insurance Office. Please note that payment of claims will only occur after the excess has been paid and samples replaced.

- Insurance@griffith.edu.au
- (07) 3735 7971

10. Disposal of an Ultralow Freezer

Reference SOP – Laboratory Equipment Disposal

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Resources

[Risk Management - Reducing the Incidence of Freezer Spoilage](#)