

GUIDELINES ON LABORATORY CONSTRUCTION AND DESIGN (VERSION 1/2004)

College of Pathologists, Academy of Medicine of Malaysia

1. Protection against sunlight

If chemicals or instrumentation that are sensitive to direct sunlight are present in the laboratory, the design of the building shall minimise all direct sunlight penetration.

2. Floors

- (a) All floors in laboratory work areas shall be finished with material which are:
 - (i) smooth.
 - (ii) impervious.
 - (iii) resistant to chemical and disinfectant used in the laboratory.
 - (iv) of adequate mechanical and structural strength.
 - (v) compatible with the nature of the laboratory operations and operator comfort.
 - (vi) slip resistant.
 - (vii) easy to clean.
- (b) Joints in slabs shall be avoided as far as possible but where used shall be constructed in such a way that they are sealed against penetration by hazardous materials.
- (c) Where there is a risk of spillage of hazardous, potentially infectious or unsealed radioactive material, the intersection of floors with walls and pillars shall be covered to facilitate cleaning.

3. Walls

All walls in the laboratory work areas shall be finished with material, which are;

- (a) smooth.
- (b) impervious.
- (c) resistant to chemical and disinfectant used in the laboratory.
- (d) easy to clean.
- (e) non glare.

4. Ceilings

Requirements for ceilings shall be as follows:

- (a) Ceilings in laboratory work areas shall be constructed of rigid, smooth faced, non absorbent materials, resistant to chemicals and disinfectants and may include fibrous plaster, plasterboard, fibrous cement, cement render or other approved material painted with a light colour.
- (b) Air-conditioned rooms or areas shall have 2.4 metres minimum clear floor to ceiling height; non-air-conditioned rooms or areas shall have 3.0 metres minimum clear floor to ceiling height.
- (c) 2.75 metres minimum clear floor to ceiling height in similar rooms having special ceiling-mounted fixtures. Higher ceilings may be needed for some types of equipment.

5. Doors

Doors within the laboratory working area shall have vision panels, be self-closing and of the appropriate fire rating.

6. Benches

Benches in laboratories shall comply with the following:

- (a) All bench-tops shall be finished with a material which is:
 - (i) smooth (free from irregularities)
 - (ii) impervious
 - (iii) resistant to chemicals and disinfectants used in the laboratory
 - (iv) scratch-resistant
 - (v) easy to clean
 - (vi) anti-static, where appropriate
 - (vii) non-glare
 - (viii) free from joints as far as possible but, where unavoidable, joints shall be sealed to prevent seepages or spillages into the space below the bench-tops. Where there is a wet area, the end of bench-tops shall be sealed to end walls, sinks and similar.
- (b) The minimum width of working spaces between benches or floor- positioned equipment shall be as follows:

No.	Working spaces	Width
(i)	Workers on one side of aisle, no through traffic	1000 mm
(ii)	Workers on one side of aisle, plus through traffic	1200 mm
(iii)	Workers on both sides of aisle, no through traffic	1350 mm
(iv)	Workers on both sides of aisle, plus through traffic	1800 mm.

7. Fixtures, Fittings and Equipments

Fixtures, fittings and equipment including under-bench cupboards shall be supported in such a manner as to facilitate cleaning of the floor surface beneath them.

8. Shelving

All shelving shall be chemically compatible with the goods stored.

9. Fume cupboards and Biosafety Cabinets

Where fume cupboards or biosafety cabinets are provided, they shall be designed, sited, constructed and installed in accordance with existing safety requirements and the manufacturer’s instructions.

10. Lunch and Rest Rooms

An area for eating, drinking and rest should be provided for the staff, away from the laboratory working area.

11. Entrances and exits

- (a) Entrances and exits shall be located such as not to cause disturbances to work area in the laboratory.
- (b) There shall be clear separation between public and laboratory work areas.
- (c) The visitor’s entrance shall be adjacent to the public area.
- (d) Access to laboratory work areas is restricted to staff only and the restricted access be clearly sign posted.

- (e) The service entrance shall be close to storage areas.
- (f) There shall be a separate exit for removal of waste.

12. Signs and labels

All pathology laboratories shall have proper signages and a proper labelling system.

13. Vector control

The construction of the pathology laboratory building shall be such as to prevent the entry and harbouring of rodents and insects. The pathology laboratory shall maintain a pest control programme.

14. Hand-washing facilities

- (a) Each pathology laboratory working area shall have liquid hand disinfectant, washing and sanitary hand drying facilities.
- (b) Hand-washing facilities shall be provided in other service rooms and in all toilets.
- (c) All hand-washing facilities and sinks for personnel use shall be equipped with hands free taps to control cross infections;

15. Toilet facilities

- (a) Adequate toilets facilities shall be provided for personnel working in the pathology laboratory.
- (b) There shall be separate toilet facilities for the public.

16. Showering facilities and eye wash station

Adequate showering facilities and eye wash station shall be provided for personnel working in the pathology laboratory for emergency as well as for cleaning purpose.

17. Washing room

The licensed pathology laboratory shall have at least one washing room which is equipped with a sink, sluice, waste receptacle and washing equipment.

18. Plumbing

- (a) Plumbing fixtures shall be designed and installed to be easily cleaned and maintained.
- (b) Sinks in which utensils and equipment are cleaned shall have double compartments with adequate counter space on both sides. The depth of the sink shall be dependent on its function.
- (c) All plumbing facilities shall be installed in such a manner as to completely prevent the possibility of cross connections between safe and unsafe supplies or back siphonage.
- (d) The pathology laboratory shall provide the following accessories
 - (i) suitable shelf or equivalent, and mirror at each hand-washing facility in toilet rooms or locker rooms;
 - (ii) toilet paper holder properly located at each water closet; and
 - (iii) suitable provision for liquid hand disinfectant at each water closet, sink, and shower.

19. Water supply

- (a) The pathology laboratory shall have adequate potable water supply.
- (b) The main storage water tank in a pathology laboratory shall be adequate to accommodate the requirements of the laboratory for a minimum of two days.
- (c) All water tanks within the pathology laboratory shall be properly maintained and shall be constructed with materials approved by the relevant local water supply authority.

20. Sewage and sewerage system

- (a) No exposed sewer line shall be located directly above the pathology laboratory working area and storage area.
- (b) Discharge of all pathology laboratory waste into the sewerage system must conform with all existing and relevant authority.

21. Nature and number of electrical sockets

- (a) The type, quantity, location and height of electrical sockets shall be appropriate for the services to be performed and all sockets shall be of the grounding type.
- (b) There shall be an adequate number of properly located sockets. Adaptors, extension cords, and junction boxes are not permitted.

22. Lighting

The number, type and location of lighting fixtures shall provide adequate illumination for the functions of each area.

23. Emergency power supply

- (a) The pathology laboratory shall have adequate emergency electrical generating equipment with automatic transfer, to essential equipment and areas in case of interruption to the normal power supply.
- (b) There shall be emergency power supply to the following -
 - (i) exit signs, exit directional signs and staircases
 - (ii) general illumination and selected sockets in the vicinity of generator set
 - (iv) alarm systems, including fire alarms activated at manual stations, water-flow alarm devices of sprinkler systems if electrically operated, fire and smoke detecting systems, and alarms required for non-inflammable medical gas systems; and freezers, incubators, critical analysers and other critical equipment
 - (v) voltage stabilisers, where necessary.
- (c) The emergency power shall be in operation immediately after interruption of normal power supply.
- (d) Sockets connected to emergency power shall be distinctively marked.
- (e) Emergency generators shall be operated for a minimum of 30 minutes weekly or as stipulated by the manufacturer including a monthly test under "load" condition and proper records of tests shall be maintained.

24. Ventilation

- (a) All rooms and areas shall be adequately ventilated.
- (b) All pathology laboratory working areas shall be air conditioned and microbiology work areas shall have no re-circulation of air.

- (c) All fresh air supply intakes shall be so located as to ensure a source of fresh air away from any source of contaminants or odours.
- (d) Exhaust air discharge shall be located to avoid cross circulation to supply air intakes or windows.
- (e) All work involving toxic chemicals shall be undertaken in a fume cupboard.

Prepared by College of Pathologists, Academy of Medicine Malaysia Working Group:

Professor Dr. Looi Lai Meng (Chairperson)

Professor Dr. Victor Lim Kok Eow

Dr. Halimah Yahaya

Dr. Jamilah Baharom

Dr. Roshida Hassan

Dr. Rohani Yassin

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