

Scottish Health Technical Memorandum 67

SHTM Building Component Series
Laboratory fitting out system

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1. Introduction

Background

1.1 This is one of a series of Scottish Health Technical Memoranda which provide specifications and design guidance on building components for health buildings.

A [Reference Section](#) is provided at the end of this document, including Acts, Regulations, and British Standards.

1.2 The numbers and titles of the SHTMs in the series are:

- 54 User manual;
- 55 Windows;
- 56 Partitions;
- 57 Internal glazing;
- 58 Internal doorsets;
- 59 Ironmongery;
- 60 Ceilings;
- 62 Demountable storage system;
- 63 Fitted storage system;
- 64 Sanitary assemblies;
- 66 Cubicle curtain track;
- 67 Laboratory fitting out systems;
- 69 Protection.

1.3 This SHTM should be read in conjunction with relevant SHPN and associated HBN guidance for laboratory areas; HBN 29: 'Accommodation for pharmaceutical services';

Scope and status

1.4 This SHTM offers guidance on the technical design and output specifications of the systems for fitting out laboratories.

1.5 The content of this SHTM does not diminish either the manufacturer's responsibility for fitness for purpose of products or the design team's responsibility for selection and application of products to meet project requirements. Design teams are also reminded of their obligations under the

Construction, Design and Management (CDM) Regulations 1994 (as amended 2000) to ensure safe construction.

- 1.6 This SHTM is concerned mainly with new building work, but much of the information is equally applicable to the replacement of laboratory fitting out systems in existing buildings.

Relationship to other data

- 1.7 The main sources of data used in the preparation of this SHTM are listed in the References section.
- 1.8 In particular, the attention of users and manufacturers is drawn to the performance requirements for the components set out in Section 4 'Performance'.
- 1.9 This SHTM was prepared for publication in December 2006. After this date, readers should ensure that they use the latest or new edition of all building legislation, British Standards etc, which may post-date the publication of this document.
- 1.10 First preference should be given to products and services from sources which have been registered under current BSI Quality Assurance procedures or other certification schemes. Suppliers offering products other than to British Standards should provide evidence to show that their products are at least equal to such Standards.
- 1.11 This guidance should be used in conjunction with sections of the National Building Specification (NBS) relevant to fitted storage. NBS is a library of standard specification clauses covering most kinds of building work and comprising a wide range of clauses with accompanying guidance notes. All clauses are optional, and their combination into a job specification is left to the specifier. NBS has great flexibility, and it can be adapted to suit the technical needs and preferences of different projects, organisations and specifiers. Specifications go out of date as a result of technical innovation or major review of a key BSI document. As NBS sections become affected by such major changes, they are reissued to members of the subscription service. Users are advised to ensure that they refer to the current edition. Refer to the NBS website at www.thenbs.com
- 1.12 Any enquiries regarding the technical content of this SHTM should be e-mailed to enquires@hfs.scot.nhs.uk

2. System description

General principles

- 2.1 This SHTM describes a range of components for use in laboratories and offers advice on their use, together with guidance on the installation of services.
- 2.2 The selection of appropriate laboratory fittings with their work surfaces, related storage and services, the wall, ceiling and floor finishes, the special building characteristics and the need to accommodate ancillary equipment and fittings for a pathology laboratory, is an extremely complex operation.
- 2.3 Laboratories may accommodate a wide range of specialist departments including haematology, chemical pathology, histopathology, microbiology etc. The fitting- out system described in this document is suitable for general use in these laboratories and also in pharmacies.
- 2.4 Worktops in a variety of heights, widths, depths and materials are supported by cantilevered structural frames giving unobstructed knee space, allowing users freedom of lateral rearrangement of under-bench storage and work positions. Workbenches can be free- standing on C-frames or fixed in island or perimeter layouts. They are suitable for a full range of laboratory work.
- 2.5 The fixed cantilever bench system permits layouts to be created to suit specific planning requirements of laboratory users.
- 2.6 Suspended and mobile under-bench units allow users total freedom to rearrange the under-bench zone and also easy access for cleaning.
- 2.7 Racking, bins or shelves for bulk storage may be fixed to walls or free-standing. Where possible, separate storerooms close to the point of use should be provided.
- 2.8 Machine benches or stands are included for heavy analytical or processing machines.
- 2.9 The range of components has been designed to be versatile, ergonomically correct, robust, durable, hygienic, and capable of complying with health and safety regulations. Value for money has been a prime consideration.
- 2.10 The components can be assembled in a number of standard design options which satisfy most common user requirements, and these are set out in [paragraphs 5.7–5.37](#).

3. Design requirements

Work benches

- 3.1 Work surfaces are available in materials listed in [paragraphs 3.10-3.16](#) and may be fitted with integral sinks and drip-cups.
- 3.2 Worktops can be supported by a cantilevered structural frame giving users maximum flexibility of lateral rearrangement of the under-bench storage and work positions.
- 3.3 The 920mm workbenches will permit domestic refrigerators to be located underneath.
- 3.4 Workbenches can be free-standing, giving the users the choice to rearrange the layout as desired (see [paragraphs 5.8–5.14](#)), or fixed (see [paragraphs 5.15–5.32](#)).
- 3.5 C-frame movable workbenches can be free-standing or linked either side-by-side or back-to-back to form an island or peninsula.
- 3.6 When in the last configuration, inverted T-shaped linking devices can be added which incorporate aluminium slotted uprights (see SHTM 62: ‘Demountable storage system’) to allow components to be added providing above-bench storage. A simple linking device is used where above-bench storage is not required.
- 3.7 Fixed workbenches can be either perimeter (supported by a wall) or peninsulas or islands (accessible from either side). For wall supported fittings the wall construction should be suitable for the support of cantilevered worktops, base and high level units.
- 3.8 Integral storage and service ducts can be accommodated above work surfaces (see [paragraphs 5.7–5.37](#)).
- 3.9 Under-bench storage can be either mobile on castors, suspended under the worktops or placed on an under-bench platform.

Materials for surfaces of worktops and sinks

- 3.10 Materials are available which vary in their resistance to corrosive chemicals and staining, abrasion and impact resistance and suitability for wet or dry activities, clerical work, inspection etc (see [paragraphs 4.15](#) and [5.43–5.54](#)).
- 3.11 Edges of worktops may be finished in a variety of ways. The cast resin materials may be moulded to a number of profiles. Hardwood and cast resin materials may be machined to designed profiles. The wood-based board

materials may have an edging applied by bonding processes. Linoleum and plastic-laminate worktops can also be post-formed to curved profiles.

- 3.12 Wet worktops can be provided with raised containment edges. These are essential where radioactive substances are being used.
- 3.13 Certain materials need supporting on a substrate or by integral framing.
- 3.14 Materials for worktops are more fully detailed in [Section 4](#). Materials include:
- standard-grade laminate;
 - solid-colour laminate;
 - post-formed laminate;
 - linoleum;
 - phenolic resin;
 - solid hardwood;
 - toughened glass.
- 3.15 Materials that can be fabricated, cast or moulded to form worktops with or without integral sinks, drip-cups and drainers include:
- cast polyester resin;
 - cast acrylic resin;
 - cast epoxy resin;
 - polypropylene;
 - stainless steel;
 - ceramic.
- 3.16 Some resin-based worktop materials may contain fillers

Storage

- 3.17 In addition to the storage of operational equipment and supplies, a disposal hold must be provided.

Under-bench units

- 3.18 Domestic-type refrigerators can be accommodated under the 920 mm high worktops.

Mobile under-bench units

3.19 The fitting of energy-absorbing buffer wheels may be desirable for units which are expected to be moved regularly. Generally under bench units will be sized as:

- 650mm high unit to fit under 720mm high benches;
- 850mm high unit to fit under 920mm high benches;
- Generally carcasses below 600mm wide have single doors. Units over this width generally have double doors.

Static under-bench units

3.20 These are standard 650mm and 850mm high units without castors.

- 550mm units to be suspended under 720mm high benches in options 1, 2, 3 and 4 (see [paragraphs 5.8–5.23](#));
- 750mm units to be placed under 920mm high benches in options 5 and 6 (see [paragraphs 5.24–5.32](#));
- 150mm, 350mm and 550mm lower storage components from the SHTM 63: ‘Fitted storage system’ range may also be suspended under worktops.

Under-bench storage with sliding doors and fitted under sinks

3.21 This is for use with all options, either 550mm or 750mm (nominal height); widths can be made to suit project requirements.

Over-bench storage

- 3.22 These units are supported by aluminium slotted uprights and are compatible with SHTM 62: ‘Demountable storage system’. They are optional on free-standing, peninsular and island workbenches. They may incorporate horizontal service ducts.
- 3.23 Storage components, cupboards, shelves etc are interchangeable with the wall-hung storage.

Wall-mounted storage

3.24 Shelving, racking, cupboards or hooks, either fixed or suspended, are as described in SHTM 62: ‘Demountable storage system’.

Substrate for fixing wall – mounted storage to be suitable to support loads. Refer also to relevant provisions within SHTM 56: Partitions.

Wall cupboards with sliding glass or solid doors

- 3.25 These are used as shelving, racking, bins and floor-track-mounted mobile systems.
- 3.26 Storage will be required for a wide range of materials, specimens, chemicals (solid and liquid), apparatus, equipment, tools and clothing.
- 3.27 A number of proprietary storage systems are available. BS EN 14056:2003 also gives general guidance on storage.

Ventilated specimen storage

- 3.28 In addition to general room ventilation, special provision must be made for the storage of formaldehyde and specimens of organic matter stored in formaldehyde or other preservatives. This usually takes the form of ventilated cupboards.

Gas and flammable liquids storage

- 3.29 External storage for bulk supplies of gases and flammable liquids must be provided. Installations to be in accordance with the relevant provisions of HTM 87: 'Textiles and furniture', SFPN 10: 'Laboratories on hospital premises', any related provisions within the Firecode series of documents and also the requirements of the Building (Scotland) Regulations 2004.
- 3.30 Local storage of flammable liquids and acids will need specially-designed storage units.

Ancillary items

- 3.31 Laboratories require a range of equipment which is highly specialised and is complementary to the benches and storage units forming the main content of this SHTM.
- 3.32 Whilst this document cannot give detailed recommendations on such equipment, some outline guidance or pointers to other existing guidance is given to enable the designers of a laboratory to make provision for these pieces of equipment.
- 3.33 These items include:
- safety cabinets;
 - fume cupboards;
 - ventilated or extract benches ([see paragraph 5.42](#)).

Refer to relevant SHPN and associated HBN guidance.

Disposal holding

- 3.34 Facilities for the temporary holding of waste matter to be disposed of are described in HBN 15: 'Facilities for pathology services'.

4. Performance

- 4.1 Laboratory workbenches and storage units should conform to the recommendations for performance set out in BS 3202-2:1991.
- 4.2 Three grades of performance have been established in this British Standard as follows:
- Grade G 'general use' – appropriate for general laboratory use (with light loaded storage) and in use for approximately eight hours per day;
 - Grade H 'heavy use' – appropriate for heavy laboratory use including up to 24 hours' use per day and some rough treatment and careless handling;
 - Grade S 'severe use' – appropriate for severe laboratory use including heavy storage loads, up to 24 hours' use per day and subject to misuse.
- 4.3 These grades may be appropriate for the strength and stability of benches and other fittings. Generally, heavy use grade will be required.
- 4.4 However, these grades and their test ratings as set out in the above BS do not readily fit the needs and practices in medical pathology laboratories for the performance of surfaces.
- 4.5 The recommended performance for these laboratories is set out in paragraphs 4.7– 4.30 and in the design selection matrices in [paragraphs 5.43 – 5.54](#). Table 1 relates these recommendations to the ratings in the BS. Additional requirements from SHTM 63: 'Fitted storage system' which may be relevant to pathology laboratories are also included in Table 1.
- 4.6 Bench usage in hospital pathology laboratories is set out in paragraphs 4.8– 4.14.

Strength and stability

- 4.7 Workbenches, storage units and shelving should comply with the recommendations for strength and stability set out in BS 3202-2:1991, and should meet the required standards when tested in accordance with the methods set out in this Standard and BS 4875 parts 5, 7 and 8.

Bench usage

- 4.8 The variety of uses, substances and occurrences to which the benches will be subjected are grouped as follows:
- Dry work – administrative (Da). This includes using the surface for writing, reading, using computers;

- Dry work – general (Dg). This includes the previous item, plus using microscopes, examining specimens and slides, dry chemical processes and analytical machines, maintenance of equipment. Minor spillages of water or chemicals may take place from time to time, and occasional light cutting and abrasion may take place;
- Wet work – general (Wg). This encompasses regular spillages of water and chemicals, corrosive, non- corrosive and biological materials, wet processes, light straining, analytical and processing machines; occasional abrasion may take place on some work surfaces;
- Wet work – heavy (Wh). This includes the usage in ‘wet work – general’ and heavy chemical spillages and staining, with regular cutting and abrasion.

Refer to [paragraphs 4.15-4.25](#) which provide more information in respect of various surface finish options.

- 4.9 Colour and tone may be important where examination of slides or specimens takes place. The choice will largely depend on the user. Therefore, the decision will need to be taken at the design stage in consultation with all stakeholders.
- 4.10 Work surfaces may need to take the load of equipment, processing and analytical machines, although machine stands, either mobile or fixed, should be specified for these when use is continuous or machines need regular servicing or are heavy.
- 4.11 A few surface materials may be able to accept all of these uses. Some surfaces may resist certain acids or stains, but not others. Some materials may resist abrasion and cutting, while others may suffer moderate wear or staining, but be capable of being satisfactorily resurfaced. Other surface materials may only be suitable for certain of the activities.

Test method ratings in BS 3202 and BS 3962		Minimum performance					
		Work surfaces				Others	
		Da	Dg	Wg	Wh		
B	Resistance to surface penetration (tool blunting)	2*	3*	4*	5*	3	
C	Impact (19.1 mm ball)	4#	4#	4#	5#	3	
D	Wet heat	55° Centigrade	4	4	4	4	2
		70°	3	3	3	3	2
		85°	3	3	3	3	2
	Dry heat	85°	-	-	-	-	2
		100°	-	-	-	-	2
		120°	3	3	3	3	-
		140°	3	3	3	3	-
	160°	3	3	3	3	-	
E	Resistance to cold liquids						
E	Acetic acid	3	4	4	5	3	
E	Acetone	3	4	4	5	3	
E	Ammonium hydroxide	-	4	4	5	3	
E	Aqua regia	-	2	4	5	2	
E	Butyl acetate	3	4	4	5	3	
E	Dimethylformamide	-	2	4	5	5	
E	Disinfectant (phenol)	4	4	4	5	3	
E	Disinfectant (chloro)	4	4	4	5	3	
E	2-ethoxyethanol	-	2	4	5	2	
E	Gentian violet	-	2	4	5	2	
E	Hydrogen peroxide	-	2	3	3	2	
E	Nigrosine	-	4	4	5	3	
E	Olive oil	3	3	-	-	3	
E	Potable spirit	3	4	4	5	3	
E	Potassium permanganate	-	4	4	5	3	
E	Silver nitrate	-	4	4	4	3	
E	Sodium hydroxide	-	4	4	5	3	
E	Sulphuric acid (concentrated)	-	-	2	3	2	
E	Sulphuric acid (diluted)	-	2	2	5	2	
E	Toilet spirit	3	3	4	5	3	

Test method ratings in BS 3202 and BS 3962		Minimum performance				
		Work surfaces				Others
		Da	Dg	Wg	Wh	
E	Xylene	-	4	4	5	3
F	Resistance to surface wear	150 for all grades				
H	Resistance to surface heating	3 for all grades, no blistering				
L	Bond quality	No failure of the glue line to occur such that any area of either the surfacing material or substrate greater than 40 sq m is free from adherent matter derived from substrate or surfacing material				
M	Adhesion of edging material 40° Centigrade 50°	4 for all grades 3 for all grades				
N	Resistance to humidity	No visible deterioration, 0.8 mm max increase in panel thickness				
P	Water ingress	No visible deterioration, no blistering				
Q	Effects of flooding	No visible deterioration, 0.8 mm max increase in panel thickness				
R	Worktop and work-surface replacement	Record result				
S	Impact (42.8 mm ball)	Record result				
<p>Notes:</p> <p>For convenience, the explanation of performance ratings shown above is set out below:</p> <p>Rating 5 No visible change (no damage)</p> <p>Rating 4 Slight change in lustre, visible only when the light source is mirrored in the test surface on or near the mark and is reflected towards the observer's eye, or a few isolated marks just visible</p> <p>Rating 3 Slight mark, visible in several viewing directions, e.g. almost complete disk or circle just visible</p> <p>Rating 2 Strong mark, the structure being largely unchanged</p> <p>Rating 1 Strong mark, the structure of the surface being changed or the surface material being wholly or partially removed or the filter paper adhering to the surface</p> <p>These levels apply to hard work surfaces only. Record results for assessment of tool blunting propensity (soft work surfaces only).</p> <p>* These levels apply to hard work surfaces only.</p>						

Table 1: Surface ratings

4.12

Scratches and cuts can be satisfactorily removed or smoothed out on some surfaces using abrasive pads, sanding machines or scrapers.

- 4.13 Cutting boards should be provided and used to avoid predictable damage to bench surfaces.
- 4.14 Cleaning off after staining should be done as soon as possible, and can be satisfactorily carried out by the use of a number of substances and methods familiar to most laboratory scientific staff, depending on the surface material and the stain. These include methylated spirit, acid alcohol, xylene and domestic oven-type cleaners.

Surface finishes

- 4.15 Surfaces and finishes of workbenches, storage units and shelving should conform to the recommendations of BS 3202-2:1991 and Table 1, and should meet the required standards when tested in accordance with the methods set out in BS 3202- 2:1991, BS 3962-5:1980, BS 3962-6:1980, BS EN 12720:1997, BS EN 12721:1997 and BS EN 12722:1997. These methods of test and ratings required are set out in Table 1.

Joints in work surfaces

- 4.16 Any joints in work surfaces must be made using epoxy resin grout or other suitable material to give a surface which will not crack, retain dirt or foreign matter, and will not promote or sustain the growth of harmful pathogenic agents.

Suitability of surface materials

- 4.17 Refer to [Table 2: Surface Finishes](#) when selecting the most suitable surface finish.

Edges

- 4.18 Edges to work surfaces, doors and drawer fronts and all exposed edges of carcasses must be resistant to wear and tear, impacts and liquids in normal use. They must satisfy the same test standards as the main surfaces of the components, particularly tests C, D, F, L, M, N, P and S.
- 4.19 Edges can be cast, moulded or machined from the solid in the resin materials with appropriate profiles. Profiled and post-formed edges in linoleum or plastic laminate should provide a similar standard of performance as the main surface of the component.
- 4.20 Wet worktops can be provided with raised containment edges. These are essential where radioactive substances are being used.
- 4.21 PVC edges 2–4mm thick and applied by an edge- banding machine, and moulded polyurethane edges where applied to timber-based board materials, can give a high performance.
- 4.22 Hardwood edgings are generally only suitable for use in administrative, dry-work situations.

Resurfacing test

- 4.23 In addition to BS 3202-2:1991, when a work surface has been renovated by refinishing or resurfacing, the surface should be retested in accordance with performance requirements set out in [paragraphs 4.8–4.15](#), and should achieve the same level of performance as in the original test.

Test samples

- 4.24 Test samples should be in accordance with BS 3202-2:1991.

Tolerances

- 4.25 Manufacturing and assembly tolerances should be in accordance with BS 3202-2:1991.

Surface spread of flame

- 4.26 When tested in accordance with BS 476-7:1997, painted and lacquered surfaces should achieve a minimum of Class 4, and melamine surfaces Class 3.

Sinks, drip cups etc.

- 4.27 Subject to the standard of finish required, sinks forming part of a work surface should be integral with the work surface. Any bonding or jointing must be carried out under workshop conditions to provide a homogeneous assembly.

Refer also to [paragraphs 6.3-6.7](#) for relevant services requirements.

Ironmongery for fittings and furniture

- 4.28 All ironmongery should be corrosion-resistant. Hinges should enable doors to open through 270°, and when tested on storage unit doors must comply with the requirements of BS 4875-7:2006.
- 4.29 Handles and pulls for doors and drawers should not be of a form which could act as a reservoir for spillages from work surfaces above, and should not be liable to cause injury to users or catch on clothing.
- 4.30 Locks are not required generally on storage units in laboratories; security is better dealt with by locking rooms or departments. Locks should only be fitted to storage units where demanded by statutory requirements or special local conditions.

Radioactive substance

- 4.31 Advice should be sought from the designated radiation protection adviser when radioactive substances are to be used.

Raised edges are essential where radioactive substances are being used. The duty of the worktop proposed for use with radioactive isotopes for example must be specified as the weight of lead protection, etc. may require the provision of additional floor mounted support.

5. Design application

Layout design

- 5.1 The range of fitting out components contained in this SHTM has been developed to cater for most layouts and all the configurations described in BS EN 14056:2003.
- 5.2 Workstation layouts can be wall-related, peninsular, island or a combination of the three.
- 5.3 The use of machine benches for cumbersome analytical and processing equipment is strongly recommended. Access to the backs of some machines may be required for maintenance, in which case braking castors should be fitted.
- 5.4 Mobile workstations and mobile sink units may be used in conjunction with all options.
- 5.5 Guidance regarding layout and ergonomic data for benches and storage is contained in BS EN 14056:2003 and HBN 15: 'Facilities for pathology services'. Careful consideration should be given to relevant PDA guidance for layouts, bench heights etc.
- 5.6 Consultation should take place with fire officers, radiation protection advisers, statutory bodies and other relevant specialists regarding layouts. Subsequent rearrangement or change in use may require approval.

Design options

- 5.7 A variety of design options can be arrived at using the component and service arrangements described in previous sections.

Option 1

- 5.8 Loose C-frame workbenches with piped and wired services are fed from overhead outlets to relocatable bollards on the work surfaces.
- 5.9 Drainage is via flexible wastes to floor points.
- 5.10 This option gives total adaptability which can be carried out by the laboratory staff without disrupting the work of the laboratory.

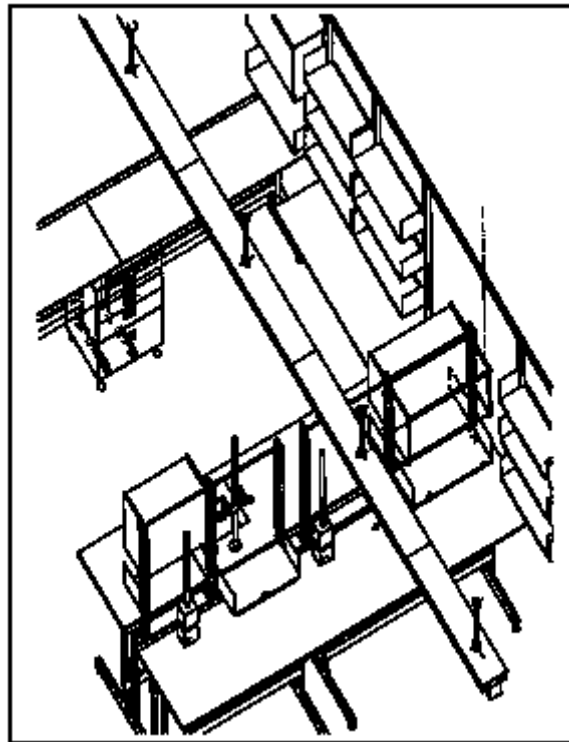


Figure 1: Option 1

Option 2

- 5.11 Loose C-frame workbenches with services and drainage are attached below work surfaces.
- 5.12 Outlets are through relocatable bollards on the work surfaces.
- 5.13 Drainage is either through flexible pipes to floor points or hard-piped to the perimeter wall.
- 5.13 Adaptation is by laboratory staff in conjunction with local plumbers, with little disruption to the work of the laboratory.

Note: Options 1 and 2 allow only single-sided operation on peninsular benches; all the other options allow pass-across operation.

Option 3

- 5.15 Cantilevered workbenches are bolted to floors and walls, with piped service and drainage runs enclosed below work surfaces.
- 5.16 Taps and valves are deck-mounted.
- 5.17 Wired services are in horizontal distribution ducts 300–450mm above bench level, leaving a clear worktop.

5.18 Rearrangement of benching requires the services of several building and specialist trades and may involve full or partial closure of a laboratory.

Option 4

5.19 Cantilever workbenches are bolted to floors and walls.

5.20 All services are housed in horizontal distribution ducts 300–450mm above the work surfaces, leaving a clear worktop.

5.21 Drainage is via under-bench casing.

5.22 Rearrangement of benching requires building and specialist trades and will involve closure of the laboratory.

5.23 Under-bench storage to Options 1–4 can consist of mobile units on castors or carcasses suspended below worktops.

Option 5

5.24 C-frame benches are bolted to the floor; a fixed plinth/shelf covers the feet, with under-bench units standing on it.

5.25 Taps and valves are desk-mounted. Wired services are in horizontal distribution ducts 300–450mm above bench level, leaving a clear worktop.

5.26 Under-bench rearrangement can be carried out by the users.

5.27 Rearrangement of benching requires building and specialist trades and will involve closure of the laboratory.

Option 6

5.28 C-frame benches are bolted to the floor; a fixed plinth/shelf covers the feet, with under-bench units standing on it (see Figure 2).

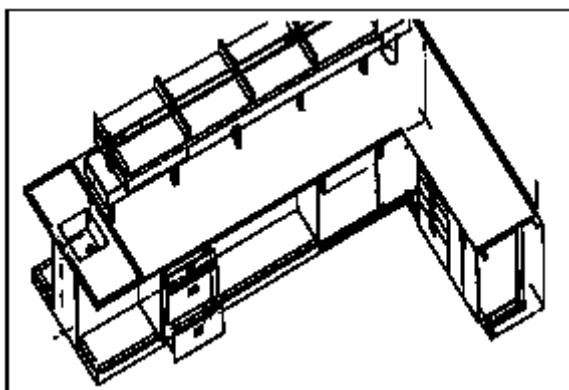


Figure 2: Option 6

- 5.29 All services are housed in horizontal distribution ducts 300–450mm above the work surfaces, leaving a clear worktop.
- 5.30 Under-bench rearrangement can be carried out by the users.
- 5.31 Rearrangement of benching requires building and specialist trades and will involve closure of the laboratory.
- 5.32 See [Figures 3a and 3b](#) for example arrangements of design [Options 1–6](#).

Option 7

- 5.33 Workstations are suspended from the structure above.
- 5.34 Supply services are fed from above and distributed via a horizontal duct 300–450mm above the work surface.
- 5.35 Drainage is into floor points.
- 5.36 All under-bench storage is made up of mobile units.
- 5.37 Rearrangement of benching requires building and specialist trades and will involve closure of the laboratory.

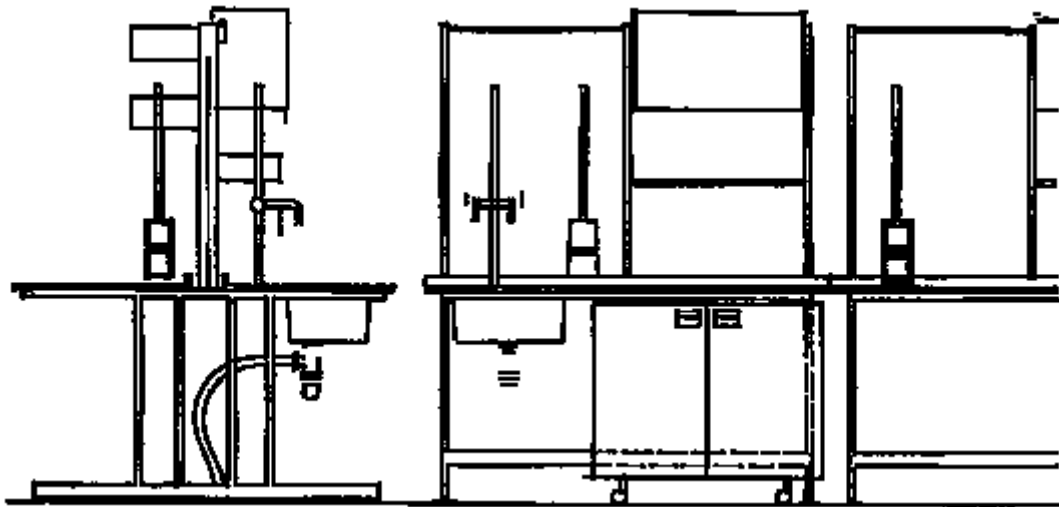
Ergonomics

- 5.38 Advice on layout space requirements is given in BS EN 14056:2003 and HBN 15: 'Facilities for pathology services'.
- 5.39 Workbenches should follow the recommendations in BS EN 14056:2003 and be constructed to the following dimensions:
- Worktop heights:
 - (i) sitting: 720mm;
 - (ii) standing or sitting on high stools: 920mm.
 - Worktop depths: generally 600mm and 750mm.
- 5.40 Storage for apparatus, equipment, materials and papers should be located at levels convenient to the users; advice is given in BS EN 14056:2003 and SHTM 63: 'Fitted storage system'. The designs for storage units in this SHTM comply with these recommendations.

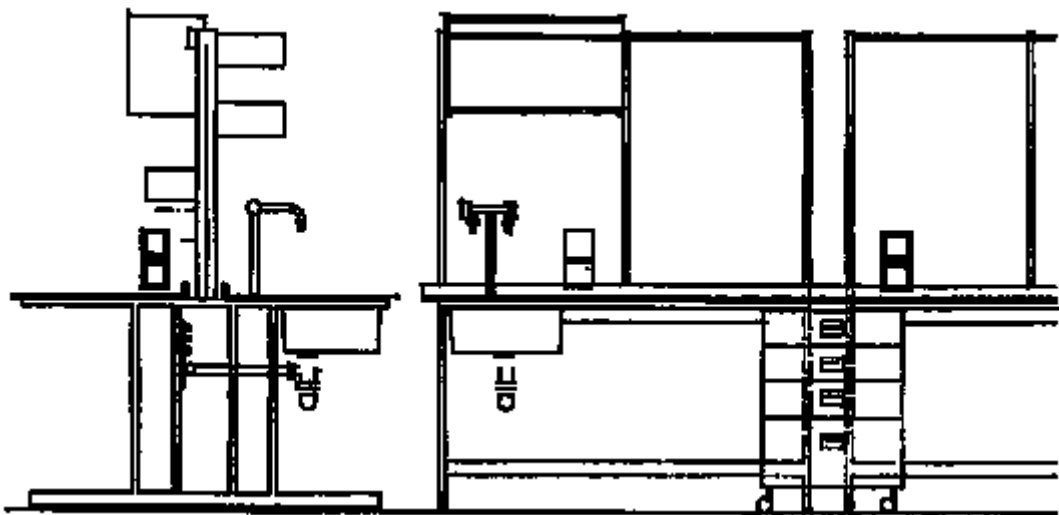
Fitments with extract capability

- 5.41 HBN 15: 'Facilities for pathology services' gives guidance on microbiological safety cabinets and fume cupboards.

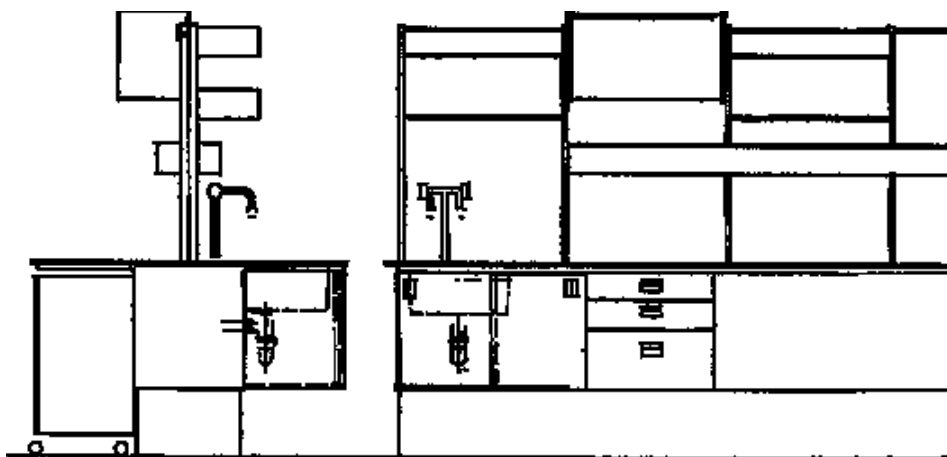
Figure 3a Design options (see also Figure3b)



Option 1

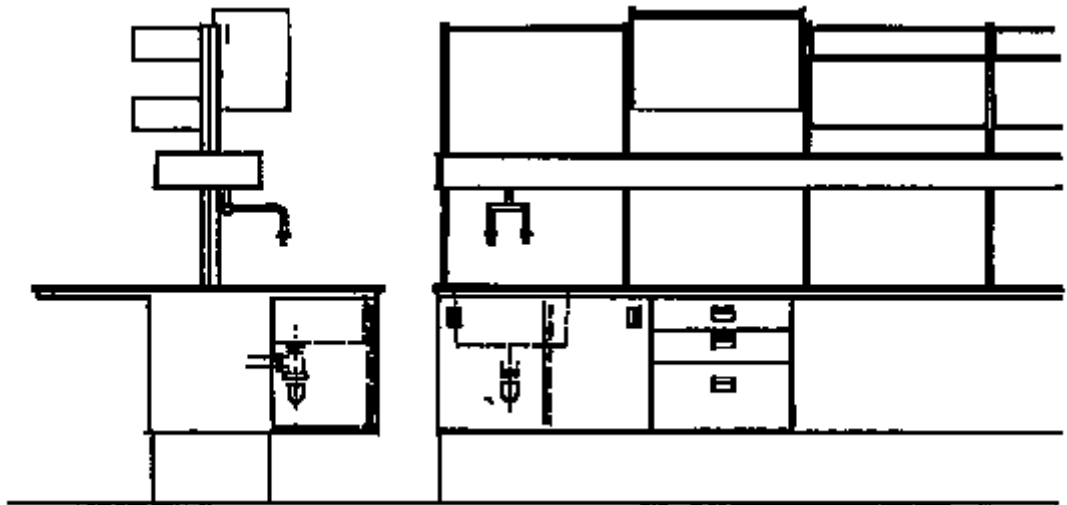


Option 2

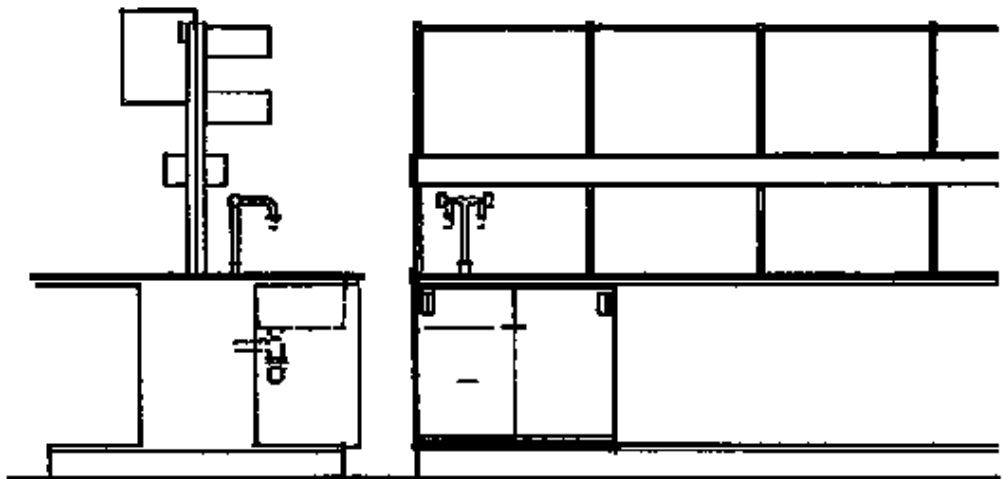


Option 3

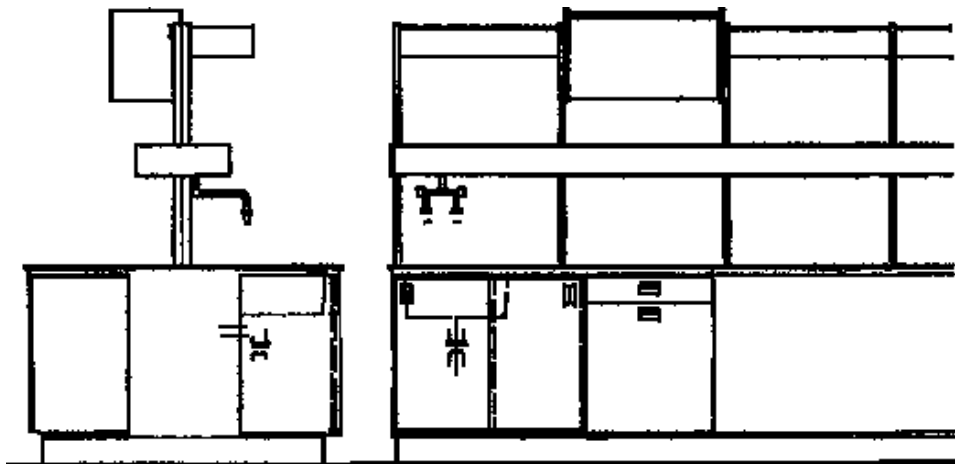
Figure 3b Design options (continued from Figure 3a)



Option 4



Option 5



Option 6

Ventilated/extract dissecting tables

- 5.42 Workbenches – single- or double-sided – have perforated worktops with downdraught ventilation that takes chemical and other noxious fumes and particles away from the operators. It will be necessary to carry out a COSHH assessment to ascertain what hazards are present before steps can be taken to reduce the associated risks.

Design selection matrices

- 5.43 The selection of appropriate laboratory fittings, with their work surfaces, related storage and services, the wall ceiling and floor finishes, the special building characteristics and the need to accommodate ancillary equipment and fittings for a pathology laboratory, is an extremely complex process.
- 5.44 The process involves lengthy dialogues between architects, designers, engineers and the users, that is, the pathologists and medical scientific officers.
- 5.45 A wide and deep range of background knowledge is required. Laboratories are not built in large numbers; consequently, participants in the design team may have had little previous experience in briefing for the design and construction of a laboratory project.
- 5.46 To assist this design process, two design selection matrices ([Tables 3 and 4](#)) have been provided as a starting point for project design. They are intended to enable a detailed brief to be prepared at an early stage and to act as a checklist for the designers.
- 5.47 The lists of items and recommended selections within these tables are typical only, and final selections must be carefully checked with project teams and specialist supplier input sought as required.
- 5.48 [Table 3](#) shows the relationship of the rooms in a pathology laboratory with:
- the activities performed in the rooms;
 - wall, ceiling and floor finishes (see SHTM 56: 'Partitions', SHTM 60: 'Ceilings' and SHTM 61: 'Flooring');
 - certain special building characteristics.
- 5.49 [Table 4](#) shows the relationship of the activities with:
- services;
 - ancillary equipment;
 - workbenches, machine stands and sinks;
 - storage.

- 5.50 To illustrate how these matrices may be used, examples have been filled in as would be appropriate for a typical laboratory installation, with the intention of providing general guidance in the provision of fittings and services etc, and at a later stage to form a starting point for project design.
- 5.51 They can also be used in blank form as questionnaires or checklists in the briefing and detail design process between the architect, design team and laboratory users.
- 5.52 When they are used in this way, most boxes can be used as tick boxes but, in a few instances, a selection of grade, quality or size etc must be made. A code or figure should be inserted using the references set out in the earlier sections of this document. In some other instances, more than one option or characteristic may be required. For example, in some laboratories it will be necessary to have workbenches of both heights for use when sitting in low chairs, high stools or standing. Both boxes must be ticked to show this.
- 5.53 At the later stages of the project, these matrices can be built up into fully developed schedules of fittings etc.

Relates to Activities, Finishes and Building Characteristics	Patient waiting area	Patient reception	Consulting/examination room	Venepuncture room	Patient/specimen WC	Specimen reception	Out-of-hours facility	General office	Computer room	PLMSO/co-ordinators' room	Secretaries' room	Bulk store / storekeeper's room	External flammable materials/gas store	Autoclave area	Central washup	Minor equipment maintenance	Disposal holding area	Cleaner's room/store	Staff change /WC/shower	Staff Room	Technical library/seminar room	Duty staff bedroom/WC/shower	Consultants, junior medical staff office	SCLMSO office	Store, chemicals /slides/specimens/ equipment	General laboratory	Special tests laboratory
ACTIVITIES																											
Ablutions			•	•	•	•				•									•			•	•	•		•	•
Automated analysis/ system																										•	•
Category 3 work																											
Centrifugation						•																				•	•
Chemical disposal, bulk																										•	•
Chemical tests, manual																										•	•
Computing	•	•				•		•	•	•	•										•		•	•		•	•
Equipment maintenance														•		•										•	•
General laboratory work														•									•	•		•	•
Media preparation																										•	•
Microscopy																					•					•	•
Overnight duty																						•				•	•
Packaging and posting, specimens						•																					
Preparation of liquids																										•	•

Table 2

Relates to Activities, Finishes and Building Characteristics ACTIVITIES	Patient waiting area	Patient reception	Consulting/examination room	Venepuncture room	Patient/specimen WC	Specimen reception	Out-of-hours facility	General office	Computer room	PLMSO/co-ordinators' room	Secretaries' room	Bulk store / storekeeper's room	External flammable materials/gas store	Autoclave area	Central washup	Minor equipment maintenance	Disposal holding area	Cleaner's room/store	Staff change /WC/shower	Staff Room	Technical library/seminar room	Duty staff bedroom/WC/shower	Consultants, junior medical staff office	SCLMSO office	Store, chemicals /slides/specimens/equipment	General laboratory	Special tests laboratory
Preparation of specimens																											
Radio-isotopes handling/disposal																											
Slide preparation				•																						•	•
Solvent handling																	•									•	•
Specimen cut up (Histopathology)																											
Specimen disposal														•			•										
Specimen reception						•																					
Staining																										•	•
Sterilization															•												
Storage, general												•												•			
Storage, bulk corrosive																											
Storage, inflammable													•														

Table 2 (continued)

Relates to Activities, Finishes and Building Characteristics	Patient waiting area	Patient reception	Consulting/examination room	Venepuncture room	Patient/specimen WC	Specimen reception	Out-of-hours facility	General office	Computer room	PLMSO/co-ordinators' room	Secretaries' room	Bulk store / storekeeper's room	External flammable materials/gas store	Autoclave area	Central washup	Minor equipment maintenance	Disposal holding area	Cleaner's room/store	Staff change /WC/shower	Staff Room	Technical library/seminar room	Duty staff bedroom/WC/shower	Consultants, junior medical staff office	SCLMSO office	Store, chemicals /slides/specimens/equipment	General laboratory	Special tests laboratory	
ACTIVITIES																												
Weighing																											•	•
Writing (Administrative)		•	•			•	•	•	•	•		•									•	•	•	•			•	•
Writing (laboratory)				•		•	•							•	•	•							•	•			•	•
FINISHES																												
Walls	5	5	3	3	5	5		6	6	6	6	6			3	5	3	3	5	6	6	5	6	6	6	6	3	3
Ceilings	4	4	3	3	5	4		6	6	6	6	6			3	2	3	5	5	6	6	6	6	6	6	6	3	3
Floors	6	6	6	3	2	6		6	6	6	6	5			3	3	5	2	5	5	6	3/6	6	6	5	3	3	
BUILDING CHARACTERISTICS																												
Airtightness																												
Radiation source																												
Sound source						•																	•			•		
Sound insulation required																												
Vibration free																							•			•		
Black-out facility																												
High security						•	•																•			•		

Table 2 (continued)

Relates to Activities, Finishes and Building Characteristics	Environmental/public health laboratory	Containment level 3 laboratory	Bacterial/viral/antibiotic serology lab	Blood culture laboratory	Media preparation/plate	Weighing/reagent preparation area	Isotope laboratory	Immunology laboratory	Coagulation	Gross cutting/histopathology/specimen processing	Specimen storage/disposal	Slide block/store	Processing laboratory/cytology	Screening laboratory	Darkroom/photography	Blood grouping laboratory	Blood cross-matching laboratory	Blood/blood products issue	Tissue typing laboratory
ACTIVITIES																			
Ablutions	•	•	•	•	•		•	•	•	•	•		•	•		•	•		•
Automated analysis/ system	•	•	•	•	•		•	•	•				•			•	•		•
Category 3 work		•											•						
Centrifugation	•	•	•	•			•	•	•				•			•	•		•
Chemical disposal, bulk				•				•	•										
Chemical tests, manual	•	•	•	•		•		•	•		•		•			•	•		
Computing	•		•	•			•	•	•	•	•		•	•		•	•	•	•
Equipment maintenance	•	•	•	•	•		•	•	•	•	•		•			•	•		•
General laboratory work	•	•	•	•		•	•	•	•	•			•			•	•		•
Media preparation	•			•	•	•		•	•										
Microscopy	•	•	•	•				•	•					•		•	•		•
Overnight duty																			
Packaging and posting, specimens																•	•	•	
Preparation of liquids				•	•			•	•				•			•	•		•

Table 2 (continued)

Relates to Activities, Finishes and Building Characteristics	Environmental/public health laboratory	Containment level 3 laboratory	Bacterial/viral/antibiotic serology lab	Blood culture laboratory	Media preparation/plate	Weighing/reagent preparation area	Isotope laboratory	Immunology laboratory	Coagulation	Gross cutting/histopathology/specimen processing	Specimen storage/disposal	Slide block/store	Processing laboratory/cytology	Screening laboratory	Darkroom/photography	Blood grouping laboratory	Blood cross-matching laboratory	Blood/blood products issue	Tissue typing laboratory
ACTIVITIES																			
Preparation of specimens																			•
Radio-isotopes handling/disposal							•												
Slide preparation	•			•				•	•				•						
Solvent handling	•			•				•	•	•			•						
Specimen cut up (Histopathology)										•									
Specimen disposal																			
Specimen reception																			
Staining	•	•		•				•	•	•			•			•	•		•
Sterilization																			
Storage, general											•	•				•	•		
Storage, bulk corrosive																			
Storage, inflammable																			
Weighing	•			•	•	•	•	•	•	•	•		•			•	•		•
Writing (Administrative)				•				•	•										

Table 2 (continued)

Relates to Activities, Finishes and Building Characteristics	Environmental/public health laboratory	Containment level 3 laboratory	Bacterial/viral/antibiotic serology lab	Blood culture laboratory	Media preparation/plate	Weighing/reagent preparation area	Isotope laboratory	Immunology laboratory	Coagulation	Gross cutting/histopathology/specimen processing	Specimen storage/disposal	Slide block/store	Processing laboratory/cytology	Screening laboratory	Darkroom/photography	Blood grouping laboratory	Blood cross-matching laboratory	Blood/blood products issue	Tissue typing laboratory
ACTIVITIES																			
Writing (laboratory)	•	•	•	•	•	•	•	•	•				•	•		•	•	•	•
FINISHES																			
Walls	3	3	3	3	3	3	3	3	3	3	3	6	3	3	2	3	3	5	3
Ceilings	3	3	3	3	3	3	3	3	3	3	3	6	3	3	5	3	3	4	3
Floors	3	3	3	3	3	3	3	3	3	3	3	6	3	5	3	3	3	3	3
BUILDING CHARACTERISTICS																			
Airtightness																			
Radiation source							•												
Sound source	•		•	•	•		•	•	•				•			•	•		•
Sound insulation required																			
Vibration free	•		•	•		•		•	•					•		•			•
Black-out facility															•				
High security	•		•	•		•													

Table 2 (continued)

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Potable water	Hot water	Deionised water	Normal waste	Corrosive waste	Organic waste	Radioactive waste	Macerated waste	Drench shower	Fuel gas	Laboratory gases	Single-phase electricity supply	Three-phase electricity supply	Uninterrupted electricity supply	Clean electricity supply	Emergency electricity supply	Safety cut-out	Alarm systems	Call system	Computer service	Intercom	Radio	Remote dictation	Telephone	Television	Task lighting	Air pressure delivery tubes
ACTIVITIES																											
Ablutions	•	•		•																							
Automated analysis/ system	•		•	•	•	•	•				•	•	•			•	•			•				•			
Category 3 work	•	•	•		•							•	•											•		•	
Centrifugation												•	•														
Chemical disposal, bulk	•	•		•	•							•									•						
Chemical tests, manual	•		•	•	•	•			•			•					•			•	•			•		•	
Computing												•		•		•	•			•	•			•		•	
Equipment maintenance	•	•	•	•								•				•	•									•	
General laboratory work	•	•	•	•	•	•			•	•	•	•				•				•	•			•		•	
Media preparation	•	•	•	•						•		•	•				•			•				•		•	

Table 3

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Potable water	Hot water	Deionised water	Normal waste	Corrosive waste	Organic waste	Radioactive waste	Macerated waste	Drench shower	Fuel gas	Laboratory gases	Single-phase electricity supply	Three-phase electricity supply	Uninterrupted electricity supply	Clean electricity supply	Emergency electricity supply	Safety cut-out	Alarm systems	Call system	Computer service	Intercom	Radio	Remote dictation	Telephone	Television	Task lighting	Air pressure delivery tubes
ACTIVITIES																											
Microscopy												•				•				•	•			•			
Overnight duty	•	•		•																•	•	•		•	•		
Packaging and posting, specimens	•	•		•								•								•	•			•			
Preparation of liquids	•		•		•							•					•				•			•		•	
Preparation of specimens																											
Radio-isotopes handling/ disposal	•		•	•			•					•	•				•			•	•			•		•	
Slide preparation	•	•	•	•						•		•				•	•									•	
Solvent handling	•			•																						•	
Specimen cut up (Histopathology)	•	•		•		•						•				•	•			•			•		•	•	
Specimen disposal	•	•		•		•		•				•					•			•	•			•		•	

Table 3 (continued)

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Potable water	Hot water	Deionised water	Normal waste	Corrosive waste	Organic waste	Radioactive waste	Macerated waste	Drench shower	Fuel gas	Laboratory gases	Single-phase electricity supply	Three-phase electricity supply	Uninterrupted electricity supply	Clean electricity supply	Emergency electricity supply	Safety cut-out	Alarm systems	Call system	Computer service	Intercom	Radio	Remote dictation	Telephone	Television	Task lighting	Air pressure delivery tubes
ACTIVITIES																											
Specimen reception	•	•		•								•				•	•			•	•			•		•	•
Staining	•		•	•	•							•													•		
Sterilization	•	•	•			•				•		•	•								•			•			
Storage, general																											
Storage, bulk corrosive									•																		
Storage, inflammable																											
Weighing																											
Writing (Administrative)																				•	•		•	•			
Writing (laboratory)																				•	•		•	•			

Table 3 (continued)

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Extract ventilation: general	Extract ventilation: local	Supply ventilation	Cooling	Refrigeration	Refrigeration malfunction alarm	Safety cabinet	Fume cupboard	Laminar flow cabinet	Ventilated bench	Adaptability	Wet work	Minor spillages	Regular spillages	Water	Corrosive chemicals	Non-corrosive chemicals	Organic spillage	Powder or solid spillage	Light staining	Heavy staining	Dry work	Occasional abrasion	Regular abrasion	Occasional cutting	Regular cutting	Heavy equipment
ACTIVITIES																											
Ablutions																											
Automated analysis/ system	•				•	•					•	•	•		•	•	•	•		•		•					•
Category 3 work	•						•					•	•			•	•	•				•					
Centrifugation												•	•									•					•
Chemical disposal, bulk	•							•				•		•	•	•	•		•		•						
Chemical tests, manual	•				•			•				•	•	•		•	•	•				•					
Computing																						•					
Equipment maintenance												•	•			•					•		•				
General laboratory work	•			•	•	•		•			•	•	•		•	•	•	•	•	•		•		•		•	•
Media preparation	•				•	•			•		•	•	•	•	•		•			•		•	•	•			•

Table 3 (continued)

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Extract ventilation: general	Extract ventilation: local	Supply ventilation	Cooling	Refrigeration	Refrigeration malfunction alarm	Safety cabinet	Fume cupboard	Laminar flow cabinet	Ventilated bench	Adaptability	Wet work	Minor spillages	Regular spillages	Water	Corrosive chemicals	Non-corrosive chemicals	Organic spillage	Powder or solid spillage	Light staining	Heavy staining	Dry work	Occasional abrasion	Regular abrasion	Occasional cutting	Regular cutting	Heavy equipment
ACTIVITIES																											
Microscopy											•	•	•					•				•					
Overnight duty																											
Packaging and posting, specimens	•				•						•		•									•					
Preparation of liquids					•			•				•						•			•						
Preparation of specimens																											
Radio-isotopes handling/ disposal	•					•	•		•		•	•	•									•					•
Slide preparation										•		•	•		•		•					•					
Solvent handling	•									•		•		•													
Specimen cut up (Histopathology)	•									•		•		•	•			•				•		•		•	

Table 3 (continued)

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Extract ventilation: general	Extract ventilation: local	Supply ventilation	Cooling	Refrigeration	Refrigeration malfunction alarm	Safety cabinet	Fume cupboard	Laminar flow cabinet	Ventilated bench	Adaptability	Wet work	Minor spillages	Regular spillages	Water	Corrosive chemicals	Non-corrosive chemicals	Organic spillage	Powder or solid spillage	Light staining	Heavy staining	Dry work	Occasional abrasion	Regular abrasion	Occasional cutting	Regular cutting	Heavy equipment
ACTIVITIES																											
Specimen disposal	•				•					•	•	•		•			•						•				
Specimen reception	•				•						•	•	•										•				
Staining	•				•							•		•		•	•	•		•							
Sterilization	•			•	•							•		•	•			•					•				•
Storage, general																											
Storage, bulk corrosive																											
Storage, inflammable																											
Weighing																•	•		•	•			•				
Writing (Administrative)																							•				
Writing (laboratory)																							•				

Table 3 (continued)

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Light equipment	Surface colour – light	Surface colour – dark	Workbench	Machine stand	Bench height 720	Bench height 920	Sink	Drip cup	Under bench storage	Mobile	Static	Over bench storage	Open	Closed	Bilk storage	Ventilated specimen storage	Gas/flammmable storage
ACTIVITIES																		
Ablutions																		
Automated analysis/ system	•			•	•		•			•				•	•	•		•
Category 3 work				•	•	•	•	•	•				•	•	•			
Centrifugation	•			•	•	•	•			•								
Chemical disposal, bulk			•	•			•	•		•			•			•	•	
Chemical tests, manual	•	•		•			•	•	•	•	•	•	•	•	•	•		
Computing	•			•						•	•			•	•			
Equipment maintenance				•					•	•			•					
General laboratory work	•	•		•	•		•	•	•	•	•	•	•	•	•	•		
Media preparation	•			•			•	•	•	•	•	•	•	•	•	•		

Table 3 (continued)

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Light equipment	Surface colour – light	Surface colour – dark	Workbench	Machine stand	Bench height 720	Bench height 920	Sink	Drip cup	Under bench storage	Mobile	Static	Over bench storage	Open	Closed	Bilk storage	Ventilated specimen storage	Gas/flammmable storage
ACTIVITIES																		
Microscopy	•	•				•	•	•					•					
Overnight duty																		
Packaging and posting, specimens	•			•		•	•	•					•	•				
Preparation of liquids				•						•			•			•		
Preparation of specimens																		
Radio-isotopes handling/ disposal		•		•	•		•	•	•	•			•					
Slide preparation		•		•						•			•					
Solvent handling				•						•			•					
Specimen cut up (Histopathology)	•	•		•			•	•					•					

Table 3 (continued)

Relates activities to Services , Ancillary equipment, Workbenches, machine stands and sinks, Storage	Light equipment	Surface colour – light	Surface colour – dark	Workbench	Machine stand	Bench height 720	Bench height 920	Sink	Drip cup	Under bench storage	Mobile	Static	Over bench storage	Open	Closed	Bulk storage	Ventilated specimen storage	Gas/flammable storage
ACTIVITIES																		
Specimen disposal				•			•	•	•	•			•					
Specimen reception	•	•		•		•	•	•		•		•		•		•		
Staining	•		•	•			•	•	•	•	•	•	•					
Sterilization	•			•	•		•	•	•	•		•		•		•		
Storage, general														•	•	•	•	
Storage, bulk corrosive																•		
Storage, inflammable																		•
Weighing	•			•			•						•					
Writing (Administrative)				•			•						•					
Writing (laboratory)				•		•							•					

Table 3 (continued)

6. Engineering services

- 6.1 BS EN 14056:2003 and HBN 15: 'Facilities for pathology services' give general guidance on services in laboratories. All current legislation and safety aspects should be complied with. Particular attention should be paid to potentially dangerous combinations of services. Cavities containing certain gases will require ventilation.
- 6.2 A wide range of engineering services will need to be accommodated in ceiling voids, horizontal ducts or runs above or below work surfaces, vertical ducts from benches to ceiling voids, and in partitions.

Drainage

- 6.3 Drainage systems will be required to deal with a range of chemical or organic waste, some requiring special attention to the design of the drainage system, involving limited lengths of wastes, and special traps, particularly where macerators are used. Wastes to bench sinks should be formed of corrosion- and acid- resisting pipework discharging into floor or wall outlets.
- Where radioactive waste is encountered, the strength must be verified to determine the need for special holding tanks, dwell times, acceptability of discharges into the local sewer network.
- 6.4 Where benches are loose or intended for regular rearrangement, wastes can be of smooth-bore flexible pipework.
- 6.5 Drench showers (and possibly eye-bath facilities; a COSHH assessment should be carried out first to ascertain what hazards are present before taking a decision) will be needed in areas where hazardous substances present a danger. Suitable floor gratings are included in SHTM 64: 'Sanitary assemblies'.

Piped or wired services

- 6.6 Other piped services may also be in flexible pipework when used in adaptable bench arrangements. Flexible gas connections will require automatic cut-off valves.
- 6.7 Taps to serve sinks and drip-cups should normally be mounted horizontally on walls or ducts, or drop vertically from the underside of horizontal over-bench ducts. This is to ensure easily cleaned, hygienic junctions with mounting surfaces. In some cases, such as when benches or sinks adjoin windows, deck mounting may be unavoidable. Where hoses are attached to taps, or where venturi pumps are to be used, suitable protection from back-siphonage must be provided (The Water Supply (Water Fittings) Regulations 1999)

- 6.8 Isolation switchgear for emergency use should be sited conveniently for users, especially on peninsular or island benches.

Ventilation

- 6.9 Because of the variety of fumes and gases that are likely to be present, specialised local exhaust ventilation (LEV) systems will be required to comply with the Control of Substances Hazardous to Health Regulations 2002. Where both general laboratory ventilation and LEV systems are installed, specialist advice should be sought to ensure that they do not adversely interact with each other.
- 6.10 Building features which can affect the aerodynamic performance of equipment with extract capability are opening windows, doors, beams, columns, the mechanical ventilation system, and peculiar wind changes caused by adjacent buildings. Large pieces of equipment and passing traffic can also have a detrimental effect.

7. Building components and finishes

- 7.1 The design, construction, materials, building components and finishes are extremely important to the efficient operation of laboratories.
- 7.2 The other volumes in the building component series of SHTMs 54 -71 give general guidance on components and finishes.
- 7.3 The layout of the building and fire requirements may determine that some of these elements should be of fire-resisting construction.
- 7.4 The detailing of joinery and finishes should be designed to prevent the accumulation of dirt, particularly to horizontal surfaces.
- 7.5 Where radioactive substances are used, precautions may be necessary in the designing and detailing of doors, walls, ceilings and floors. Some form of tanking/containment may be necessary to stop the migration of radioactive fluids.
- 7.6 Refer also to the previous sections dealing with worktops and drainage.

Partitions

- 7.7 SHTM 56: 'Partitions' gives general guidance on partitions and wall finishes for health buildings.
- 7.8 The partitions forming the rooms and spaces of pathology departments may be of permanent construction or of a type easily moved to permit rearrangement of laboratory areas. They may be masonry or hollow-framed construction. They should be robust enough to withstand impact from trolleys, equipment and people. The construction and finishes should be durable and easily cleaned. They should be capable of supporting fittings and services. They will require a degree of imperviousness.
- 7.9 Sound insulation may be required for some rooms.

Ceilings

- 7.10 SHTM 60: 'Ceilings' gives general guidance.
- 7.11 Ceilings frequently include lighting and service outlets, and an easily cleaned surface is essential.

Flooring

- 7.12 The structure of floors should be rigid enough to reduce the incidence of deflection and cracking to a minimum to prevent the passage and lodgement of biological and chemical material.
- 7.14 The surface finishes should be impervious, easily cleaned, durable, comfortable and reasonably slip-resistant.
- 7.15 Block and section cutting in pathology laboratories presents problems with wax pouring and cutting. Recent trials have shown that textile floor coverings of a short pile with low retention characteristics can be effective in combating this problem.
- 7.16 Steps at split levels such as at entrances must be avoided to take account of the special needs of disabled people (refer to section 4 of the Building (Scotland) Regulations 2004) and where corrosive liquids could be transported.

Wall, ceiling and floor finishes

- 7.17 These are shown in [Table 3](#).

Doors

- 7.18 SHTM 58: 'Internal doorsets' gives detailed guidance including widths of openings.
- 7.19 Doors should permit easy access for people, goods, trolleys and the largest items of equipment during building, the commissioning period and the life of the building. A number of double doors will be required. The requirements of disabled staff and patients must be considered, particularly in venesection areas: HBN 40: 'Common activity spaces' gives guidance.
- 7.20 Finishes should be suitable for the use of the room. Applied protection or damage-resistant finishes will be required on some doors.
- 7.21 Vision panels are required to most doors to reduce the risk of collisions, especially where vessels containing dangerous chemicals are being transported.

Ironmongery

- 7.22 Ironmongery should be chosen carefully. Unnecessary latches and handles should be avoided in favour of push plates and pull handles with closers, leaving hands free (see SHTM 59: 'Ironmongery').
- 7.23 Security is essential and requires careful consideration. External access control into laboratory buildings or departments must be monitored; generally, digital or

electronic systems are installed. Locks on doors are usually suited. Central locking systems may be appropriate. Agreement with management must be obtained, and specialist advice is recommended.

Sanitary assemblies

- 7.24 Appliances should be easily cleaned and equipped with fittings which can be operated without the use of hands. SHTM 64: 'Sanitary assemblies' gives advice on this and includes 'hospital pattern' fittings which are suitable.
- 7.25 Drench showers and eyewash facilities will be required in certain areas.

Windows

- 7.26 Windows are extremely important in providing daylight, but ventilation is better achieved by mechanical means because uncontrolled draughts can seriously interfere with the operation of fittings with extract capability (see SHTM 55: 'Windows').
- 7.27 Care should be taken to ensure that windows are positioned to give good daylighting to the full depth of the room (this means high window heads). Sills should be at an appropriate height, and proper regard should be paid to the problem of glare and the prevention of solar gain.
- 7.28 Service runs, radiators and benches must be taken into account when determining sill heights.

Alarm systems

- 7.29 Alarm systems may include hazard alarms, intruder systems, closed-circuit television, smoke detectors and fire alarms.
- 7.30 Security alarm systems are very important and require careful consideration in the design and fitting out of laboratories (see HBN 15: 'Facilities for pathology services').

8. Procurement: manufacturer's proprietary ranges

- 8.1 Where a manufacturer offers a complete range of the components described in this SHTM made to its own design, the architect/specifier should require that test certificates be produced showing compliance with the requirements of this SHTM together with a detailed product specification.

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