



Variable Air Volume (VAV) Technology Fume Cupboards



ISO 9001
ISO 14001
ISO 45001





Reduce Your Carbon Footprint and Save on Energy Costs with Intelligent Variable Air Volume (VAV) Technology Fume Cupboards

Why use VAV? Why wouldn't you?

Any increased capital outlay is quickly recovered in energy savings. It protects your operators, makes the lab more comfortable, and it's the right thing to do for our planet.

In laboratories featuring fume cupboards the air extracted through the fume cupboard must be replaced. This is typically achieved with conditioned heated or cooled air.

The fume cupboard's own running costs are minimal. The cost is generated by the energy required to replace the conditioned air pulled through the unit and discharged outside.

Constant Air Volume (CAV) Fume Cupboards

Typically, a standard fume cupboard will be a Constant Air Volume (CAV) unit unless specified otherwise. Whether the fume cupboard is in use, or the sash is open or closed, CAV cupboards pull through a constant volume of air.

Variable Air Volume (VAV) Fume Cupboards

A VAV system reduces the volume of conditioned air extracted through the open sash of a fume cupboard. The face velocity sensor controls a motorised damper typically located above the fume cupboard.

When the sash is open at 500mm (the safe working height), the fume cupboard VAV damper is also open. As the sash is lowered, the VAV system closes the VAV damper. This reduces the amount of conditioned air pulled through the fume cupboard while maintaining a constant face velocity across the face of the sash.

Low Volume Fume Cupboards

A Low Volume fume cupboard sits between CAV and VAV. It operates at lower face velocity, typically 0.3m/s. This can lead to a 40% energy saving in the costs of heating/cooling replacement air compared to a traditional 0.5m/s face velocity fume cupboard.

However, Low Volume will not deliver the same energy-efficient benefits as VAV.



Why Use VAV?

- VAV systems ensure a constant face velocity regardless of sash position down to a minimum of 30% volume. This protects operators from potentially hazardous fumes and substances.
- Energy-efficient VAV units are cost-effective. They can reduce energy costs by up to 70%.
- With the year-on-year energy cost savings, the payback of the fume cupboards is substantially accelerated.
- Less energy = lower carbon emissions. A VAV system can help meet carbon reduction targets and can contribute towards a building achieving a 'Very Good', 'Excellent' or 'Outstanding' BREEAM rating.
- Extracting a lower volume of air stabilises the ambient temperature within the lab, making for a more pleasant working environment with potentially less noise.



Intelligent Variable Air Volume (VAV) Technology Fume Cupboards



VAV Fume Cupboards & Auto Sash Controls

To maximise the benefits of VAV technology Clean Air recommends VAV fume cupboards are fitted with an Auto Sash controller. Without the controller, the VAV performance will still be dependent on operator behaviour.

A PIR sensor will monitor when the fume cupboard is unoccupied and automatically close the sash. While there is an increased capital outlay for the control system, the two controls in combination will reduce energy costs dramatically. VAV and auto sash fume cupboards can achieve energy savings of up to 70% or greater.



Payback Reward for Doing the Right Thing

Using the conditions in our table for reference, the energy cost saving of a VAV system on a single unit could result in achieving payback for that fume cupboard in 12 to 15 months. With a VAV and Auto Sash system, payback could be achieved in around 15-18 months, with enhanced ongoing savings thereafter.

Retro-Fit VAV to Existing Fume Cupboards

Considerable energy savings can be made by upgrading existing CAV fume cupboards to VAV. Clean Air's fast, efficient service engineers can retro-fit a VAV alarm/control panel, PIR sensor, motorised dampers, and a blanking panel on-site to virtually any make and model of CAV fume cupboard. These units are then more cost-effective and environmentally sustainable.

Typical potential energy savings

Calculated August 2024

Based on 2000mm wide standard fume cupboard operating with a face velocity of 0.5m/s, constant volume system

	Annual kWh usage	Annual energy cost	CO2 Tonnes	Potential savings per year
Current operating mode	89,258	£6,803	18.89	
Change to VAV Extract & Supply	43,244	£3,542	9.61	£3,261
Change to VAV Extract & Supply with Auto Sash Closer	30,116	£2,638	7.01	£4,165

*2000mm F/C, 0.50m/s, 0.51m³/s | 19°C base temperature | VAV sashes open 10 hours per day, 5 days per week, 48 weeks per year, all other times@ 30% volume | Autosash sashes open 2 hrs per day, 5 days per week, 48 weeks per year, all other times@ 30% volume | Based on gas fired boiler heater – Gas £0.062 per kWh, Electricity £0.25 per kWh | Extract and supply fans 0.55 kW, 70% efficiency | Weather station: Manchester Airport, heat degree average of last 3 years

Contact our friendly team to discuss our energy-saving technology options

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