

E.6 FUME CUPBOARDS – TABLE OF CONTENTS

[UNSW DESIGN & CONSTRUCTION REQUIREMENTS – WEB ENTRY PAGE](#)

[SECTION A – INTRODUCTION](#)

[SECTION B – DEVELOPMENT & PLANNING](#)

[SECTION C – ARCHITECTURAL REQUIREMENTS](#)

[SECTION D – EXTERNAL WORKS](#)

[SECTION E.1 – HYDRAULIC SERVICES](#)

[SECTION E.2 – MECHANICAL SERVICES](#)

[SECTION E.3.1 – ELECTRICAL SERVICES](#)

[SECTION E.3.2 – LIGHTING](#)

[SECTION E.3.3 – SPECIAL SYSTEMS](#)

[SECTION E.3.4 – HIGH VOLTAGE](#)

[SECTION E.4 – COMMUNICATIONS](#)

[SECTION E.5 – LIFTS](#)

E.6 FUME CUPBOARDS – SCHEDULE OF CHANGES – REVISION 4.1 .....	3
E.6 FUME CUPBOARD .....	4
E.6.1 Standards .....	4
E.6.2 Design Criteria .....	4
E.6.3 Fume Cupboards .....	4
E.6.3.1 Inner Chamber : .....	4
E.6.3.2 Air Baffles : .....	5
E.6.3.3 Working Surface (Base): .....	5
E.6.3.4 Outer Panels : .....	5
E.6.3.5 Front Fascia : .....	6
E.6.3.6 Sash : .....	6
E.6.3.7 Cable Ports: .....	6
E.6.3.8 Tap Ware: .....	6
E.6.3.9 By-pass grille: .....	7
E.6.3.10 Variable Speed Drives: .....	7
E.6.3.11 Base: .....	7
E.6.3.12 Labels: .....	7
E.6.3.13 Electrical and Controls: .....	7
E.6.4 Ventilation of Support Cabinet .....	8
E.6.5 Support Structure .....	8
E.6.6 Inspection of fume cupboard .....	8
E.6.7 Ductwork .....	8
E.6.7.1 Surface finish of ductwork .....	9
E.6.7.2 Ductwork above roof .....	9
E.6.7.3 Labelling of ductwork .....	9

E.6.7.4	Identification of fume cupboards and fans.....	9
E.6.7.5	Dampers .....	9
E.6.8	Fans.....	9
E.6.9	Electric Motors .....	10
E.6.10	Location of fume cupboard .....	10
E.6.11	NATA Certification .....	11
E.6.12	Placing in service of fume cupboards .....	11

**SECTION F – SPECIFIC AREA REQUIREMENTS**

**APPENDIX 1 – BUILDING AUTOMATION AND CONTROL SYSTEMS SPECIFICATION**

**APPENDIX 2 – CONCRETE FOR STRUCTURES**

**APPENDIX 3 – UNSW CONTROL SYSTEM STANDARDS HVAC**

**APPENDIX 4 – DOCUMENT REQUIREMENTS**

**APPENDIX 5 – UNSW STANDARD PRELIMINARIES**

**APPENDIX 6 – SECURITY SYSTEMS**

**E.6 FUME CUPBOARDS – SCHEDULE OF CHANGES – REVISION 4.1**

As a guide only, attention is drawn to changes that have been made in the following clauses since the last revision

Clause	Date
General revision	
No change	August 2004

## **E.6 FUME CUPBOARD**

### **E.6.1 Standards**

Each fume cupboard and associated system shall comply with the requirements of the following standards:

- a) AS / NZS 2243-8 Safety in Laboratories - Part 8: Fume Cupboards.
- b) AS / NZS1668-1 Fire and Smoke Control.
- c) AS / NZS 1530-3 Simultaneous Determination of Ignitability,
- d) Flame Propagation Heat Release and Smoke Release.
- e) AS / NZS 3000 SAA Wiring Rules.
- f) AS 2118 Automatic Fire Sprinkler Systems
- g) Occupational Health and Safety Act.
- h) Board of Fire Commissioners.
- i) Environment Protection Authority "Environmental Noise Control Manual 1985".
- j) Australian Gas Authority.
- k) Local Water Supply Authority.

### **E.6.2 Design Criteria**

Face Velocity between 0.5 m/s and 0.6 m/s at fume cupboard with the sash fully open.

Stack discharge velocity between 10 - 15 m/s at all time and at any sash position.

Manual or automatic by-pass shall be provided to achieve the above.

Duct velocities shall not exceed 7 m/s.

Noise level shall not exceed 55 dBA at the operator's position for both fully open and fully closed sash positions.

### **E.6.3 Fume Cupboards**

Each fume cupboard shall have the following features :

#### **E.6.3.1 Inner Chamber :**

Manufactured in one piece from glass-fibre reinforced fire retardant plastic covered by unbroken gel coating with generous radius corners, coloured white.

Minimum thickness of finished inner chamber sides and back 4.0 mm.

**E.6.3.2 Air Baffles :**

Manufactured from glass-fibre reinforced fire retardant plastic coloured white. The baffles shall be fitted at the rear of the inner chamber and shall be easily removable for cleaning.

**E.6.3.3 Working Surface (Base):**

Shall be manufactured from 316 stainless steel raised 40mm at sides and rear and 20 mm minimum at front.

A 300 x 150 x 150 mm deep 316 stainless sink shall be incorporated in the base and it shall form an integral part of the base. The sink shall have 50 mm dia. integral waste outlet ready for connection to building drainage system.

Position sink in base as far as possible to one side in order to have as much working surface as is possible.

Polish surface of base and sink to grade 4 finish.

The raised sides and front shall be welded at the corner joints and ground smooth. Corners shall have generous radius to match the curvature of the inner chamber of the fume cupboard so that when the base is set into the inner chamber the gap between the sides of the inner chamber and the raised sides of the SS base is less than 1.5 mm at all points.

The gap shall be sealed using suitable sealant and finished smooth. There shall be no protrusion of fixings of the stainless steel base to the inner chamber of the fume cupboard.

NOTE: The 316 stainless steel base and sink is acceptable for most applications at the UNSW. The Consultant/Designer shall however obtain confirmation in writing from the end user that this type of material is suitable for their application.

If 316 stainless steel base and sink is not acceptable, another suitable material must be specified and the Consultant /Designer must obtain written confirmation from the end user that this type of material is suitable for the application.

**E.6.3.4 Outer Panels :**

shall be manufactured from glass-fibre reinforced fire retardant plastic, coloured white and fitted with large access panels.

Minimum thickness of all panels 3.0 mm.

**E.6.3.5 Front Fascia :**

Shall be of the picture frame style designed for smooth air flow and manufactured in one piece from glass fibre reinforced fire retardant plastic.  
Minimum thickness of fascia 3.0 mm.  
Colour shall be as nominated by the Superintendent.

**E.6.3.6 Sash :**

Shall be 6.0 mm clear toughened glass vertically sliding and counter balanced. Leading edge shall be fitted with extruded uPVC aerofoil edge strip and two (2) lifting handles set back from the edges.

Sash cords shall be in stainless steel.

**E.6.3.7 Cable Ports:**

Provide two (2) 100 mm diameter cable ports one on each side of the fume cupboard.

Services Required : The Consultant/Designer must obtain written confirmation from the end user of the services required, all services shall be colour coded to AS 1345 or DIN 12920.
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Also provide: two (2) twin 10 Amp GPO's with neon indicator, 40 watt fluorescent light fitted on the exterior of the inner chamber and isolated with 3.0 mm thick clear toughened glass panel to give minimum 400 lux inside the fume cupboard, access shall be provided for cleaning of light and glass panel.

All GPO's shall be protected by Residual Current Devices (RCD's)

GPO's shall be fitted to individual sealed mounting block and all wiring within the fume cupboard assembly shall be run in flexible conduits.

**E.6.3.8 Tap Ware:**

Shall be located on the front fascia in the vertical plane.

Faucets and taps for all fixtures and appliances shall be "ENWARE" commercial laboratory tapware including service valves and dual check tube nozzles.

Finish as specified in project documents. Allow for submitting indicator button and colouring code schedule for approval prior to procurement.

Cold water tap indicator shall be marked "NPCW" and hot water marked "NPHW".

Mandatory Requirement "ENWARE"

**E.6.3.9 By-pass grille:**

When provided for air volume control, the grille shall be louvred type and manufactured in one piece from glass fibre reinforced fire retardant plastic. Colour shall be as nominated by the Superintendent.

**E.6.3.10 Variable Speed Drives:**

Variable speed drives are preferred for air volume control ([See Section E.3.3](#))

**E.6.3.11 Base:**

Shall be marine ply 20 mm thick.

**E.6.3.12 Labels:**

Provide warning and instruction labels.

**E.6.3.13 Electrical and Controls:**

Each fume cupboard shall be factory wired and tested. Controls shall be electronic, fully programmable and ready for integration into the University Building Automation and Control System (BACS) which uses native BACnet protocol.

Also Refer to [Section B](#)

Termination of wiring shall be to junction box mounted on top of the fume cupboard ready for site connection.

Controls shall be housed in a module installed on the fume cupboard. The front panel of the control module shall indicate current operation or failure of the fume cupboard.

The control system shall manage the following functions:

- a) Fan on/off operation. Light on/off operation.
- b) Power Availability.
- c) Gas Availability.
- d) Pump On/Off operation (if fitted).
- e) Pre-Purge Cycle.
- f) Post-Purge Cycle.
- g) Fan Failure.
- h) Pump Failure (if fitted).
- i) Visual and Audible Emergency Indicator.

- j) Fan Boost (if fitted).
- k) Baffle Wash Spray (if fitted).
- l) Air Flow Safety.

#### **E.6.4 Ventilation of Support Cabinet**

The use of existing in situ “closed” support cabinets is not a preferred option. Where it is however justifiable that existing in situ “closed” support cabinet/s must be used to support new fume cupboards, the support cabinets shall be ventilated by providing a 150 x 50 mm uPVC air grille in each cabinet door at low level and two (2) 50 mm dia. uPVC pipes connecting the cabinet inner space with the exhaust duct above the fume cupboard.

The pipes shall be concealed and located at either side of the cabinet.

#### **E.6.5 Support Structure**

Unless the fume cupboard is specified to be installed on existing bench or cabinet it shall be provided with its own support stand capable of carrying the weight of the fume cupboard, working equipment and materials and to withstand the temperatures that will arise in the proposed use.

The support stand shall be of the “open” type and manufactured from material impervious to chemicals.

New cabinets for support of fume cupboards are not acceptable.

#### **E.6.6 Inspection of fume cupboard**

Sample of polished Stainless Steel base complete with sink and drain outlet shall be brought to the UNSW for inspection and approval by the Superintendent prior to installing it in the fume cupboard.

The completed fume cupboard, as will be installed on site, shall be inspected by the Superintendent at the manufacturer’s factory.

The fume cupboard must be approved by the Superintendent prior to delivery to site.

Minimum two (2) days notice shall be given to the Superintendent for the inspection.

The Superintendent’s transportation costs to and from the fume cupboard manufacturer’s factory and accommodation and meals, if required, shall be provided by the Contractor.

#### **E.6.7 Ductwork**

All ductwork shall comply with the requirements of the SMACNA Ductwork Construction Standards.

All ductwork shall be constructed from uPVC of appropriate thickness flat sheets.

Flexible ductwork shall not be used.

#### **E.6.7.1 Surface finish of ductwork**

All ductwork inside the building shall have no special protection, unless specified otherwise.

All ductwork external to the building, and where exposed to the elements shall be fibre glassed externally and painted with flowcoat to colour approved by the Superintendent.

Duct joints welded on site shall also be fibre glassed over and painted with flowcoat.

Sealants will not be accepted as duct joints.

#### **E.6.7.2 Ductwork above roof**

Ductwork above roof level shall be extended to discharge at a point 3 metres minimum above the highest level of the roof and shall be coned as necessary to discharge air at a velocity greater than 10m/s.

All supports for ductwork shall be in hot dip galvanised metal.

#### **E.6.7.3 Labelling of ductwork**

Permanent labels shall be affixed every 5 metres and in prominent positions on ductwork in ceiling space and exposed to view, including ductwork above roof. The labels shall identify the fume cupboard, to which the ductwork is connected to and its locations.

#### **E.6.7.4 Identification of fume cupboards and fans**

Each fume cupboard shall be identified by the room number followed by the building code number ie. FC101-D26.

Each exhaust fan shall be identified by the fume cupboard it serves followed by the building code number ie. EFFC101-D26.

#### **E.6.7.5 Dampers**

Where volume control dampers are required, butterfly type shall be used, with all parts inside the ducting constructed from uPVC.

Fire dampers, if allowed to be used, shall be in stainless steel.

All fire dampers shall be equal to Lorient LVH-OSS Series Intumescent fire dampers.

### **E.6.8 Fans**

Each fume cupboard exhaust fan shall be centrifugal, belt driven, and constructed from fully moulded corrosion proof thermo-setting plastic 6.0 mm thick, suitable for fume cupboard exhaust. The fan shall be capable of handling 20% increase in exhaust air flow.

Variable speed fans if used shall be wired with fully shielded cable from the variable speed drive to the fan.

Fan shall be as follows :

- a) Backward curved non-overloading type with laminar section impeller.
- b) Fan housing to be fabricated from rigid uPVC and stiffened as required.
- c) Impeller to be fabricated from high impact KD material.
- d) Provided with a motor, drive and common base frame.
- e) All steel surfaces exposed to fumes shall be painted with zinc phosphate, chlorinated rubber anti-corrosive primer and chlorinated rubber chemical resistant coating.
- f) Drive shaft 316 stainless steel.
- g) Belt driven including motor mounting plates, tachometer access hole.
- h) Taper lock vee pulleys with provision for belt adjustment and multiple belts.
- i) Guard for belt drive and rotating shaft. Belt guard shall be constructed of hot dip galvanised sheet metal with an expanded metal front panel. Rotating shaft guard shall be constructed of hot dip galvanised sheet metal formed around the shaft. All guards shall be easily removable.
- j) Centre drill fan shaft to accommodate tachometer spindle.
- k) Fitted with removable access panel to enable access to all internal surfaces of the fan requiring cleaning.
- l) Fitted with clear uPVC inspection panel.
- m) Statically and dynamically balanced prior to final assembly and delivery.
- n) located on approved anti-vibration mounts.
- o) Fitted with 20 mm diameter drain outlet.
- p) run drain outlet to discharge point approved by the Superintendent.
- q) Labelled identifying the fume cupboard it serves and its location in the building.
- r) Provided with a test certificate. A copy of the test certificate shall be given to the Superintendent.

Note: fans exposed to the elements shall be fibre glassed externally and painted with flow coat to colour approved by the Superintendent.

### **E.6.9 Electric Motors**

Fan motors shall comply with relevant AS codes, and shall be suitable for outdoor installation and continuous operation.

### **E.6.10 Location of fume cupboard**

Each fume cupboard shall be located in a room/laboratory in accordance with the requirements of AS 2243.8 figure 1.

#### **E.6.11 NATA Certification**

Each fume cupboard and its associated system, as installed and tested, shall be NATA certified.

One(1) copy of the NATA certification shall be supplied to the Superintendent

One(1) copy of the NATA certification shall be inserted in each Maintenance Manual.

One certification label shall be affixed to the fume cupboard.

#### **E.6.12 Placing in service of fume cupboards**

The fume cupboards shall not be placed in service unless all commissioning and testing has been successfully carried out and approved by the Superintendent..