



UNIVERSITY OF
BIRMINGHAM

Health and Safety Policy Hazardous Substances

UHSP/15/HS/08 Schedule 3.10

Hazardous Substances Policy - Control Measures

Fume Cupboard System Specification

This document is a schedule from University hazardous Substances Policy. It sets out a specification for a general purpose laboratory fume cupboard. This document forms a part of the University Health and Safety Policy. It has been approved by the Environment, Health and Safety Executive Committee, in consultation with the Joint Safety Advisory Committee, and it will be subject to review.

Hazardous Substances Policy - Control Measures

Fume Cupboard System Specification

The following is a specification for a general purpose laboratory fume cupboard. All University fume cupboards should conform to this specification. This is the minimum requirement. However, certain of these features such as the face velocity or the fabric will need to be modified for a particular installation where, for example, the level of hazard is high or where the substances used are damaging to the normal materials of construction. Amended or further requirements for a particular installation will be notified separately by the University Health and Safety Unit. The design, construction and siting and the complete installation of a fume cupboard should conform to the recommendations in **BS EN 14175**¹ and, in particular, to the following specifications.

The Fume Cupboard

Face Velocity:

Either

- no individual measurement in the plane of the sash less than 0.55 m/sec. and no measurement less than or greater than 20% of the average face velocity; or
- an average face velocity of 0.4m/s and no measurement less than or greater than 10% of the average, provided
 - Containment is < 0.005ppm, Robustness of Containment is < 0.1 ppm and Air Exchange Efficiency is < 10 seconds;

when the sash is set at 500 mm.

Audio Visual Indicators:

- (a) green lamp, labelled "sash safe", to indicate sash below 500 mm;
- (b) red lamp, labelled "sash high", and audible alarm to indicate sash above 500 mm; the alarm to be equipped with a mute button which is automatically re-set when the sash is returned to below 500 mm;
- (c) green lamp, labelled "airflow safe", to indicate the face velocity specified above is being exceeded at all points in the plane of the sash;
- (d) red warning lamp, labelled "airflow failed", and audible alarm to indicate that the lowest value of face velocity is below the value specified above (for commissioning purposes, the alarm should be set to operate at not less than 90% of the specified value).

Work Surface:

this must be smooth, non-absorbent and easily decontaminated with any internal angles/corners rounded; it should have raised edges to contain spillage and be made of one-piece ceramic or cast epoxy resin. The dished area of the work surface must not extend under the airfoil referred to in paragraph 2 of "Design" below. A minimum distance of 50 mm is required between the edge of the dished area and the rear of the airfoil.

Linners and rear baffle:

should be of solid epoxy resin.

NB The sealing compounds used at the joins of work surface and liners should be epoxy based.

Sash:

this should be of toughened glass, with a sash lock fitted at 500mm (NB not a security lock, but a releasable physical stop).

Design:

- 1 surfaces must be smooth, non-absorbent and easily decontaminated with any internal angles, joints/corners, rounded, i.e. coved;

¹ Fume Cupboards, BS EN 14175-Parts 1,2 3, 4 and 6::2006 and DD CEN/TS 14175-5:2006

- 2 an **aerodynamically styled facia** (bevelled edges to opening) with a gap left between the airfoil at the bottom of the facia and the front edge of the work surface;
- 3 a **rear baffle**;
 - the rear baffle should be angled near the top to form an imaginary apex with the ceiling of the fume cupboard which should be sloped from the front at a similar angle or similar aerodynamic feature proven by development;
 - the exhaust slot formed between the bottom of the baffle and the rear of the work surface should be covered by a coarse arrestor to prevent tissues and other light items from being drawn into the exhaust system;
- 4 a **bypass** arrangement, with the inlet located so as not to interfere with the aerodynamic facia and also to direct the expansion path from any explosion within the fume cupboard up and away from the operator, unless a VAV fume cupboard is installed;
- 5 **internal fittings**, including sinks, must not be closer than 150 mm to the plane of the sash;
- 6 **sinks**, if fitted, must be integral to the work surface with no overhanging lips and connections to the waste system must be via a small trap (existing waste systems may need to be refurbished).

Typical Dimensions:

Internal width 1200 mm; internal depth 650mm; internal height 1100mm; height of work surface above floor 900mm; max. sash opening 750mm.

Services

As specified by user on *Fume Cupboard Requirements* form,

BUT, in the absence of user specification, a minimum of one cold water outlet and drip cup and one double 13 amp electric socket,

AND subject to any specific comments on particular installation by the University Health and Safety Unit.

Siting of fume cupboard:

- 1 the distance from the plane of the sash to any space used frequently or for movement of other personnel should be at least 1000 mm;
- 2 the distance between the plane of the sash and a bench opposite to it and used by the same operator should be at least 1400 mm;
- 3 there should be no opposing wall (or other obstruction likely to affect the airflow) within 1400 mm of the plane of the sash for a single fume cupboard but may need to be as much as 2000mm for a higher airflow fume cupboard or a bank of fume cupboards;
- 4 no fume cupboard should be installed in a position where it is likely to be affected by another item of equipment. In particular, the distance from the plane of the sash to the sash of an opposing fume cupboard, to the face of an open fronted safety cabinet, or to the edge of an exhaust hood, should be carefully considered;
- 5 any room air supply diffuser should not cause an airflow exceeding 0.2m/s within 400 mm of the sash;
- 6 no fume cupboard should be positioned with either side closer than 300 mm from a wall or similar obstruction;
- 7 no large obstruction, e.g. an architectural column, projecting beyond the plane of the sash should be within 300 mm of the side of the fume cupboard;
- 8 no doorway should be within 1000 mm of the plane of the sash or within 300 mm of the side of a fume cupboard;
- 9 if a fume cupboard is not designed to contain a possible fire or explosion, the fume cupboard should not be sited in a position where exit from a work space to the only escape route will necessitate passing directly in front of the fume cupboard.

The unobstructed floor area in front of a fume cupboard should be outlined on three sides by 50mm red tape applied to the floor, 300 mm from each side and 1400 mm from the plane of the sash. A prohibition sign (using the symbol and colouring conforming with *The Safety Signs and Signals Regulations 1980*) displaying the wording "Do not place furniture or equipment in the area outlined in red" should be affixed to the lower part of the door to the unventilated under cupboard.

If it is necessary to display a sign prohibiting the use of an adjacent window, this should follow the format specified above and contain the wording "Do not open window while fume cupboard is in use".

Ventilated Understorage

Part of the understorage should be fitted out for the storage of toxic/corrosive substances. A 200 mm, black on yellow, triangular **corrosive** hazard warning sign conforming to ***The Health and Safety (Safety Signs and Signals) Regulations 1996*** should be applied to the door of this compartment.

The compartment and its fittings should be non-corrodable and fitted with 50 mm deep, corrosion-proof trays for spill containment near centre and at bottom (the distance between these two trays should allow the storage of 2.5 litre Winchester bottles in the bottom of the cupboard).

The compartment should be vented at low level via a small duct connected into the fume cupboard exhaust duct.

Fume Discharge System

- 1 **Negative pressure** inside building (fan positioned outside building);
- 2 **exhaust fan speed control** to maintain steady state speed control after commissioning and to allow adjustment by variable speed controller located adjacent to the fume cupboard, but inside a secure box separate from the main control panel;
- 3 high velocity vertical discharge, not less than 10 m/s;
- 4 a **minimum height of the top of the stack** above ground level of normally 1.25 times the height of the highest point of the building or 3 m above the highest point of the building, whichever is the greater;
- 5 the **fan and motor** specifications should assume highly flammable fume discharge.

Airflow Sensor:

this should be of the type produced by TEL Ltd whereby the airflow through an orifice in the ceiling of the fume cupboard chamber is monitored by a calibrated diode to provide a signal for audio-visual airflow indicators.

Materials of construction

The materials of construction of the fume cupboard system must be compatible with the substances used or generated in the system.

Air Make-Up System

Where it is necessary to install an air make-up system, the system should provide 90-95% ,filtered, heated, fresh air to replace the air extracted by a fume cupboard(s).

Audio Visual Indicators on main control panel:

The following to be activated by pressure switch sensing differential pressure across make-up air fan:

- (a) green lamp, labelled "make-up airflow on", to indicate make up airflow operating;
- (b) red warning lamp, labelled "make-up airflow failed", and audible alarm to indicate make up airflow below 50% of fume cupboard exhaust volume.

Plans sent to the Health and Safety Unit for approval should be accompanied by line drawings and detailed specifications and *Type Test* data of the model of fume cupboard chosen to meet these requirements, in accordance with DD CEN/TS 14175-5:2006.