Scottish Health Technical Memorandum 2025

(Part 1 of 4)

Overview and management responsibilities

Ventilation in healthcare premises

The production of this document was jointly funded by the Scottish Executive Health Department and the NHSScotland Property and Environment Forum.

NHSScotland, P&EFEx, June 2001

Contents

1. Introduction

General

1.1 Ventilation is used extensively in healthcare premises for primary patient treatment eg. in operating departments, intensive treatment units and isolation suites. It is also installed to ensure compliance with quality assurance of manufactured items in pharmacy and sterile supply departments and to protect staff from harmful organisms and toxic substances for example in laboratories.

1.2 This edition of Scottish Health Technical Memorandum 2025; *Ventilation in healthcare premises* is published in four separate parts. It is equally applicable to both new and existing sites. It gives comprehensive advice and guidance to healthcare management, design engineers, estates' managers and operations' managers on the legal requirements, design implications, maintenance and operation of specialist ventilation in all types of healthcare premises.

1.3 Current statutory legislation requires both "management" and "staff" to be aware of their collective responsibility.

1.4 "Ventilation" is provided in healthcare premises for the comfort of the occupants of buildings. More specialised ventilation will also provide comfort but its prime function will be to closely control the environment and air movement in the space that it serves in order to contain, control and reduce hazards to patients and staff from airborne contaminants, dust and harmful micro-organisms.

1.5 Ventilation systems, in themselves, present little danger to patients or staff; however, they do possess the ability to transmit hazards arising from other sources to large numbers of people. The danger may not become apparent until many patients and staff have been affected.

1.6 The sophistication of ventilation systems in healthcare premises is increasing. Patients and staff have a right to expect that the systems will be designed, installed, operated and maintained to standards that will enable them to fulfil their desired functions reliably and safely.

2. Management responsibilities

Statutory requirements

2.1 The Health and Safety at Work etc Act 1974 (HSW Act 1974) is the core legislation that applies to ventilation installations. As these installations are intended to prevent contamination, closely control the environment, dilute contaminants or contain hazards, their very presence indicates that risks to health have been identified.

2.2 The Control of Substances Hazardous to Health (COSHH) Regulations 1999 regulations place upon management an obligation to ensure that suitable measures are in place to protect their staff and others affected by the work activity. These methods may include both safe systems of work and the provision of a specialist ventilation system. In laboratories the requirements are often met by the provision of fume cupboards and safety cabinets.

2.3 The existing requirements to provide ventilation, implicit under HSW Act 1974 and COSHH, have been made explicit by the Management of Health and Safety at Work Regulations 1999, the Workplace (Health, Safety and Welfare) Regulations 1992 and the Provision and Use of Work Equipment Regulations 1998, all issued as a result of European Directives.

2.4 Where specialist ventilation plant is provided as part of the protection measures there is a statutory requirement that it be correctly designed, installed, commissioned, operated and maintained. The local exhaust ventilation (LEV) section of the COSHH regulations requires that the plant be inspected and tested at least every 14 months by an independent organisation and that management maintains comprehensive records of its performance, repair and maintenance.

2.5 Certain substances have Occupational Exposure Limits (OEL) set out in Guidance Note EH 40 published annually by the Health and Safety Executive. If special ventilation systems are provided to meet these standards they will also be subject to the COSHH regulations as above.

2.6 All ventilation systems should conform to the principles set out in the *Approved Code of Practice on the Prevention and Control of Legionellosis* published by the Health and Safety Commission and Scottish Health Technical Memorandum SHTM 2040;*The control of legionellae in healthcare premises – a code of practice*.

2.7 Special ventilation plants installed in laboratories dealing with research, development or testing, whether involving drugs, animals or genetically modified organisms, may be subject to particular legislation with regard to their operation in addition to that mentioned above. Further information is given by the Health and Safety Commission Health Services Advisory Committee in:

a. safe working and prevention of infection in clinical laboratories;

b. safe working and prevention of infection in clinical laboratories: model rules for staff and visitors;

c. safe working and prevention of infection in clinical laboratories in the mortuary and post-mortem room.

2.8 Plants installed in units manufacturing medicinal products to the standards set out in the current European Guide to Good Manufacturing Practice may also be subject to particular legislation with regard to their operation in addition to that mentioned above.

2.9 Records and log books should be kept of the commissioning information, operational management, monitoring and maintenance of the equipment. The Health and Safety Executive, Medicines Inspectorate and other interested bodies have a statutory right to inspect them at any time. All records should be kept for at least five years.

2.10 The fire regulations require that if ventilation ductwork penetrates the fabric of a building it should be designed and installed so as to contain the spread of fire. It is a management responsibility to ensure that the standards applied during the design and installation are not reduced during the operation and maintenance of the equipment.

2.11 In the event of a reportable incident connected with ventilation equipment or any area that it serves, all records and plant log books will need to be collected as evidence. Proven breaches of the statutory requirements can result in prosecution and may also give rise to a civil suit against the operators.

Other responsibilities

2.12 Management has a general responsibility to ensure that ventilation systems are operated at a standard suitable for the purpose for which they were installed.

2.13 While ventilation plant itself has not been shown to pose a high risk to health, it does have the ability to transfer a hazard, originating from another source, to a large number of people, without them becoming immediately aware of it.

2.14 Increased health risks to patients will occur if the more specialised ventilation systems installed to supply high quality air to operating departments do not achieve and maintain the required standards. The link between post-operative infection and theatre air quality has been well established. Plants serving conventional operating departments, for instance, will be required to ensure the separation of areas within the suite by maintaining a specific direction of air flow between rooms, even when doors are opened. They will also maintain the selected operating department environmental conditions regardless of changes in the outside air conditions or activities within the space. In addition ultra-clean operating ventilation systems which are designed to provide an effectively particle-free zone around the patient while the operation is in progress have been shown to significantly reduce post-operative infection in patients undergoing deep wound surgery. Their use for similar forms of surgery may well be indicated.

2.15 Ventilation systems that can be shown to be inappropriate, inadequate or ineffective and that give rise to proven failures can result in a civil suit by the patient against the operators. The same may be true of other ventilation applications.

2.16 If the plant has been installed to dilute or contain harmful substances, its failure may expose people to unacceptable levels of contamination, again without their becoming immediately aware of it. Proven failures can give rise to a civil suit against the operators by the individuals who have been affected. This would be in addition to the actions brought as a result of breaching the statutory requirements.

Summary of requirements

Requirement	Reason	Location
Statutory	Health and Safety at Work etc Act	Operating departments. Laboratories. Pharmacies Post Mortem Rooms
	COSHH regulations (including Local exhaust ventilation requirements)	Areas containing identified biological or chemical hazards. Areas containing oxygen displacing gases. Enclosed work-spaces. Workshops.
	Building regulations	Any room which cannot be naturally ventilated.
Functional	Comfort	Situations where the quality of the environment for staff and patient is critical to their general performance and well-being.
Clinical	Post-operative infection reduction	Operating suites used for general surgery, casualty, obstetrics/gynaecological and maternity procedures.
	Reduction of deep wound sepsis	Ultra-clean operating suites for transplant, deep wound surgery, hip replacement, bone grafting and bone marrow transplant procedures.
	Control of infection	Isolation rooms Barrier nursing rooms Treatment rooms Plaster rooms

Operational management

2.17 When new ventilation systems are accepted for use, full information as to their designed mode of operation together with recommended maintenance procedures should be provided as part of the handover procedure.

2.18 Those required to monitor and/or maintain ventilation equipment will need to show that they are competent to do so. As a minimum they should have sufficient knowledge of its correct operation in order to be able to recognise and report faults. Training in the correct operation and routine maintenance of the equipment will be required as part of the handover procedure at the end of the commissioning period.

2.19 Routine maintenance procedures can cause risks to the health of staff carrying out the work and those receiving air from the plant. All those involved

should be made aware of the risks, safe systems of work should be agreed, and suitable safety equipment should be provided and training in its use given.

2.20 Staff engaged in the service and maintenance of ventilation extract systems from pathology departments or laboratories may be particularly at risk. In these cases the risk should be identified and assessed, the means by which the system can be rendered safe to work on should be determined, training in the exact procedures should be adopted and given to all staff involved and a permit-to-work scheme on the system should be implemented.

2.21 Regular tests, at intervals agreed with the local fire prevention officer, will need to be carried out in order to demonstrate the continuing efficiency of the fire detection and containment systems. Records of these tests should be kept.

2.22 A periodic review of the need for, and operational condition of, ventilation equipment will need to be undertaken.

2.23 Training in the use of safety equipment and a safe system of work will need to be repeated periodically in order to cater for changes in staff. Records of the training provided should be kept and maintenance procedures reviewed periodically to ensure that they remain appropriate.

Designated staff functions

2.24 A person intending to fulfil any of the staff functions specified below should be able to prove that they possess sufficient skills, knowledge and experience so as to be able to perform safely the designated tasks.

2.25 **Management** - management is defined as the owner, occupier, employer, general manager, chief executive or other person who is ultimately accountable for the safe operation of premises.

2.26 **Authorised person** - a person appointed or contracted by the general manager to review and witness documentation on validation and provide auditing and advice on ventilation installations and their application.

2.27 **Test person** - a person or organisation contracted by the general manager to carry out commissioning, validation and routine testing of ventilation installations.

2.28 **Maintenance person** - a member of the maintenance staff, ventilation equipment manufacturer or maintenance organisation employed by the general manager to carry out maintenance duties on ventilation installations.

2.29 **Infection control officer** - or consultant microbiologist, if not the same person, nominated by the management to advise on monitoring infection control policy and microbiological performance of the systems. Major policy decisions should be made through an infection control committee.

2.30 **Plant operator** - any person who operates a ventilation installation.

2.31 **User** - the person responsible for the management of the unit in which the ventilation system is installed, for example, head of department, operating theatre manager, head of laboratory, production pharmacist, head of research or other responsible person.

2.32 **Contractor** - the person or organisation responsible for the supply of the ventilation equipment, its installation, commissioning and validation. This person may be a representative of a specialist ventilation organisation or a member of the general manager/chief executive's staff.

2.33 A record should be kept of those appointed to carry out the staff functions listed above. The record should clearly state the extent of the post holders duties and responsibilities and to whom they are to report.

2.34 Any training given should be recorded together with the date of delivery and topics covered.

2.35 Substitute or replacement staff should be designated in order to cover for sickness, holidays and staff transfers.

3. Functional overview

Terms in use

3.1 The terms “ventilation” and “air-conditioning” are often used interchangeably to describe the same equipment. A general explanation of the terms is given below.

Ventilation

3.2 Ventilation is a means of removing and replacing the air in a space. In its simplest form this may be achieved by opening windows and doors. Mechanical ventilation systems provide a more controllable method. Basic systems consist of a fan and collection or distribution ductwork; more complex systems may include the ability to heat and filter the air passing through them. Ventilating equipment may be required in order to remove smells, dilute contaminants and ensure that a supply of “fresh” air enters a space.

Air-conditioning

3.3 Air-conditioning is the ability to heat, cool, humidify, dehumidify and filter air. This means that the climate within a space being supplied by an air-conditioning plant can be maintained at a specific level within a specified range regardless of changes in the outside air conditions or the activities within the space. Air-conditioning equipment may be required in order to provide “comfort conditions” within a space.

Special ventilation

3.4 In healthcare premises, certain activities will necessitate the provision of ventilation equipment with additional special features in order to achieve and maintain specific conditions. These may be needed in order to assist with the treatment of patients or maintain the health and safety of staff. The precise reason for providing special ventilation will depend upon its intended application. The list below indicates some of the more typical reasons:

a. to provide “close” control of temperature;
b. to provide “close” control of humidity;
c. to remove, contain or dilute specific contaminants and fumes;
d. to ensure the isolation of one space from another;
e. to preserve a desired air flow path from a “clean” to a “less clean” area;
f. to provide control of the cleanliness of a space.

3.5 The following departments will usually have specialist ventilation requirements, either for a single room or throughout a suite:

a. an operating suite;
b. a laser surgery unit;
c. an intensive treatment unit;
d. an infectious diseases isolation unit;
e. a manufacturing pharmacy and cytotoxic drug units;
f. a specialist X-ray and scanning unit;
g. pathology department;
h. a mortuary and dissection suites;
i. research laboratories and associated animal houses;
j. sterilizing and disinfecting unit (SDU).

Equipment requirements

3.6 Ventilation may be provided in a wide variety of ways. These will include extensive purpose-built air-conditioning units housed in their own plantrooms, proprietary “packaged” systems often sited outside on a roof or wall-mounted electric fans located at the point of use.

3.7 Specialist ventilation systems utilising full air-conditioning are expensive so they are only used where there is a specific need to control closely the environment within a space, for example an operating department, intensive treatment suite or laboratory.

3.8 A fixed volume of air may be supplied, usually expressed as a number of air changes per hour (ac/h) or cubic metres per second (m^3/s) that the plant is set to deliver, or the volume of air supplied may be varied in order to maintain a specific pressure relationship between the area supplied by a special ventilation system and other surrounding areas.

3.9 An uncontaminated air supply to the plant is essential. In order to achieve this the air intake will be positioned so that air from extract systems or other dubious sources cannot be drawn in. The area surrounding the intake will need to be kept clean and free of waste material in order to reduce the possibility of bio-hazards or fire. The intake itself will be protected by a louvre and mesh screen to prevent rain water, vermin and insects etc from entering the system

3.10 Most modern plants are fitted with the means to recover energy from the extract air without causing contamination of the incoming supply air.

3.11 Ultra-clean systems use the same basic plant and equipment as standard air-conditioning but are in addition fitted with a terminal device that supplies the air in a uni-directional manner to the working area. Their standard of filtration

is also higher and is capable of delivering air with a very low particle count to the space that they serve.

3.12 Local exhaust ventilation (LEV) is a term used to describe systems installed to prevent hazardous substances from entering the general atmosphere of the room in which they are being used. Their primary function is to protect staff from the effects of their work activity.

3.13 Simple LEV systems comprise a capture hood, extract ductwork and fan. These are used to contain industrial types of hazard such as fumes from welding processes, gas discharges from standby battery banks and dust from woodworking machinery. The vapour given off when large quantities of chemicals are decanted into ready-use containers and fumes from X-ray film processing units are examples of chemical hazards often controlled by LEV systems.

3.14 In laboratories, pharmaceutical manufacturing facilities and operating suites, LEV systems usually take the form of semi-open fronted cabinets within which the hazardous substance is manipulated. These cabinets either have their own filtered air supply or are fed with air from the room. The air extracted from the cabinet is passed through a high-efficiency filter before being discharged either to the atmosphere or back into the room. Microbiological safety cabinets, laboratory fume cupboards, cytotoxic drug cabinets, and fixed or mobile glutaraldehyde disinfecting enclosures are all examples of this type of facility.

3.15 Mortuaries and dissection suites may have LEV systems incorporated within the dissection table, specimen bench and bone saw.

4. Management summary

4.1 The guidance contained in this SHTM should not be applied retrospectively; however, there is an obligation to review existing installations and ensure that they are of a safe standard. The guidance should be applied in full to new installations and major refurbishments of existing installations.

4.2 Ventilation will need to be provided:

a. as a requirement for patient care;

b. in order to fulfil a statutory duty.

In assessing the need for more specialist ventilation and the standards desired for patient care, managers will need to be guided by their medical colleagues and by information published by the Department of Health.

4.3 The statutory need for ventilation falls into two categories:

a. in the first, the need for specialist ventilation and the standards to be adopted are clearly set out in specific pieces of legislation. An excellent example of this is the current legislation surrounding the manufacture of medicinal products in the European Community. The managers of the departments affected by this type of legislative requirement should be aware of their needs and be able to advise on the standards to be achieved;

b. the second type of statutory requirement arises due to the interpretation of both the Health and Safety at Work etc Act and the Control of Substances Hazardous to Health (COSHH) regulations. The person tasked with conducting COSHH assessments will be able to advise as to the need for, and standard of, ventilation in each particular case.

4.4 It is a management responsibility to ensure that the standards applied during the design and installation of ventilation systems are not reduced during the operation and maintenance of the equipment.

4.5 Clear lines of managerial responsibility should be in place so that no doubt exists as to who is responsible for the safe operation and maintenance of the equipment. A periodic review of the management systems should take place in order to ensure that the agreed standards are being maintained.

4.6 These objectives will only be achievable if the personnel engaged have the necessary experience and training to undertake their designated tasks.

Appendix 1

Use and function of typical equipment used in ventilation plants

1. Typical equipment used in ventilation plants is listed below together with a brief description of both function and use.

General

2. The equipment built into the ductwork should be of a type that will neither cause nor sustain combustion.

3. No materials that could sustain biological activity should be used in the construction or assembly of the plant.

Air intake

4. As an uncontaminated air supply is essential, it is positioned so that air from extract systems or other dubious sources cannot be drawn in. The area surrounding the intake will be kept clean and free of waste material in order to reduce the possibility of bio-hazards or fire. The intake itself will be protected by a louvre and mesh screen to prevent rain water, vermin and insects etc entering the system.

Damper

5. Several types may be fitted:

   a. automatic dampers fitted immediately behind the air intake and extract louvres. They will automatically close when the plant is shut down in order to prevent an uncontrolled circulation of air;

   b. balance dampers are fitted into each branch of the air distribution ductwork system so that the design air flow rate can be set during the commissioning process;

   c. where ductwork passes through a fire compartment wall, ceiling or floor a fire and/or smoke damper may be required;

   d. plant isolating dampers are fitted so that the main plant can be isolated from its air distribution duct system. They are manually operated and enable cleaning and maintenance of the air-conditioning equipment to be carried out.

Ducting

6. The means by which air is conveyed from the intake to its point of use. Ducting is usually constructed of galvanised steel and will normally be insulated to reduce noise and conserve energy. Ducts can also be formed in concrete, brickwork, stainless steel or plastic and may be rigid or flexible.

Fan

7. A series of rotating blades that move the air in the direction required. Fans are usually powered by electric motors either directly connected to them or driven through belts and pulleys. A fan may be arranged to either force air into or draw air from a ductwork system.

Attenuator/silencer

8. A device that will contain and absorb the noise emitted by a fan. They may be required to reduce disturbance caused by noise breaking out through the air intake and also noise transmitted along the ductwork to the conditioned space.

Filter

9. A filter consists of a labyrinth of fibrous material contained in a frame. It is designed to capture and hold particles being carried in the airstream. Because of the size, range and number of particles that exist in air, no filter can remove them all. The purpose of filtration is to reduce their number, size and range to an acceptable level. Filters of progressively higher grades are fitted through the ventilation system:

   a. primary filters (coarse) are designed to collect the larger particles and are intended to keep the air-conditioning plant clean;
   b. secondary filters (fine) will remove the staining particles from air and keep the conditioned space visibly clean;
   c. high efficiency particulate air filters (HEPA/absolute) will remove virtually all particles from air. These may be required in order to reduce contamination in the working area either biologically or in terms of particle count.

10. Filters may be fitted to extract systems in order to remove biological, radiation or chemical hazards. If so they are often contained in a “safe change” facility in order to protect those carrying out their maintenance.

11. Activated carbon filters will reduce odours in extracted or recirculated air.

Heater battery/heater coil

12. A series of coils with or without fins through which steam or hot water is circulated. Heat is given up to the air passing over the battery thus increasing its temperature. Heating is usually carried out in stages, the final battery being controlled by the end user. Small batteries may be electric.

Humidifier

13. A device for increasing the humidity of air by adding moisture. For ventilation in healthcare premises this is normally achieved by releasing “clean” steam into an air supply duct. The steam will be completely absorbed into the air, increasing its humidity. The level of humidity may be preset or controlled by the end user.

Cooler battery/cooling coil

14. A series of finned coils mounted in the air supply duct. Either chilled water or refrigerant is circulated through the coils causing heat to be removed from the air. This will reduce its temperature and may also condense moisture out of the air. As free moisture in a duct can be a source of contamination the coil will be fitted with an eliminator and drainage system.

Eliminator

15. A device for catching and removing water droplets from an air stream. It may form part of a cooling coil or be a separate device.

Drainage system

16. A means of removing water from ductwork and disposing of it safely. Typically it will consist of a tray mounted in the duct to catch moisture, a glass water seal trap, continuously falling drainage pipework and an air break in the drain run to prevent waste water returning and contaminating the duct.

Access and observation ports

17. Doors and removable panels providing access for routine maintenance and cleaning. The doors should be fitted with glazed ports and suitable lighting provided so that the correct operation of devices such as cooling coils, humidifiers and filters can be easily observed.

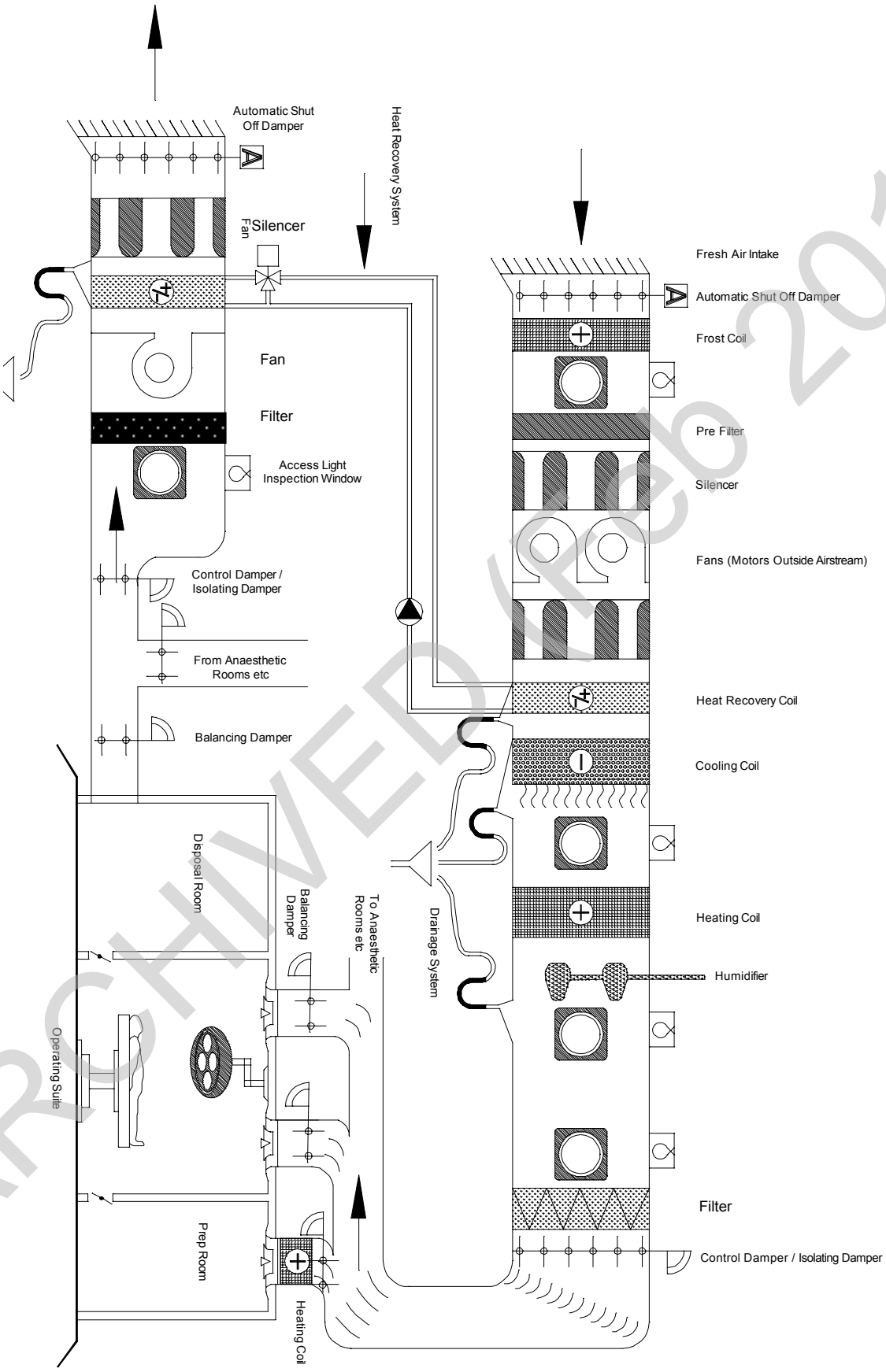
Energy recovery

18. Most modern plants are fitted with the means to recover energy from the extract air without causing contamination of the incoming supply air. These devices will be fitted with both an eliminator and a drainage system. Several types of energy recovery systems are available.

Typical plant

19. The layout of a typical plant designed to serve an operating suite is shown in Figure 1. It contains most of the equipment described above. Full details of the plant illustrated and its mode of operation are given in Part 2; 'Design considerations' of this SHTM.

Figure 1: A typical operating suite ventilation plant



Appendix 2: Abbreviations

BS	British Standards
COSHH	Control of Substances Hazardous to Health
HMSO	Her Majesty's Stationary Office
HTM	Health Technical Memorandum
LEV	Local exhaust ventilation
NHS	National Health Service
P&EF	Property and Environment Forum
P&EFEx	Property and Environment Forum Executive
SHTM	Scottish Health Technical Memorandum
SHTN	Scottish Health Technical Note
SI	Statutory Instrument
WRC	Water Research Centre

References

NOTE:
Where there is a requirement to address a listed reference, care should be taken to ensure that all amendments following the date of issue are included.

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
Acts and Regulations				
	Building (Scotland) Act	HMSO	1959	
	Clean Air Act	HMSO	1993	
	Electricity Act	HMSO	1989	
	Health and Safety at Work etc Act	HMSO	1974	
	Registered Establishments (Scotland) Act	HMSO	1998	
	Water (Scotland) Act	HMSO	1980	
SI 2179 & 187	The Building Standards (Scotland) Regulations (as amended)	HMSO	1990	
	Building Standards (Scotland) Regulations: Technical Standards Guidance	HMSO	1998	
SI 1460	Chemicals (Hazard Information and Packaging for Supply) Regulations (CHIP2)	HMSO	1997	
SI 3140	Construction (Design and Management) Regulations	HMSO	1994	
SI 437	Control of Substances Hazardous to Health Regulations (COSHH)	HMSO	1999	
SI 1057	Electricity Supply Regulations (as amended)	HMSO	1988 (amd 1994)	
SI 635	Electricity at Work Regulations	HMSO	1989	
SI 2372	Electromagnetic Compatibility Regulations (as amended)	HMSO	1992	
SI 2451	Gas Safety (Installation and Use) Regulations	HMSO	1998	
SI 2792	Health and Safety (Display Screen Equipment) Regulations	HMSO	1992	
SI 917	Health & Safety (First Aid) Regulations	HMSO	1981	
SI 682	Health & Safety (Information for Employees) Regulations	HMSO	1989	

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
SI 1380	Health and Safety (Training for Employment) Regulations	HMSO	1990	
SI 341	Health and Safety (Safety Signs and Signals) Regulations	HMSO	1996	
SI 2307	Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)	HMSO	1998	
SI 2793	Manual Handling Operations Regulations	HMSO	1992	
SI 3242	Management of Health and Safety at Work Regulations	HMSO	1999	
SI 1790	Noise at Work Regulations	HMSO	1989	
SI 3139	Personal Protective Equipment (EC Directive) Regulations (as amended)	HMSO	1992	
SI 2966	Personal Protective Equipment at Work (PPE) Regulations	HMSO	1992	
SI 128	Pressure Systems Safety Regulations (PSSR)	HMSO	2000	
SI 2306	Provision and Use of Work Equipment Regulations (PUWER)	HMSO	1998	
SI 3163	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)	HMSO	1995	
SI 3004	Workplace (Health, Safety and Welfare) Regulation	HMSO	1992	
British Standards				
BS 848	**Part 1:** Fans for general purpose performance testing using standardized airways	BSI Standards	1997	
BS 1710	**Specification for identification of pipelines and services**	BSI Standards	1984	
BS 3928	**Method for sodium flame test for air filters (other than for air supply to I.C. engines and compressors)**	BSI Standards	1969	
BS 4533	**Luminaires. Particular requirements. (Relevant parts)**	BSI Standards		
BS 4718	**Methods of tests for silencers in air distribution systems**	BSI Standards	1971	
BS 4979	**Methods for aerodynamic testing of constant and variable dual or single duct boxes**	BSI Standards	1986	
BS 5295	**Environmental cleanliness in enclosed spaces** **Parts 1 & 2**	BSI Standards	1989	

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
BS 5410	**Code of practice for oil firing. Installations of 44kW and above capacity for space heating, hot water and steam supply purposes** **Part 2**	BSI Standards	1978	
BS 5440	**Installation of flues and ventilation for gas appliances**	BSI Standards	1990	
BS 5588	**Fire precautions in the design, construction and use of buildings** **Part 9:** Code of practice for ventilation and air-conditioning ductwork	BSI Standards	1999	
BS 5720	**Code of practice for mechanical ventilation and air-conditioning in buildings**	BSI Standards	1979	
BS 5726	**Microbiological Safety Cabinets** **Part 1:** Specification for design construction and performance	BSI Standards	1992	
BS 5726	**Microbiological safety cabinets.** **Part 4:** Recommendation for selection, use and maintenance	BSI Standards	1992	
BS 6281	**Devices without moving parts for the prevention of contamination of water by backflow** **Part 1**: Specification for type A gaps for inlet or feed pipes.	BSI Standards	1992	
BS 6798	**Specification for installation of gas-fired boilers of rated input not exceeding 70 kW net**	BSI Standards	2000	
BS 7258	**Laboratory Fume Cupboards** **Parts 1 & 2**	BSI Standards	1994	
BS 7258	**Laboratory fume cupboards.** **Part 3:** Recommendations for selection, use and maintenance	BSI Standards	1994	
BS 8313	**Code of practice for accommodation of building services in ducts**	BSI Standards	1997	
BS EN 255	**Air conditioners liquid chilling packages and heat pumps with electrically driven compressors**	BSI Standards	1997	
BS EN 12469	**Biotechnology. Performance Criteria for microbiological safety cabinets**	BSI Standards	2000	
BS EN 60651	**Specification for sound level meters**	BSI Standards	1994	

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
PO 6609	**Insitu aerosol testing of HEPA filtration- an explanatory supplement to BS 5295 Part 1**	BSI Standards	1996	
Scottish Health Technical Guidance				
SHTM 2005	Building management systems	P&EFEx	2001	CD-ROM
SHTM 2007	Electrical services supply and distribution	P&EFEx	2001	CD-ROM
SHTM 2011	Emergency electrical services	P&EFEx	2001	CD-ROM
SHTM 2020	Electrical safety code for low voltage systems (Escode – LV)	P&EFEx	2001	CD-ROM
SHTM 2023	Access and accommodation for engineering services	P&EFEx	2001	CD-ROM
SHTM 2040	Control of legionellae in healthcare premises – a code of practice	P&EFEx	2001	CD-ROM
SHTM 2045	Acoustics	P&EFEx	2001	CD-ROM
SHPN 1	Health service building in Scotland	HMSO	1991	
SHPN 2	Hospital briefing and operational policy	HMSO	1993	
SHTN 1	Post commissioning documentation for health buildings in Scotland	HMSO	1993	
SHTN 4	General Purposes Estates and Facilities Model Safety Permit-to-Work System	EEF	1997	
	NHS in Scotland – PROCODE	P&EFEx	2001	Version 1.1
NHS in Scotland Firecode				
SHTM 81	Fire precautions in new hospitals	P&EFEx	1999	CD-ROM
SHTM 82	Alarm and detection systems	P&EFEx	1999	CD-ROM
SHTM 83	Fire safety in healthcare premises: general fire precautions	P&EFEx	1999	CD-ROM
SHTM 84	Fire safety in NHS residential care properties	P&EFEx	1999	CD-ROM
SHTM 85	Fire precautions in existing hospitals	P&EFEx	1999	CD-ROM
SHTM 86	Fire risk assessment in hospitals	P&EFEx	1999	CD-ROM
SHTM 87	Textiles and furniture	P&EFEx	1999	CD-ROM
SFPN 3	Escape bed lifts	P&EFEx	1999	CD-ROM
SFPN 4	Hospital main kitchens	P&EFEx	1999	CD-ROM
SFPN 5	Commercial enterprises on hospital premises	P&EFEx	1999	CD-ROM
SFPN 6	Arson prevention and control in NHS healthcare premises	P&EFEx	1999	CD-ROM

Publication ID	*Title*	*Publisher*	*Date*	*Notes*
SFPN 7	Fire precautions in patient hotels	P&EFEx	1999	CD-ROM
SFPN 10	Laboratories on hospital premises	P&EFEx	1999	CD-ROM
Health and Safety Publications				
EH 40	HSE Occupational Exposure limits	HSE	Annual	
MES	Model Engineering Specifications	NHS Estates	1997	As required
Miscellaneous References				
	Buffalo Forge Co. Fan Engineering	Buffalo Forge Co. Woods		
	CIBSE Guides and Commissioning Codes, A, W and R	CIBSE	1986	
	HVCA: Specification for sheet metal ductwork	HVCA		
DW/143	Ductwork leakage testing			
DW/TM2	Cleanliness of new ductwork			
CM0101	HVCA: Standard maintenance specification for mechanical services in buildings: CM0101 Volume 1 Heating and Pipework Services Volume 2 Ventilating and Air Conditioning Volume 3 Control, energy and building management systems Volume 4 Ancillaries, plumbing and sewerage Volume 5 Electrics in buildings	HVCA		
	Model Water Byelaws: Dept. of the Environment	HMSO	1986	
	Water Supplies Byelaws Guide	WRC		