

Code of practice for

Fire protection for electronic data processing installations

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Fire Standards Policy Committee (FSM/-) to Technical Committee FSM/12, upon which the following bodies were represented:

- British Cable Makers' Confederation
- British Fire Protection Systems Association Ltd.
- British Fire Services' Association
- British Telecommunications plc
- Chartered Institution of Building Services Engineers
- Chief and Assistant Chief Fire Officers' Association
- Department of Health
- Department of the Environment (Property Services Agency)
- Department of Transport (Marine Directorate)
- Electrical Contractors' Association
- Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
- Engineering Industries Association
- Home Office
- Institution of Electrical Engineers
- Institution of Fire Engineers
- London Fire and Civil Defence Authority
- Loss Prevention Council
- Ministry of Defence
- National Association of Fire Officers
- National Caravan Council Limited
- National Inspection Council for Electrical Installation Contracting
- National Inspection Council (Quality Assurance Ltd.)
- Royal Institute of British Architects
- Society of Fire Protection Engineers
- Trades Union Congress

The following body was also represented in the drafting of the standard, through subcommittees and panels:

- Department of the Environment (Building Research Establishment)

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Foreword

This British Standard code of practice has been prepared under the direction of the Fire Standards Policy Committee and is a revision of BS 6266:1982 which is withdrawn. It is based on current methods of fire protection and on current conditions in the electronic data processing (EDP) field, i.e. relating to installations that have a low inherent fire risk. The standard is based on the expectation that manufacturers will continue to guard against design changes that would affect these conditions. The main purpose is therefore to protect such installations, which are sensitive to heat, smoke and water, from fire external to the EDP equipment.

The major changes from the 1982 edition are:

- a) the inclusion of a comprehensive introduction which discusses general fire safety and precautions associated with the good management of EDP installations;
- b) the addition of definitions for material of limited combustibility, protected space and building protection;
- c) the addition of three further system performance tests to supplement the two given in the 1982 edition;
- d) expansion of the discussion on types of extinguishing systems to include foams;
- e) expansion of the section dealing with operational fire precautions to include contingency measures, damage control and post-fire planning;
- f) a discussion of the use of halons and the phasing out of such systems.

The design and construction of facilities for electronic data processing installations often involve personnel from several different professional disciplines, including the insurers, an architect, a structural engineer, a building services engineer, a quantity surveyor, as well as personnel from local authorities such as the building control department, the fire authority and the local electricity supply authority. It is important that the professional design team should be fully briefed as to the client's requirements for fire protection and that their work should be coordinated and integrated, by a design team leader with that of all other disciplines and the suppliers and installers of the electronic data processing equipment.

The extent to which this standard is implemented will depend upon economic and practical factors, and might have to be the subject of agreement between the parties mainly concerned, after assessment of the fire risk. Before installing EDP equipment, the fire insurer and the fire authority should be consulted.

The most effective fire prevention comprises sound structural, engineering and operational precautions. Additional protection can be provided by fire detection and extinguishing systems (see BS 5839 and BS 5306).

Ensuring that the design, installation (including installing practice) and maintenance of all protection measures conforms to a recognized quality system such as that provided by BS 5750 is an important aspect in providing protection that is most effective and fit for its purpose.

Because damage to an electronic data processing installation can have serious consequences, the precautions recommended in this standard for buildings that house EDP equipment may be more stringent than the requirements of legislation, particularly as regards separation from other accommodation, and separation within the EDP area itself.

The recommendations made in this standard are mainly concerned with protection of buildings and their contents and protection against asset loss and business interruption. They are additional to legislative requirements concerned with safety of life. The main Acts and Regulations concerned are given in appendix B.

Safety requirements for EDP equipment are dealt with in BS 7002 and recommendations for the accommodation and operating environment of computer equipment are dealt with in BS 7083.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations. In particular attention is drawn to the Electricity at Work Regulations 1989.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 30, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

A fire in an EDP installation can lead to extensive asset losses and serious business interruption. However, the occurrence of a major fire in an electronic data processing installation is a rare event. There are probably numerous reasons for this: a high degree of security is normally implemented, human activities within central processing equipment rooms are often limited, and smoking is usually prohibited. Also, if a minor fire does occur, the fire load that could contribute to its development is often minimal, linings are usually of low flammability, and very often there will be early detection and extinguishment of the fire, either of which may occur automatically (by fixed systems) or manually (by persons on the premises).

Provided there are persons on the premises, minor incidents that involve EDP equipment can normally be dealt with simply by isolating the power to the unit in question. Any residual flaming is then easily extinguished by use of a suitable portable extinguisher. These incidents can, however, lead to a fire if appropriate action is not taken, perhaps because the premises are unmanned and there is not a suitable automatic fire detection system. Even in the absence of flaming combustion, smoke and fumes from overheated components and wiring can lead to damage of sensitive electronic equipment.

Modern electronic equipment constitutes a relatively low fire hazard, although specific components, such as power packs, may give rise to problems of the type described above. Equipment that involves mechanical elements, such as disk drives and printers, may constitute a greater hazard than solid state processing equipment, but there is no evidence to suggest that it is the cause of a significant proportion of the small number of serious fire losses that have occurred.

Accordingly, any protection philosophy that is directed solely towards fires originating within the actual EDP equipment is deficient. Air-conditioning and power supply equipment, for example, probably constitute as great a risk as EDP equipment, and experience has shown that faults, such as overheated motors in air-conditioning equipment, can cause extensive damage due, in part, to the copious production of smoke. A trend towards self-contained air-conditioning units within equipment rooms may well have exacerbated this hazard by introducing a source of fire into the protected enclosure.

Many fires affecting EDP equipment originate outside the confines of the EDP installation. In such cases, typical causes of fires include electrical faults, arson and smoking. This reinforces the importance of considering ignition sources other than those associated directly with EDP equipment.

The infrequent occurrence of serious fires in EDP installations does not obviate the need for high standards of fire prevention. It is a common misconception that the use of fire protection systems, such as sprinkler and fire detection installations, is, in itself, sufficient to prevent loss from fire. In fact, the prevention of fire is more important since, in many EDP installations, a significant financial loss can ensue from even a small fire, regardless of whether such a fire is detected or extinguished within a short time of ignition. Accordingly, in this standard, advice is given on matters, such as basic housekeeping and avoidance of ignition sources, which will reduce the probability of fire. Advice is also given for contingency planning for recovery after fire and in particular, protection and duplication of data.

It is, however, impossible to eliminate sources of fire entirely, and there is a need to consider the installation of active fire protection equipment. It should, nevertheless, be stressed that the extensive use of fire protection systems in EDP installations arises not from a high probability of fire, nor from a significant hazard to life, but from the consequences of fire loss. Indeed, the possibility of hazard to life and the provision of means of escape from fire are not directly addressed by this standard. Guidance on means of escape from office accommodation may be found in BS 5588-3. For the purposes of interpretation of BS 5588-3, much of an EDP installation can be regarded as of similar risk to office accommodation, although specific areas, such as plant rooms, uninterruptible power supply (UPS) rooms, etc. should be treated as ancillary accommodation of higher fire risk.

There are three levels of protection: equipment protection, room protection and building protection. Given that fire protection measures are often installed to prevent financial loss, directly or indirectly (i.e. through business disruption), it is obvious that the degree of fire protection should be commensurate with the potential for such loss. In major data centres, there will invariably be the potential for large financial loss due to the cost of EDP equipment and its sensitivity to damage by products of combustion. Under these circumstances, the party who will bear the burden of the loss, such as the user or insurer, will wish to ensure that any fire within the space that contains the equipment is detected at an early enough stage to allow suitable extinguishing action, normally by means of an automatic system. This may be described as “room protection”.

If any particular item of equipment is of extremely high value or is critical for continual operation, room protection may be insufficient and a higher level of protection may be required, whereby any incipient fire within a cabinet will be detected at an early enough stage to allow extinguishment before extensive damage occurs to the cabinet. This may be described as “equipment protection”.

Any need for equipment protection does, however, imply that there should be an adequate form of room protection to ensure that equipment is not damaged by fires that initiate within the general area of the room in which the equipment is housed.

There may, however, be circumstances in which protection from structural damage due to fire in the building that houses the EDP installation is as important as, or more important than, protection of the EDP equipment. This can arise, for example, if the equipment itself is not of high value but the EDP facility cannot conveniently be operated from another location (e.g. due to the existence of a dedicated communications network that terminates at the building in question). In this case, there is a need for “building protection”, where detection and extinguishing action may occur at a later stage than would occur in room protection but which will use a highly reliable method of fire extinguishment that will almost inevitably be automatic in operation.

An equipment protection system is unlikely to be adequate for room or building protection as it may not be capable of dealing with fires other than those in EDP equipment. A room protection system is likely to be inadequate for equipment protection and can only offer building protection if it is highly reliable in operation and is effective throughout all areas of the building that houses the EDP installation. A building protection system will not normally operate at an early enough stage to provide equipment protection, and may not be adequate for room protection.

The use of automatic systems for one level of protection does not imply the need for the use of automatic systems to provide another level of protection. For example, in a large installation, continuous surveillance by occupants within the EDP installation, together with manually operated extinguishing equipment, may be adequate for room protection but inadequate for equipment protection, which may require the provision of automatic detection to complement manual extinguishment. In a small continuously manned room, surveillance by occupants and the provision of manually operated extinguishing equipment may be satisfactory for equipment protection, but there may be a need for automatic detection or sprinklers in other (unmanned) parts of the building.

Analysis of the potential for financial loss should not be limited to a consideration of the material damage that might occur. It is imperative that detailed consideration is given to the potential for business interruption and consequential loss. This aspect of risk analysis should involve those responsible for EDP operations, as it will necessitate a clear definition of the maximum tolerable period for which data processing services can be interrupted, and a review of the contingency plans for operation in the event of loss of selected items of EDP equipment, the complete EDP installation or the entire building.

In practice, a wide variation of dependency on EDP facilities can be found. At one extreme, a batch processing operation may be completely duplicated at a second location, so that there is 100 % redundancy. In this case, a major fire at either location would not cause measurable interruption to the business. Protection philosophy should then be related entirely to the potential for financial loss that results from damage to equipment.

At the other extreme, a “real-time” facility may be absolutely critical to the revenue-earning capacity of an organization, e.g. it may control a major manufacturing process or provide financial dealing information. In these circumstances, even a few minutes down time may result in significant business interruption and, because of dedicated communications, it may be impossible to restore the service at another location and, for these reasons, equipment, room and building protection may be warranted.

In practice many installations will be between these two extremes and it is essential that there is adequate consultation between all parties to ensure that the protection is commensurate with the exposure to loss. Such parties will comprise the insurer, the building manager, the computer operations manager and the fire engineer. Consultation with the local fire authority and the building control officer is also advisable.

The degree of protection advocated in this standard is primarily intended for high cost or critical EDP installations. It may not be appropriate for the “electronic office” that does not require a special environment, and, after consultation between all interested parties, may be relaxed for low cost installations that are not significant to the continued functioning of an organization. Conversely, only the most stringent application of this code may be appropriate for particularly critical EDP installations, for which a degree of redundancy in protection systems may form part of the protection philosophy.

It will normally be necessary to consider the potential for business interruption separately from the potential for material damage. Since the former, in particular, may vary with time due to changes in dependency on EDP facilities or modifications to contingency plans for recovery, it is essential that the standard of protection is reviewed periodically to ensure that it remains appropriate to the exposure to loss.

1 Scope

This British Standard makes recommendations for the protection from fire of electronic data processing (EDP) installations.

It applies to new installations, but the recommendations may also be used as a guide to the adequacy of precautions in existing installations or when alterations are made to an EDP area.

The standard is not intended to apply to equipment limited in value or in economic importance, e.g. microcomputers, desk-top units, visible record computers or some EDP equipment. However, users may decide to apply the whole, or part, of the recommendations given in this standard to such equipment depending on the importance of a system, the information recorded and the consequence of any loss of use. For example, part of or the whole of this standard may be applied to an area housing two or more small computers that require special environmental control.

NOTE The titles of the publications referred to in this standard are listed on page 30.

2 Definitions

For the purposes of this standard, the following definitions apply in addition to those given in BS 5839-1.

2.1

electronic data processing (EDP) area

the room, or rooms, in which are situated the machinery and electronic equipment necessary to receive or transmit data, to process it and either to record or print the output results, or to feed the output directly to controlled processes

NOTE The EDP area may comprise one or more of the following.

- a) *Central processing area (CPA)*. That part of the EDP area in which the central processing unit and its associated equipment are installed.
- b) *Data handling area*. That part of the EDP area in which data is received and transferred to computer input media such as punched cards, punched paper tape, magnetic tape, or disk, including direct document reading equipment.
- c) *Media stores*. Ready-use paper store and magnetic media library.
- d) *Output printing area*. That part of the EDP area in which the printing of output data is carried out.
- e) *Communications area*. That part of the EDP area in which the EDP telecommunications are installed.
- f) Other areas served by the same air-conditioning system.

2.2

fire load

calorific energy of the whole contents of a space, including the facings of the walls, partitions, floors and ceilings

2.3

fire resistance

the ability of a component or construction of a building to satisfy for a stated period of time the appropriate criteria specified in the relevant Part of BS 476. The criteria are as follows:

- a) for walls and partitions, equal compliance for loadbearing capacity (where appropriate), integrity and insulation from either side;

b) for floors, equal compliance for loadbearing capacity, integrity and insulation from the lower side;

c) for doors and glazed elements, compliance for integrity from either side.

2.4 fire stop

a seal provided to close an imperfection of fit between elements and components of or construction in a building, or any joint, so as to restrict penetration of smoke and flame through that imperfection or joint

2.5 fire separation

separation or compartmentation within a building or area, by construction, to achieve the appropriate fire resistance

2.6 non-combustible material

any material capable of satisfying the performance requirements specified in BS 476-4, or any material which, when tested in accordance with BS 476-11, does not flame or cause any rise in temperature on either the centre (specimen) or furnace thermocouples

2.7 total flooding

the discharge of an extinguishing agent into an enclosed volume, intended to achieve a uniform concentration of the agent within that volume sufficient to extinguish a fire

2.8 aspirating smoke detection system

a fire detection system that monitors a protected space for the presence of smoke by drawing an air sample from the protected space through pipework to a central detection point. The air sample is tested for the quantity of smoke present and an alarm condition is signalled at a predetermined response level

2.9 coincidence connection

a facility designed in such a way that an output is obtained only when at least two independent detection inputs are present at the same time. Thus, an output suitable for triggering a fire extinguishing system is obtained only after a detector has detected a fire, and at least one other independent detector covering the same protected space has confirmed the existence of fire

2.10 material of limited combustibility

either:

- a) a non-combustible material; or
- b) any material of density 300 kg/m^3 or more which, when tested in accordance with BS 476-11, does not flame, and the rise in temperature on the furnace thermocouple is not more than 20°C ; or
- c) any material with a non-combustible core of 8 mm thick or more, having combustible facings (on one or both sides) not more than 0.5 mm thick.

2.11 class 0 material or surface

either:

- a) composed throughout of materials of limited combustibility; or
- b) a material classified as class 1 when tested in accordance with BS 476-7, which has a fire propagation index I of not more than 12, and a subindex i_1 of not more than 6, when tested in accordance with BS 476-6.

2.12 protected space

that area or volume protected by a fire detection and/or extinguishing system

2.13 room protection

the provision of a fire detection and/or a fire extinguishing system within a room, floor void or ceiling void

2.14 equipment protection

protection that is intended to minimize the extent of fire damage to equipment in which fire originates

2.15 building protection

the provision of a fire detection and/or a fire extinguishing system within a building to limit structural damage to the building

2.16 fire door (assembly)

a door or shutter provided for the passage of persons, air or objects which, together with its frame and furniture as installed in a building, is intended, when closed, to resist the passage of fire and/or gaseous products of combustion and is capable of meeting specified performance criteria to those ends

3 Location and construction

3.1 Sites and buildings

Before installation of the EDP equipment, internal fire hazards and any hazards external to the building should be assessed and appropriate fire precautions should be adopted. Consideration should be given to the gap between buildings in order to protect sensitive equipment from fires in nearby buildings.

Wherever practicable, EDP areas should not be sited where firefighting is difficult or where there is a risk of flooding, e.g. in basements. Where this is not practicable, precautions should be taken to prevent flooding and there should be adequate access for firefighting personnel.

Lightning conductors should not be routed through an EDP area.

NOTE The possible need for lightning protection for a building, and methods of achieving this, are dealt with in BS 6651.

3.2 Fire separation of EDP area

3.2.1 The EDP area should be reserved for operations associated with the use of the EDP equipment.

3.2.2 The EDP installation should be housed in a separate building or isolated by fire separation in part of a building. In the latter case, consideration should be given to the occupancy of the remainder of the building and to the construction of separating walls and floors, which should be made of materials of limited combustibility. The construction should have a fire resistance of not less than:

- a) 60 min when the remainder of the building has a low fire load, such as offices;
- b) 120 min when the remainder of the building has a medium fire load, such as factories;
- c) 240 min when the remainder of the building has a high fire load, such as furniture warehouses.

NOTE 1 In some cases the fire resistance may have to be increased.

NOTE 2 With regard to separation from power rooms, see 4.2.2.

Glazed elements in separating walls should be fire resistant in terms of both integrity and insulation. The separating construction should, where possible, be imperforate particularly where the construction provides separation from an occupancy of high fire load. In walls that are recommended by this standard to have the periods of fire resistance shown in items a), b) and c), openings should be protected by at least one fire door (see 2.16) in combination, if required, with additional fire doors, such that the aggregate fire resistance is not less than that of the separating construction. All such fire doors should resist the passage of smoke.

In the case of fire-resisting shutters, these should be held open by a fire-sensitive device. The device should be sited on the side of the wall remote from the EDP accommodation.

A combination incorporating a fire-resisting lobby is preferred, since separation by two fire doors is more effective as a barrier to smoke. Where a single fire door is selected, the EDP area should still be separated from any other accommodation by two doors. This may be achieved, for example, by the fire door in the wall that encloses the EDP area opening onto a fire-resisting corridor in which all other doors are FD30S fire doors, or onto a section of corridor that is separated from all doors to non-EDP accommodation by cross-corridor FD20S fire doors.

NOTE 3 Details of the FD classification system are given in PD 6512-1.

3.2.3 The floor of any storey immediately above an EDP storey should be made water resistant and any other necessary precautions taken to prevent water from entering the EDP area. It is recommended that ventilation ductwork or service ducts serving other parts of the building should not pass through an EDP area. If, because of planning difficulty, ventilation ductwork or service ducts have to pass through an EDP area, they should be protected in accordance with methods 2 or 3 of BS 5588-9:1989, i.e. treated as fire-resisting shafts (to contain fire and smoke within the ductwork) with fire resistance as recommended for fire-separating walls and floors. Any ducts serving the EDP area, and external to it, should be treated as fire-resisting shafts, to prevent fire from entering the duct (see also 4.1.4).

3.3 Linings within an EDP area and ancillary accommodation

Linings to walls, partitions, soffits, ceilings and voids should be class 0 (see 2.11) and, as far as practicable, should not give rise to the production of dust, or of corrosive or toxic fumes when involved in a fire.

3.4 Raised floors within an EDP area

3.4.1 General

Materials used to support raised floors built above structural floors should be of adequate strength, be non-combustible and should not incorporate materials having a melting point lower than 600 °C. The design of a raised floor should be such that it retains its integrity and provides adequate thermal insulation in the event of a fire developing in the void beneath. Where combustible materials are used for the raised floor, it should be faced on the underside with non-combustible material.

Where modular raised floors are installed, appropriate lifters should be provided which are obvious and readily accessible.

NOTE Additional guidance is available in PSA publication MOB 01.801, June 1981, *Performance specification — Platform floors*¹⁾.

3.4.2 Risk of water damage

The use of water leakage detection systems should be considered. In order to avoid the risk of water damage from external sources in the computer area, the main floor level should be raised and sills (with or without ramps) fitted at all door openings.

Particular care should be taken to avoid flooding of cable voids formed by cutting ducts in main floors. The main ceiling and the main floor of the EDP area should be made water resistant and dustproof by suitable means to ensure long-term protection.

Service pipes (e.g. central heating) carrying water, other than pipes for sprinkler protection of the EDP area, should not be brought into the EDP area unless a water supply is essential for the efficient operation of the installation. In such cases provision should be made for cutting off, in an emergency, any water supplies other than those to sprinkler systems.

Where large discharges or deposits of water may occur (e.g. from the operation of sprinklers), adequate facilities should be available to enable removal of water.

3.4.3 Distributed equipment

Where EDP hardware is not confined to a dedicated area but is decentralized within a large area (e.g. computer controlled fabrication hardware in a manufacturing complex), consideration should be given to separating the hardware from the manufacturing process by a fire-resisting construction. There should be means of shutting down power to the decentralized equipment.

3.5 Suspended ceilings within an EDP area

Suspended ceilings and any linings thereto should be made of materials of limited combustibility and, as far as practicable, should not give rise to the production of dust, nor of corrosive or toxic fumes, when involved in a fire. Non-combustible mineral fibre or glass fibre filling inserted above ceiling tiles (e.g. for acoustic or air balancing reasons), should be contained in sealed bags of minimal fire-propagating properties.

In the exceptional case of a suspended ceiling being of the fire-protecting type, i.e. designed to give fire protection to the structure above, the ceiling should be installed to achieve the performance as tested; it should not include potential points of weakness (e.g. recessed plastics light fittings) that were not included in the tested construction.²⁾

3.6 Walls and partitions within an EDP area

3.6.1 Ancillary accommodation within an EDP area

Equipment or processes with a higher fire risk, e.g. data preparation areas, service rooms and working stationery stores, should be separated from the rest of the EDP area by construction with a fire resistance of at least 60 min. Partitions should be constructed of materials of limited combustibility (see 2.10). Small offices having similar fire risk to the CPA should be separated from the remainder of the EDP area by construction with a fire resistance of not less than 30 min.

3.6.2 Division of the EDP area into rooms

Further division of the EDP area into rooms for operating convenience may also provide some degree of fire protection for vulnerable items such as working media libraries.

Where this benefit is required, maximum protection should be secured by fire-resisting walls and partitions that are constructed from the structural floor to the soffit of a structural floor or roof above. Any concealed parts of such partitions should be constructed of materials of limited combustibility. Any openings in the walls or partitions above the floor void and below the ceiling void should be protected by self-closing doors or hatches with a fire resistance equivalent to that of the partitioning.

NOTE In dividing the EDP area into rooms, consideration should be given to the effect this will have on the design of fire detection and extinguishing systems (see 5.1 and 5.2).

3.6.3 Holes for the passage of cables or other services

Any holes created for the passage of cables, etc. should be fire stopped to maintain the integrity and overall fire resistance of the walls or partitions. This is also necessary to prevent leakage of gas from an automatic gaseous extinguishing system. Proprietary fire-stopping systems which facilitate modification to wiring are preferred.

3.6.4 Glazed elements in internal walls

Glazed elements in internal walls may be provided if fire resistant.

¹⁾ Available from Property Services Agency Library, Sales Office, Block C, Whitgift Centre, Wellesley Road, Croydon, Surrey.

²⁾ An assessment by competent persons which indicates that the features in question do not compromise the fire resistance of the ceiling is acceptable in lieu of test evidence.