

**Specification for Biological Containment Level Laboratory
Facilities Policy Arrangements**

HSA-10126 part 2

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1. Introduction

This document provides details on the specification of research laboratories where biological hazards are used and stored in order to comply with the requirements of relevant H&S and environmental regulations.

This guidance is based on the requirements of:

- Schedule 3A of the Control of Substances Hazardous to Health Regulations (COSHH) 2002.
- Advisory Committee on Dangerous Pathogens guidance “The Management, design and operation of microbiological containment laboratories”.
- Special Advisory Committee on Genetic Modification compendium of guidance.
- Department for Environment Food & Rural Affairs Animal Pathogens – Guidance on Controls 2015.

The containment measures are designed to limit the exposure of workers to the agent, and to prevent or minimise the dispersal of the agent from the laboratory.

For the purpose of this guidance the following definitions apply:

A **laboratory** is a room in which biological agents/materials are handled

An **ancillary room** is a room where biological agents/materials may be stored, or where equipment is used with biological agents/materials which are in primary containment (e.g. centrifuges, incubators) and are not directly handled.

This document focuses on the design standards required for containment level 1 and 2 laboratories working with human and animal pathogens and class 1 and 2 genetically modified microorganisms.

It must be noted that the COSHH regulations do not themselves specify the requirements for containment level 1 laboratories, as the material used within them represent by definition very low risk to health. However, it is likely that these laboratories would be used to work with other harmful substances e.g. chemicals and as such should be designed to appropriate “wet laboratory” standards with due particular notice to good occupational hygiene requirements.

Additional control measures may be required e.g. for industrial scale use, use of microorganisms in animal facilities or in plant-growth facilities based on risk assessment. Guidance on this, and on containment level 3 facilities, including derogated containment level 3 facilities is available from H&S Services.

In practice, ancillary rooms should meet the same general standards of cleanability as the equivalent level laboratory (impervious benches, floors and seating). There should be sufficient space to carry out the required activity, including space to put down samples, racks or trays etc. and space to be able to deal with any spillages or incidents.

2. Laboratory specification

The following table outlines the main design requirements relating to the control of biological agents in laboratories. Where guidance is specific for a defined type of hazard e.g. under SAPO, GMM or COSHH this is highlighted in bold.

2.1 Security & Siting

All CL2 laboratories: access to the laboratory must be restricted to laboratory personnel and other authorised persons. The laboratory must be secured in a way to prevent unauthorised access, for example by access control systems for entry into containment level 2 laboratories, suites or unit.

Small laboratories may be locked with a key or pin-code lock when un-occupied, however in large multi-occupancy laboratories, unauthorised access should be prevented even when occupied.

CL2 laboratories do not need to be separated from any other activities in the same building e.g. by a lobby.

For SAPO CL2: laboratories should not be sited next to a known fire hazard (e.g. solvent store) or be in danger of flooding.

For SAPO CL2: must be secure against intruders or vandals. An intruder alarm system must be fitted.

For facilities handling/storage of relevant materials under the Anti-Terrorism, Crime and Security Act Schedule 5 “Pathogens and Toxins” additional security measures may be required, for further information contact H&S Services.

2.2 Separation of activities

In all laboratories: In order to minimise exposure and contamination, office space should be provided separate to the laboratory. Some space may be provided to write-up laboratory books but should not be used for general office activities or for the storage of non-lab-essential paperwork.

2.3 Lab coat storage

In all laboratories: There must be separate storage space for lab-coats which should be kept within the laboratory. At CL2 these should be located near the hand-wash basin and lab exit) or an annex room of the laboratory.

For SAPO CL2: the entrance to the laboratory should have a clearly defined clean and dirty side over which staff don or remove protective clothing and wash their hands.

2.4 Hand-wash basin

In all laboratories: There should be a dedicated hand-wash basin, located near the laboratory exit. This should be a stand-alone unit with curved bowl.

At CL2: Taps should be operable without touching by hand (elbow, knee or foot- operated or proximity-sensor operation) and provide both hot and cold water.

A soap dispenser and hand drying facilities should be located at convenient point near the basin, together with a bin for waste paper towel (unless hand-dryers are provided).

At CL2: disinfectant soap should be available



2.5 Bench surfaces

In all laboratories: Benching must be easy to clean, impervious to water and resistant to the effects of alkalis, acids, solvents, disinfectants and other materials expected to be in use. The aim is to be able to effectively disinfect any spill of infectious materials, and to design out cavities, cracks, porous surfaces, etc., where infectious biological agents can lodge and remain viable for long periods.

At CL2: For new facilities/laboratory refurbishments - all bench surfaces should be suitable laminate or solid impervious surface such as Corian® or Trespa®.

In all laboratories: in existing laboratories, wooden surfaces must be varnished with a durable varnish that meets the above criteria. Such benches must be regularly inspected (e.g., monthly) for damage, and any damage found made good without delay. At CL2: Ideally, all wooden bench surfaces should be replaced by a suitable laminate or solid impervious surface such as Corian® or Trespa®.

The edges of benches, cupboards, drawers, etc., (where these are made of wood or veneer over chipboard) must also be impervious to penetration by liquid spills.

At CL2: Bench to bench/upstands or wall joints should be sealed to prevent ingress of contamination or sufficient space allowed between benches to allow cleaning.

2.6 Under bench cupboards

At CL2: All under bench cupboards should be on casters to facilitate cleaning. Where this is not practicable units should be sealed to the floor to prevent ingress of liquids.

Surfaces should be non-porous and cleanable.

2.7 Laboratory sinks

In all laboratories: Must be easy to clean and resistant to disinfectants. If chlorine-based disinfectants are to be used, the use of polypropylene or epoxy resin bowls is preferable to the use of stainless steel, because of the greater resistance to corrosion. Consideration should be given to drainage and to provision of splash backs to prevent damage to laboratory fixings.

At CL2: Catch pots or large traps should not be fitted on the waste, a simple "S-bend" is preferable, followed by a direct discharge to a foul sewer.

In SAPO labs: Liquid effluent containing specified pathogens should be treated by a procedure known to kill the relevant pathogens prior to disposal. Since this procedure may take some time, it may be necessary to have more than one standing tank in the laboratory. Sufficient space and secondary containment should be available for these.

2.8 Flooring

At CL2: An impervious floor surface is not a regulatory requirement at CL2. In practice the floor should be easy to clean and resistant to commonly used disinfectant. A "one-piece" / seamless impervious flooring sealed at floor/wall junctions is recommended as standard for all CL2 laboratories. Due regard should be made to slip-resistance and cleanability of flooring.

Floors should be kept in a good condition, with any damage to the integrity of the flooring repaired. Wooden floors should be sealed with appropriate sealant.

2.9 Walls and other surfaces

At CL2: Walls should generally be smooth and painted. Exposed breeze-block, brick or plaster are not acceptable as they may absorb contamination and are difficult to clean.

Doors, windows and other fixtures should be finished with an appropriate gloss or varnish.

2.10 Air handling

In all laboratories: Ventilation may be supplied to provide a comfortable working environment.

At CL2: If the laboratory is designed to be fully mechanically ventilated (i.e. forced inflow and extract of air and not simply extraction of air from lab through a safety cabinet), the system should be capable of maintaining a net inward flow of air (i.e. negatively pressured) when work is in progress. In such circumstances it is important to ensure that the laboratory cannot become positively pressurised with respect to the surrounding environment.

There should be no recirculation of extracted air i.e. air from one room being re-supplied to another via the general ventilation system. Air must be expelled from the building in such a way that it cannot re-enter via air intakes.

Doors should be kept shut whilst work is in progress.

In practice, windows should remain shut whilst work is in progress to prevent a positive pressurisation of the lab in comparison with the corridor.

At GMM CL2: it is a regulatory requirement to maintain the laboratory at a negative pressure with respect to the surrounding areas if the risk assessment shows that this is necessary e.g. if GMM can be transmitted via the air.

2.11 Local exhaust ventilation

At CL2: – the laboratory must be equipped with a LEV protective cabinet (i.e. a microbiological safety cabinet) where procedures likely to generate aerosols will be used.

Microbiological safety cabinets must be sited, commissioned and tested in accordance with the appropriate British Standard (BS EN12469:2000 and BS EN5726:2005).

2.12 Space

Each user should have sufficient space to work safely and ergonomically. The Advisory Committee for Dangerous Pathogens recommends approximately 24m³ per worker.

2.13 Storage

At CL2: materials should be stored safely, e.g. located in a secure area to prevent unauthorised access. Storage should be constructed of material which is easy to clean, impervious to water and resistant to acids and alkalis. Where storage is outside the main lab, the storage should be lockable.

SAPO CL2: specified pathogens should be stored in the laboratory in suitable containers in a cabinet reserved for specified pathogens and kept under lock and key.

In any CL2: Use of cardboard or (un-sealed) wooden boxes to store materials on, or under benches (on the floor) should be avoided. If under-bench storage cannot be avoided, consumables should be transferred to cleanable plastic boxes. Use of cardboard boxes for storage in other locations in the laboratory should be minimised as far as possible.

2.14 Laboratory seating

In all laboratories: Stools and chairs should either be non-upholstered, or be upholstered in a non-absorbent material covered with an impervious surface e.g. polyurethane or vinyl seating that is easy to clean.

Chairs used for periods of time should have foot support and back support and be height adjustable.

At low level e.g. desk height, chairs on castors may be acceptable, subject to local risk assessment, high level chairs e.g. draughtsman chairs should be on glides and not casters to prevent accidental movement. ...

Ergonomic chairs such as sit stand stools or saddle stools may be suitable for certain situations

2.15 Signage

At CL1: Laboratories should be labelled “Containment Level 1 Laboratory” but should not display a biohazard warning symbol.

At CL2: Laboratories should be labelled “Containment Level 2 Laboratory” and must display the biohazard warning symbol together with a no access to unauthorised user prohibition symbol.

At SAPO CL2: The door signage should make it clear that Animal Pathogens are in use in these facilities.

2.16 Autoclaves

At CL1: an autoclave is required to be available on site. Waste can be transferred in secure containment.

At CL2: an autoclave is required to be available within the same building as the laboratory. Derogation may be sought provided that a validated means of inactivation is in place.

At SAPO CL2: each laboratory should have access to an autoclave – all waste material must be sterilised prior to removal from the laboratory site.

2.17 Vector control

At GM CL1 and 2: where risk assessment shows that it is required, an efficient system for the control of disease vectors that could disseminate the GM material is required.

At SAPO CL2: the laboratory must be proofed against entry or exit of animals or insects. This is particularly important in the case of diseases which can be spread by insect vectors.

2.18 Other facilities

Adequate lighting should be provided throughout the laboratory, particularly to enable operators to see spillage easily.

Any absorbent materials e.g. lagging, foam sealant, fabric notice boards should be avoided, where necessary absorbent materials should be covered with a cleanable finish.