



Project Specifications: Fume Cupboards, Controls, Fans, Duct, Schedules Etc.

FUME CUPBOARDS:

GENERAL

Scope

This section of the specification describes the requirements for fume cupboards.

Description:

Provide fume cupboards of Laboratory Systems Group Pty Ltd "Smoothflow" 2000 model Series bench-mounted type and complying with Australian Standards AS2243.8, AS2430.3, AS3000.

Supplier Details:

Laboratory Systems Group Pty Ltd
Unit 6, 144-150 Canterbury Road
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The fume cupboard shall be free standing, self contained and suitable for relocation if required, and shall be installed where shown on the drawings or as detailed.

The fume cupboard is required to be of the highest standard in both performance and construction. It shall comply in all respects with the requirements below.

Construction: (Option 1)

Construct the fume cupboard inner chamber of "**Fire-kem**" material with the indices for ignitability, 9, flame propagation, 0, heat release, 2, and smoke release, 6. (testing to AS1530.3)

Construction: (Option 2)

Construct the fume cupboard inner chamber of **white PVC** material.

Construction: (Option 3)

Construct the fume cupboard inner chamber of GRP Reinforced material

Construction: (Option 4)

Construct the fume cupboard inner chamber of 316L Stainless Steel with brushed finish.

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Front Fascia;

Manufacture the fume cupboard front fascia from moulded sections with aerofoil entry on the sides, top and bottom.

Worktop:

Provide a "Trespa Athlon" removable worktop to the inside of the fume cupboard for the work surface.

Base/sump:

Construct the base/sump from the same material as the chamber, to form an integral part of the fume chamber with radiused corners and incorporating an anti-spill lip and removable worktop.

Sash:

Provide 6mm toughened glass for the fume cupboard sash, supported from the sash frame. Attach the sash cables to the lifting mechanism not the glass. Attach counter weights by stainless steel cables concealed behind the front fascia.

Handle Sash:

Use a full-length aerofoil shaped handle on the sash. Do not put any holes in the glass.

Baffles:

Fit the fume cupboard with baffles to provide even distribution of extraction from the chamber. They shall be preset and non-adjustable. They must be easily removable without the use of any tools.

Fixed Volume Extraction: (Option 1)

Allow for a fixed volume extraction from each fume cupboard to achieve a face velocity that complies with the current Australian standards. The face velocity must be as uniform as possible in all sash positions and incorporate a sash by-pass system to avoid high velocities under the sash in lowered positions.

Variable Volume Extraction: (Option 2)

Allow to install a "Sensaflow" variable volume extraction system to each fume cupboard the Sensaflow system shall provide infinitely variable extraction and be proportional to sash opening while maintaining a constant face velocity regardless of sash position. The outlet velocity shall be maintained at minimum as per AS2243.8 in all sash positions.

Mistline Fume Scrubbing System:

Fit the fume cupboard with a "Mistline" direct mounted fume scrubber unit. The unit shall be sized to allow for complete wet scrubbing of the appropriate capacity to suit the fume cupboard system.

Construction of the unit shall be from PVC/PP and be complete with all sprays, wash pads, drains and mist eliminator.

The Mistline fume scrubber unit shall be fitted with a recirculating wash system comprising of a neutralising tank, recirculating pump, spill tray, and all associated pipe work to complete the system.

The reticulating tank will be located below the fume cupboard in the under bench. All components shall be suitable for corrosive environments.

Option:

The Mistline fume scrubber shall be direct run to waste system.

Dosing System (Optional):

Install a pH dosing system to the recirculating tank with dosing liquor reservoir. The dosing liquor is to be suitable for neutralization of the contaminant.

Light:

Install in the fume cupboard a fluorescent light, mounted externally and sealed from the fume chamber area by a 6mm toughened glass panel.

Services:

Wall mount service outlets on the internal chamber and position remote control valves on the side mullion. The laboratory tapware shall be of the "Enware"/"Broen" Manufacture or equal approved.

Water outlets and valves must be tested to local authority requirements and all outlets and handles must be colour coded to DIN 12920. (See schedule for details)

Electrical:

The fume cupboard shall be equipped with double 10Amp GPO's (see schedule for details)

The GPO's shall be located outside the cupboard at the front of the fume cupboard opening. GPO's shall include RCD protection (30 mA sensitivity).

Cabling

All cabling within the fume cupboard shall be enclosed in conduit or cable duct. Unenclosed cables in accessible locations will not be accepted. All cable terminations shall be fully enclosed or shrouded (including connections to GPOs and switches).

Labelling and Data:

The fume cupboard manufacturer is to provide clear identification, permanently fixed onto the fume cupboard in an accessible location, with the following details:

Manufacturers name and address.

Labelling in accordance with A.S. 2243.8.

Date of manufacture.

Date of installation/commissioning details.

THE FINAL FUME CUPBOARD MODEL DECISION SHALL BE MADE BY THE END USER GROUPS.

FUME CUPBOARD SAFETY CONTROL SYSTEM:

Fit the fume cupboard with a Safety Control System. The system is to be a microprocessor controller with an electronic touch panel having audible signal when action initiated, LCD display status of operation and incorporate all switches relays and timers and be complete with an adjustable fume/air monitoring device which sensors loss of extraction to the fume cupboard, as manufactured by Laboratory Systems Group "Smoothflow Safety Control System" Mark 3 to comply with Australian Standards AS2243.8 – and AS2430.3.6

Service Isolation:

The Safety Control System is to incorporate a push button fume cupboard emergency isolator, which will de-energize electrical supply and isolate selected services. The Safety Control System must then operate the exhaust fan in post-purge mode continuously.

Pre- and Post-Purge Operation

Safety Control system is to incorporate a manual fan operation control, complete with adjustable pre and post-purge fan operation. Electrical supply and flammable services to be interlocked to operate with fan.

Air Flow

The system is to be complete with an air velocity sensing device that is adjustable which, in the event of airflow failure, will activate an audible and visual alarm and will deactivate power and flammable gas services to the fume cupboard.

SENSAFLOW INFINITELY VARIABLE AIR CONTROL SYSTEM

Fit new and existing fume cupboards with the energy saving, infinitely variable air flow control, "Sensaflo" proprietary system, as manufactured by Laboratory Systems Group or approved equal.

The system must infinitely vary the speed of the associated fan to maintain a constant velocity through the face opening of the fume cupboard, irrespective of sash position. The system must be capable of comparing velocity with fan speed and therefore indicate an airflow fault at any sash position if the face velocity falls below that required by AS2243.8-2006.

The minimum sash opening to be 50mm.

Provide input harmonic filters with the variable speed drives to eliminate current distortion upstream.

Prove that the harmonic filters are functioning correctly using a cathode ray oscilloscope, and arrange demonstration for the satisfaction of the Technical Officer. Allow to test one off existing harmonic filter, in addition to new installed as part of this project.

Comply with current regulations for electromagnetic compatibility (EMC) for the installation of all VSDs.

Alarms:

Incorporate in the control unit, audible and visual alarms to AS2243.8.

Power Supply:

The Electrical/Mechanical Services Subcontractor will provide single phase at the fume cupboard, and will install a shielded three-phase cable to a three-phase isolator on the roof and connect the associated fan. The Electrical/Mechanical Services Subcontractor must allow to connect the fume cupboard to the local single phase supply, connect the VSD to the three phase shielded cable, and connect the fan to the three phase isolator on the roof.

BMS/DDC Interface:

Allow for a 0-10 V output communications port to interface with the Building management system.

Final connection to BMS/DDC will be by other trades.

Output Signals:

Allow for an output signal from the Fume Cupboard System to the AHU for on/off status and/or alarm.

Thermal Detectors (Optional):

Install and wire to a junction box on the Fume Cupboard a suitable thermal detector for a corrosive environment.

One in each Fume Cupboard

COMMISSIONING AND TESTING

The fume cupboard manufacturer is to carry out commissioning of the fume cupboard system and all associated equipment that is related to the fume cupboard to A.S. 2243.8 (**N. A. T. A. Test Accreditation is required**).

Test results for the fume cupboard shall be handed over to the person in charge of the fume cupboard.

A Smoke Test in accordance with A.S. 2243.8 is to ensure reasonable airflow patterns are being achieved.

Commissioning of the system is to be carried out to provide a minimum average face velocity across the fume cupboard (in fully open position) of 0.5 m/s. All fans shall be supplied to suit the system duty requirements and system resistance as required.

Training:

Training of the principal's representatives to be fully conversant in the operation of the fume cupboard system.

CENTRIFUGAL EXHAUST FANS**General**

This Section of the specification describes the requirements for fume cupboard fans.

Fans are to be Laboratory Systems Group Pty Ltd "VSB series" Polyfan.

Check the scheduled estimated system resistances and duty in the schedule of equipment. Fan static pressures and motor kilowatt sizes are given for guidance purposes only.

Fan motors must have rated power output of not less than 120% of the fan power required at initial operating conditions.

Fans are to be provided with motors and drives selected to allow the fan to run up to full speed in less than 8 seconds on starting. Motors are to be rated to start as frequently as required under normal operating conditions, but in any case, it must be possible to immediately restart a motor after prolonged operation at full load and at maximum ambient temperature without overheating or operation of protection devices.

Fan intakes and discharges are to be connected to duct work and plenums by flexible connections.

Fans are to be manufactured to a fully developed design currently in production and readily available and supported by test data sheets and complete service facilities and spare parts. Statically and dynamically balance rotating parts on assembly.

Description:

Fans are to be single inlet or a classification suitable for the performance scheduled and a discharge position suitable for the installation Fans shall be selected for maximum operating efficiency.

Volume/Speed Control:

Fans are to be controlled by variable speed drives (VSD).

VSD units are to comply with all relevant codes.

Fan outlet stacks:

The fan outlet stacks shall comply with relevant sections of AS2243.8; they shall be generally constructed of PVC complete with a coned outlet to achieve discharge velocities.

Housing:

Injection moulded PP casing and discharge port, unless otherwise scheduled and complete with:

- Curved aerodynamic inlets
- Spigots on air inlet where ducted
- Provision for bolting down
- Fit drain hole with screwed plug
- Variable speed drive as scheduled
- Rotor Rear Flange Shaft Seal

Impellor:

Injection moulded PP. The impellor is to be statically and dynamically balanced.

Bearings:

- Be self-aligning and/or roller to AS 2729
- Have a basic rating life equal to or greater than 50,000 hours.

Drive Shafts:

- Mild steel
- Have countersunk ends at centres for tachometer application or because of duct covers make provision for use of stroboscope or optical tachometer

Drive:

Direct drive with minimum rating of 120% of motor power. Higher service factors may be required for particular application, as scheduled.

Frame:

Unless scheduled otherwise, fan and motor to be mounted on mild steel fabricated frame fully galvanised. The base is to incorporate provision for anti-vibration mounts.

DUCTING AND FITTINGS

Fume Cupboard and Exhaust Ducting:

Fume cupboard exhaust ductwork is to be generally constructed from U.P.V.C.

Extruded thin wall circular ventilation ductwork should be used where possible with the minimum number of joins.

Duct is to be joined via spigots or sockets with an approved solvent or hot air welding. All joints are to be airtight. Where multiple ducts and fans are provided they may be supported together and braced in order to improve stability and strength.

Bends are to be of moulded radiused construction. Lobster segmented type bends will not be accepted.

The construction and installation is to be strictly in accordance with A.S. 2243.8.

SCHEDULES (To be used as a guide)

Fume Cupboards - General

FUME CUPBOARD NO	OVERALL SIZE MM	SASH HEIGHT MM	NOMINAL AIR FLOW L/s
FC-1	1200w x 750deep x 1500 high	650	305
FC-2	1500w x 750deep x 1500 high	650	400
FC-3	1800w x 750deep x 1500 high	650	495
FC-4	2000w x 750deep x 1500 high	650	595
FC-5	2400w x 750deep x 1500 high	650	695

Schedule to be extended to suit project:

Fume Cupboards – Service Requirements

FUME CUPBOARD NO	POWER	NAT GAS	NITROGEN	WATER/ SINK	HELIUM	VAC ASPIRATOR
FC-1	2 off 10A Double GPO's, 1 each side	1 off barbed outlet. LHS	Nil	1 off barbed outlet with oval pot sink RHS.	Nil.	One to be supplied to attach to C/W outlet
FC-2	2 off 10A Double GPO's, 1 each side	1 off barbed outlet. LHS	1 off barbed outlet. LHS	1 off barbed outlet with oval pot sink RHS.	1 off barbed outlet. LHS	One to be supplied to attach to C/W outlet
FC-3	2 off 10A Double GPO's, 1 each side	1 off barbed outlet. LHS	Nil	1 off barbed outlet with oval pot sink RHS.	Nil	One to be supplied to attach to C/W outlet
FC-4	2 off 10A Double	1 off barbed	1 off barbed outlet. LHS	1 off barbed outlet with	1 off barbed	One to be supplied to

	GPO's, 1 each side	outlet. LHS		oval pot sink RHS.	outlet. LHS	attach to C/W outlet
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Schedule to be extended to suit project:

Fan Performance Schedule

UNIT NO	AIR QTY (t/s)	ESTIMATED STATIC PRESSURE (Pa)	FAN TYPE
FCF-1	305	100	VSB 25 Centrifugal Direct Drive
FCF-2	400	100	VSB 25 Centrifugal Direct Drive
FCF-3	495	100	VSB 30 Centrifugal Direct Drive
FCF-4	595	100	VSB 30 Centrifugal Direct Drive
FCF-4	695	100	VSB 30 Centrifugal Direct Drive

Schedule to be extended to suit project:

Note:

Estimated static pressure given as a guide only. Fan supplier must calculate static pressure based on final ductwork configuration.