Research Ventilation Management Policy

1.0 Purpose & Scope

This policy serves to provide procurement, installation, maintenance, and management guidance for ducted fume cupboards either maintained by Birkbeck estates or utilised by staff and students. Its implementation will ensure that fume cupboards are safe, functional, and efficient. This policy should be consulted upon any new installation, refurbishment, or commissioning of any fume cupboards utilised by Birkbeck staff and students. Good practice steps for users should be included in inductions for relevant staff and students. Disposal and decommissioning, as well as un-ducted cupboards or microbiology-safety cabinets, are not covered in this document.

Basic guidance the commissioning of ducted microbiology-safety cabinets is included.

2.0 Relevant Vocabulary

- **Biological-safety cabinet –** Also referred to as Microbiosafety-cabinet. All cabinets referred to in this policy are specifically class II biosafety cabinets (as defined by EN 12469)
- **Constant Air Volume (CAV) –** Fume cupboards which use a constant air extract rate, no matter sash height.
- **Control of Substances Hazardous to Health (COSHH) –** Current UK regulations which require employers to control substances hazardous to health and prevent/reduce exposure to such substances.
- **Ducted –** A fume cupboard which is non-recirculating and ventilates its extracted air externally via a systems of vents and fans.
- **Face Velocity –** The velocity of the air passing through the work opening of the fume hood measured in the plane of the sash. Measured in meters per second (m/s).

- **Make-up Air -** Air needed to replace the air exhausted from a room by the fume hood and other ventilation devices.
- **Sash –** A safety screen in the work opening of the fume hood, which can be positioned between the operator and the work chamber for protection. The opening can be adjusted vertically (and in some cases horizontally) to vary the size of the opening and control the face velocity of air into the fume hood.
- **Variable Air Volume (VAV) –** Fume cupboards which vary extract rates to ensure a constant face velocity during sash movement.

3.0 Introduction

Birkbeck College utilises fume cupboards and Class II biological safety throughout its research spaces. The primary function of a fume cupboard is to protect the user, either from noxious fumes or explosion, and this must be prioritised over all other factors. The primary function of a safety cabinet is to provide protection not only for the user, but for the sample as well. Fume cupboards can consume large amounts of energy, though this varies greatly with type (e.g. VAV vs CAV) and utilisation. Correct procurement, installation and usage of fume cupboards can lead to immense energy reductions and financial savings whilst improving the safety of users. Having committed to a 25% reduction in carbon emissions by 2020, Birkbeck College must examine its fume cupboard strategies to ensure all cupboards being utilised are as efficient and safe as possible.

Primarily, this policy aims to ensure a safe working environment for the users, facilitated by a review of current standards (see section 5) and baseline requirements. Subsequent maintenance and efficiency specifications will then be described.

4.0 Lines of Responsibility

Birkbeck Estates

- Maintain asset lists of all fume cupboards and associated fans and discharge stacks.

- Maintenance of ducting but not the fume cupboards themselves.

- Ensure non-compliant or non-functioning discovered fume cupboards are promptly labelled and restricted from use and repairs or replacements are organised in a timely fashion (no longer than 1 month).

- Ensure sufficient make-up air is provided for fume cupboard areas.

- All records of any works conducted are kept in a centralised manner and are accessible, including copies on the hoods themselves.

- Engineers and any work on cupboards must be informed by of the guidelines in this policy.

- Ensure ductwork and any other related fabric of the building is regularly cleaned and maintained.

- Ensure, except in an emergency or due to unforeseen mechanical failure, duct extract fans are not switched off or maintained without prior consultation with users.

Faculties and Users

- Maintenance and repairs of fume cupboards with all servicing and records of testing kept and accessible for users or estates access.

- Ensure fume cupboards are well maintained at a user level: This includes closing sashes, not using for long-term storage or blocking air flow, turning off where possible and avoiding damage to fume cupboard interiors.

- Ensure users are appropriately trained in good practice and understand the basic principles of fume cupboard function and operation.

- Report any issues promptly to local lab management and/or Estates.

- Display appropriate signage and contact details for experiments for which users will not be present for periods of longer than 6 hours. There is an 'Overnight Emergency Response Form' appended at the end of this document. This or a substitute, which includes details of the user, supervisor, hazards present, essential services (water, inert gas etc.), shut-down instructions and specific fire-fighting measures should always be employed when the user will be absent for a prolonged period.

- Ensure fume cupboards are not manipulated to allow sashes to go above safe working levels except under normal operating conditions if the design allows.

- No users or departments should purchase, procure, dispose, or install fume cupboards without consultation and approval from Birkbeck Estates and Health and Safety Services. Purchasers should work with Facilities and Management to ensure requirements are met, particularly when ducting is required.

- Make no modifications to sash height or air flow alarm systems to disable or mute the sounder.

- Have accessible records of all harmful and toxic substances being stored in vented cabinets below fume cupboards. Note if fume cupboards are being used inappropriately for the storage of harmful and toxic substances, such substances should be noted and put into appropriate vented cabinets.

- Schools and users must inform anyone who is to do work on the fume cupboard of the recommendations made in this policy.

- Follow recommendations made in this document when engaging any works on fume cupboards, including best-practice for users. Any deviations from the recommendations in this document must be accompanied by a reasoning which is approved by H&S, users, and the environmental team.

Capital Projects

- Ensure users and managers are consulted thoroughly on selection and functionality of fume cupboards. This includes whether fume cupboards are VAV or CAV, any requirement for specialised purposes (for e.g. for radioactive work), and possible limitations due to setting or environments.

- Ensure that the most energy efficient fume cupboard installation has been achieved.

- Use competent contractors and inspectors.

- Provide all installation, commissioning and testing data and user manuals to estates and users.

- Follow recommendations made in this document when proceeding on fume cupboard projects. Any deviations from the recommendations in this document

must be accompanied by a reasoning which is approved by H&S, users, and the environmental team.

- Ensure all selection and instalment of fume cupboards complies with all British Standards as well as any relevant policies (such as this one).

5.0 Current Standards and Regulations

The Control of Substances Hazardous to Health (COSHH) regulations 2002 require prevention or adequate control of exposure to hazardous substances. Where the risk assessment and COSHH risk assessment supplement determines that LEV is required, this must be suitably selected, used, tested, maintained and appropriate records kept. BS EN 14175 represents the most recent fume cupboard standard and applies to all fume cupboards currently supplied and installed. It comprises:

- Part 1: Vocabulary
- Part 2: Safety & performance requirements
- Part 3: Type Test methods
- Part 4: On-site test methods
- Part 5: Recommendations for installation and maintenance
- Part 6: Variable air volume (VAV) fume cupboards

Although BS EN 14175 does now also cover types of fume cupboard not previously covered by BS7258, such as walk-ins, VAV, horizontal sashes and low sill cupboards, it is more of a product standard with little reference to installation requirements. Hence BS7258 should continue to be referenced, particularly Part 2: Recommendations for the exchange of information and recommendations for installation. As with BS 7258, BS EN 14175 does not cover recirculating fume cupboards and these are described within BS 7989: Specification for recirculatory filtration fume cupboards.

Apart from British Standards, HSE (Health and Safety Executive) has produced guidance, as well as owns a significant amount of primary and secondary legislation. The primary legislation comprises the Acts of Parliament, including the Health and Safety at Work etc. Act 1974. The secondary legislation is made up of Statutory Instruments (SIs), often referred to as ‘regulations’. HSE guidance is not law though may refer to current laws, and it is recommended to be followed. HSE258 is the current guidance on Controlling Airbourne Contaminants at Work, and contains useful advice on containment, design, installation, commissioning, legal requirements, and more.

6.0 Procurement & Installation

- All fume cupboards purchased should be low-flow VAV fume cupboards, unless verified reasoning is provided. Two-person fume cupboards with a 2400 mm width (or less) and sliding doors should be applied where possible, particularly in larger teaching spaces to achieve air volume efficiencies. Where single worker fume cupboards are necessary, 1000 mm or 1200 mm width should be preferred over 1500 mm unless specified. VAV fume cupboards should be installed to function in unison with supply-air systems.

- During commissioning of new fume cupboards, containment testing must be completed. Face velocities may be set below 0.5 m/s if 0.01 ppm is achieved during such containment testing (for SF_6 containment testing). Thus initial face velocities should be set according to such containment testing rather than just achieving 0.5 m/s. Only new hoods should be set as low as 0.35 m/s. Standard fume cupboards should not be below 0.4 m/s.

- Where safe and previously evidenced by containment testing, 0.4 m/s (or 0.35 m/s on low flow hoods) should be the set face velocity for fume cupboards during COSHH inspection. In the absence of containment testing, face velocities must not go below 0.5 m/s.

- SF_6 Containment testing should be conducted on all new installations prior to usage to ensure efficiencies are achieved.

- Face velocities on old and new fume cupboards should be considered using a maximum sash working height of 0.4 m, as opposed to 0.5 m during annual COSHH inspections.

- New fume cupboards should be integrated with existing BMS controls (and monitored), and Estates trained appropriately on their usage and maintenance. Night-time set-backs should be implemented where possible, though users and facilities must be engaged and educated thoroughly (particularly of hours of reduced flow and allowances).

- Installation of new fume cupboards should have heat-recapture systems considered.

- New fume cupboards require local alarming and notifications, air-flow rates, and VAV controls for users.

7.0 Annual Servicing & Containment

- Servicing may require roof access. In such scenarios a risk assessment must be conducted to ensure any repairs/inspections are accomplished safely.

- Containment testing should be conducted every 10 years. Containment will permit the lowest possible face velocity for safe working environments.

- All existing fume cupboards should be commissioned to achieve as low a face velocity as possible, though again only low-flow hoods should be set as low as 0.35 m/s. Standard fume cupboards should not be below 0.4 m/s. In the absence of containment testing, face velocities should be set to 0.5 m/s.

- Fume cupboards may not have sashes set to a working height of anything above 0.4 meters unless necessary for equipment and evidenced through risk assessment.

8.0 Best Practice – Users

- Sashes must be closed when users are not present.

- Fume cupboards should not be used for long-term storage of anything unless specified and approved. Note that annual COSHH inspections will take into account anything left inside (HSG 258), and thus moving something inside after inspection can alter safety. Thus users should note when inspections are to take place and ensure the interior reflects normal work settings.

- Alarming is promptly reported

9.0 Commissioning of Class II cabinets

Current Standards

EN 12469 stipulates (Annex H) airflow velocities required for all three classes of cabinets (I, II, and III). Legal requirements during commissioning are as follows:

- Mean inflow velocity to achieve operator protection: ≥0.4 m/s
- Mean downflow velocity to achieve product protection: 0.25 m/s – 0.5 m/s

These standards should be adhered to during all commissioning and inspections.

Commissioning

As a means of ensuring further efficiencies, Class II cabinet inflow rates are to be further regulated by the college. Downflow rates should adhere to EN 12469.

- Mean inflow velocity rates should be set at no higher than 0.55 m/s unless otherwise stipulated as a requirement by users or engineers. Inflow velocity rates should never exceed 0.65 m/s.

Record of Amendments

Version	Section	Amendment	Current Version
1.0			

Appendix

Recirculating and portable duct-less fume cupboards

This appendix covers the use of duct-less fume cupboard systems which draw air through an open enclosure and pass it through a replaceable filter (e.g. activated carbon) before expulsion back into the laboratory. The principle concerns regarding this type of equipment is that the filters have a finite absorbent capacity which, if exceeded, will allow hazardous concentrations of contaminant to pass through the filter into the laboratory atmosphere. Importantly, this can happen without a noticeable decrease in air flow (unlike particle filters/HEPA etc. which get blocked) so passing a face velocity test is not an indication that the filter is containing the contaminant vapours/gasses.

For this reason the use of such a system should only be considered for use with non-hazardous substances or where ducted systems are not reasonably practicable, for example in temporary field laboratories. They must never be used for the containment of highly hazardous substances, particularly known or suspect carcinogens/mutagens, teratogens etc. Use must only be permitted if a suitable risk assessment has been carried out taking into account the following recommendations;

a) The appropriate filter must be selected for the substances to be used. Consideration must be given to the compatibility of substances.

b) Calculations must be made to establish the release characteristics of the contaminant, these should be applied to determine the maximum time the system can be used before exhausting the filter element.

c) Are there any circumstances where de-sorption can occur due to preferential absorption of another chemical at a later stage?

d) The likely date of exhaustion must be clearly displayed on the system, and communicated to staff using it.

e) A system of work must be devised to monitor the use of the system, for example the actual release of contaminant and duration of use. A record of the system use shall be maintained and made available for inspection by all staff likely to use the system.

f) The system of work must consider the handling and disposal of contaminated filter elements, which are likely to be classified as special waste, and require appropriate disposal.