

LABORATORY FUME CUPBOARDS

FUME CUPBOARDS

DESIGN FEATURES

GENERAL ARRANGEMENT

FACE VELOCITIES

EXTRACTION SYSTEMS

AIRFLOW CHARACTERISTICS



CONTENTS

- 1 Introduction to laboratory fume cupboards
- 2/3 General design features - Constaflow FC
- 4 General arrangement - Constaflow FC
- 5 General arrangement - Inductaflow FC
- 6 Design features - Inductaflow FC
- 7 Design features - Distillation FC
 - Walk-In FC
 - Perchloric acid FC
- 8 Design features - Radiochemical and Isotope FC
- 9 General arrangement - Distillation FC
- 10 General arrangement - Walk-In FC
- 11 General arrangement - Radiochemical FC
- 12/13 Schematic drawings of range & GAM valves
- 14 Fume cupboard face velocities
- 15/16 Airflow characteristics
- 17-21 Optional Items & Additional Products
 - General arrangement - understructures
 - Fume extraction systems
 - Emergency showers & Eye wash

FUME CUPBOARDS FOR:

UNIVERSITIES, TECHNICAL COLLEGES, CHEMICAL AND PHARMACEUTICAL INDUSTRIES, MINING INDUSTRIES, NUCLEAR RESEARCH STATIONS, PUBLIC UTILITIES.

MAXIMUM SAFETY, MAXIMUM EFFICIENCY, MAXIMUM ECONOMY, MINIMUM AIR EXTRACTION, MINIMUM COUNTERFLOW, MINIMUM TURBULENCE.

INTRODUCTION



The fume cupboard is the single most important factor to be considered when planning a laboratory. Toxic fumes can cause injury or even death. Corrosive fumes can cause severe damage to sophisticated and expensive equipment.

Safety margins require that a high standard of efficient extraction be achieved with the sash fully open and with a minimum quantity of air. Herein lies the challenge for the designer because the replacement of air which has been extracted requires costly energy, particularly in air conditioned laboratories.

The modern fume cupboard is a sophisticated piece of laboratory equipment and its precise function for any given situation is predetermined at the design stage. We have long realised that the so-called fume cupboard which is little more than a ventilated box, devoid of aerodynamic design, gives unsatisfactory performance and no longer has any useful function to perform in the modern laboratory.

This realisation is to-day shared by most users and the proof lies in the considerable success enjoyed by the Constaflow and Inductaflow range of fume cupboards.

These fume cupboards, designed to meet the most stringent operating conditions, are specified in almost all major laboratory projects.

The company's policy of continually seeking improvements in design and manufacture is actively pursued and therefore illustrations and descriptions appearing in this catalogue are not binding in detail.

GENERAL DESIGN FEATURES

CONSTAFLOW FUME CUPBOARDS

Airfoil Design

Each fume cupboard has an airfoil design at the entrance where the inner liner forms an unbroken line with the outer airfoil sections. This feature, in conjunction with correct baffle positioning in the fume cupboard chamber, creates a smooth flow of air and uniform face velocities even with the sash fully open.

The airfoil design minimizes turbulence caused by the movement of laboratory personnel. An air slot, situated immediately above the work surface, facilitates the speedy removal of heavy fumes at a low level.

Air Bypass

Each fume cupboard has an air bypass which avoids excessive face velocities which might otherwise interfere with the work in the fume cupboard. The bypass provides a constant volume airflow through the cupboard, even when the sash is in the fully closed position.

Work Surface

Each fume cupboard is fitted with an integral work surface of a suitable material. The work top is dished to form a watertight pan, 10mm deep, to contain spillage. A drip cup (1,5" BSP male connection) fitted flush with the surface is let into the work top.

Sliding Door

A rise and fall sash is fitted to each fume cupboard and the sash is counterbalanced with a single weight. A stainless steel sash cable runs on ball raced nylon pulleys. The easy to operate sash has a continuous finger grip and runs in recessed guides which do not obstruct the flow of air into the fume cupboard. A fail safe system is built into the design of door mechanism in the unlikely event of cable breakage the door will not come down.

Electrical Services

15 amp switch socket outlets and the light switch are mounted on a removable panel at the left hand side of the fume cupboard. The fluorescent light is mounted into a hinged box fixed to the front part of the roof and is well protected from corrosive fumes, by a 6mm thick sheet of toughened glass.

GENERAL DESIGN FEATURES

CONSTAFLOW FUME CUPBOARDS

Mechanical Services

DIN colour coded valves of the remote control type form an integral part of the fume cupboard. The valve controls are mounted at eye level on a removable panel which is situated on the right hand side of the fume cupboard. Rylsan coated service outlets are mounted on the inner side wall.



Remote Control Valve



Water outlet



Gas outlet

Service Connections

All connections, mechanical and electrical, are located in the service ducts between the inner and outer panels on either side of the cupboard, where they are well protected from corrosive fumes. Mechanical services are piped by means of flexible polyethelene tubing between valve and outlet, with plain ends protruding into the space underneath the fume cupboard for mains connection by others. Electrical sockets and the light switch are wired by means of 3 core captyre into a junction box which is mounted onto the left hand side of the roof. Mains connections by others.

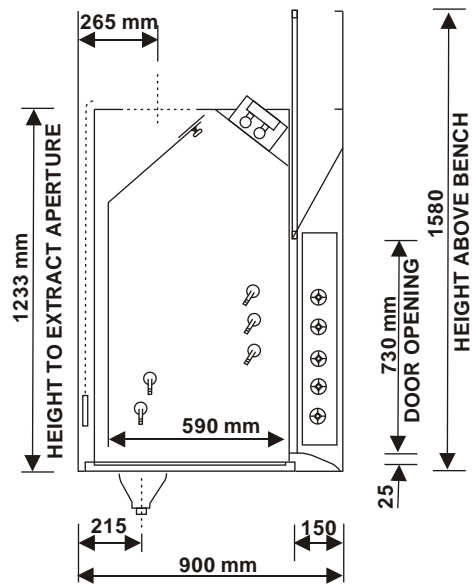
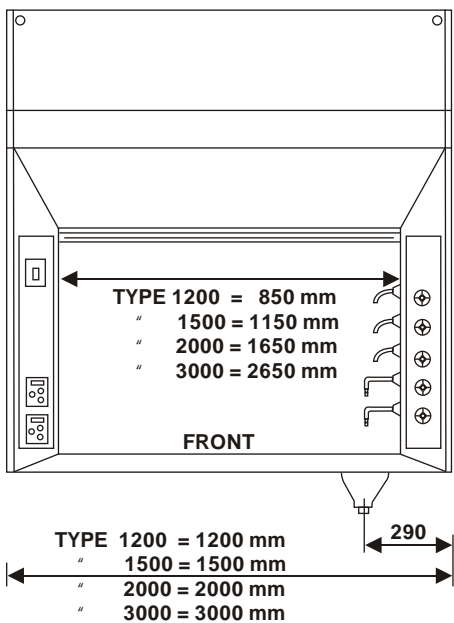
Materials & Method of Construction

(Anti-fire hazard)

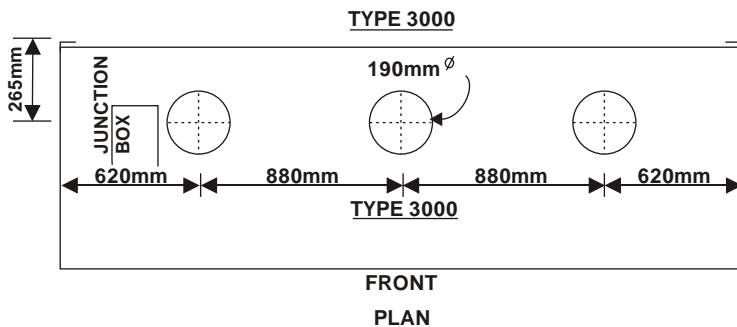
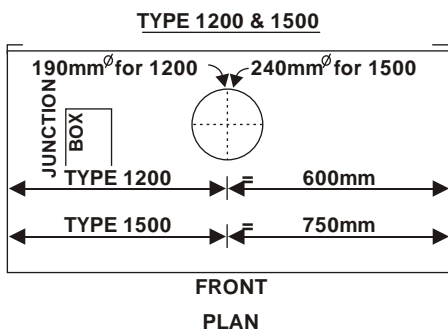
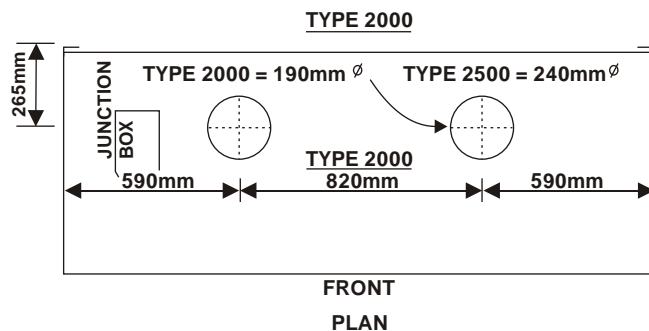
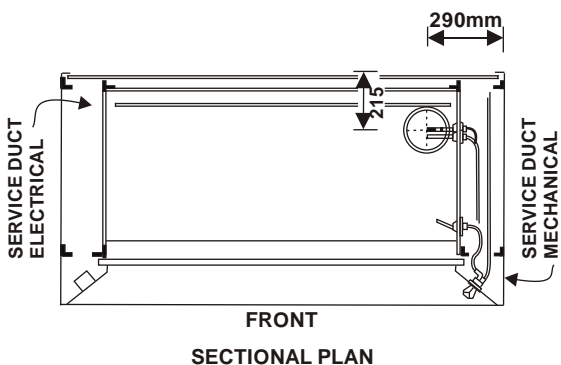
Generally and with few exceptions all materials used are non-inflammable. This minimizes the fire hazard when heat sources such as gas flames and high temperature electric hot plates are used in the fume cupboard. Fume cupboards are delivered in individual sections which are joined together on site by means of corrosion resistant fasteners. This method reduces the risk of damage in transit and facilitates the easy replacement of individual components if necessary.

CONSTAFLOW

FUME CUPBOARDS



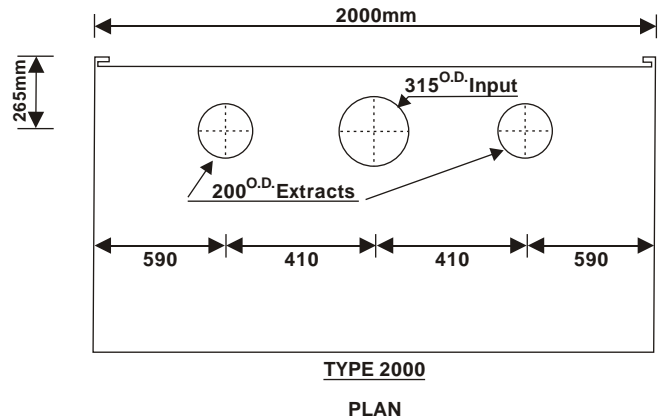
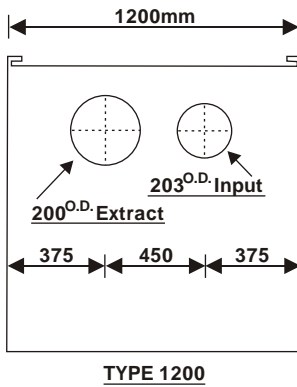
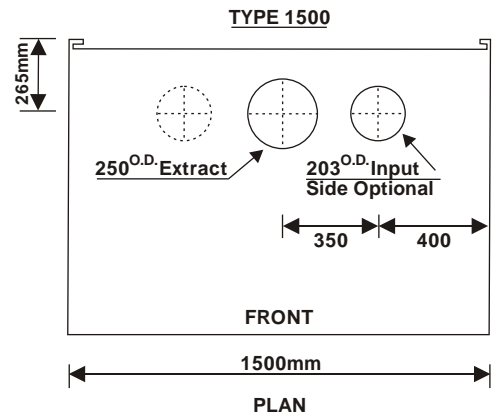
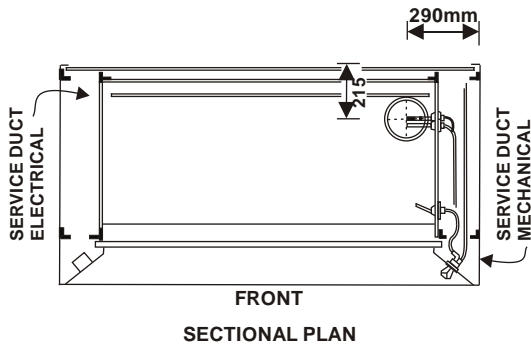
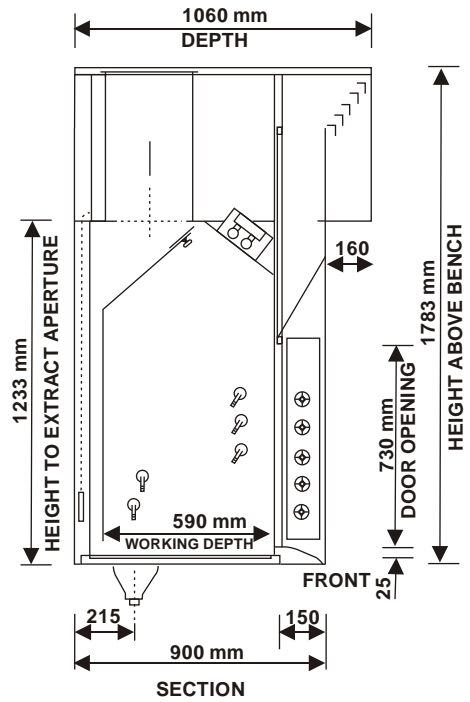
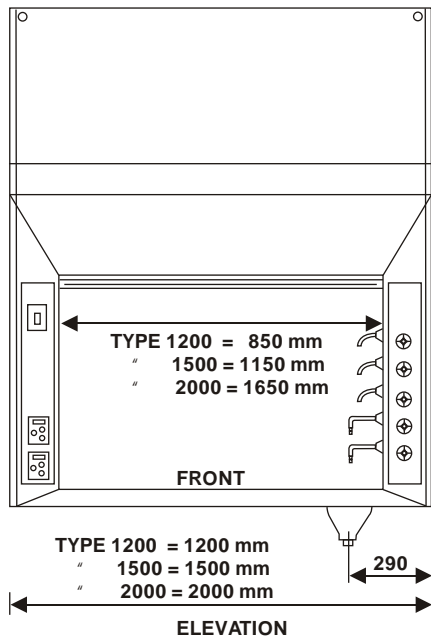
SECTION



GENERAL ARRANGEMENT

INDUCTAFLOW

FUME CUPBOARDS



GENERAL ARRANGEMENT



GENERAL DESIGN FEATURES

INDUCTAFLOW FUME CUPBOARDS



Constaflow fume cupboard.

Inductaflow Fume Cupboards

Based on the proven Constaflow principle, the Inductaflow fume cupboards have been developed primarily to conserve the energy which is produced in conditioning room air. Although air conditioning is expensive, both in initial cost and in continued operation, such expenses can be minimized by the utilisation of Inductaflow fume cupboards.

Inductaflow fume cupboards incorporate an auxiliary air plenum chamber, through which up to 60% of the total air extracted is introduced from outside sources; only 40% of the total extracted air is taken from within the room. The Inductaflow cupboard therefore requires an auxiliary air supply system, in addition to the fume extraction system.

DISTILLATION

FUME CUPBOARDS



Walk in fume cupboard.

Distillation Fume Cupboard & Walk In Fume Cupboard

Designed on Constaflow principles these types of fume cupboards facilitate the efficient extraction of fumes which result from working with toxic or noxious gases in conjunction with bulky laboratory apparatus. The Distillation fume cupboard is supplied with one sliding door which covers a maximum of two thirds of the total open face area.

The Walk In fume cupboard is equipped with two sliding doors which can be fully opened. This facilitates the installation of large distillation equipment and scaffolding.

Perchloric Acid Fume Cupboard

Laboratory work which involves the use of Perchloric Acid should only be undertaken in a fume cupboard which has been specifically designed for the purpose.

Both the interior liner and the work surface should preferably be fabricated from 316 stainless steel; this material is inorganic, almost completely non-absorbent and largely resistant to the acid.

The work surface should incorporate an integral continuous trough and drip cup for collecting and draining wash down water. It should be welded to the interior liner and the complete interior should be of a seamless welded watertight construction.

A water spray system should be incorporated into the fume cupboard, permitting a daily wash down. The washing down should be performed after the days work when the fume cupboard is not in use and with the extraction fan switched off. Special consideration should be given to the provision of higher than normal face velocities and duct systems should be straight and as short as possible. Perchloric acid fume cupboards should be connected to their own individual extraction systems.

RADIO CHEMICAL & ISOTOPE

FUME CUPBOARDS



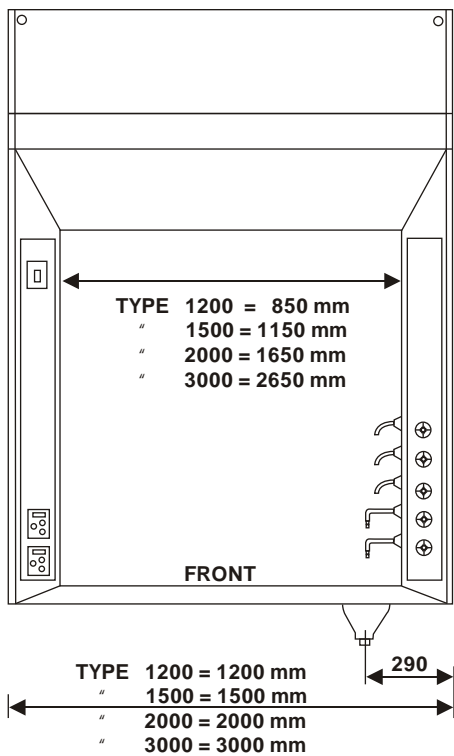
Constaflow fume cupboard.

Radio Chemical & Isotope Fume Cupboard

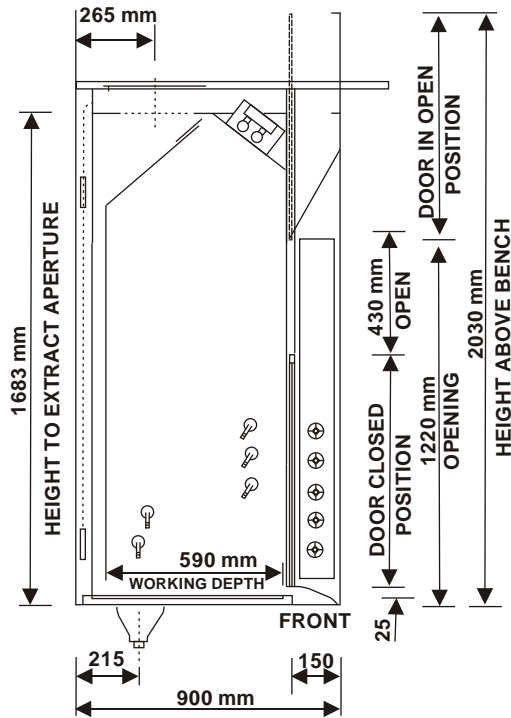
Special considerations should be given to fume cupboards for radiochemical use. The interior liner and the work surface should be made of type 304 or 316 stainless steel with seamless welds and an integral drip cup. The interior should be free of gaps and crevices to facilitate easy decontamination and cleaning. Where necessary bag in bag out HEPA ABSOLUTE FILTERS must be specified in the exhaust system and the fan must be capable of coping with the increased resistance offered by the filter. Fume cupboard face velocities have to be higher than normal and individual exhaust systems should be connected to these fume cupboards.

DISTILLATION

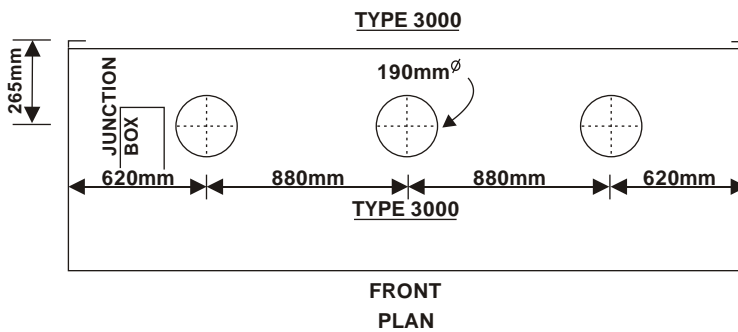
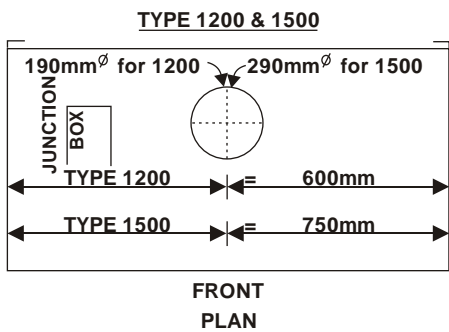
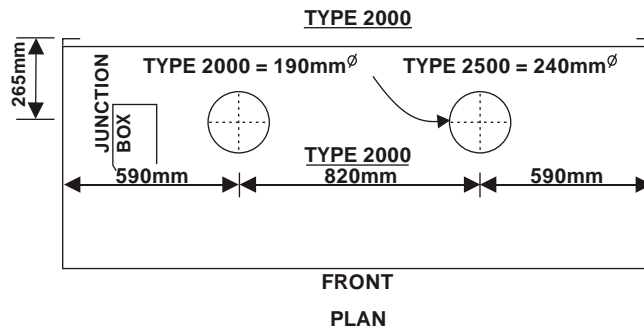
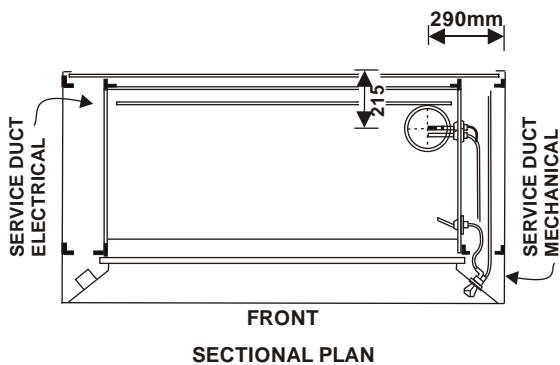
FUME CUPBOARDS



ELEVATION



SECTION

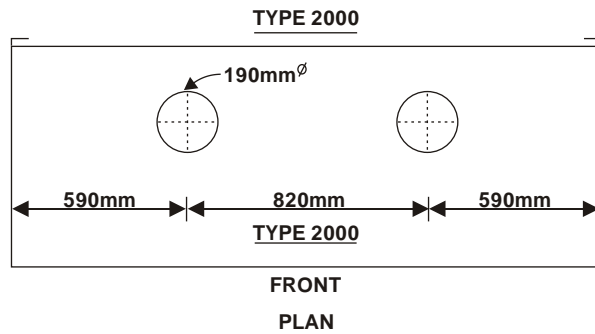
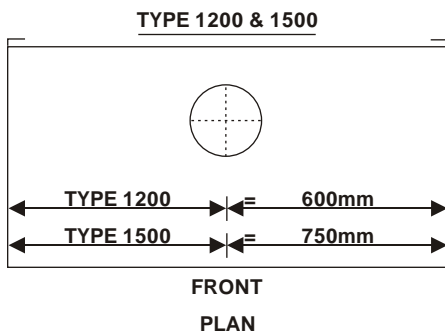
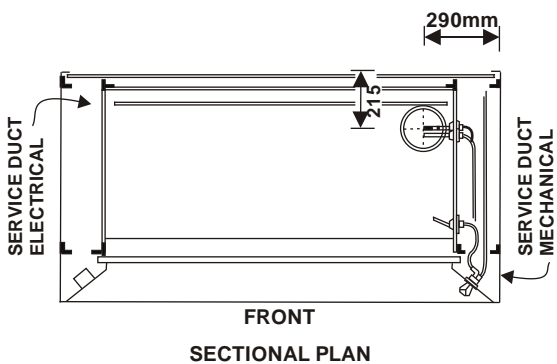
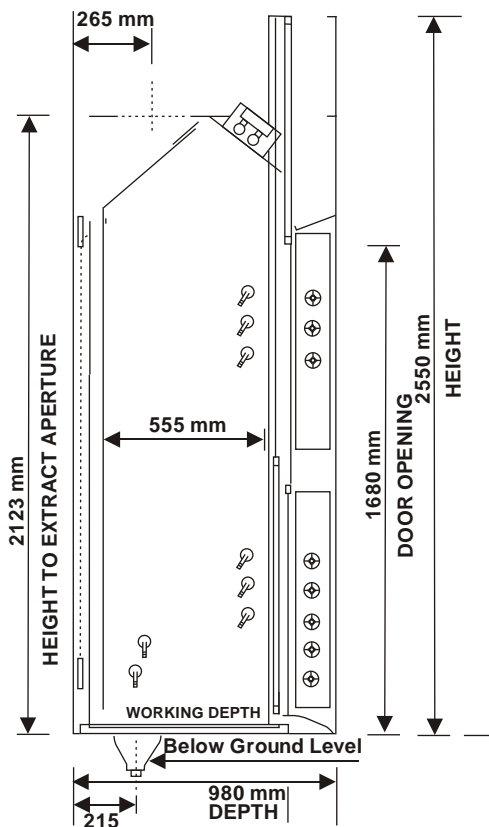
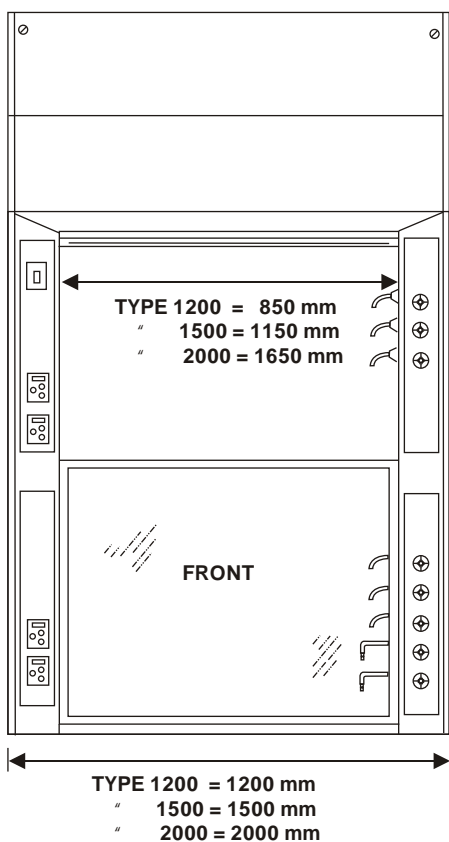


GENERAL ARRANGEMENT



WALK-IN

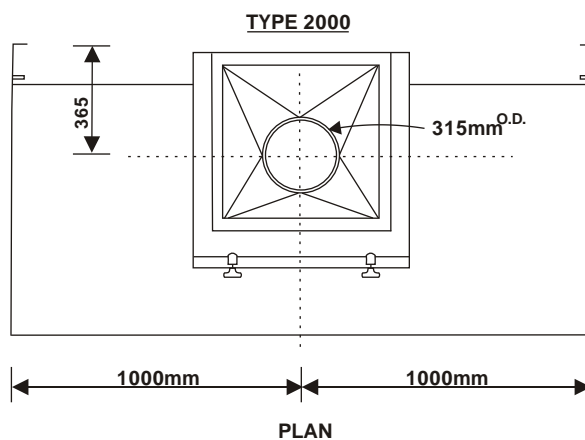
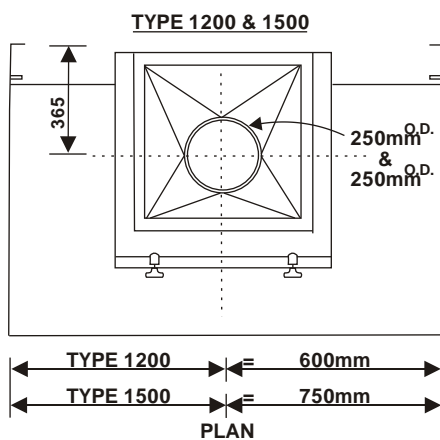
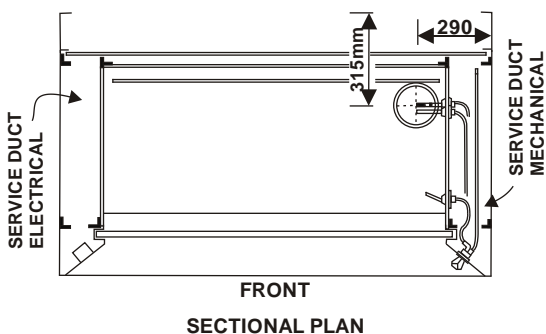
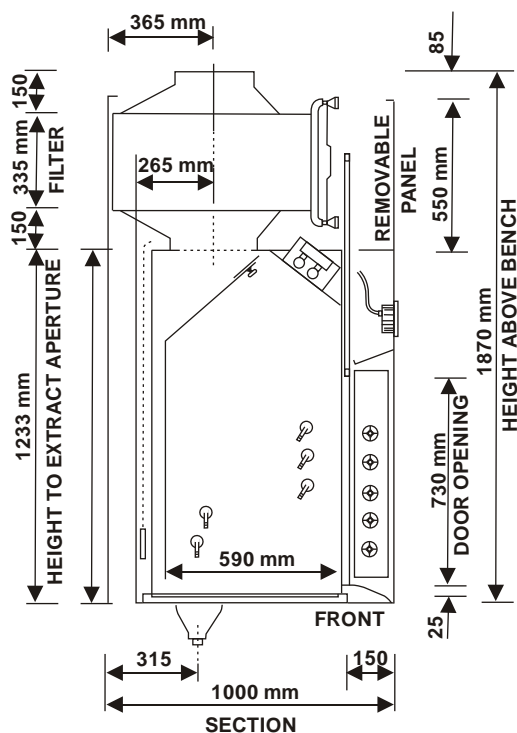
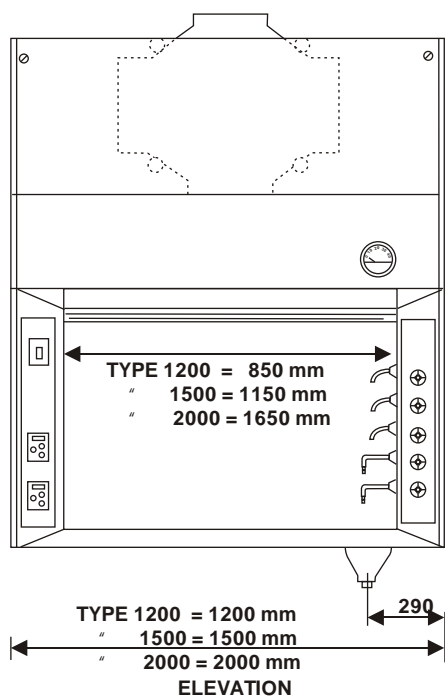
FUME CUPBOARDS



GENERAL ARRANGEMENT

RADIO CHEMICAL

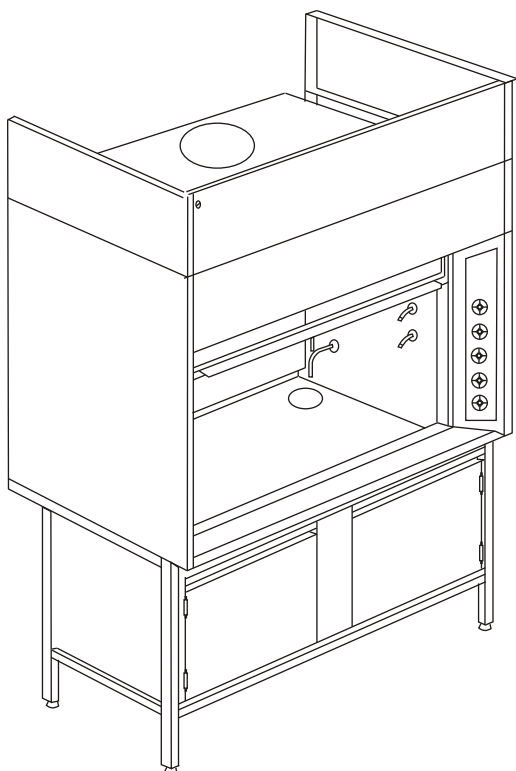
FUME CUPBOARDS



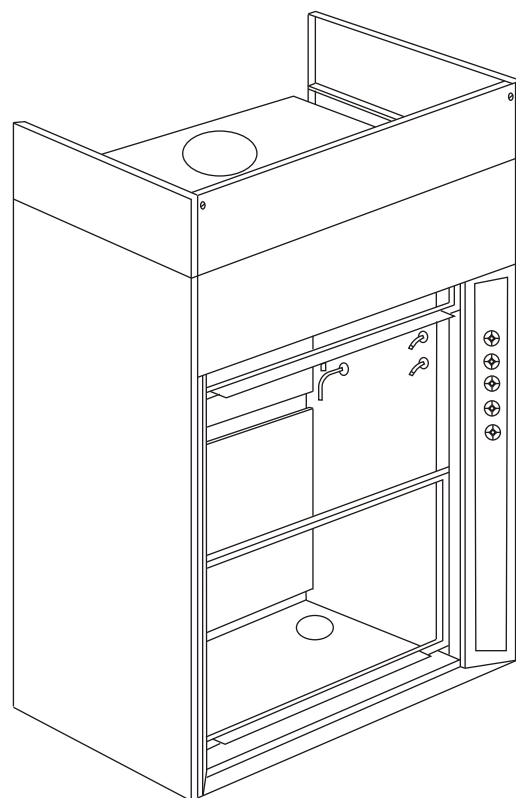
GENERAL ARRANGEMENT



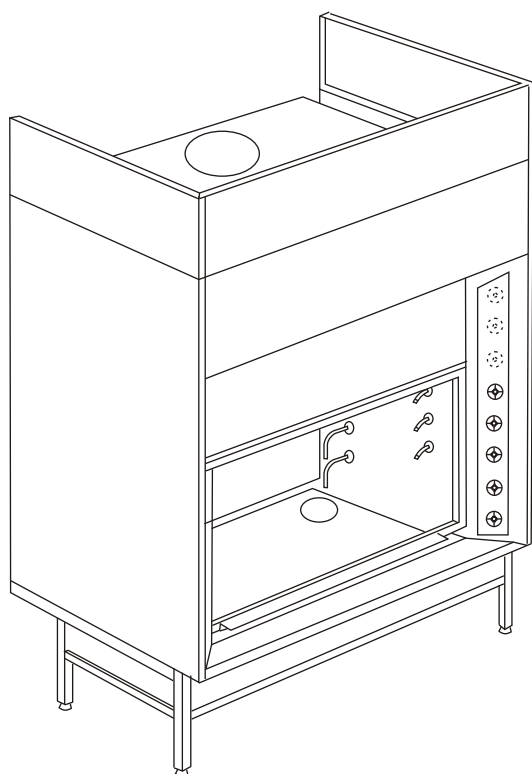
LABORATORY



CONSTAFLOW FUME CUPBOARD

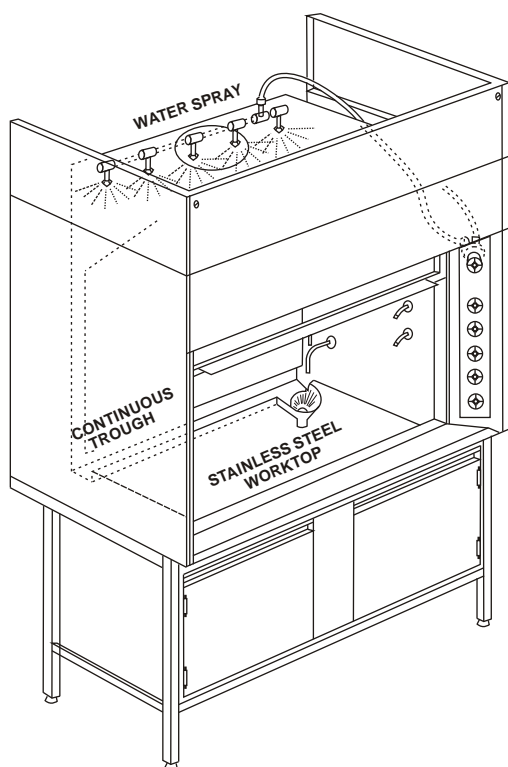


WALK-IN FUME CUPBOARD

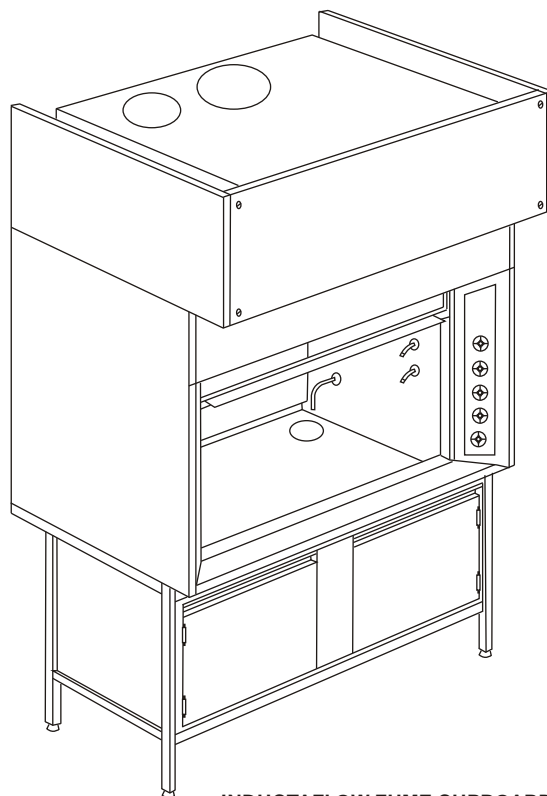


DISTILLATION FUME CUPBOARD

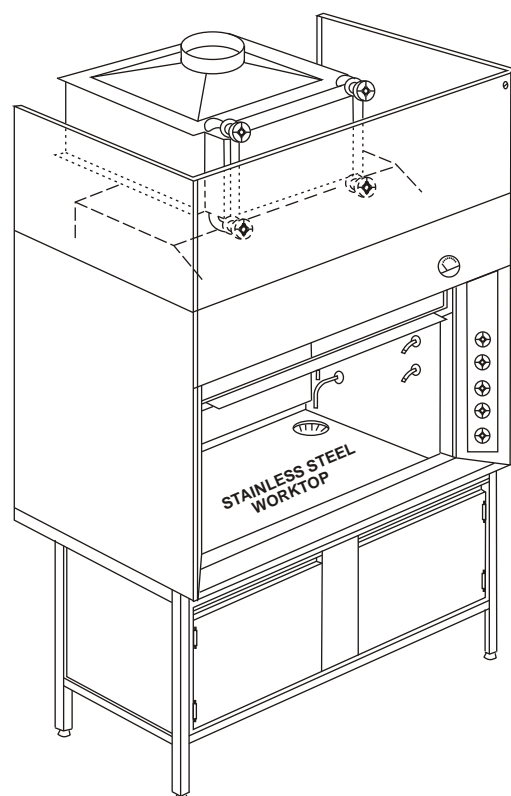
FUME CUPBOARDS



PERCHLORIC ACID FUME CUPBOARD



INDUCTAFLOW FUME CUPBOARD



RADIOCHEMICAL FUME CUPBOARD

FACE VELOCITIES

FUME CUPBOARDS



Constaflow fume cupboard.

Due to the smooth airflow pattern obtained with our range of fume cupboards, efficient extraction can be achieved even with the sash fully open, and at face velocities ranging from 0,30 to 0,65m/sec (60 to 120 lfpm) covering the complete spectrum from low toxicity, via medium, thru high toxicity.

There are, of course, no hard and fast rules to apply, each and every application must be regarded separately. Minimum face velocities may vary considerably even in a given application, and especially when adverse conditions pertain. Adverse conditions, over which the manufacturer of fume cupboards has no control, include:

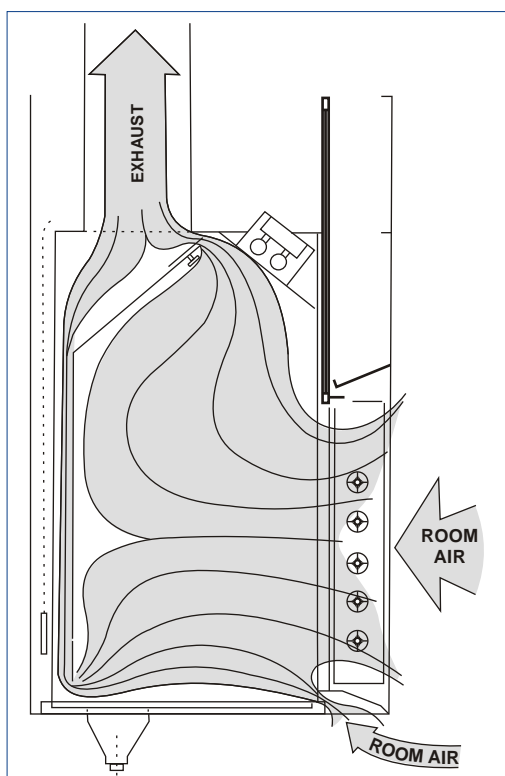
- **Cross drafts which counteract the natural flow of air into the fume cupboard.**
- **Excessive heat generation due to electric hot plates, gas burners, water and steam baths.**
- **Large and bulky equipment being located close to the fume cupboard opening and which interferes with the smooth flow of air into the cupboard.**

Generally, we recommend the following face velocities for our fume cupboards; these velocities will give efficient extraction with the sash in the fully open position (for conventional non-airfoil fume cupboards add 40% to the quoted figures):

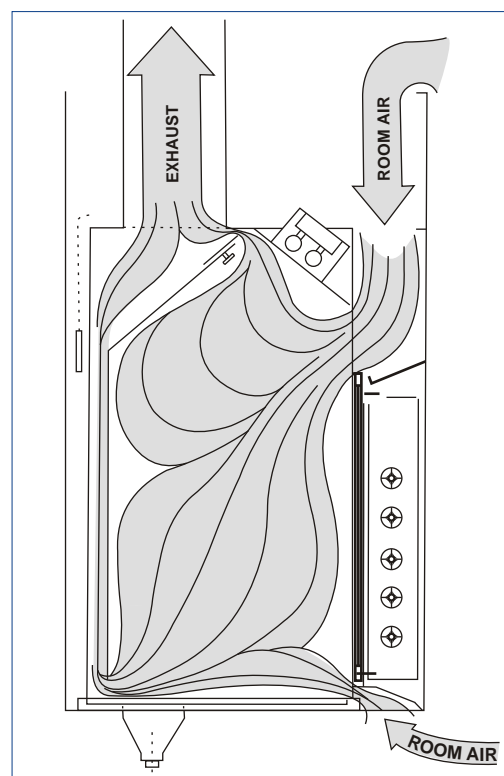
- **0,55 - 0,66 m/sec - High toxicity applications**
- **0,45 - 0,55 m/sec - Medium toxicity applications**
- **0,35 - 0,45 m/sec - Low toxicity application**

Sufficiently high face velocities must be selected to provide an adequate safety margin for personnel. However even the best fume extraction systems are largely dependent upon favourable conditions in the laboratory and judicious use by the laboratory technician for successful operation.

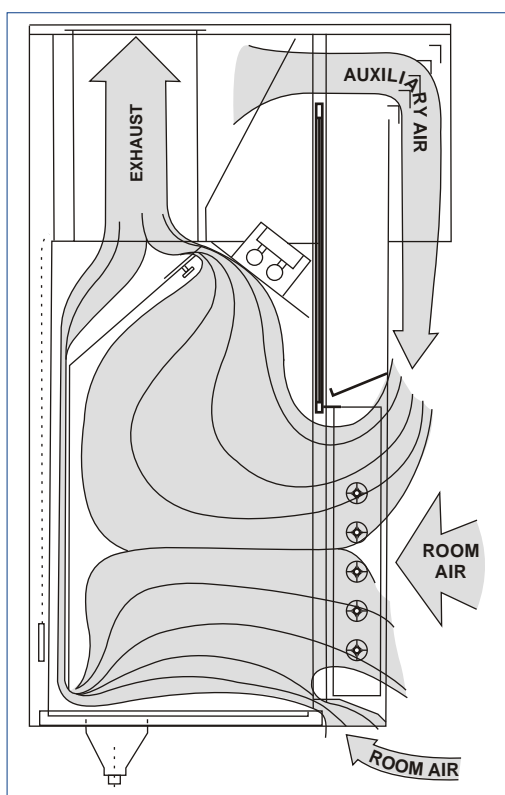
AIRFLOW CHARACTERISTICS



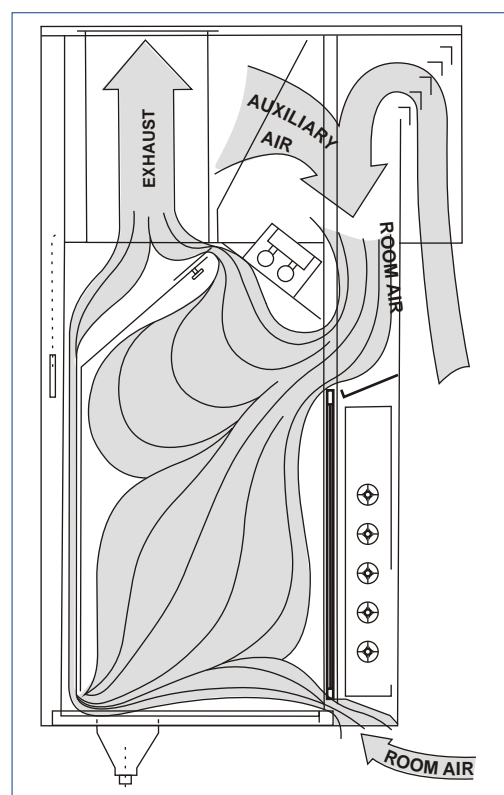
Constaflow - Sash open



Constaflow - Sash closed



Inductaflow - Sash open



Inductaflow - Sash closed

AIRFLOW CHARACTERISTICS



A typical Constaflow fume cupboard installation.

Constaflow Fume Cupboards

Sash open

With the sash in the open position the air bypass is closed; all air enters uniformly through the fume cupboard face opening and the air slot immediately above the work top.

Sash closed

With the sash in the closed position the air bypass is open; all air enters through the bypass and the air slot immediately above the work top.

Inductaflow Fume Cupboards

Sash open

With the sash in the open position the auxiliary air enters the fume cupboard face opening via the pressurized air plenum chamber, which is equipped with an air splitter and guide vanes to create a smooth flow. Room air, mixes with the auxiliary air to enter the fume cupboard through the face opening and the air slot above the work top.

Sash closed

With the sash in the closed position the auxiliary air enters the fume cupboard through the air bypass. Room air also enters the cupboard through the air bypass, and to a lesser extent through the air slot above the work top.

Note: Due to their airfoil design our range of fume cupboards permit extraction rates of up to 40% less than with out-moded fume cupboards of non-airfoil design and are markedly superior in fume extraction efficiency.

The efficiency of our fume cupboards does not depend upon the closure of the sash; on the contrary, it is fully operational and provides effective extraction with the sash in any position.

Fume Extraction Systems

A well designed fume cupboard requires an equally well designed fume extraction system. As pre-determined face velocities with the sash fully open must be achieved for efficient extraction, the fans must be capable of extracting the correct volume of air against the total system resistance.

The ducts should be of sufficient diameter to avoid excessive air speeds in the ducts. Centrifugal fans should run at low speeds (approximately 1000 RPM) to avoid the excessive noise levels which otherwise stem from high tip speeds of the extraction fan(s).

Exhaust stacks require special attention because they can become inefficient if poorly designed weather cowls impede the airflow at the exit point.

All ducting and extraction systems should be resistant to corrosion and preferably of either PVC, Polypropylene or another suitable material.

Perchloric Acid and Radio Chemical fume extraction systems require special consideration and in all instances where fume extraction systems are contemplated we suggest you consult us at the design stage where our experience will confer the utmost benefit to your installation.



A typical fume extraction fan

OPTIONAL ITEMS & ADDITIONAL PRODUCTS

FUME CUPBOARDS

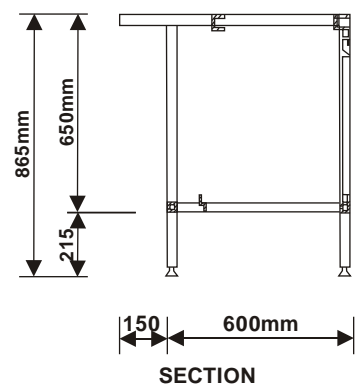
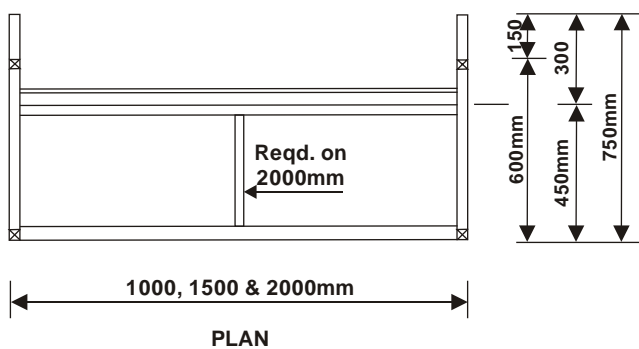
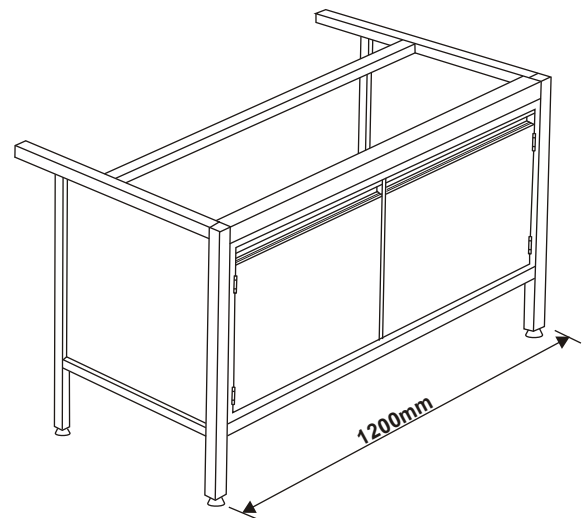
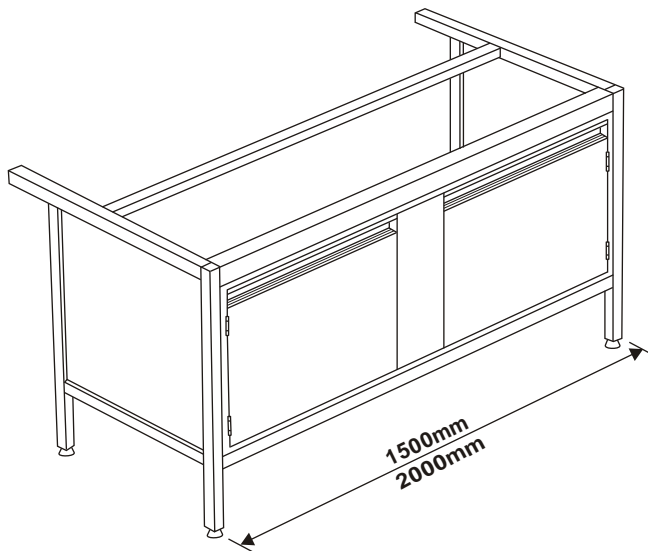
Understructures

Optional Fume Cupboard Understructures can be supplied for a variety of storage applications such as:

General Purpose

Acid Storage (with PVC or Polypropylene lining)

Solvent Storage (with fire resistant lining material and built in dry powder fire extinguisher)



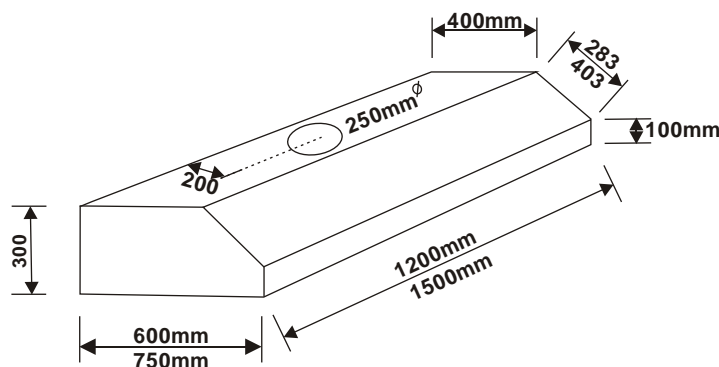
GENERAL ARRANGEMENT

OPTIONAL ITEMS & ADDITIONAL PRODUCTS

FUME CUPBOARDS

Fume Hood

Fume Hoods although not as efficient as a fume cupboard can be supplied to order in a range of corrosion resistant materials ranging from fibre glass, PVC, Polypropylene or clear perspex.



Fume Extraction Arms

Moveable localised extraction systems for convenient extraction at non fixed points eg: over a work bench where various samples are tested and mobility is required. Can be supplied connected to a pre existing or its own extraction system.
Uses: Dust extraction, chemical fume extraction and welding fume extraction.



Safety Air Flow Alarm System

A low airflow alarm system with audio visual indication can be installed to monitor and indicate correct and safe fume extraction. These units can also be retro fitted to existing fume cupboards.

OPTIONAL ITEMS & ADDITIONAL PRODUCTS

FUME CUPBOARDS

Gas Scrubbers

Environmental air pollution can be minimised by installation of a gas scrubbing system into the fume cupboard extraction system. These systems are highly specialised and require further detailed information and consultation with the end user.



Gas Scrubber

Laboratory Valves, Emergency Showers and Eye Wash

A catalogue of the full range of these items is available on request.



Shower/Eye Wash



Emergency Eye Wash



Moveable Laboratory
Emergency Spray

Laboratory Apparatus

A variety of laboratory apparatus is available as follows: Drying ovens, incubators, low temperature incubators, growth chambers, digestors, water baths, chilled water baths, circulators, hot plates, magnetic stirrers, shaking machines (linear and orbital), portable fume cupboards, bio hazard (class 1 and 2), laminar flow cabinets (horizontal and vertical) and furnaces.

Separate data sheets available on request.

OPTIONAL ITEMS & ADDITIONAL PRODUCTS

FUME CUPBOARDS

Laboratory Furniture

Laboratory furniture available in various materials such as steel, melamine, PVC, polypropylene, including special storage cupboards for acids and solvents.



PVC Lined Acid Storage Cupboard

Portable Filtered Fume Cupboard

Portable filtered fume cupboards are available where conventional ducted fume cupboards are not required.



Portable Filtered Fume Cupboard

Laminar Flow Cabinets & Class 2 Biohazard Cabinets

Horizontal, vertical Laminar Flow Cabinets and Class 1 & Class 2 Cabinets can be supplied on request.



Horizontal Laminar Flow Cabinet