HTM 03-01 2021 Overview of Major Changes & Updates

Overview

The principles and requirements for appropriate and effective ventilation with specific healthcare related issues are explained, including the legislative obligations and standards which must be considered.

Net zero carbon

Health Technical Memorandum 03-01 supports UK legislation to bring all greenhouse gas emissions to net zero by 2050, and promotes sustainable methods of ventilation in healthcare facilities. The HTM's core principle is that the default method of ventilation should as far as possible be natural ventilation followed by mixed mode (natural with mechanical ventilation), with mechanical ventilation being the last option.

The energy consumption of ventilation systems should be further minimised by specifying solutions with the lowest lifecycle environmental cost. The basic objective of energy-saving strategies in this HTM is to provide the required ventilation service using the minimum energy. To this end, Health Technical Memorandum 03-01 recommends switching a system "off" when not required to be the most energy-efficient policy. If the system is needed to maintain a minimum background condition, reducing its output by "setting back" to the minimum necessary to achieve and maintain the desired condition is the next best option.

Fans represent an enormous potential for energy savings to reduce carbon emissions, as they are among the largest single users of energy (they use approximately 40% of all electricity in ventilation systems). The European Regulation 1253/2014, implementing the Energy-related Products (ErP) Directive, has significantly reduced the power to drive fans. Accordingly, Health Technical Memorandum 03-01 recommends using electronically commutated fans, as these have been proven to be the most energy-efficient, while also advising that belt-driven fans should no longer be installed.

Part A: The concept, design, specification, installation and acceptance testing of healthcare ventilation systems

Ventilation Safety Groups – Chapter 4

The requirement to have a formal VSG to manage and provide assurance on all aspects for the ventilation systems present on a site, including;

- the design process for new healthcare premises;
- the design process for modifications to existing premises;
- the commissioning and validation process;
- operational management and maintenance;
- annual verification and performance testing;
- prioritising the plant replacement programme;
- decommissioning and removal of redundant equipment.

Derogations and alternative design strategies

(4.10) Any derogations or alternative design strategies from this guidance should be subject to the scrutiny and agreement in writing by the VSG. The reason for the derogation or alternative design strategy and limits to its application should be recorded.

Assessment of service requirements: selection of design criteria (4.18 – 4.62)

Extensive guidance is provided relating to the full and comprehensive factors which can influence the assessment of service requirements and define design performance criteria.

Refurbishment of existing facilities and fitting out shell schemes (4.69)

When refurbishing existing facilities or fitting out "shell" schemes, every effort should be made to achieve full compliance with this HTM and current Health Building Notes (HBNs).

Change of use of existing facilities (4.73 & 4.74)

When a change of use of existing facilities is contemplated, the ventilation requirement should be completely revised to suit the new use (see paragraph 4.63).

A new AHU fully compliant with current standards will normally be required. The existing AHU should only be retained if it is not more than 10 years old and is (or can be made) fully compliant with current standards.

Chilled beams (5.19) & Stand-alone air-conditioners (5.25)

Chilled beams should not be installed in clinical areas without the agreement in writing of the VSG. Stand-alone air conditioners include fan coil units, split-comfort air-conditioners, room conditioners and cassette units. All of these devices recirculate air which affects indoor air quality and may increase the risk of healthcare-associated infections (HAIs). Therefore they should not be installed in clinical areas. *Changed from critical care areas to all clinical areas, high risk of HAI's due to recirculated air.*

Note: Patient bedrooms are classed as clinical areas as treatment is often delivered at the bedside rather than in a designated treatment room.

Clean Air pathways (5.59)

The philosophy of establishing a clean airflow path – from the air-supply point, past the breathing zone of the staff, on to the patient or other source of airborne hazard, and out via a low-level extract should apply in anaesthetics rooms, recovery areas, birthing rooms, bronchoscopy rooms, laboratories and post-mortem rooms.

Chapter 8 Specific healthcare department requirements (Design Standards)

The range of specific clinical rooms/areas has been expanded to provide an increased range of examples so as to inform designers on ventilation aspects and principles (air changes and pressure regimes). Whilst this can never be completely comprehensive it now provides a good range of clinical areas which can be used to inform ventilation requirements for the vast majority of clinical activities and services. Appendix 2 has also been expanded to provide further examples.

Airflow rates and pressure cascades are more tailored to the applications to take advantage of new fan and control technology and so reduce energy consumption, or to reflect the changing use of sedation or clinical risks. For example theatres are now specified to achieve at least 22 ACH (reduced from 25ACH). Endoscopy suites have changed from 15ACH with a positive pressure cascade to 10 ACH with a -5Pa negative Pressure cascade. All treatment rooms should have low level extract to maintain safe airflow paths (chapter 8 Table 2).

Air from Lay-up Prep Areas into theatres - Clause 8.35 in Part A of the standard states: -The volume of supply air being discharged through the pressure stabiliser may be used to offset the volume of supply

air to the operating theatre. (The volume of air being supply into the lay-up prep should not be less than 22-ACH and should maintain at least 280l/s flow in the theatre – the prep should be at 10Pa higher pressure to the theatre). It was previously not considered acceptable practice to count air from the lay-up prep towards the theatre air change rate to achieve adequate dilution within the theatre, other than say 100l/s to achieve open door protection so long as the primary fresh air flow directly into the theatre for dilution purposes has already been achieved. This revision should be considered and reviewed by the VSG prior to any acceptance, on either new or existing systems (during verification).

Theatre Scrub Areas (8.46)

Where the scrub is a trough on the wall or in an open bay within the operating theatre, it should have low-level extract under it.

Equipment Selection Guidance (chapter 9) has been updated and refined to provide detailed advice on plant and equipment including updated information on air quality and filter standards.

AHU Location (9.4)

Mounting any type of vent unit in ceiling void in clinical areas is not permitted Formal RA required for non-clinical ceiling void mounted equipment and agreed by VSG

Use of roof mounted or external AHU's (9.5, 9.6, & 9.7)

AHUs should be located in purpose-built plantrooms or designated service spaces within a building. This will allow for routine service and maintenance (which is a statutory requirement) to be carried out at any time of day and regardless of weather conditions. It will also protect the plant from contamination by bird droppings, so reducing the risk of fungal spore contamination of the air supplied by the AHU. Control of pests and vermin will be simpler and while not in themselves a source of airborne contamination, their corpses can become a reservoir of biological material that may lead to insect infestations within the AHU.

When refurbishing or changing the use of an existing building, plant space should be created to house the ventilation plant and other services. If located on a roof they should be enclosed in a plantroom with a safe means of access. If located at ground level they should be secured within a plantroom to prevent unauthorised access. Measures should be taken to exclude vehicles from the vicinity to ensure that exhaust fumes will not be drawn into intakes. Intakes for ground level AHUs should be extended to a height and distance from contamination sources that allows them to draw in unvitiated air.

In the unlikely event that an internal or external plantroom cannot be provided, and ventilation units have to be located outside, they should be fully weatherproof to IP65 and secured from unauthorised access. Protection against the elements should also be provided for personnel carrying out routine inspection and maintenance activities. As an example, when two units are outside, and they are installed with their access doors facing each other, if the gap between them is roofed over and the open ends capped, the AHUs themselves create what is in effect a plantroom.

Provision of water facilities in plantrooms

Plantrooms should be provided with sink/wash facilities for cleaning of glass traps and hand washing after filter changing.

Access arrangements for plant and equipment (Note)

Roof level plantrooms should be served by a lift

Air Intakes Note: *(Cryptococcus Precautions)*

Steps should be taken to prevent birds landing or roosting in the vicinity by removing ledges or fitting anti-pigeon spikes.

Fans (9.41 / 9.45)

For an application outside of the capacity range of EC fans, direct-drive plug fans controlled by an inverter mounted externally to the air stream may be selected.

Belt- and pulley-driven fans should not be installed in healthcare ventilation systems.

Flexible Ducting (9.160)

Max length of flexible ducting reduced from 1m to 0.5m

AHU - Plant minimum standards (9.14)

AHU Plant should comply with the minimum standards set out in Table 8.

AHU Element	Minimum Standard	Notes
Construction	Double metal or composite skin with sandwiched insulation to "Euroclass A" fire rating Smooth internal surface without channels or ridges No projecting spire or tech screws inside the unit.	Note: Capping projecting spire screws is not acceptable.
Internal surface finish	Non-corrodible, washable and smooth and of a colour that allows accumulations of dirt to be easily seen	Stainless steel or white powder coated mild steel or with an equivalent protective treatment; but NOT surface galvanised
Thermal transmittance	BS EN 1886 Class T2	Manufacturer's declaration
Thermal bridge	BS EN 1886 Class TB2	Manufacturer's declaration
Deflection	BS EN 1886 Class D2	Manufacturer's factory test
Factory airtightness test – pre-delivery	BS EN 1886 Class L2	Test at +700 Pa and –400 Pa
Site airtightness test	BS EN 1886 Class L2	+700/–400 Pa
Filter frame bypass leakage	BS EN 1886 Section 7	
Supply and extract intake and discharge isolation dampers	BS EN 1751 C3 (low loss)	Motorised opening and fitted with an end switch and spring return
Access doors	Secured from casual access. Fan chamber doors to be fitted with a two-stage latch	Key or similar device required to open access doors Door hinges should be adjustable to so that leakage can be eliminated on site
Specific fan power -Internal (SFPint)	Current Eco design requirement for energy-related products (ErP)	EU 1253 – 2014
Specific fan power - System (SFPsyst)	UK Building Regs	Part L2
Energy recovery	Current ErP EU 1253	Run-around coil – 68% Heat pipes – 73% Plate heat exchanger – 73% Thermal wheel – 73% Heat pump – EU 2281/201 Any other device – see standard

Chapters 10 & 11

Advice is given on installation standards and the appointment of an independent validator. More detailed information is given on the commissioning process.

Standard of installation

All ductwork should be tested for leakage irrespective of velocity/pressure to ensure and improve energy efficiency. The updated (2021) version of the HTM is trying to drive a reduction of energy use and therefore carbon footprint. Leaky ducts waste energy. The concept is that we do not accept leaking water, sewage or gas systems so why should ventilation be any different?

The DW143 guidance is quoted to specify the test methodology with a blanket acceptable performance level of below 3%.

11.20 During the installation of the system the following will be witnessed:

- that air-pressure tests and air-leakage tests on ventilation ducting have been carried out in accordance with the methods set out in the BESA DW143 –'Ductwork leakage testing' but the leakage rate to be not greater than 3% (it is usual to carry out these tests a section at a time as the ductwork is installed and before its insulation is applied. The results will be recorded in the commissioning manual);

First Fix Inspection

12.12 If possible, the following airtightness tests should be witnessed during the inspection:

- AHU installation leakage (BS EN 1886);
- supply and extract duct leakage (BESA DW/143);
- initial permeability test (see paragraph 12.17).

Acceptance testing: validation (Chapter 12)

Validation acceptance standards and methodology has been completely revised, and expanding to specify specific processes and roles required to achieve compliance. Examples include;

Permeability testing - 12.17 The following areas will require permeability testing:

- isolation suites of any type;
- operating suites of any type;
- pharmacy aseptic preparation facilities;
- IAP cleanrooms in sterile services departments;
- category 3 and 4 containment facilities;
- any other area specified within the contract.

Information (Chapter 13)

The HTM introduces a standard method of identifying and labelling ventilation systems and the creation of an inventory of installed systems. This database forms the foundation of an effective management system for all ventilation systems.

Specific requirements have been included to ensure all information required to safely operate and manage the ventilation systems are provided at completion of a project/installation and maintained and reviewed throughout the life of the system.

Expected service life (13.32)

Plant to be deep cleaned and controls renewed after 10 years and new plant at 20 years

Part B: The management, operation, maintenance and routine testing of existing healthcare ventilation systems

Chapter 1 (System Information)

Each ventilation system should have a log (physical or electronic) that contains the following information:

- The unique system identification reference.
- Purpose of the system.
- Date of installation.
- Details of the installed equipment and ductwork layout.
- Detail of the fire plan, any fire-rated ductwork and location of fire and smoke dampers.
- Design performance parameters, for example airflow rates, air-change rates, pressures, etc.
- Commissioned date and performance.
- Record of the system validation and original acceptance.
- Records of the annual inspection and verification.
- Maintenance records and plant information, for example fan specifications and filter sizes.

The records should be linked to the inventory and stored in such a way as to be readily available in the event of plant breakdown or other incident.

Lifecycle of ventilation systems (1.53/1.54)

Plant should be scheduled for replacement after 20 years. CIBSE Guide M gives advice on plant lifecycle and the risk assessment of plant condition. In order to secure funding and programme downtime for the area served, a site-wide plant replacement programme should be in place. As an example, if a site has 40 AHUs then at least two will need to be replaced every year. The plant replacement should coincide with a refurbishment of the area served.

In order to maintain efficiency, ventilation systems should be refurbished at their mid-life point (typically 10 years after original installation). The complete system should be taken out of use and thoroughly inspected. The AHU and its distribution ductwork should be cleaned as appropriate, any internal corrosion investigated and treated, the complete control system up- graded and the entire installation rebalanced and recommissioned. The performance of the system should be validated before being returned to service.

Note: During this process the opportunity should be taken to replace any belt-driven fans with the most energy-efficient fans available, for example electronically commutated (EC) plug fans or direct-drive plug fans.

Chapter 2 - Ventilation Safety Group (VSG)

The management of the ventilation systems of a healthcare provider should be overseen by the Ventilation Safety Group (VSG). The VSG should have clearly defined roles and responsibilities, be part

of a healthcare organisation's governance structure and report to the designated person at Board level. It will be led and chaired by a person who has appropriate management responsibility, knowledge, competence and experience (for example the Designated Person).

It is important that decisions affecting the resilience, safety and integrity of the ventilation systems and associated equipment are not taken without the agreement of the VSG. The VSG should ensure that appropriate expertise and competence is available when making such decisions.

Ventilation policy document

The VSG will produce a ventilation policy document for the healthcare provider. In its simplest form this may just be a statement that the healthcare provider will follow the guidance contained in Health Technical Memorandum 03-01 Parts A and B as appropriate. It may also specify any departures from that guidance in terms of local additional requirements or derogations.

The policy document will be endorsed by the healthcare provider's board.

Equipment Release Certificate

The requirement to use a specific ventilation ERC or Permit to Work system is now mandatory for work on critical ventilation systems.