

INTRODUCTION

All fume cupboards need to conform to the AS/ NZ 2243-8-2001. This standard requires that the fume cupboard has sufficient airflow through it to provide an average face velocity of no less than 0.5 m/s when the sash is fully open.

In the past fume cupboards have been provided with a exhaust fan that is set to a predetermined speed calculated to provide the required airflow. To prevent excessive air velocities through fume cupboard sash opening when the sash is lowered most modern fume cupboards are provided with an air bypass system that ensures that the face velocity remains reasonably uniform (see fig. 1).

Standard air bypass fume cupboards are provided with a lock or physical stop to limit the sash opening height. Referred to as the "normal working height" this height is calculated to provide the required fan speed for the 0.5 m/s face velocity.

Sashes that are opened above this height when setting up larger experiments can reduce the face velocity below 0.5 m/s compromising the fume cupboards operation.

The problem with an air bypass system is that regardless of the sash position the fan continues to evacuate the same volume of air from the room. An average sized fume cupboard will exhaust upwards of 0.35 m³/s (300 l/s) of air from a room and often there are several fume cupboards in the one room.

The cost of air conditioning or heating a laboratory will obviously increase dramatically if conditioned air is exhausted at such a high rate.

(VSS) VARIABLE SPEED SYSTEM

It was because of these high operating costs and the demand for energy conserving systems that Thermoplastic Engineering developed a variable speed system fume cupboard.

By controlling the fan speed to provide exactly the required volume of air for the sash position, the VSS system dramatically reduces the volume of air being exhausted by the fume cupboard system.

There are several advantages to a VSS fume cupboard system as opposed to a standard Air Bypass fume cupboard system:

- Continuous sensor monitoring of sash position.
- Fan speed adjusts to the required 0.5 m/s face velocity at all times to suit the sash height. (see fig. 2).
- Eliminates the need of a sash lock.
- Exhausts far less air than a standard fume cupboard system. *For example, an average sized VSS fume cupboard with its sash at 200mm will only need to exhaust 0.138 m³/s (138 l/s).*
- Far quieter than a standard fume cupboard at normal operating sash heights because of the reduced air volume.

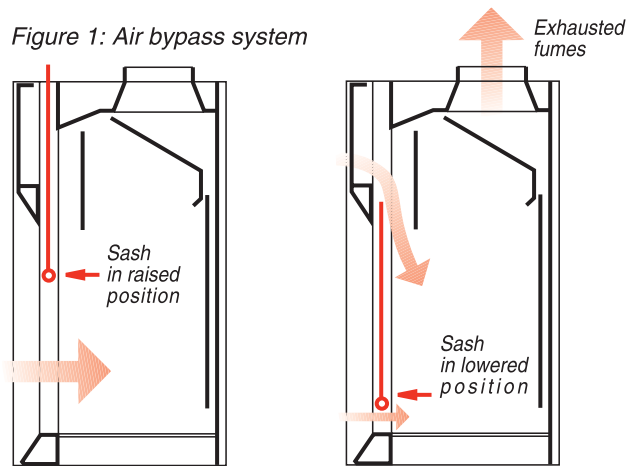
CASE STUDY

A graphic illustration on the cost saving benefits of the VSS system were highlighted in the results of an independent cost analysis comparison between single speed cupboards and Labfit VSS cupboards.

The laboratory chosen was the Stage III works at the Chemistry Department, University of Canterbury.

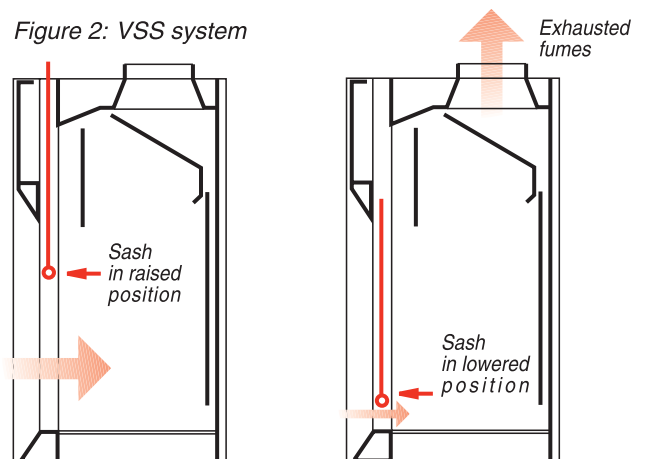
The results of this analysis clearly stated the advantage of fume cupboards utilising variable speed controlled fans from both an energy reduction and cost savings point of view. The actual result was a 48% saving in energy, that converted into a 52% cost saving when compared to the energy costs of a fixed fan cupboard. The VSS system has additional benefits of reducing noise levels and reducing servicing and maintenance requirements. (Costs were as at January 2001 and for copies of the above study please contact us direct).

Figure 1: Air bypass system



Standard air bypass system that ensures face velocity remains reasonably uniform

Figure 2: VSS system



Fan speed adjusts to the required 0.5 m/s face velocity at all times to suit the sash height.

