



The Institute of Healthcare Engineering and Estate Management

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No 3. MAINTENANCE, FIRE/SMOKE DAMPERS

FIRE SAFETY TECHNICAL PLATFORM (FSTP)- LIBRARY OF TECHNICAL GUIDANCE

Introduction

The FSTP has at its core, to act as the focus for technical matters concerning Fire Safety, creating relevant IHEEM policies, advising on relevant issues to the Technology Platform Committee and managing the Institute's relevant technical responses and activities. The main work activities include creating technical guidance documents on fire safety matters with an emphasis on maintenance. This document covers fire and fire and smoke dampers.

Effective fire compartmentation is intended to preserve life and property, paramount in healthcare premises due to the dependent nature of some of the occupants. Effective fire separation of building services such as ventilation plays a critical role in containing a fire at its source, thereby reducing its effect on the primary building structure.

The rate of spread is controlled by creating fire-resisting compartments (and sub compartments) which subdivide the building. It is therefore essential that all openings and gaps in these compartments are fire-stopped or fire-rated to restrict lateral and vertical fire spread and to achieve the required degree of containment. Failure to do so may allow fire and/or smoke to spread uninhibited in cavities and penetrations in a building.

Department of Health, Estates and Facilities Alert for England Issued: 21/10/2014 Ref: DH/2014/003

An Estates and Facilities Alert was issued by the Department of Health in October 2014 entitled "Reminder for the testing of fire & smoke dampers and ensuring the integrity of fire stopping" (appendix 1). Details from it are:

Reminder for the testing of fire & smoke dampers

Fire and Smoke Dampers

2. *All healthcare organisations should review their existing risk assessments and inspection/maintenance regimes relating to the inspection, maintenance and testing of fire and smoke dampers and their associated actuating mechanisms and control systems.*
3. *All healthcare organisations should ensure that they have a full inventory of all installed fire and smoke dampers within their premises.*
4. *All installed fire and smoke dampers, and their associated actuating mechanisms and control systems, should be included in a formal maintenance programme to ensure that they are inspected and tested in order to confirm they:*

- *meet the guidance cited above and are fit for the purpose they are intended.*
- *are in good working order and have not been damaged, disconnected or wedged open.*



The Institute of Healthcare Engineering and Estate Management

Scope

This document contains guidance on matters to be considered when producing a risk based maintenance program which meets the requirements of Article 17 of the Regulatory Reform (Fire Safety) Order 2005 (the Order) “a suitable system of maintenance, maintained in an efficient state, in efficient working order and good repair”. It should not to be quoted as if it is a specification.

This document is based on government advice provided in HTM series and Approved Document B to the building regulations.

In this note fire dampers are defined as being provided (usually) in ventilation ductwork to prevent the spread of fire and in some cases smoke, from one fire compartment to another. Systems designed to extract smoke and other products of combustion to safeguard means of escape as part of a pressure differential life safety means of escape strategy as defined in BS EN 12101 Smoke and heat control systems are outside of the scope.

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ALARP

A key concept in fire safety is defined in the Housing, Communities and Local Government Guides to fire Risk assessment as low as reasonably practicable “a concept where risks should continue to be reduced until you reach a point where the cost and effort to reduce the risk further would be grossly disproportionate to the benefit achieved”

HTM Guidance

Guidance on the frequency of inspecting of fire compartmentation and fire stopping can be found in:

HTM 05-03 part K:

“Annual tests and checks

5.147 All structural fire protection and elements of fire compartmentation should be inspected and any remedial action carried out.”

HTM 03-01 part B,

Frequency of inspections and verifications

1.31 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.

Critical ventilation systems (and ventilation serving critical areas)

4.13 All fire dampers should be tested as part of the annual verification.

Types of fire damper:

Fusible link, spring operated fire damper.

These dampers are the simplest type. The damper operates when a fusible link is heated to its' operating temperature (usually 72°C) allowing a spring (or in some cases gravity) to close the fire damper. Once operated these must be re-set manually. They provide a barrier to fire but will have limited control over smoke spread. These are also known as "manually resettable fire damper".

Electrically operated fire and smoke damper

These dampers are normally operated by an electric motor, usually on an automatic signal from the fire alarm and/or an in-duct smoke detector, often via a decoder. They usually provide a barrier to both fire and smoke. Provision of end switches (limit switches) can provide information as to whether the damper is closed or open. They can usually be operated remotely and may be provided with a fire-fighters panel to allow control. It is important that control panels are subject to periodic maintenance.

Intumescent dampers

These dampers operate by thermal activation of an intumescent material within the damper. This expands and completely fills the opening, it may take around 5 minutes to activate. These dampers are not commonly found in healthcare buildings other than in air transfer grilles. These dampers are outside of the scope of this technical guide.

Provision of plans indicating full inventory of fire compartmentation

It should be ensured that there is in place a full inventory set of plans showing the location of all fire compartmentation, the rating of that compartmentation and the location of all fire/smoke dampers. Each damper should have its' own unique identifying number. There must be access to each damper such that the internal operation of the damper can be viewed and the damper wiped clean.

Inspection and Maintenance

Fire Safety Protocol (HTM 05-01 Appendix E)

HTM 05-01 states that the fire safety policy should be underpinned with a series of supporting fire safety protocols. One of these protocols (appendix E) should be on Maintenance of Fire Precautions and Systems and should include:

What procedures should be followed for the maintenance of fire precautions and systems?

What should be the maintenance intervals for each system or element of the fire precautions?

What arrangements are there for a degradation of the fire precautions or system during maintenance activity? How are building occupants notified? How do the fire risk assessments reflect the potential impact?

This fire safety protocol should include fire dampers and an exemplar protocol is provided as appendix 2 to this note.

General

In a maintenance schedule in compliance with Article 17 of the Order, the following should be considered.

- Frequency of inspection should be based on three factors a) the criticality of the system, b) the operating environment (If the environment is not considered normal e.g. dusty, the frequencies may need to be revised, such revision should be based on a documented risk assessment), c) past history. If similar dampers have shown a high failure rate then maintenance should be more frequent.
- There must be a full inventory of all installed fire and smoke dampers and fire dampers and their locations (ideally including a plan) which includes the type and size of damper.
- It is important that access is available and gained to the actual in duct operating part of the damper, this is usually by means of a removable inspection panel.
- Maintenance and Inspection should be completed by a competent person. A competent person is someone with sufficient training, knowledge and experience to complete the task.
- A risk assessment and method statement should be prepared for all aspects of damper maintenance and should be checked in the normal way. If access is to be gained via patient accommodation areas, the method statement may need to be verified by infection control.
- Consideration should be given to the actions to take if there is a fire during the maintenance.
- In the case of fire and smoke dampers, consideration should be given to checking the operating signal from the fire alarm.
- Where access is denied, a record must be kept.
- Critical spares should be available. Where there is delay in repair, a review of the Fire Risk Assessment should be completed to consider enhanced monitoring (or other mitigating solutions) of the environment to eliminate/ reduce potential safety risks involved with the system fault.
- Records should be kept of all maintenance, ideally this should be photographic showing closure of the dampers and subsequent opening, also the name of the person completing the maintenance.
- Manufacturers' instructions should be followed regarding the nature of maintenance, for instance whether a lubricant is required.

Frequency of maintenance

The following factors should be considered:

Risk

Critical systems

Critical systems are defined in HTM 03-01 part B, 4.7. *“Ventilation in critical systems provide essential services. The loss of service from such a system would seriously degrade the ability of the premises to deliver optimal healthcare.”* Critical systems include areas serving very high dependency patients and may also include areas in which there is essential plant, equipment or storage, the loss of which would meet this definition.

The frequency of testing and maintenance in critical systems should form part of the annual verification system and be a minimum of annually.

Non-critical systems

These are all areas other than critical systems. It is important that there is confidence in the condition and operation of fire dampers. An accepted maintenance regime in line with ALARP and regulatory compliance will have the following elements:

1. Initial confidence in the system. All dampers should have been subject to a maintenance regime. If this has not been the case, then there should be a complete check and test of all fire/smoke dampers.
2. Location and access. It is important that on-going maintenance of the fire/smoke dampers has identified the locations of all dampers and that access is available to them to operate and check the operation of the damper components.
3. Testing of fire and smoke dampers via the control panel will give an indication of the state of the system but gives no data on the accumulation of internal contamination. Where the facility to test dampers remotely from the panel (or BMS) is used, this should be augmented by a physical check of at least a percentage of fire dampers. These should be rotated so that over a period of time all dampers have been tested. If the physical check uncovers dampers which are defective despite the panel showing them as being operating correctly, the extent of the physical check should be increased to the point at which there is confidence in the system.
4. On-going testing and maintenance should be set at a level which provides confidence in the system. If an unacceptable percentage (determined by risk management group in conjunction with competent person) of dampers require maintenance such that they would not operate effectively, the scope of the testing and maintenance should be increased to a point that there is confidence in the system.
5. **Testing via end switches:** Many electronically operated fire and smoke dampers have the facility to check whether they are open or closed via end switches. These switches (also known as limit switches) provide a signal upon closing and opening. This may be used as an indication that the dampers are closing and opening effectively but does not give an indication of how clean the ductwork/damper is. For this reason if this is used as a means of testing, it must be augmented with a visual inspection (to include cleaning and where necessary lubrication) at a period determined by risk assessment. If this method is utilised the visual inspection element should be phased so that an equal percentage is completed each year rotated such that all are completed at the determined interval. Before implementing this system of testing all fire dampers must have been tested visually at least once to ensure their initial condition and that access is available. If during the visual inspection it is found that there is anything other than minor contamination then the percentage requiring visual inspection each year should be increased to a point that confidence is gained in the system

Maintenance procedure

It is important that manufacturer's guidance is followed. A risk assessment and method statement covering all aspects of the maintenance procedure is prepared and vetted in the normal way for each site. As a minimum the following should be included:

Fusible link, spring operated fire damper.

These fire dampers are simple in operation with no reliance on external systems for operation. Their simplicity and robustness means that they are unlikely to fail however the manual operation of the damper can be sudden and they can be difficult to re-set. These dampers can be fitted with remote status indicators to show when they have operated.

To Include: Operation of the fire damper to fully closed, check for damage or corrosion, cleaning if necessary, any lubrication in line with manufacturers guidance, re-set.

Fire and Smoke dampers

These fire dampers may be tested remotely and an indication of their operation gained from the illumination of lights for closed and open. It is important that this is not the only method of test and that sufficient are tested by physical inspection of the closure and opening of the damper that there is confidence in the system.

To Include: Operation of the fire damper to fully closed, check for illumination of the closed indicator light. Operation of the damper to fully open, check for illumination of the open indicator light. Physical check to include removal of the inspection cover, operate damper to fully closed, operate damper to fully open. Cleaning and lubrication (where necessary) to be in accordance with manufacturer's instructions.

All dampers: It is important that closure of the damper is checked either via end switches or visually to ensure all blades fully close. The structural mounting and support of the damper and fire compartmentation around the damper should be checked for integrity. The damper fixing should be checked as far as possible to ensure that it is in accordance with manufacturer's specification, for example drop rods fixed to securing lugs on damper frames, correct riveted fixing of duct to damper frames, and damper fixing to the wall. Defects/ remedial actions identified via the inspection regime should be recorded and repaired as soon as possible. A record (if possible to include photographs) must be kept of all damper maintenance. Where dampers cannot be repaired immediately the Fire Risk Assessment for the area concerned should be reviewed.

Estates and Facilities Alert

INFORMATION

Ref: DH/2014/003

Issued: 21/10/2014

Notice

Reminder for the testing of fire & smoke dampers and ensuring the integrity of fire stopping

Information

There have been recent reports in the national media regarding:

- the lack of suitable access to fire and smoke dampers, and their actuating mechanisms, to enable inspection, maintenance and testing to be completed in a safe and competent manner.
- inadequate inspection, recording and documentation of fire stopping.

It has been highlighted that in certain circumstances, due to incorrect design and installation, maintenance personnel cannot gain safe access to facilitate the necessary statutory inspection of the fire and smoke dampers and their actuating mechanisms. In addition there has been a failure to record the full details of where fire stopping has been installed, hence causing difficulties in ensuring its integrity is maintained.

This results in the organisation responsible for the building potentially being in contravention of Article 17 of the Regulatory Reform (Fire Safety) Order 2005 and thereby putting patients, visitors and staff at risk in the event of a fire.

Action required

1. All healthcare organisations should review the guidance on fire and smoke dampers and fire stopping contained within*:
 - Regulatory Reform (Fire Safety) Order 2005
 - Building Regulations – Approved Document B
 - Health Technical Memorandum 05 series: Firecode – Fire safety in the NHS
 - Health Technical Memorandum 03-01: specialised ventilation for healthcare premises (Parts A and B)
 - HBN 04-01: Isolation facilities for infectious patients in acute settings

*Note: this list is not exhaustive.

Fire and Smoke Dampers

1. All healthcare organisations should review their existing risk assessments and inspection/maintenance regimes relating to the inspection, maintenance and testing of fire and smoke dampers and their associated actuating mechanisms and control systems.

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3. All healthcare organisations should ensure that they have a full inventory of all installed fire and smoke dampers within their premises.
4. All installed fire and smoke dampers, and their associated actuating mechanisms and control systems, should be included in a formal maintenance programme to ensure that they are inspected and tested in order to confirm they:
 - meet the guidance cited above and are fit for the purpose they are intended.
 - are in good working order and have not been damaged, disconnected or wedged open.
5. Where a lack of safe access to a fire or smoke damper, and its associated actuating mechanism, is identified this should be brought to the immediate attention of the Director of Estates & Facilities and the Trust Fire Safety Manager / Fire Advisor.
6. Where problems are identified, a programme to repair or replace damaged fire and smoke dampers, and associated actuator mechanisms, should be put in place.
7. Once any repair or replacement programme has been completed, the fire risk assessment for the premises should be updated, and key findings brought to the attention of all staff that might be affected.

Fire stopping

8. All healthcare organisations should review their existing risk assessments and inspection regimes relating to the inspection of fire stopping.
9. All healthcare organisations should ensure that they have a full inventory of fire stopping within their premises ([see HTM 05-01 Appendix E – Developing fire safety protocols](#) for advice on the information that should be collated).
10. If not already in place, systems should be implemented to ensure the integrity of fire stopping can be confirmed within the organisation's premises. This should incorporate permit-to-work systems that ensure fire stopping is re-instated during, and following, works (e.g. construction, installation or maintenance) that may impinge on the integrity of the installed fire stopping.

Suggested Onward Distribution

Those responsible at Board Level for Fire Safety/Protection
Directors of Estates & Facilities
Risk Managers
Health & Safety Managers
Fire Safety Officers/advisers

References

Regulatory Reform (Fire Safety) Order 2005
<http://www.legislation.gov.uk/ukxi/2005/1541/contents/made>

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Building Regulations – Approved Document B
<http://www.planningportal.gov.uk/buildingregulations/approveddocuments/partb/>

Firecode:

Health Technical Memoranda 05-01 Managing Fire Healthcare safety
<https://www.gov.uk/government/publications/managing-healthcare-fire-safety> Health

Technical Memoranda 05-02

<https://www.gov.uk/government/publications/guidance-in-support-of-functionalprovisions-for-healthcare-premises>

Health Technical Memoranda 05-03 <https://www.gov.uk/government/publications/suiteof-guidance-on-fire-safety-throughout-healthcare-premises-parts-a-to-m>

Health Technical Memorandum 03-01: specialised ventilation for healthcare premises (Parts A and B) <https://www.gov.uk/government/publications/guidance-on-specialisedventilation-for-healthcare-premises-parts-a-and-b>

HBN 04-01: Isolation facilities for infectious patients in acute settings
<https://www.gov.uk/government/publications/adult-in-patient-facilities>

Additional information for England

The above sections of this Alert were compiled by Department of Health for circulation in England only.

Action required by this alert should be **underway by: 28/10/2014**

Action required by this alert should be **completed by: 30/04/2015**

Enquiries should quote reference number DH/2014/003 and be addressed to:

Mb-defects&failures@dh.gsi.gov.uk

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<https://www.cas.dh.gov.uk>

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Appendix 2

Example Risk Based Maintenance Regime in line with HTM 05-01 Appendix E

Maintenance and testing of fire dampers

The following fire damper maintenance regime will be followed at _____ hospital and is to be agreed with the local fire prevention officer in line with HTM 03-01 part b, 1.31.

Critical systems

All fire dampers in critical systems are to be tested annually as part of the annual verification. This may also include non-critical systems which serve critical areas such as very high dependency patients or indeed dampers which are critical in terms of the potential impact of their failure. Maintenance will be completed in line with manufacturer's guidance to include: Access the damper via the inspection hatch. Operation of the fire damper to fully closed, check for damage or corrosion, cleaning if necessary, any lubrication in line with manufacturers guidance, re-set.

Non-critical systems

Electrically operated fire and smoke damper

Frequency: 12 months.

All dampers will be tested annually from the control panel such that the panel is operated to indicate the damper is fully closed and then fully open. Any dampers in which the indicator lights do not operate will be subject to a physical inspection.

Physical inspection

In addition to any dampers which fail the test from the panel, 20% (or such a percentage as decided by the risk management group in consultation with the competent person) of all dampers are to be physically inspected via an access hatch to ensure proper operation and that dampers are clean and undamaged.

Lubrication/cleaning will be in accordance with manufacturer's instructions.

If more than 1% of the 20% of dampers fail the test such that they would fail to prevent the spread of fire and smoke, a further 10% (or such a percentage as decided by the risk management group in consultation with the competent person) of dampers is to be tested with the same failure criteria replicated.

In addition, if a damper has failed as a result of contamination, all dampers in this duct subject to the same or similar airflow should be tested.

Testing of dampers is to be rotated such that all dampers are physically inspected at least every 5 years.



The Institute of Healthcare Engineering and Estate Management

Mechanical spring-operated fusible link dampers

Frequency: 25% (or such a percentage as decided by the risk management group in consultation with the competent person) of dampers to be tested annually. If more than 1% of the 25% of dampers fail the test such that they would fail to prevent the spread of fire, a further 25% of dampers is to be tested with the same failure criteria replicated. The testing of dampers is to be rotated such that all dampers are tested at least every 4 years.

Testing to include: Operation of the fire damper to fully closed, check for damage or corrosion, cleaning if necessary, any lubrication in line with manufacturers guidance, re-set. The structural mounting and support of the damper and fire compartmentation around the damper should be checked for integrity. The damper fixing should be checked as far as possible to ensure that it is in accordance with manufacturer's specification, for example drop rods fixed to securing lugs on damper frames, correct riveted fixing of duct to damper frames, and damper fixing to the wall

All dampers

Essential spares: sufficient essential spares such as decoders, operating motors and fusible links should be kept such that defective dampers can be immediately repaired.

In the case of any fire or fire and smoke dampers which would fail to prevent the spread of fire and/or smoke and cannot be immediately repaired, the Fire Risk Assessment should be reviewed to ensure the on-going safety of relevant persons, bearing in mind the risk posed to the clinical operation of the building.