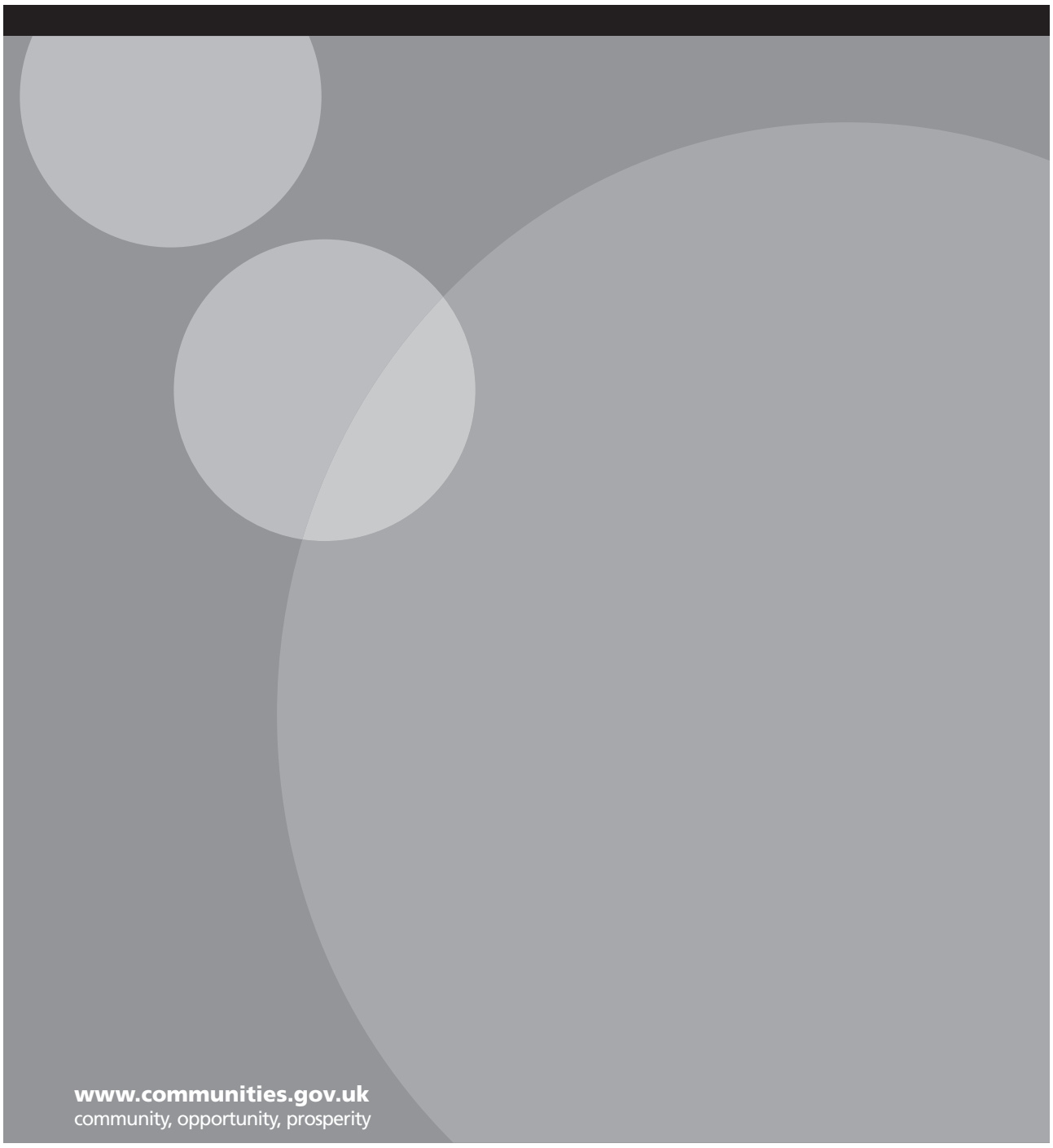
Communities and Local Government

Improving the energy efficiency of our buildings

A guide to air-conditioning inspections for buildings



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A guide to air-conditioning inspections for buildings

The Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations 2007 SI 2007/991 amended by SI 2007/1669, SI 2007/3302 and SI 2008/647

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Contents

Foreword

This document is not a statement of the law, but is intended to help anyone who manages or controls air-conditioning plant understand how the Directive and Regulations work in practice, how to apply the Regulations, what their responsibilities are and when air conditioning inspections are required.

Air-conditioning inspections promote the improvement of the energy performance of buildings and form part of the final implementation in England and Wales of the European Directive on the Energy Performance of Buildings.

This guide describes the scope and requirements of the Regulations applying to air-conditioning plant and provides guidance on who is affected and how these are applied. It is intended for anyone who manages or is responsible for air-conditioning plant. While this guidance aims to explain how the requirements will work in practice, any interpretation of the Regulations is offered only as a guide, as the Department cannot provide legal advice. Therefore, it is important to read and understand the Regulations as well. In cases of doubt independent legal advice should be sought.

This document is part six of the series that explains the introduction of energy performance certificates, display energy certificates and air-conditioning inspections in England and Wales.

1. Introduction

1.1 Why air-conditioning inspections are required

Having your air-conditioning system inspected by an Energy Assessor is designed to improve efficiency and reduce the electricity consumption, operating costs and carbon emissions for your system. Energy inspections will highlight improvements to the operation of your existing systems or opportunities to replace older, less energy efficient systems or oversized systems with new energy efficient systems.

As the replacement of refrigerant is restricted in older systems (as established under other legislation), there is an additional incentive to improve or replace older systems with more modern energy efficient units.

Building owners and managers who control air-conditioning systems have statutory obligations and duties of care in the operation and maintenance of air-conditioning systems. The energy inspections discussed in this guide are in addition to the normal activities associated with the ownership and operation of air-conditioning systems.

Inspection, maintenance and cleaning programmes maintain the ability of the system to provide healthy and comfortable environments for building occupants, limiting the escape of refrigerant gases and ensuring the safety of equipment. The practices and procedures needed to achieve these aims should be applied more frequently than the assessment for energy efficiency described here. It is outside the scope of this document to describe such procedures in detail, but an introduction to available professional and industry good practice guidance is included in annex A.

1.2 When air-conditioning inspections are required

All air-conditioning systems with an effective rated output of more than 12kw must be regularly inspected by an Energy Assessor. The inspections must be a maximum of five years apart.

The regulations require the first inspection of the affected air-conditioning systems to be carried out as follows:

- for all systems first put into service ***on or after*** 1 January 2008, the first inspection must have taken place within five years of the date when it was first put into service
- for other air-conditioning systems, where the effective rated output is more than 250kW the first inspection must happen by 4 January 2009

- for other air-conditioning systems, where the effective rated output is more than 12kW the first inspection must happen by 4 January 2011

From 4 January 2011, if the person in control of the air-conditioning system changes and the new person in control is not given an inspection report, the new person in control of the system must ensure the air-conditioning system is inspected within three months of the day that person assumes control of the system.

1.3 Systems requiring an air-conditioning inspection

Only air-conditioning systems with an effective rated output of more than 12kW are affected by these regulations.

The ***effective rated output*** is the maximum calorific output in kW stated by the manufacturer of the system as deliverable during continuous operation while complying with the useful efficiency indicated by the manufacturer.

One or more air-conditioning units ***within*** a building controlled by a single person are considered to comprise a single air-conditioning system for the purposes of the regulations.

The person who ***controls*** the ***operation*** of the system is the person who controls the ***technical functioning*** of the system, not someone who can just alter the temperature.

For the purposes of the regulations, a ***building*** is defined as "*a roofed construction having walls, for which energy is used to condition the indoor climate, and a reference to a building includes a reference to a part of a building which has been designed or altered to be used separately*".

A part of a building designed or altered to be used separately is where the accommodation is made or adapted for separate occupation. This could be indicated by the accommodation having its own access, separate provision of heating and ventilation or shared heating and ventilation but with the ability by the occupier to independently control those services. For a non-dwelling the part could be deemed to be separate even if some facilities (i.e. kitchen and toilet facilities) were shared.

An air-conditioning system refers to any system where refrigeration is used to provide cooling for the comfort of occupants. This would exclude separate refrigeration provided ***solely*** for process applications such as cold stores, pharmaceutical production etc.

1.4 Other requirements of the Energy Performance of Buildings Directive

Other aspects of the Energy Performance if Buildings Directive may apply to a building:

1. An Energy Performance Certificate (EPC) is required when a building is constructed, sold or let:

a. for non-dwellings, this requirement started for buildings larger than 10,000m^2 from 6 April 2008, for buildings larger than 2,500m^2 from 1 July 2008 and for all other non-dwellings from 1 October 2008

b. this is a current requirement for all marketed sales of homes requiring a home information pack. For any other home sales, this requirement starts from 1 October 2008

c. this requirement started from 6 April 2008 for homes when constructed

d. this requirement starts from 1 October 2008 for homes when rented

2. A Display Energy Certificate (DEC) is required by occupiers of public buildings:

a. where the building is greater than 1000m^2

b. the building is occupied by a public Authority or an institution providing public services to a large number of persons

c. the public visit the building

1.5 F Gas inspections

Fluorinated greenhouse gases are among the Kyoto Protocol groups of gases for which the EU has committed itself to reduce emissions. EC Regulation 842/2006 on certain fluorinated greenhouse gases (the F gas Regulation) is the legal instrument by which emissions reductions are to be delivered. The Regulation requires leakage checks to be carried out, repairs to be completed, gases to be recovered so that they do not escape to the atmosphere, certified personnel and companies to be used, labels to be used on some equipment, information to be reported to the Commission, and bans some F gas products. Further European Community regulations have fleshed out many of these requirements.

Article 3 of the F gas Regulation introduces a requirement for operators to use all available measures which are technically feasible and that do not entail disproportionate cost in order to prevent leakage of F gases and to repair any detected leakage (as soon as possible) from the following list of stationary applications: refrigeration, air conditioning and heat pump equipment, including their circuits, and fire protection systems.

For the purposes of this requirement "checked for leakage" means that the equipment or system is examined primarily for leakage using direct or indirect measuring methods, focusing on those parts of the equipment most likely to leak.

The Regulation also provides a timetable for the checking of leakage of these stationary applications. The operators of these applications have to ensure that they are checked for leakage in line with the timetable set out in the Regulation.

The checking for leakage timetable is graduated in line with the amount of F gas contained in the application as follows:

- at least once every twelve months for applications containing 3kg or more of F gases (this shall not apply to equipment with hermetically sealed systems, which are labelled as such and contain less than 6kg of F gases)
- at least once every six months for applications containing 30kg or more of F gases
- at least once every 3 months for applications containing 300kg or more of F gases

These applications must also be checked for leakage within one month after a leak has been repaired to ensure that the repair has been effective.

2. What are air-conditioning inspections?

2.1 What does an air-conditioning inspection cover?

The inspection will examine the refrigeration and air movement equipment that are part of air-conditioning systems, and their controls. It will also examine any documentation that helps to understand the systems, or indicates the extent to which the systems have been maintained. The energy assessor is also required to estimate whether the system is suitably sized for the cooling loads in the treated spaces, and to provide advice on ways in which the performance of the system might be improved.

Access will be required to equipment that may be located in plant rooms, or outside the building, including rooftops or other locations with limited provision for access. In all cases the building owner or manager should agree the means for safe access with the energy assessor, following a health and safety risk assessment of the individual situation. The energy assessor may need to be accompanied by the responsible building manager or maintenance agent at all times.

Some additional access is likely to be needed, for example to the inside of AHUs or ducts. This must be provided and supervised by the responsible building manager or maintenance agent with due regard to the safety of the energy assessor and to building occupants. This would require the system to be turned off to allow safe access, so arrangements may need to be made for this outside working hours to avoid disruption to business. Similarly, the Energy Assessor may need to access a sample of components, such as fan coil units, which may be hidden above suspended ceilings. Again, access should be provided by the building manager.

Building owners and managers should not expect the air conditioning inspection to identify hazards or unsafe aspects of the installation, operation or maintenance of systems that should be identified and addressed by other arrangements, nor should they expect the energy assessor to fix any problem identified as part of the inspection.

If owners or managers require this service then they should ensure that the need is clearly specified in the invitation to undertake the work, assure themselves that the energy assessor is competent to undertake such additional work, and ensure that such aspects are clearly expressed in their contract or agreement with the energy assessor.

2.2 What can I expect in the report?

The purpose of the inspection and report is to ensure that building owners or managers are provided with basic information regarding the efficiency of the air-conditioning systems that they control, together with advice on how the energy efficiency or effectiveness of these systems might be improved.

Acting on the advice in the inspection report and rectifying faults or making appropriate improvements, where this is attractive and cost effective, may result in immediate improvements to the effectiveness of air-conditioning systems or reduce the operating costs.

In some cases the costs of providing both heating and cooling may be reduced, in cases where these two systems are unnecessarily in use at the same time due to inappropriate controls or settings.

In many cases it will be clear that the building and systems are already well understood, documented and commissioned, with records available showing that the equipment has been regularly maintained to a good standard. In such cases an energy inspection could be reduced in extent and the inspection report brief, with the main content advising on opportunities for load reduction or on alternative solutions not previously considered. However, in other cases the energy assessor may find it necessary to suggest relatively basic maintenance, such as cleaning or repairs, to equipment whose efficiency has evidently suffered through neglect.

Cleaning operations or adjustments to controls do not form part of the inspection procedure, even where they might be carried out simply and with significant immediate effect in improving efficiency. The inspection is not intended, or expected, to involve any physical work of this nature as this could change the level of professional risk to the energy assessor. Authority to carry out such work would need to be given as part of *a separate arrangement* by the building owner or manager provided the Energy Assessor has the necessary competence to do this work. However, the building owner, manager or their representative may well be able to carry out some alterations themselves as the energy inspection is carried out, provided they agree with the assessor's observations.

Most reports are likely to contain advice with a combination of simple low or no cost measures and measures where some investment may be required either to apply the measures, or to investigate the potential to apply measures in more detail. The manager should also be provided with, or informed how to obtain, access to advice on the ongoing management of the systems, particularly that contained in existing free publications such as the Carbon Trust's ***Good Practice Guides***.

2.3 What a report must contain

The inspection report must include an assessment of the efficiency of the system and its size compared to the cooling requirements of the building. It must also contain appropriate advice on possible improvements to the system.

The following information must be included:

- the address of the building in which the system is located
- the name of the energy assessor
- the name and address of the energy assessor's employer, or the name under which the assessor trades and his address
- the date on which the inspection occurred
- the name of the approved accreditation scheme that he is a member of

An example template for an inspection report is shown.

Example proforma for the Packaged cooling system report

Report of packaged cooling system inspection

Organisation	
Address	
Contacts	

Prepared by	
Date of inspection	

Equipment assessed	
Equipment	
Location	
Areas served	

Assessment of documentation and records	
Equipment list	
Temperature control	
Time control	
Maintenance regime	
Controls & sensors	
Metering	
Loads	
Issues	

3. Obtaining an air-conditioning inspection

3.1 Responsibilities for ensuring inspections are done

If you control the operation of an air-conditioning system affected by these Regulations, it is your responsibility to:

- ensure an inspection has been done in accordance with the requirements and timetable of the Regulations
- keep the most recent inspection report made by an energy assessor
- give any inspection report kept by you to any person taking over your responsibilities with respect to the control of the air-conditioning system

If you have taken over control of an air-conditioning system from 4 January 2011 and you haven't been given an inspection report, you must ensure the system is inspected within three months of taking over such control.

3.2 Control of air-conditioning systems

The person who ***controls*** the ***operation*** of the system is the person who controls the ***technical functioning*** of the system, not someone who does no more than adjust the temperature.

The owner of the system will usually control the operation of the system even where day to day operation is contracted out to another. Where a tenant takes total responsibility for a building and its services (e.g. full repairing and insuring lease), then the tenant will control the system.

Where the operation and management of the system is carried out on a day-to-day Facilities Management basis, or a servicing company provides routine servicing and maintenance, the contract may specify the FM or servicing company as the controller of the system with responsibility for ensuring that inspections are carried out. Depending on the terms of such a contract the FM or servicing company may accordingly become responsible under the regulations also. Even in such cases, however, the landlord or tenant retains a parallel duty to ensure the air conditioning inspection has been done.

Where air-conditioning systems are installed locally by a tenant, the responsibility will lie with the tenant as they own the system.

3.3 Responsibilities for conducting air-conditioning inspections

An energy inspection of an air-conditioning system must be carried out by an accredited energy assessor who is a current member of an approved accreditation scheme. The appropriate methodology is as described in CIBSE TM44 or equivalent.

The energy assessor must provide a written report of the inspection to the person who has control of the operation of the air-conditioning system as soon as practicable after the inspection.

3.4 Energy assessor accreditation

Government approved accreditation schemes control the quality of air-conditioning inspections by ensuring energy assessors are competent and possess the appropriate skills to conduct energy assessments. To become a member of an accreditation scheme, energy assessors will need to:

- demonstrate their competence, either by having a recognised qualification from an awarding body ***or*** approved prior experience and learning equivalent to the National Occupational Standard requirements
- maintain appropriate professional indemnity cover
- update their skills and knowledge regularly
- participate in the accreditation body's quality assurance procedures
- abide by the scheme's advice and guidance

Approved accreditation schemes for energy assessors for air-conditioning can be found on the Department for Communities and Local Government website at www.communities.gov.uk/epbd.

3.5 Responsibilities with respect to other inspection or certification procedures

The assessor's report should be kept in a safe place so that it can be used to inform subsequent inspections. It is recommended that the inspection report should be kept in the building log-book, together with ongoing maintenance and/or energy records

More recent buildings may already be provided with a building log-book satisfying the requirements of Part L of the Building Regulations to provide the owner with information about the building, its fixed services and their maintenance requirements. The CIBSE Log Book Toolkit provides guidance and a template for the preparation of the log book, and also on its

subsequent use by the building manager. The building log-book would be the most suitable place to keep records of the air-conditioning inspection, together with other such inspection results e.g. F Gas inspections. Where a log-book does not exist, it would be useful to begin a file to keep these records.

The information that would be helpful to keep in the building log-book, or in a separate file if a formal log-book is not available, includes:

- the preparatory details as listed in Sections B1 (simpler packaged systems) or C1 (more extensive and centralised systems) of TM44
- a copy of the inspector's full signed report from the air-conditioning inspection
- the recommendation report and any data used to prepare an EPC for the building (if one has been required)
- the advisory report produced to accompany a DEC if one has been required
- the reports from any other regular inspections (such as inspections for refrigerant leakage) involving the building's air-conditioning or heating systems

This information can then be provided for subsequent energy inspections, and the time needed to carry out such inspections can be minimised.

4. Applying the regulations in practice

4.1 Determining the size of your air-conditioning system

The effective output of an individual air conditioning unit or system may be given on the rating plate attached to the unit. It may also be stated in the operating and maintenance manual, if it can be located. Finally, the information may be available from the manufacturer's website. Alternatively, where the system is covered by a maintenance contract, the capacity should be known by the contractor and should be reported in the maintenance records they supply.

The guidelines below are an approximate indication of typical figures for installed capacity for various spaces and may help you determine whether your system is within the scope of the Regulations. Cooling requirements depend on a wide range of circumstances, including the fabric, location and orientation of the building towards the sun, as well as the activities and number of people in the building. Older systems are also likely to have higher rated outputs for a given floor area. Where more specific figures are needed these should be calculated taking account of the particular circumstances of the building and its use.

The guidelines below are for offices and shops. If it is not clear to you whether your building reaches the threshold you must determine the installed capacity of your system by appropriate inspection, calculation and enquiries. In other, more specialised, buildings, the wide range of factors which influence system capacity means that these systems should be determined by a suitably qualified person on a case by case basis if the information is not already available.

Activity	Likely area requiring 12kW of cooling
Air-conditioned general office spaces Assuming typical levels of electrical equipment and 8–10m^2 per person	200m^2
Air-conditioned offices with high levels of IT and electrical equipment	100m^2
Office, call centre or dealing floors with high occupant densities of 6m^2 or similar, and high levels of IT, communications or lighting loads may well fall within the scope at smaller areas.	
Retail spaces with average levels of display lighting	250m^2
Retail spaces with high levels of display lighting and illuminated cabinets	150m^2

For larger systems, a central cooling system serving an office building of 2,000m^2 is likely to be 250kW rated output.

Cooling systems serving meeting rooms which may be used by large numbers of people, such as council chambers, may exceed the 250kW threshold for lower floor areas.

4.2 Control and contractual arrangements for air-conditioning units and the requirements for air-conditioning inspections

4.2.1 Control of equipment

The central air conditioning system for the building is 150kW.

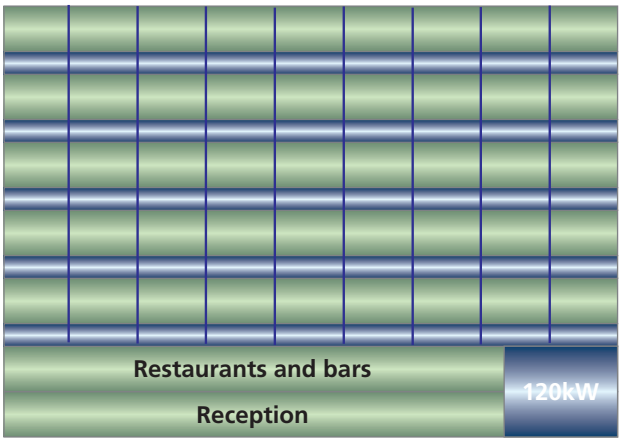
Tenant 1 occupies floors 1 and 2 and have additionally installed their own systems of 110kW.

The Landlord is the relevant person for the control of the central (150kW) system. The tenant is the relevant person for the control of the additional system (110kW) on floors 1 and 2.

The landlord is responsible for ensuring there is an inspection report for the central system and the tenant is responsible for ensuring there is an inspection report for the equipment they have installed.

In this example each party controls less than 250kW and an inspection will be required by 4 January 2011.

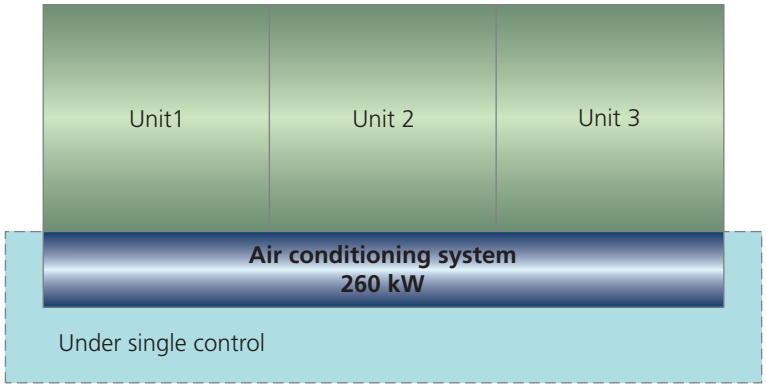
4.2.2 Multiple small systems in a building



Hotel has 50 rooms. Each room has a cooling capacity of 3kW. The system is under the control of the hotel chain. The total under single control is 270kW, 150kW in the rooms and 120kW for the reception and restaurants. The system needs to be inspected by 4 Jan 2009.

4.3 Control of air-conditioning units in buildings or parts of buildings and the requirements for air-conditioning inspections

4.3.1 Equipment under single control in parts of a building



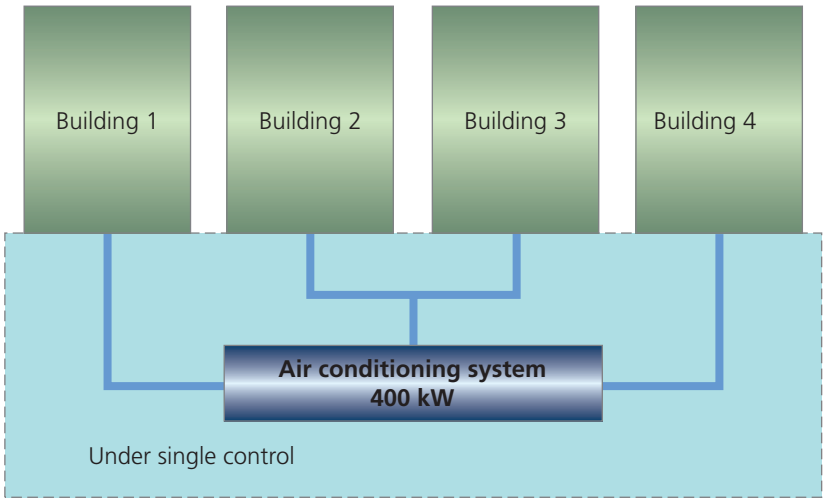
Units 1,2 and 3 are parts within a building.
They are designed or altered to be used separately.

The air-conditioning system serves units 1,2 and 3 and are controlled by the same person.

Together the total capacity controlled is > 250kW.

The system needs to be inspected by 4 Jan 2009.

4.3.2 Equipment under single control in separate buildings



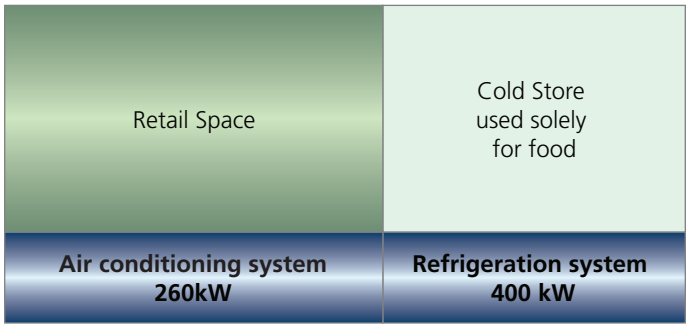
Air-conditioning systems in Buildings 1–4 are part of a district cooling system and are controlled by the same person.

Together the total capacity controlled is > 250kW.

Therefore the system needs be inspected by 4 Jan 2009.

4.4 Cooling capacity and process applications

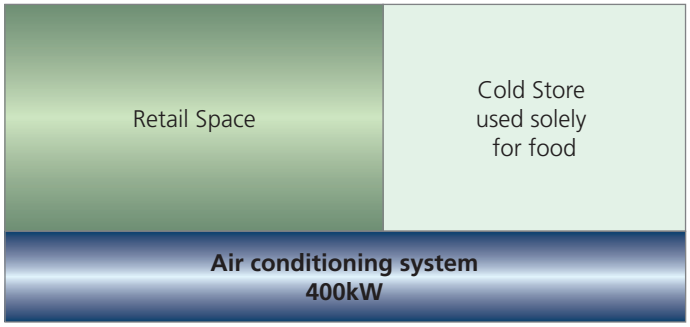
4.4.1 Refrigeration provided solely for process applications



The retail space is served by a system under single control > 250kW. The system needs to be inspected by 4 Jan 2009.

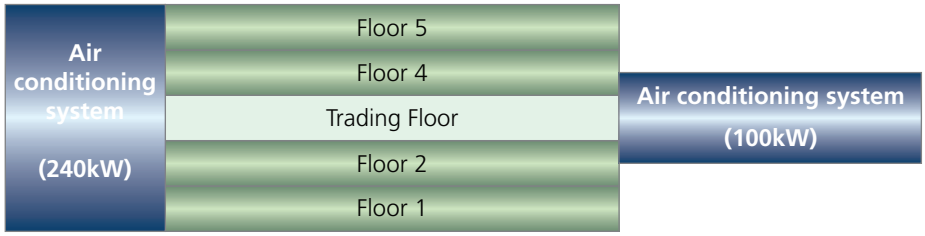
The cold store exists solely for the cool storage of food. This system does not require an inspection report.

4.4.2 Cooling capacity and refrigeration combined for process applications and comfort



The retail space and cold store is served by a system under single control > 250kW. Even though the cold store is a process application, the air-conditioning system also conditions space for the benefit of occupants in the retail space. The system needs to be inspected by 4 Jan 2009.

4.4.3 Cooling capacity, where occupants benefit from additional cooling capacity



The building is served by a single system under single control < 250kW. In addition an air-conditioning system of 100kW has been installed to serve the trading floor. The total under single control is > 250kW. The system needs to be inspected by 4 Jan 2009.

The occupants on the trading floor are using the machines rather than solely running the process. Therefore any additional air conditioning capacity benefits the occupants and is included in the air-conditioning capacity to be inspected.

5. Assessing the energy performance of an air-conditioning system

5.1 The scope of an inspection

Refrigeration

Refrigeration equipment and its associated heat exchange systems are checked briefly. The inspection looks primarily for indicators of damage or lack of maintenance that would significantly reduce their efficiency from their "as new" state. The contribution that refrigeration makes to most buildings' total annual energy consumption is likely to be relatively small, and so opportunities for cost effective improvement by replacing equipment are likely to be limited, except where equipment has failed and/or is likely to be replaced anyway.

Effective heat rejection is necessary to maintain the efficiency of the refrigeration system. If outdoor heat rejection equipment is damaged, or its access to adequate flow of air is otherwise reduced, its effectiveness in rejecting heat is reduced. This has the effect of reducing refrigeration efficiency, and reducing the cooling capacity of the system. It may cause the refrigeration equipment to turn off and on under the action of its own high temperature or pressure cut-out, often without satisfying the building cooling load, increasing the wear and tear on the equipment and reducing its service life.

Similarly, effective indoor heat exchange is necessary to maintain the efficiency of the refrigeration system. If this heat exchange equipment is damaged, or its access to adequate airflow is otherwise reduced, is effectiveness in transferring heat to the refrigeration system is reduced. This has the effect of reducing refrigeration efficiency, and reducing the cooling capacity of the system. It may cause the refrigeration equipment to turn off and on under the action of its low temperature or pressure cut-out, often without satisfying the building cooling load.

Air movement systems

Where installed as part of the system to provide cooling, air movement systems are an important factor in the assessment. The contribution that fans make to the total annual energy consumption of the combined cooling system is likely to be higher than that of the refrigeration plant itself, and there may be a greater potential for improvement.

The effectiveness of how air is delivered can play a part in determining the overall efficiency of the air-conditioning system. Where delivery systems are ineffective, plant that is otherwise efficient may operate for longer periods than necessary. Important factors to observe are the condition of, damage to, or blockage of filters and heat exchangers, and the fan type and method of control.

Ventilation air delivery systems need free access to outdoor air. Where grilles, screens or pre-filters are obscured by damage or debris, additional energy will be needed to overcome the extra resistance caused by the restriction to flow, or the system may under-perform in other ways due to reduced air flow rates.

Where systems provide cooled air, admitting air from locations where the local air temperature may be higher than ambient will add to the energy required to achieve cooling to the required temperature. Such locations might include positions near busy roads, in car parks, or where exhaust air from the building could be drawn into the air inlet.

Controls

System controls are assessed in more detail. There could be considerable scope to identify inefficiency due to inappropriate control methods, incorrect control settings and poorly located sensors, and there could be much potential for improvement at low cost. Although discovered 'faults' might be as simple as time-switches or cooling or heating thermostats being incorrectly set, the Energy Assessor would not reset them but will report to the building owner or manager.

An investigation of the realised effectiveness of system controls over any significant period of operation would be outside the scope of a simple inspection regime, but a series of physical observations of their layout and operation could give an indication of potential inefficiency, ineffectiveness or misuse.

It might not be possible to investigate some aspects of the layout and operation of controls, particularly in more complex systems. However, sufficient of the following important issues should be accessible to a brief examination:

- the set temperatures to which the treated spaces are to be conditioned
- the time periods during which they are to be conditioned
- the appropriateness of the control zones, control sensors and their locations
- the potential for cooling to be operated at the same time as heating
- the method of refrigeration capacity control
- the method of air flow rate control

Where systems are controlled by a Building Management System, it may be necessary for the building manager to arrange for relevant aspects of this information to be extracted from the BMS prior to the inspection. The Energy Assessor will be able to advise on this.

5.2 Documentation

A number of points to be assessed as part of the procedure may be found by examining records describing the installed systems and their commissioning results. As an example, the Specific Fan Power (SFP) of air supply and exhaust systems may be calculated from details of the installed plant and commissioning flow rates, for comparison with current guidance.

5.3 Maintenance

Evidence of any existing planned maintenance schedule, or of other recent maintenance activities will be sought. Where records clearly show that equipment and systems are already the subject of regular good practice checking and maintenance procedures, a number of aspects of the energy inspection and provision of advice may be reduced in scale or omitted.

5.4 Advice on improvement options

Three broad levels of energy efficiency are likely to be found when systems are assessed:

- systems where efficiency is clearly impaired due to faults, neglect or misuse
- systems where efficiency is likely to be lower than the current minimum provisions for building services in Approved Document L2B due to aspects of design or use
- systems that are acceptably efficient

Correspondingly to these, there are three broad ‘levels’ of advice you may receive:

a) advice on the rectification of faults in the system that are impairing its efficiency as designed

b) improvement advice to bring existing systems broadly in line with the current minimum provisions for building services in Approved Document L2B

c) best practice improvement advice to raise standards even where systems are fully compliant with the current minimum provisions for building services in Approved Document L2B

Given the need for simplicity and consistency, the inspection will mostly provide a combination of aspects of a) and b) only. However, best practice aspects may be provided on a generalised basis by providing reference to other published guidance sources.

There is a further category of advice which may be given. Some systems may be older and operate with refrigerants which are being phased out, or having their use and supply restricted, under regulations relating to ozone depleting substances. In these cases the assessor may give advice on possible options for future system adaptation to use other refrigerants, or complete replacement. This advice will need to be supplemented by a more detailed assessment when modifications or replacement are to be undertaken.

6. Consumer protection and enforcement

6.1 Checking the authenticity of an air-conditioning inspection report or an energy assessor

An air-conditioning report must be produced by an accredited energy assessor. If you have commissioned an air-conditioning inspection for your system, the accredited energy assessor should provide you with a written copy of the inspection report.

All energy assessors must be accredited. If you wish to check that an energy assessor is a member of an accreditation scheme, you can ask your energy assessor which accreditation scheme they are a member of (and their membership number). The accreditation scheme can confirm that your energy assessor is accredited to practice as an energy assessor.

The currently approved accreditation schemes for air-conditioning inspections are run by:

- Chartered Institution of Building Services Engineers (CIBSE)
- Royal Institution of Chartered Surveyors (RICS)
- EPC Ltd
- Quidos
- HIC Ltd
- NAPIT
- BESCA

Further details are available from www.communities.gov.uk/epbd.

6.2 Complaints

Complaints about the availability or quality of an air-conditioning inspection report or about an energy assessor or energy assessment, should be directed to the following:

1. *Failure to have an air-conditioning inspection report*. For complaints regarding the availability of an air-conditioning inspection report, contact the building occupier or an authorised officer of the local Weights and Measures Authority (usually the person in that authority is known as a

Trading Standards Officer). The authorised officers have the power to act on your complaints.

2. *Quality or accuracy of the air-conditioning inspection report and its recommendations*. For complaints regarding the quality and accuracy of the air-conditioning inspection report, contact the accreditation body of the energy assessor who produced the report. Contact details can be found on the report.
3. *Complaints regarding an energy assessor or any aspects of the energy assessment*. For complaints regarding the energy assessor or the energy assessment, contact the energy assessor in the first instance and if the matter is not resolved, contact the accreditation body of the energy assessor who produced the inspection report. Contact details can be found on the report.

If you suspect that your air-conditioning inspection report is subject to fraud, then the matter should be referred to the police.

6.3 Penalties for not having an air-conditioning inspection report

Local authorities (usually by their Trading Standards Officers) are responsible for enforcing the requirements relating to air-conditioning inspection reports. Failure to commission, keep, or provide an air-conditioning inspection report when required by the Regulations means you may be issued with a penalty charge notice. Trading Standards Officers may act on complaints or undertake investigations. They may request you to provide them with a copy of your air-conditioning inspection report. If asked, you must provide this information within seven days of the request or be liable to a penalty charge notice for failing to do so. A copy of an air-conditioning inspection report can be requested by an enforcement officer at any time up to six months after the last day for compliance with the obligation to make it available.

The penalty for failing to having an air-conditioning inspection report is fixed at present at £300.

If you are issued with a penalty charge notice and you believe it should not have been issued you can request a review. If you are not satisfied with the outcome of the review you may appeal to the county court within 28 days after you are given notice confirming the penalty charge notice from the local authority.

If you want to sell or let a building with an air-conditioning system which should have been inspected, then it is very likely that the legal advisors to the potential tenant or buyer will require sight of the report during the legal processes prior to exchange of contracts. Failure to have a report where one is required may have a negative impact on the transaction process.

Annex A

Good Practice Inspection and Maintenance of air-conditioning Equipment

The CIBSE, in common with other professional and industry bodies, recommends that air-conditioning equipment is regularly inspected and maintained to good practice standards. This is considered necessary for a variety of important reasons, including:

- to maintain healthy and comfortable conditions for building occupants
- to minimise loss of refrigerant gases that may damage the atmosphere or contribute to global warming
- to ensure the continued safe and efficient operation of the equipment

To support these aims, a number of industry and professional bodies have developed guidance on good practice for the inspection and maintenance of most air-conditioning equipment, and support training schemes to provide the technical skills necessary to carry out the work. Among these the CIBSE, the Heating and Ventilation Contractors' Association (HVCA), the Institute of Refrigeration (IOR), and the Air-conditioning and Refrigeration Industry Board (ACRIB) are widely recognised as setting the industry standard.

The frequency with which air-conditioning equipment should be inspected and maintained is an additional important factor. Manufacturers will normally recommend the particular intervals they consider appropriate for their own equipment, although this may sometimes be considered on the conservative side and others might recommend longer intervals.

It must be stressed that the inspection and assessment procedures described in this guidance only provide an initial survey of equipment designed to alert the owner or manager to the more obvious needs to maintain or modify air-conditioning systems. These inspections will only be capable of identifying instances where performance is likely to have been significantly affected, based on visual inspection and observation, in accordance with the requirements of the Energy Performance of Buildings Directive. These are not a substitute for the inspection and maintenance regimes recommended by CIBSE, industry and the professions, and considered necessary for the safe and correct operation of equipment.

Guidance on good and best practice inspection and maintenance of air-conditioning equipment, and controls, has been published by the CIBSE and the HVCA. It includes both strategic advice for the building owner or operator, and specific detailed advice for the maintenance contractor.

The Guide M, Maintenance engineering and management covers most aspects of engineering services maintenance both from the standpoint of the services designer and of the building owner or operator. It reviews the procurement of maintenance

services and legal issues as well as providing an overview of the maintenance needs of building services systems including air-conditioning systems and their controls.

The HVCA's ***SMG 2000: Standard Maintenance Specification for Services in Buildings***, produced in association with CIBSE, provides advice on the maintenance of a wide range of engineering services from the standpoint of the service engineer. It provides advice, in checklist form, indicating the specific components that should be inspected, and the recommended frequencies of inspection for each. It is divided into equipment categories that include the whole range of air-conditioning system components and its associated controls.

Both documents are extensive, and it is not suggested that a building owner or manager should read them entirely. However, they both provide a highly useful source of reference in planning a maintenance strategy and selecting a suitable contractor to undertake the work. They do not supplant equipment suppliers' own recommendations for inspection and maintenance, which may be more demanding and which the owner or manager may consider need to be carried out in order to preserve equipment guarantees. They do provide a consensus view of standards that are appropriate to the safe working and efficiency of systems where manufacturer guidance may be absent.

Also relevant are ***British Standard 8210:1986 Guide to Building maintenance management, and the BSRIA Application Guide AG 4/2000: Condition survey of building services***. These documents address the whole range of issues relating to building fabric and services equipment and include some general guidance on simpler inspections that would be carried out as part of asset and condition surveying, and maintenance planning. The guidance is aimed primarily at maintaining or reviewing the value of the building and its systems as assets, but includes aspects that could affect energy efficiency among the factors to be reviewed.

It is not possible, in this guidance to specify the content or frequency of good practice inspection and maintenance. Such a specification should ideally be arrived at as an individual decision for the owner or manager, based on the good practice guidance described above, additional relevant guidance that may have been provided by particular equipment suppliers, and the specific aims and needs of the organisation. However, the owner or manager seeking good practice maintenance of air-conditioning systems may specify that requirement more simply by asking organisations to quote for maintenance in accordance with the HVCA's ***SMG 2000: Standard Maintenance Specification for Services in Buildings***, for the relevant equipment. Organisations should also be asked to demonstrate that their personnel are suitably qualified to undertake work of that nature.

Annex B

Operating your air-conditioning system energy efficiently

Maintaining your air-conditioning system

Regular maintenance checks will help ensure your air conditioning system is operating as efficiently as possible. Energy consumption can increase by as much as 60 per cent as a result of poor maintenance and dirty components.

Your maintenance checklist should include:

Condensers. Check condensers are unobstructed and always ensure condensing and evaporating devices are clean and well maintained.

Refrigerant charge and leakage. Check the refrigerant charge for air conditioning and comfort cooling plant regularly and examine joints etc for signs of leakage. Some refrigeration systems may also be subject to routine leakage testing requirements under the F-gas regulation (EC Regulation No. 842/2006 on Certain Fluorinated Greenhouse Gases).

Pipework insulation. Damaged insulation on refrigerant pipework will consume more energy maintaining the required temperature. Replace any damaged sections and pay specific attention to pipework located outside a building.

Fans, filters and air ducts. Blocked filters lead to reduced airflow and increased operating costs. Check and clean fans, filters and air ducts and consider fitting gauges that indicate when the replacement of filters is required.

Thermostat calibration. Calibrate thermostats annually to ensure they respond correctly to actual temperatures.

Stay safe. Keep heat exchangers and cooling towers clean and treated to save energy and prevent health problems such as Legionella.

Operating your air conditioning system efficiently

- setting controls correctly and reducing the need for cooling will reduce the operating cost of your air conditioning system
- turn cooling thermostats up. Set the temperature ‘switch on’ to around 25–27°C and ensure heating switches off at around 19°C so that the two systems do not operate simultaneously
- match air flow rates to demand. Excessive draughts can cause joint stiffness, headaches and a dry nose and throat. Ask your maintenance technician for options to improve the internal environment
- switch off unnecessary electrical equipment. Switch off computers and lights when not required

- let the building cool overnight. Ensure blinds are down at the end of the working day and open secure vents overnight, where possible
- place heat-emitting equipment in a separate, naturally ventilated area. Colder areas on the north side of buildings are ideal
- service computer server rooms separately from the main system and cool only to the maximum temperature at which the equipment can operate effectively. Building occupants should be able to override these temperatures but controls should be reset when the area is vacated
- keep windows closed when air conditioning is on. Blinds can be angled to reduce solar heat gains whilst reflecting light on to walls and ceilings to reduce demand for electric lighting
- use external shading to reduce the amount of light/heat entering a space. 'Louvres' can be retrofitted to buildings to provide shade during summer whilst allowing lower winter sun to penetrate the area
- encourage staff involvement by demonstrating how they can be more in control of their own environment. Explain how thermostats operate and give guidance on recommended operating temperatures and on how to set heating or cooling units correctly. Display instructions on individual units and ensure that remote controls are accessible
- keep a log book detailing control settings, maintenance information and any records of the commissioning process. A comprehensive logbook helps users to develop a better understanding of a building's operation and management

Monitor energy usage

Monitor your energy consumption by examining your energy bills and any other meters which have been installed. Some energy suppliers are able to provide "real time" consumption data for your building.

Investing in new equipment

Investing in new equipment is a big decision for most businesses. Tax relief may be available in the form of Enhanced Capital Allowances (ECAs). You also need to think about whether the proposed work means you will need to make more improvements as part of the consequential improvement requirement in the Building Regulations.

The Consequential Improvement requirement applies to proposed work in buildings over 1000m^2 which include:

- an extension
- the initial provision of any fixed building services, which include heating, air conditioning, and mechanical ventilation or air handling
- an increase to the installed capacity of any such fixed building service

If any of these applies, then you will have to carry out such further improvements to the building as a whole are necessary to ensure that it complies with the requirements of Part L, Conservation of Fuel and Power, of Schedule 1 to the Building

Regulations 2000, as long as they are technically, functionally and economically feasible. For more information if you think you may be affected, see Approved Document L2B at www.planningportal.gov.uk.

The Enhanced Capital Allowance (ECA) scheme encourages businesses to invest in energy-saving plant or machinery. The ECA scheme provides certain businesses with 100 per cent first year tax relief on their qualifying capital expenditure. To qualify the equipment must be specified on the Energy Technology List (ETL) which is managed by the Carbon Trust on behalf of Government. The scheme allows businesses to write off the whole cost of the equipment against taxable profits in the year of purchase. For further information visit: www.eca.gov.uk/etl

Interest Free Energy-Efficiency Loans

Energy-Efficiency Loans of between £5,000 and £100,000 are available to qualifying small and medium sized enterprises (SMEs) In England* and Scotland* and any sized business in Wales*, looking to invest capital in energy saving projects. All businesses based in Northern Ireland* may now be eligible to apply for an interest free loan of up to £400,000. The loans are repaid over a period of up to four years and businesses must have been trading for at least 12 months. Loans are subject to terms and conditions and eligibility. Visit www.carbontrust.co.uk/loans for more details.

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