

Safety, Hazard Containment and Sterilising

Making Science Safe

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Most laboratories will, at some point in their procedures, handle chemicals. This may be as simple as weighing out a powder, or as complex as multi-stage organic synthesis. Whatever the application, safety is a priority and, to protect laboratory staff, some form of chemical containment is required. Ductless fume hoods and filtered storage cabinets are popular, cost-effective and environmentally-friendly options for laboratories across a wide range of scientific disciplines.

Health and safety is a key consideration for all laboratories, ensuring that the workplace does not pose a health hazard to staff. To maintain a safe working environment, some form of chemical containment is necessary, whether it is a fume hood for experimental work, or a specialist cabinet for day-to-day storage.

A Cost-Effective Option

Typically, chemicals are handled in a ducted fume hood. This system works by drawing solvent fumes up through the fume hood and expelling them into the atmosphere via ducting. While these systems allow almost any chemical to be handled safely, capital expenditure – around £8,000 for an entry level fume hood, plus the cost of installation – is significant, and there are legal requirements regarding the height of the exhaust that must be complied with. For many laboratories, ductless – or recirculating – fume hoods, such as the Captair® Flex® range from Erlab, are a more cost-effective option.



Vented filtered storage cabinets, such as the Captair Store 834, perfectly complement recirculating fume hoods

Ductless fume hoods are free-standing systems that rely on activated carbon and HEPA filters to eliminate the risk involved in handling chemicals in a more environmentally-friendly way than venting into the atmosphere. These systems are less expensive to purchase than their ducted counterparts – an entry level unit is typically around £2,500 – and cost around £60 a year to run. The additional cost of fixed installation is avoided, making them ideal for companies who only occasionally handle a limited number of chemicals and prefer to avoid costly capital expenditure. With no ducting required, the systems are moveable, leaving laboratories free to position the fume hood wherever it is most convenient, whether that is on a static laboratory bench or a mobile cart. This is particularly beneficial for small start-up companies, which frequently operate from leased premises, as the terms of the lease may prohibit any structural changes being made to the fabric of the building. Even if such changes are permitted, the building will have to be returned to its original state should the company relocate, requiring further expenditure.

Choosing the Right Filter for your Application

Ductless fume hoods use four types of activated carbon filters, specific for ammonia, formaldehyde, organic vapours, and organic vapours and acids, to remove harmful fumes, plus a HEPA filter for particulates. Before any fume hood is recommended, it is essential to perform an assessment of the chemicals used. Only then can an informed choice be made, ensuring that the fume hood has the correct

combination of filters to provide maximum protection for laboratory staff. It is all too easy to make the mistake of purchasing a fume hood without profiling the laboratory chemicals, assuming that the filter supplied is suitable, which may or may not be the case. With the air being recirculated back into the laboratory, there is no room for error; to ensure that the recirculated air is clean, it is vital that the correct filters are installed and that there are processes in place to check that the fume hood is working correctly. This is where specialised, factory-trained distributors can help, providing the specialist knowledge required to determine the correct size of fume hood and the most effective types and configuration of filters for safe laboratory practice.

Expert Knowledge Equals Peace of Mind

Customer consultation is key to providing the most appropriately configured ductless fume hood for a laboratory's specific application. Protocols such as the simple three-step Erlab Safety Program (ESP®) followed by Camlab make the process as straightforward as possible, and enable a bespoke solution to be developed. This may be a modest entry level system with just one activated carbon filter, or a larger system with up to eight filters and, potentially a HEPA

filter as well. The initial step – the ValiQuest® questionnaire – identifies which chemicals are used in the laboratory and to what extent, enabling the correct filter(s) to be determined, as well as an estimated filter lifetime. Asura®-certified engineers assemble the fume hood at the customer site, ensuring that it is working correctly and providing staff with an operational overview. A ValiPass certificate is also issued, detailing the chemicals the unit is approved for use with, as well as detector settings and information regarding the anticipated filter life expectancy. Finally, the ValiGuard® service ensures that usage is monitored and saturated filters replaced and disposed of correctly. This type of collaboration allows customers to take advantage of the distributor's expertise, eliminating the need for laboratory staff to assemble and install the unit, or to replace filters, providing complete peace of mind that nothing has been overlooked.



The Captair Flex XL 483 ductless fume hood enables chemicals to be handled in a safe, cost-effective, environmentally-friendly manner

A Complete Service

Over time, fume hood filters will become saturated and need replacing – filters should generally be replaced on a rolling 12-month basis, unless otherwise indicated – and it is important that manufacturers and distributors are fully committed to supporting customers in this. Some manufacturers, including Erlab, also supply filters for ductless fume hoods produced by other companies. This enables distributors to offer a 'one stop shop', simplifying ordering and replacement of filters throughout the laboratory. Service contracts can also be beneficial; while laboratories can undertake routine filter changes themselves, engineers will also check the fan speed and airflow velocity, ensuring optimal operation of the fume hood. It is also important to realise that saturated filters are chemical waste and, as such, must be disposed of by incineration. A distributor with a waste transfer licence is invaluable – Camlab, for example, is authorised to work in partnership with Veolia to dispose of saturated filters in a high temperature incinerator – removing the burden of disposal from the laboratory.

Storing Chemicals Safely

While ductless fume hoods enable safe working practices to be observed, they are just one piece of the puzzle; when not in use, chemicals must be stored correctly. There is always a temptation to store chemicals in fume hoods, but this is far from ideal; the air flow is disrupted, and the system operates far less efficiently. With laboratories increasingly seeking to use more environmentally-friendly processes and reduce their carbon footprint, the need arose for an alternative means of storing chemicals safely, but with lower energy consumption. This resulted in the extension of the filter technology used in fume hoods to storage cabinets. Vented filtered storage cabinets – such as the Captair Store™ – perfectly complement recirculating fume hoods, offering all the same benefits but consuming far less energy. Like their fume hood counterparts, careful choice of filters allows these storage cabinets to be tailored to a laboratory's specific needs, ensuring safe storage of chemicals by removing odours and potentially toxic vapours from the atmosphere.

Summary

Ductless fume hoods and vented filtered storage cabinets offer benefits to a broad range of laboratories, from education, academia and research, to industry and manufacturing. Compared to ducted systems, capital expenditure and day-to-day running costs are lower, the systems are moveable and more environmentally friendly and, with a choice of filters, bespoke solutions tailored to specific applications can be created. Careful choice of supplier is the key to a seamless service. Ideally, this service would include an initial consultation, ensuring that the selected system is appropriate for the chemicals to be handled, plus unit assembly and installation, and chemical waste disposal of saturated filters. When this is backed by ongoing service and support from a dedicated, knowledgeable sales and engineering team, safety is assured.

