Health Facilities Scotland

NHS National Services Scotland

# NHS Scotland Firecode
# Scottish Health Technical Memorandum 81

## Part 1: Fire safety in the design of healthcare premises

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Version 5.0

# Contents

# 1. Introduction

## About this publication

This Scottish Health Technical Memorandum (SHTM) provides guidance on the design of fire precautions for new healthcare premises, extensions and structural refurbishments to existing facilities.

It recognises the interaction between physical fire precautions, the dependency of patients, the potential fire hazards within healthcare premises, management policies and procedures, and the availability of adequately trained staff to carry out evacuation procedures and ensure an acceptable level of fire safety.

Additional guidance on the application of fire safety standards, referred to in this document, is contained in the complete suite of SHTM Firecode, and where applicable, this will be signposted.

**Note 1.1:** SHTM 81 Part 1: has been retitled as ‘Fire safety in the design of healthcare premises version 5’ and replaces previous versions of SHTM 81 Part 1 titled ‘Fire Precautions in New Healthcare Premises

## Overview

This Scottish Health Technical Memorandum (SHTM) recognises the requirement for an enhanced level of fire safety in healthcare premises for the protection of patients and other occupants.

Whilst the incidence of fire in hospitals and other healthcare premises is low, the consequences may be serious because of the difficulties and dangers associated with the emergency evacuation of patients, some of whom may be highly dependent on life support equipment and require staff assistance in the event of a fire evacuation.

The technical standards outlined within this document meet the statutory requirements of the Building (Scotland) Regulations 2004. They are supplementary to the Scottish Building Standards technical handbook non-domestic. Local Authority Building Standards will reference this document as part of their compliance regime.

The guidance in this document is consistent with the statutory compliance requirements of the Fire (Scotland) Act 2005 as amended and the Fire Safety (Scotland) Regulations 2006.

The procedures and technical guidance described in this document should be a core component of the procurement and design process for new healthcare premises and extensions or structural refurbishments to existing facilities.

The term ‘healthcare premises’ is used in this guidance document to allow the broad spectrum of premises used to treat NHS Scotland patients to be fully taken into account. However, where appropriate, the term ‘hospital’ is used to identify specific requirements and recommendations for that occupancy.

NHS Scotland Firecode defines a Hospital as healthcare premises with bed-patient facilities.

Following the guidance within this document will ensure that active and passive fire precautions are of a high standard. This will facilitate the formation of effective fire safety management and emergency fire action plans for the occupied premises.

It is the responsibility of the Health Board Chief Executive to ensure that the managerial, procurement and technical provisions for fire safety in healthcare premises meet or exceed the standards specified in this document.

References throughout this document to British and other technical standards do not include publication date and the current edition should be used.

## Status

The Fire Safety Policy for NHS Scotland mandates that NHSS bodies give regard to SHTM Firecode guidance for proposed and existing healthcare premises.

## Legislation

Relevant legislation appertaining to the construction and management of healthcare premises includes:

- The Building (Scotland) Act and Regulations;
- The Fire (Scotland) Act and Regulations;
- The Health and Safety at Work Act and Regulations;
- The Construction (Design and Management) Regulations;
- Dangerous Substances and Explosive Atmospheres regulations;
- The Equality Act.

## Variations from standards

Where it is proposed to adopt a methodology that varies from SHTM 81 or the technical handbook non-domestic, it should be evidenced that the variation meets or exceeds the benchmark standards.

Any variations should be fully justified and documented in the ‘design proposal fire safety strategy’ and agreed with all relevant parties including the NHSS Health Boards fire safety advisors, Local Authority Building Standards and the Scottish Fire and Rescue Service.

If a fire-engineered design is proposed, the Health Board should appoint an independent third party assessor to verify that the design proposal meets the statutory and mandatory standards.

# 2. Scope of SHTM 81

Throughout this guidance, reference is made to healthcare premises owned or occupied by NHS Scotland; however, the standards apply equally to premises that are owned or managed by any other healthcare provider.

Designers should reference this document and other NHS Scotland SHTM Firecode documents, in conjunction with the Building Standards technical handbook non-domestic.

This guidance is specifically applicable to healthcare premises used for the treatment of patients. Buildings that do not have patient access such as offices, laboratories, and storage facilities, and are not physically connected to a patient treatment facility should be designed and constructed in accordance with the technical handbook non-domestic.

Many premises that do not have patient access are integral to the delivery of healthcare services e.g. warehouses and pharmacies. NHS Scotland Health Boards may wish to include particular aspects of this document, such as increased compartmentation or fire suppression systems, to protect the infrastructure and ensure business continuity.

## Use by competent person

The guidance in this document has been prepared on the understanding that it can be interpreted and utilised by ‘competent persons’, who are appropriately qualified with sufficient technical knowledge relevant to the healthcare environment.

## Consultation

NHS Scotland Bodies commissioning new healthcare premises and extensions or structural refurbishments to existing facilities should ensure that, at the earliest stage of the design process, there is close collaboration between all parties, including the Health Boards fire safety advisors regarding the fire safety provisions. This applies to all premises whether owned, leased, public private partnership or third party contract.

Scottish Government policy (CEL(2010)19) mandates NHS Scotland Bodies follow the built environment investment quality processes. These include the NHS Scotland Design Assessment Process (NDAP), and the NHS Scotland Assure processes (DL(2021)14).

It is essential that there is early consultation between the design team, the Health Boards subject matter experts, the Health Board fire safety advisor and clinical teams to ensure there is no conflict between patient care and fire safety requirements. It may also be appropriate to liaise with the client’s insurers and the Health Boards legal advisors.

# 3. Fire safety during construction

The potential danger from fire is particularly severe on many construction sites, where high-risk activities, such as hot works are frequently combined with circumstances where fire can spread quickly, and escape may be difficult. If a worksite is within the curtilage of an existing healthcare facility, any fire incident has the potential to significantly impact on the occupied premises. Therefore, site activities of contractors should be supervised and controlled to ensure that a suitable means of escape remains available throughout the construction process, including handover and commissioning, from the occupied premises and construction site.

Construction sites are designated as ‘relevant premises’ for the purposes of Part 3 of the Fire (Scotland) Act. Therefore, where a construction site shares part of a site with an operational healthcare facility, the occupiers of the respective parts must co-operate to ensure there are adequate fire precautions to ensure the safety of all persons.

The Health Board should appoint a nominated person during the commissioning and handover phases to ensure that suitable fire safety precautions are put in place to compensate for any snagging work activity that impacts on the fire safety provision or fire safety systems being inoperative whilst testing takes place.

The Health Boards fire safety advisor should liaise closely with the nominated person.

If a construction site adjoins or is within the curtilage of an existing healthcare facility, the existing emergency fire action plan should be reviewed and revised to take account of the effect of works on the means of escape provision. The revised plan should take particular account of works that are close to an access or exit route, ambulance and other emergency vehicle arrival areas, supply delivery areas, medical gas cylinder handling areas and storage areas containing highly flammable materials.

The management arrangements must include a fire safety procedure for the site at all phases of construction, including commissioning and handover.

All persons working on or visiting the site should receive fire safety induction training regarding the work activity, the means for raising an alarm of fire and the evacuation procedures. Further information is available in HSE guidance: Fire safety in construction (HSG168).

# 4. Classification of patient dependency

The passive and active fire precautions specified in this document recognise the need to minimise disruption to patient care in the event of fire.

The level of fire precautions and fire evacuation procedures should be based on patient dependency and the fire loading of adjacent areas.

Firecode classifies patient dependency into three distinct groups:

- **very high dependency** - Patients for whom movement or evacuation would severely affect their medical care and may prove life threatening. This will include those in intensive care areas, operating theatres, coronary care, special care baby units etc.;
- **dependent** - Patients whose clinical treatment or condition creates a dependency on staff to evacuate in the event of fire. Evacuation of this patient group is unlikely to prove life threatening although it will most likely be necessary to move them to an adjoining compartment or sub-compartment, where their care can be continued;
- **independent** - Patients are considered as independent if their mobility is such that they can evacuate a premises unaided or with minimal assistance from another person. This would include being sufficiently able to negotiate stairs as well as being able to comprehend the emergency wayfinding signage around the healthcare facility.

# 5. Progressive horizontal evacuation

The immediate and total evacuation to outside of the building may not be practicable or desirable for the following reasons:

- patients may be dependent on medical, electrical or mechanical equipment and cannot be moved easily or quickly as the act of doing so may incur harm;
- patients ability to respond to an alarm of fire may be limited by mental health; visual or aural impairments;
- patients with restricted mobility may not be able to negotiate escape routes, particularly stairways, without assistance;
- the effects of medication may restrict patients' response.

Progressive horizontal evacuation is a systematic process of moving patients away from the area affected by fire to an adjoining compartment or sub compartment on the same level, where the patients and staff are protected from the immediate dangers of fire and smoke and patient medical care can be continued. The adjoining compartment/sub compartment should be capable of holding the occupant capacity of the vacated compartment in addition to its own occupancy. Patients and staff may remain in the adjoining compartment / sub compartment until the fire is extinguished.

If necessary due to fire development, occupants should have the facility to move continually away from the area of fire, either, to the next adjoining compartment / sub compartment, or to an escape stair or escape lift that leads to a place of safety, or directly to a place of safety.

Every storey containing bed-patient areas within hospitals should be designed to provide for progressive horizontal evacuation.

The facility for progressive horizontal evacuation should be considered for any healthcare premises or area that will provide treatment, medication or anaesthetic that could result in delayed patient evacuation. Where this is the case, a clear fire strategy should be agreed between the designer and the Health Boards fire safety advisers on the elements required to facilitate PHE from specified areas.

Factors that should be considered include:

- the dependency of patients;
- the mobility of patients and others that effect their ability to evacuate premises in a fire emergency;
- fire hazards within the premises;
- management policies, including the availability of sufficient and adequately trained staff.

# 6. Fire detection and alarm systems

The provision of automatic means for detecting a fire and raising the alarm is of vital importance in healthcare premises, particularly in areas of a building that are not permanently staffed, to provide the maximum available safe egress time (ASET) from the earliest stage of fire development.

An automatic fire detection and alarm system should be installed in all healthcare premises and should be designed and installed in accordance with the guidance in SHTM 82: Fire alarm and detection systems and BS 5839-1: Fire detection and fire alarm systems for buildings.

- a category L1 system should be provided throughout all parts of hospital premises;
- for healthcare premises other than hospitals, the fire detection and fire alarm system should be appropriate for the risk, but a minimum of L3 standard;
- fire alarm zones should be consistent with fire compartment and sub-compartments boundaries;
- fire alarm systems should incorporate an automatic means of alerting the fire and rescue service, usually through a third-party alarm-receiving centre (ARC).

All fire alarm systems should have the capability of being fitted with detectors that can differentiate between false alarm triggers such as dust or steam and an actual fire. This will greatly minimise the number of unwanted fire alarm signals and ensure an immediate mobilisation of fire service appliances via an alarm receiving centre. This is of particular importance where it is not possible to check for signs of fire e.g. roof voids, areas not permanently staffed and during periods that premises are unoccupied.

The fire service will always attend any incident where they receive a 999 call that confirms a fire.

Voice alarm systems have been shown to provide significant benefits, and may be considered for use, particularly in areas where large numbers of public congregate e.g. Atriums and retail areas.

Guidance on voice alarm systems is provided in SHTM 82: Fire alarm and detection systems and BS 5839-8: Code of practice for the design, installation, commissioning and maintenance of voice alarm systems.

# 7. Automatic fire suppression systems

Automatic fire suppression is mandated in prescribed areas, see section 10.

An automatic fire suppression system may be an integral part of a fire-engineered solution to achieve an acceptable standard of fire safety where there is a variation from Firecode and the Building Standards technical handbook non-domestic.

In addition to the mandatory standards, automatic fire suppression systems should be fully considered for all new healthcare premises, extensions or structural refurbishments to existing facilities, and the rationale fully documented in the fire strategy proposal.

Considerations should include:

- enhanced life safety provision;
- minimising the spread of fire and subsequent disruption to patient services;
- the strategic importance of the facility with regard to ensuring the ongoing provision of healthcare;
- the geographical location of the building e.g. island or remote area with limited fire service attendance;
- availability of mains water supply and whether there is sufficient water pressure;
- areas of special fire risk within or adjacent to a hospital e.g. laboratories, a national treatment centre and a national distribution centre;
- Fire Service attendance criteria in response to automatic fire alarm activations;
- environmental factors e.g. smoke contamination of surrounding atmosphere, large volumes of water used in the operation of firefighting and subsequent contaminated water run off;
- cost benefit analyses comparing the cost of reinstatement of services after a fire event compared to the initial cost of installation of a suppression system.

Where installed, sprinkler systems should comply with the requirements of BS EN 12845 Fixed firefighting systems: Automatic sprinkler systems and the Loss Prevention Council (LPC) Rules.

Where other suppression systems are proposed it should be evidenced that they comply with the relevant BS EN standard.

# 8. Temporary waiting spaces

Temporary waiting spaces/refuges are places of relative safety where persons with restricted mobility have access to a communication facility, whereby, they can call upon staff to assist them with their ongoing evacuation.

Temporary waiting spaces should be provided in healthcare buildings in accordance with the technical handbook non-domestic section 2.9.30 and emergency voice communication systems should comply with BS 5839-9: Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems.

# 9. Hospital streets

A hospital street is a protected zone in a hospital that serves as a circulation route, facilitates progressive horizontal evacuation and provides a fire-fighting bridgehead.

A hospital street should:

- have an unobstructed width of at least 3m;
- be divided into at least 3 sub-compartments;
- have at least 2 final exits at ground floor level;
- have access to at least 2 escape stairs at every upper storey, accessed from separate sub-compartments;
- be designed whereby a door from a hospital street to an adjoining compartment is located so that an alternative independent means of escape from each compartment is available;
- not contain a shop or commercial enterprise;
- not have a travel distance between escape stairs that exceeds 64m;
- not have a single direction of travel that exceeds 15m;
- not have a travel distance that exceeds 32m from a compartment exit to an escape stair;
- not have a door that is located in the same sub-compartment as a door to a protected zone containing a stairway or lift.

# 10. Construction and compartmentation

## Introduction

Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, fire and smoke are inhibited from spreading beyond the compartment of origin.

## Compartment wall

A compartment wall with a medium fire resistance duration should be provided between different hospital departments and hospital departments and protected zones.

## Compartment

Every compartment in a hospital should have a maximum area of 1500m$^2$.

Every upper storey and every basement storey should form a separate compartment.

## Sub-compartment

Every compartment should be divided into at least 2 sub-compartments by a wall with short fire resistance duration, so that no sub-compartment is more than 750m$^2$.

Where a compartment is under the maximum size of a sub-compartment, it need not be further sub-divided, except where it is the only compartment on a floor, then it should be sub-compartmented to provide the facility for progressive horizontal evacuation.

## Minimum storey areas

Every storey in a hospital at a height of more than 7.5m containing departments to which patients have access should either comprise at least 4 compartments, each of which should have an area of at least 500m$^2$ or have a hospital street and at least 3 other compartments.

In a hospital, every storey at a height of more than 18m containing departments to which patients have access should either comprise of at least 4 compartments, each of which should have an area of at least 500m$^2$ or have a hospital street and at least 3 other compartments each of which should have an area of at least 500m$^2$.

## Wards occupied with very high dependency patients

Every ward occupied with very high dependency patients should be divided into at least 2 sub-compartments by a sub-compartment wall of short duration fire resistance.

Every entrance to a ward occupied with very high dependency patients should be from a hospital street or through a lobby that is enclosed with short duration fire resistance.

## Fire hazard rooms and fire hazard departments

In hospitals and in some instances other healthcare premises, certain rooms and departments that have an inherent fire risk, require an enhanced level of fire precautions.

These are termed fire hazard rooms or fire hazard departments and they should be enclosed in fire resisting construction so that fire is contained for a sufficient time to secure the safe evacuation of adjacent patient care areas.

The following fire hazard rooms and fire hazard departments should be enclosed with short duration fire resistant construction, including windows, vents, ducting and door sets:

- wards and bedrooms designed for very high dependency patients and patients with severe mental health illness;
- chemical stores;
- domestic services rooms that are designed to allow storage of flammable materials, chemicals, or the charging of electrical devices/equipment;
- day rooms (floor area over 20m$^2$);
- smoking rooms (where permitted);
- disposal rooms;
- laboratories;
- lift motor rooms;
- linen stores;
- kitchens with full cooking facilities;
- laundry rooms;
- staff changing and locker rooms;
- x-ray and record stores;
- store rooms that are designed to allow storage of flammable materials, chemicals, or the charging of electrical devices/equipment;
- rooms designed specifically for the charging of electrical devices/equipment;
- flammable stores;
- Any other room or department with a correspondingly high fire load.

The undernoted departments should not be located directly below or adjoin operating theatres, wards occupied with very high dependency patients or special care baby units (SCBUs).

Where they are located below, or adjoin any other hospital department to which patients have access, they should have a fire suppression system installed.

- boiler houses;
- central stores;
- commercial enterprises;
- flammable stores;
- laundries;
- main electrical switchgear;
- main kitchens;
- refuse collection and incinerators;
- any other department with a correspondingly high fire load.

The undernoted departments should have an automatic fire suppression system where they are located directly below, or adjoin operating theatres or wards occupied with very high dependency patients.

- central staff changing facilities;
- central sterile supplies;
- hospital sterilising and disinfecting units;
- health records departments;
- pathology;
- manufacturing pharmacies;
- any other department with a correspondingly high fire load.

## Combustibility

In a Hospital, compartments should have walls, floors and ceilings (attached to the roof structure), constructed of products that achieve European Classification A1 or A2 or it can be demonstrated that the fire performance of the completed structure achieves the intent of the building regulations. However sub-compartments may be constructed with products of European Classification B, C, D or E, provided the completed structure achieves short duration fire resistance.

## Junction with external walls

Where a compartment wall or sub-compartment wall meets an external wall, there should be a 1m wide strip of the external wall which has the same level of fire resistance duration as the compartment wall or sub-compartment wall, to prevent lateral fire spread.

Where a lower roof abuts an external wall, the roof should provide a medium duration fire resistance for a distance of at least 3m from the wall.

## Cavity barriers

Cavity barriers need not be provided to divide a cavity above an operating theatre and its ancillary rooms.

Where cavity barriers are installed between a roof and a ceiling above an undivided space, the maximum limit of 20m should be applied.

## Corridors

Corridor walls serving sleeping accommodation should be constructed of short duration fire resistance including windows, vents and ducting. Any door in the wall should have short duration fire resistance and be fitted with self-closing devices. Cupboard or storeroom doors should be of short duration fire resistance, but do not require self- closing devices provided they are kept locked shut when not in use.

## Protected lobbies

Protected lobbies should not form part of a through route i.e. they should not be located across a corridor if the corridor continues beyond the protected lobby.

## External wall systems

External wall systems, including cladding and insulation, on all hospitals with a total floor area of more than 200m$^2$, should be constructed of products achieving European Classification A1 (non-combustible) or A2 (will not significantly contribute to fire load and fire growth).

See Scottish Advice Note: Determining the fire risk posed by external wall systems.

## Car parks

Direct access from an enclosed car park to a hospital should be via a protected lobby.

Vertical access from an enclosed car park to a hospital should be via a protected lobby in the stair enclosure.

# 11. Means of escape

The requirements for means of escape are based on:

- the potential for progressive horizontal evacuation, achieved by dividing a storey into compartments and sub-compartments;
- height above ground level of the patient access area;
- travel distance and escape routes;
- provision of an adequate number of exits and escape stairs;
- provision of emergency escape lighting;
- provision of a fire alarm and detection system;
- provision of fire resilient infrastructure.

The number of exits in a hospital should be calculated in accordance with the requirements of the technical handbook non-domestic section 2.9.1 and the additional criteria below.

A minimum of 2 storey exits should be provided from a hospital. The number of storey exits increases in proportion to the number of patient beds:

- any storey with more than 100 patient beds should have at least 3 storey exits;
- any storey with more than 200 patient beds should have at least 4 storey exits;
- any storey with more than 300 patient beds should have at least 5 storey exits.

## Compartment exits

In a hospital where a storey is divided into 3 or more compartments, each compartment should have exits to:

- an adjoining compartment and a hospital street, or
- an adjoining compartment and an escape stair, or
- an adjoining compartment and a final exit.

Each sub-compartment should be provided with at least 2 exits by way of protected zones or unprotected zones to adjoining, but separate, compartments or sub-compartments.

## Travel distance

Travel distance in patient access areas of healthcare premises should not exceed 15m in one direction of travel and 32m in more than one direction. Travel distance may be measured to a place of safety, a protected zone, an escape stair or a protected door in a compartment wall or a sub-compartment wall however an escape route should not pass through fire hazard rooms.

Travel distance should be measured along the actual escape route and should take account of the location of equipment, items of furniture and other obstructions that will be present when the building is occupied.

Where an escape route passes through an open plan area, the route should be clearly defined.

The travel distances as defined above are a maximum for the occupancy type and an assessment should be made, at the design stage, as to whether this distance should be reduced to take account of parts of the building that will be occupied primarily by persons with mobility issues.

Further guidance is available in the technical handbook non-domestic section 2.9.3 table 2.11.

## Access to escape stairs

In a hospital, where an escape stair in a protected zone serves an upper storey containing patient facilities, access to the protected zone should be by way of a protected lobby or by way of a hospital street.

# 12. Fire/smoke doors

In healthcare premises, all fire door sets must be fitted with an appropriate means of preventing the passage of fire and smoke.

Fire doors, including frame, hardware and glazing should be tested and certified to BS 476-22: Fire tests on building materials and structures or BS EN 1634-1: Fire resistance test for door and shutter assemblies and openable windows.

Fire doors should be installed in accordance with BS 8214: Timber-based fire door assemblies.

In addition to ensuring the correct fire safety performance criteria of fire doors, the door sets should be robust enough for their chosen application. This should take account of potential damage caused by everyday activity such as moving patients by wheelchairs and bed trolleys.

All fire and smoke doors, including each leaf of double doors, should be provided with an identification disc. The disc should be a minimum of 45mm in diameter clearly indicating the level of fire safety performance of the door.

Automatic doors on an escape route should be installed in accordance with BS 7036: Power operated pedestrian door sets and the technical handbook non-domestic.

Door swings should not obstruct the designed width of the circulation space or escape route. However, storeroom doors, which are normally locked, may open on to circulation and escape routes; it is recommended that storeroom doors should open through 180° to avoid obstruction.

Fire doors across escape routes should open in the direction of escape, however, fire doors across escape routes providing alternative means of escape should be double swing.

## Vision panels

Where doors on escape routes sub-divide corridors or doors that are double swing, they should be provided with a vision panel at a suitable height and position for all possible users, installed in accordance with BS 8214.

## Self-closing devices

Self-closing devices should be fitted to fire and smoke doors including half leafs and installed in accordance with BS EN 1154: Building hardware - Controlled door closing devices.

To facilitate operational needs and patient comfort, self-closing doors serving patient bedrooms should be of the free swing arm type that normally stand open in any position but fully close when the fire alarm actuates.

Acoustically actuated systems are not acceptable in newly built hospitals.

## Electrically powered hold open devices

One of the main causes of damage to fire doors is due to wheelchairs, beds and trolleys colliding with partially open doors.

In order to minimise the operational impact, whilst maintaining the effectiveness of protective measures self-closing fire doors may be fitted with electromagnetic hold open devices, linked to the fire alarm. They should be designed in accordance with BS 5839-3: Specification for automatic release mechanisms and EN 1155: Building hardware: Electrically powered hold-open devices for swing doors.

Electromagnetic hold open devices should not be installed on:

- an emergency door;
- fire and smoke doors serving the only escape stair in the building;
- fire and smoke doors serving the only escape stair for part of the building;
- fire and smoke doors serving a fire-fighting shaft;

Acoustically actuated systems are not acceptable in newly built hospitals.

Further guidance is available in BS 7273-4: Actuation of release mechanisms for doors.

## Transfer grilles and vents

To reduce the possibility of smoke transfer between compartments and sub-compartments, the installation of transfer grilles in fire resisting door sets or other fire-resistant construction should be avoided. However, where they are an essential component of an air transfer system they should be provided with remotely resettable fire and smoke dampers actuated by automatic smoke detection.

Fire doors, frame and hardware (including transfer grilles and vents) should be tested and certified to BS 476-22 or BS EN 1634-1 and installed in accordance with BS 8214.

# 13. Emergency evacuation

Escape routes from bed-patient areas should be designed to permit the use of mattress and other evacuation aids should it become necessary in an extreme fire situation.

To facilitate this, an escape stair width should be a minimum of 1300mm and the landing should be designed to ensure it is of sufficient width to manoeuvre mattresses and other evacuation aids.

Consideration should be given to additional width of stairways, if required for ambulant persons to pass whilst a mattress evacuation is taking place.

## Escape lifts

In hospitals, escape bed lifts provide an option for the vertical evacuation of patients and they play an important part in the overall evacuation strategy. Therefore, the requirement for escape bed lifts should be considered at the initial design stage, and the rationale fully documented in the fire strategy proposal.

Evacuation lifts should be considered for all healthcare premises, as it is likely many patients with mobility issues will not be able to negotiate stairs to make their escape from a building. Evacuation lifts should have the same system protection measures as escape bed lifts.

Escape bed lifts should comply with SHTM 08-02: Specialist Services Lifts and SFPN 3: Escape bed lifts.

## External stairways

Unenclosed external stairways should not be provided for escape purposes from patient access areas.

## Escape routes

All escape routes should lead directly to:

- A place of safety, or
- A protected zone, or
- An unprotected zone in another compartment or sub-compartment (this facilitates progressive Horizontal Evacuation where patients may be moved to another ward in a different compartment or sub-compartment).

Escape routes including door widths from bed-patient areas should have a minimum unobstructed width of 1500mm to accommodate bed-patient evacuation.

# 14. Locks

Healthcare premises can present challenges when assessing the requirement for locked doors in secure units whilst ensuring all occupants can evacuate safely in the event of fire. Additionally, healthcare premises may have patients at risk of harm from falling down stairs, e.g. a patient ward on an upper floor providing accommodation for elderly patients.

In such cases, a variation from 'Firecode' and 'Technical Handbook: Non-Domestic' may be appropriate provided it does not diminish the means of escape provision. Where a variance is proposed, it should be supported with a robust management procedure that will ensure the following factors:

- staff have a failsafe method of unlocking exit doors;
- there will be sufficient staff available to ensure all exit doors can be unlocked;
- staff will be made aware of their responsibilities and receive comprehensive training;
- staff will be in constant communication with each other during a fire evacuation, and there will always be someone present with the responsibility of managing and coordinating an evacuation.

The safety and security measures including management procedures should be considered at the design stage onwards and form part of the buildings fire strategy.

Further information is available in SHTM 85: Fire precautions in existing healthcare premises, sections 7.133 to 7.137.

## Electrically powered locks

Electrically powered locks should not be installed on a protected door serving the only escape stair in the building, or

The only escape stair serving part of the building, or

On any door, that provides the only route of escape from the building or part of the building.

Further information is available in SHTM 85: Fire precautions in existing healthcare premises, sections 7.138 to 7.145.

# 15. Emergency escape lighting

In the event of a local or general power failure it is important that escape routes remain illuminated to aid the safe evacuation of occupants in an emergency, therefore, an emergency escape lighting system should be installed in accordance with the technical handbook non-domestic, BS 5266-1: Code of practice for the emergency lighting of premises and BS EN 1838: Lighting applications - Emergency lighting.

Due to the difficulties and dangers associated with the emergency evacuation of patients, the emergency escape lighting systems should activate within 0.5 seconds of a mains failure in all healthcare premises.

A three-hour duration emergency escape lighting system should be installed in all healthcare premises.

To maintain patient comfort, it is unlikely that ‘maintained’ emergency escape lighting would be suitable for bed patient wards, as the luminaires remain permanently illuminated with this type of system.

# 16. Fire signs and notices

Fire signs and notices should be sited in conspicuous locations throughout healthcare premises and should be installed in accordance with the guidance within SHTM 85: Fire precautions in existing healthcare premises, sections 7.12 to 7.19.

# 17. Portable fire-fighting equipment

All healthcare buildings should be designed with location points for portable firefighting equipment in accordance with the requirements of BS 5306-8: Selection and positioning of portable fire extinguishers, these points should be easily accessible to staff and should not cause an obstruction to operational activity or the means of escape routes.

Portable fire-fighting equipment should be installed in accordance with the requirements of BS 5306-8.

Hose reel installations should not be installed in healthcare premises.

Further information is available in SHTM 85: Fire precautions in existing healthcare premises, sections 7.167 to 7.177.

# 18. Fire and rescue service facilities

## General

The design and construction of healthcare premises should ensure that there is suitable access and provision of facilities for firefighting in accordance with the technical handbook non-domestic.

## Hospital streets

Where a hospital street has two or more escape stairs, Fire and Rescue Service facilities should be provided in accordance with the table below.

**Table 18.1: Fire and Rescue Service Facilities**

| Height and depth of storey above or below fire and rescue service access level | Facilities on escape stair | Technical handbook non domestic; clause |
|---|---|---|
| Basements at a depth more than 10m below access level. | Fire-fighting stair;<br>Fire-fighting lift;<br>Fire-fighting lobby;<br>Ventilation to stair and lobby;<br>Dry fire main (outlet located at every departmental entrance) | 2.14.3<br>2.14.4<br>2.14.5<br>2.14.6<br>2.14.7 |
| Basements at a depth not more than 10m below access level. | Fire-fighting stair;<br>Ventilation to stair;<br>Unvented fire-fighting lobby;<br>Dry fire main (outlet located at every departmental entrance) | 2.14.3<br>2.14.6<br>2.14.5<br>2.14.7 |
| Topmost storey height not more than 18m above access level. | Fire-fighting stair;<br>Ventilation to stair;<br>Unvented fire-fighting lobby;<br>Dry fire main (outlet located at every departmental entrance) | 2.14.3<br>2.14.6<br>2.14.5<br>2.14.7 |
| Topmost storey height not more than 50m above access level. | Fire-fighting stair;<br>Fire-fighting lift;<br>Fire-fighting lobby;<br>Ventilation to stair and lobby;<br>Dry fire main (outlet located at every departmental entrance) | 2.14.3<br>2.14.4<br>2.14.5<br>2.14.6<br>2.14.7 |
| Topmost storey height not more than 60m above access level. | Fire-fighting stair;<br>Fire-fighting lift;<br>Fire-fighting lobby;<br>Ventilation to stair and lobby;<br>Wet fire main (outlet located at every departmental entrance) | 2.14.3<br>2.14.4<br>2.14.5<br>2.14.6<br>2.14.7 |

The access level is the level at which the Fire and Rescue Services enter the building to commence fire fighting and rescue operations.

**Table notes**

If an automatic fire suppression system is installed throughout a building, no point on the storey should be more than 60m from a dry or wet rising main outlet, measured along an unobstructed route for laying fire hose.

If an automatic fire suppression system is not installed throughout the building, no point on the storey should be more than 45m from a dry or wet rising main outlet.

Scottish Fire and Rescue Service should be consulted to ensure that access and firefighting facilities meet with their operational requirements.

# 19. Assembly points

Consideration should be given, at the design stage, regarding the siting of external assembly points.

External routes and assembly points should:

- be located where persons will not be endangered by traffic or other hazards;
- be sited where access for ambulances and fire appliances is not compromised;
- have adequate signage and lighting;
- have paved footpaths;
- have dropped kerbs where crossing roads;
- not have excessive gradients;
- be located at sufficient distance from the building, i.e. a ‘place of safety’.

# 20. Heating ventilation & air conditioning systems (HVAC)

HVAC systems provide a safe and comfortable environment for occupants. The systems provide a positive or negative air pressure to protect patient treatment areas such as operating departments, intensive therapy units and isolation suites. They also ensure the correct air quality for pharmacies, laboratories and sterile supply departments.

HVAC systems should be installed in accordance with SHTM 03-01.

The ventilation system should continue to operate normally in areas not affected by fire, thereby maintaining infection control measures, and allowing patient treatment to continue.

In some instances, when a fire develops, it may be necessary to shut down the complete system, therefore, the facility should be provided with a shut down and start up control that should only be operated under the instruction of the fire service.

The HVAC control panel should be located at a department entrance or adjacent to the main fire alarm indicator panel.

## HVAC ductwork

In the event of a fire, there is a potential for large quantities of smoke and toxic gases to spread through ventilation ductwork to rooms and areas remote from the fire. Therefore, measures are required to:

- prevent fire from entering or leaving ductwork;
- limit the spread of smoke and other products of combustion within ductwork;
- maintain the integrity of walls, floors or ceilings (attached to the roof structure), where they are penetrated by ductwork.

Ductwork passing through a compartment, sub-compartment, cavity barrier or fire resisting construction protecting escape routes (including corridors serving sleeping accommodation) should be provided with remotely resettable fire and smoke dampers actuated by automatic smoke detection.

Where ductwork passes through bedrooms that are not classified as high hazard rooms, there is a requirement to limit the spread of smoke and other products of combustion to ensure a safe and manageable evacuation from rooms adjacent to a room on fire. Therefore, remotely resettable fire and smoke dampers should be fitted to ductwork at intervals not exceeding eight bedroom clusters.

However, ductwork passing through a compartment, sub-compartment, cavity barrier or fire resisting construction protecting escape routes (including corridors serving sleeping accommodation) that does not have any intakes or extracts may be constructed of fire and smoke resistant material or sited within a fire and smoke resisting enclosure.

Where ductwork penetrates any compartment wall, floor or ceiling (attached to the roof structure), it should be fire and smoke stopped to ensure that it maintains at least the same level of fire resistance as the surrounding structure. See section 21.

# 21. Fire stopping

Where services penetrate a compartment, sub-compartment, cavity barrier or fire resisting construction protecting escape routes (including corridors serving sleeping accommodation) they should be fire and smoke stopped to ensure that they maintain at least the same level of fire resistance of the surrounding structure.

Fire stopping should be installed by an accredited person and all work should be recorded by means of photographic and written evidence.

# 22. Pneumatic tube systems

Pneumatic tube systems should be installed in accordance with SHTM 08-04: part B, the systems central control should be equipped with a fire alarm interface, which, in the event of a fire, will suspend its operation and reinstate the operation of carrier movement automatically on clearance of the alarm condition.

Where a pneumatic air tube system penetrates any compartment wall, floor or ceiling (attached to the roof structure), it should be fire and smoke stopped to ensure that it maintains at least the same level of fire resistance as the surrounding structure, however, fire stopping need not be provided where:

- a pipe has a bore of not more than 110mm and is constructed from aluminium or aluminium alloy, uPVC is also permissible if it meets the standard specified within BS 4514: Unplasticized PVC soil and ventilating, or
- a pipe has a bore not more than 160mm and is constructed of iron, steel, copper or another material that is capable of withstanding 800°C without allowing flames or hot material to pass through the wall of the pipe.

# 23. Storage areas

The design and construction of healthcare premises should ensure that there are sufficient storage areas to prevent the potential for inappropriate storage that would compromise escape routes.

External collection and storage spaces should be sited at a safe distance from the building to ensure a fire in the storage area does not affect the occupied premises. Generally, a safe distance is considered as a minimum of three metres from the building. However, the final location should always be subject to completion of a Fire Risk Assessment that takes account of the following risk factors:

- the type of external wall cladding;
- the construction of any canopy to determine if it will contribute to fire spread if ignited;
- the quantity of combustible material.
- the likelihood and effect of smoke entering windows or other openings;
- the means of identifying a fire in the storage area.

# 24. Photovoltaic panels (PV)

Photovoltaic (PV) Panels should conform to BS EN 61215 or BS EN 61646 in conjunction with BS EN 61730-1.

PV panels should be installed in accordance with Microgeneration certification scheme (MCS) 2012 – 'Guide to the Installation of Photovoltaic Systems and any specific guidance issued by manufacturers.

Photovoltaic (PV) panels should be provided with:

- a switch in a prominent location, that is readily accessible to firefighters to isolate the DC side of the PV system, this switch should be provided with appropriate signage;
- automatic smoke detection in the area inside the building in which the electrical control equipment for PV panels is located. This is particularly important in the case of a loft or other area that is normally unoccupied;
- portable fire fighting location points adjacent to the control and switchgear;
- a suitable mounting system so that they do not straddle heat expansion joints or fire compartment walls;
- ground fault detection units to prevent short circuits.

Where roof mounted, there should be sufficient spacing between PV panels to allow effective firefighting and allow access for maintenance.

Secondary cells and batteries used for renewable energy storage should comply with BS EN 61427-1: Secondary cells and batteries for photovoltaic energy systems.

# 25. Lightning protection

The need for a lightning protection system should be assessed taking into account the guidance contained within BS EN 62305-1: Protection against lightning.

Where a lightning protection system is installed, surge protection should be provided to all safety services in accordance with BS 7671: Requirements for electrical installations.

# 26. Electrical vehicle charging points

Consideration should be given to designated charging areas for cars, large mobile battery-operated equipment such as forklift trucks or patient, staff and visitor mobility scooters.

Internal charging points for electric vehicles and equipment should be located in a fire hazard room.

External charging points should normally be sited at least three metres from the building. However, the final location should always be subject to completion of a fire risk assessment that takes account of the following risk factors:

- the type of external wall cladding;
- the construction of any canopy to determine if it will contribute to fire spread if ignited;
- the likelihood and effect of fire and smoke entering windows or other openings;
- the number of vehicles being charged and their proximity to each other with regard to fire spread from one vehicle to another;
- the means of identifying a fire in the charging location and the time it would take to give warning to building occupants.

Electric vehicle charging points should be provided with:

- clear and prominent notices at each charging point to indicate what equipment or vehicle it is suitable for;
- suitable instruction to demonstrate the means for isolating the power;
- suitable signage to show the action that should be taking to raise the alarm in the event of fire and to notify the Fire and Rescue Service.

Where charging points are proposed for multi storey carparks, consideration should be given to locating them in open air, on the upper deck to minimise the potential for fire spread.

# 27. Commissioning and handover

It is essential that, fire safety is an integral consideration, during the commissioning and hand over phases of any project.

As previously stated, NHS Scotland Bodies commissioning new healthcare premises, extensions or structural refurbishments to existing facilities, should ensure that, at the earliest stage of the design process, there is close collaboration between all parties.

The Fire Safety (Scotland) Regulations, section 21 co-operation and co-ordination, outlines statutory duties in relation to jointly owned or occupied premises, it sets out a requirement to consult with others and share fire safety information to ensure that arrangements are properly co-ordinated and implemented.

Key organisational roles and functions should be established to ensure a safe transition from the initial concept design, through the build stage to an operational facility.

The Health Boards Nominated Officer (fire) should ensure:

- fire safety procedures are established and relayed to all NHS Staff and others who work within the premises, immediately upon, or prior to occupation;
- fire safety induction training and familiarisation is scheduled to take place at the commencement of employment of new staff, ref - SHTM 83 part 2**:** Fire Safety Training;
- fire safety induction training and familiarisation is scheduled for existing employees taking up employment in new premises ref - SHTM 83 part 2**:** Fire Safety Training;
- a pre occupation fire safety risk assessment is undertaken;
- an Emergency Fire Action Plan (EFAP) has been established and is available to all NHS Staff and others who work within the premises;
- ongoing snagging works do not compromise occupant safety;
- fire safety systems are tested individually to ensure they conform to the agreed design specification and are functioning correctly;
- fire safety systems are tested collectively to ensure that they are fully integrated.

Commissioning and test certification documentation, including product installation and use, routine testing requirements and performance information, should be retained as a permanent reference record of the installed components.

# Appendix 1: Glossary of terms

**Active fire precautions:** installed fire safety systems.

**Addressable fire alarm system:** system in which signals from each fire detector and/or fire alarm manual call point are individually identified at the fire alarm control and indicating equipment.

**ARC (alarm receiving centre):** centralised control room for the automatic receipt of a fire alarm signals, and the onward transmission of the received information to the Fire and Rescue Service.

**ASET (available safe egress time):** calculated time available between ignition and the time at which tenability criteria are exceeded in a specified space in a building.

**CEL (Chief Executive Letter)**: letter circulated by the Scottish Government. Health Directorates to the Chief Executives of Health Boards, usually to introduce a policy directive or mandate specific course of action.

**DL:** A letter circulated by the Scottish Government. Health Directorates to the Chief Executives of Health Boards.

**Cavity barrier:** any construction provided to seal a cavity against the penetration of fire and smoke, or to restrict its movement within the cavity.

**Compartment floor:** floor with the fire resistance required to ensure compartmentation. Defined in the technical handbook non-domestic annex 2D table 2.19.

**Compartment wall:** wall with the fire resistance required to ensure compartmentation. Defined in the technical handbook non-domestic annex 2D table 2.19.

**Compartmentation:** division of a building into fire compartments intended to contain a fire within the compartment of fire origin.

**Duct:** the structure, trunking, or casing, with any apertures, enclosing a passage, other than a flue, used solely for conveying air, gases, or refuse.

**Emergency Fire Action Plan (EFAP):** written document detailing the actions to be taken in the event of a fire.

**Escape route:** means a route by which a person may reach a place of safety.

**Escape stair:** means a stair forming part of an escape route.

**Exit:** means a point of egress from a room, storey, protected zone, space, gallery, catwalk or openwork floor that forms part of, or gives access to, an escape route or place of safety.

**External wall:** includes a part of a roof pitched at an angle of 70º or more to the horizontal.

**Firecode:** Scottish Health Technical Memorandums relating to fire safety.

**Fire detection and alarm systems:** alerts occupants of fire incident.

**Fire hazard:** a set of conditions with the potential for initiating a fire.

**Fire hazard room:** room enclosed with fire resistant construction.

**Fire hazard department:** department enclosed with fire resistant construction.

**Fire precautions:** measures to reduce the likelihood of a fire occurring and to mitigate the consequences should fire occur.

**Fire resistance duration:** defined in the technical handbook non-domestic annex 2D table 2.19.

**Ground storey:** means the storey of a building in which there is situated an entrance to the building from the level of the adjoining ground, or, if there is more than one such storey, the lower or lowest of these.

**Hospital:** healthcare premises with bed – patient facilities.

**Hospital Street:** protected zone in a hospital provided to assist in facilitating circulation and horizontal evacuation, and to provide a fire-fighting bridgehead.

**Intumescent:** material with the property of swelling or foaming when exposed to heat, which is designed to maintain the integrity of a fire separating element at the position where services pass through.

**Long fire resistance duration:** defined in the technical handbook non-domestic annex 2D table 2.19.

**Medium fire resistance duration:** defined in the technical handbook non-domestic annex 2D table 2.19.

**Non-combustible:** material that does not contribute to fire growth (European fire classification A1 and A2.).

**Passive fire precautions:** the structural fire safety elements of a building.

**Place of relative safety:** - place in which there is no immediate danger from fire, e.g. adjacent compartment.

**Place of safety:** place outside of the building at a safe distance from the effects of fire and smoke.

**Protected enclosure:** enclosure separated from adjoining accommodation spaces by fire resistant construction.

**Protected lobby:** lobby within a protected zone but separated from the remainder of the protected zone.

**Protected route:** route designated for use as an escape route, which is separated from the remainder of the building by fire resistant construction.

**Protected shaft**: shaft that is enclosed with fire resistant construction.

**Protected stairway**: stairway that is enclosed with fire resistant construction.

**Protected zone:** part of an escape route which is within a building, but not within a room, and to which access is only by way of a protected door and from which there is an exit directly to a place of safety.

**Progressive horizontal evacuation (PHE):** a systematic process of moving patients away from the area affected by fire to an adjoining compartment or sub compartment on the same level, where the occupants are protected from the immediate dangers of fire and smoke.

**Roof space:** means any space in a building between a part of the roof and the ceiling below.

**Room:** means any enclosed part of a storey intended for human occupation or, where no part of any such storey is so enclosed, the whole of that storey, but excepting in either case any part used solely as a bathroom, shower room, washroom, toilet, and stair or circulation area.

**Self-closing door:** fire and smoke door that closes automatically from all angles of swing.

**SHTM:** Scottish Health Technical Memorandum.

**Short fire resistance duration:** defined in the technical handbook non-domestic annex 2D table 2.19.

**SFPN:** Scottish Fire Practice Note.

**Separating floor and separating wall:** floor or wall constructed to prevent the spread of fire between buildings or parts of a building.

**Service opening:** means any opening to accommodate a duct, pipe, conduit or cable (including fibre optics or similar tubing).

**Storey:** part of a building which is situated between the top of any floor being the lowest floor level within the storey, and the top of the floor next above it being the highest floor level within the storey or, if there is no floor above it, between the top of the floor and the ceiling above it or, if there is no ceiling above it, the internal surface of the roof; and for this purpose a gallery or catwalk, or an openwork floor or storage racking, shall be considered to be part of the storey in which it is situated.

**Sub-compartment:** part of a building (which may contain one or more rooms, and includes, where relevant, the space above the top storey of the sub-compartment) constructed to aid horizontal evacuation.

**Sub-compartment wall:** a wall with the specified fire resistance, Defined in the technical handbook non-domestic annex 2D table 2.19.

**Temporary waiting space/refuges:** are places of relative safety where persons with restricted mobility have access to a communication facility, whereby, they can call upon staff to assist them with their ongoing evacuation.

technical handbook non-domestic**:** the Building Standards technical handbook non-domestic provides guidance on achieving standards set in the Building (Scotland) Regulations.

**Unprotected zone:** any part of an escape route, which is separated by walls, glazed screens or any other permanent form of demarcation from any space intended for human occupation, including a protected zone.

**Upper storey:** any storey that is above the level of the ground storey.