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**BRITISH STANDARD CODE OF PRACTICE**

**CP 327.404/402.501 (1951)** + Amend. 1 2 3

[UDC 696.6: 654.9: 614.842]

See PD 2720 which covers whole of CP 327 series

# ELECTRICAL FIRE ALARMS

**THE COUNCIL FOR CODES OF PRACTICE FOR BUILDINGS**

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BRITISH STANDARD CODE OF PRACTICE
CP 327.404/402.501 (1951)
GENERAL SERIES

# ELECTRICAL FIRE ALARMS

Price 8/6

THE COUNCIL FOR
CODES OF PRACTICE FOR BUILDINGS
CONSTRUCTION AND ENGINEERING SERVICES

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## THE COUNCIL FOR
## CODES OF PRACTICE FOR BUILDINGS

### Construction and Engineering Services

The Council for Codes of Practice for Buildings was formed under the ægis of the Ministry of Works in September, 1942, as the result of negotiations initiated by the Minister of Works in consultation with the Ministry of Health and other Government Departments.

The Council is composed of nominees of the following professional and scientific Institutions:—

Institution of Civil Engineers
Royal Institute of British Architects
Institution of Mechanical Engineers
Institution of Electrical Engineers
Institution of Municipal Engineers
Institution of Structural Engineers
Incorporated Association of Architects and Surveyors
Royal Institution of Chartered Surveyors
Royal Incorporation of Architects in Scotland
Institution of Gas Engineers
Institution of Heating and Ventilating Engineers
Illuminating Engineering Society
Institute of Welding
Institution of Water Engineers
Institution of Sanitary Engineers

and of the British Standards Institution and the Building Industries National Council, with assessor members nominated by the Government Departments concerned, and a Chairman appointed by the Minister of Works.

Its terms of reference are—To direct the preparation of Codes of Practice for buildings—construction and engineering services.

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## BRITISH STANDARD CODES OF PRACTICE FOR BUILDINGS

Codes of Practice are divided into a Code of Functional Requirements of Buildings and a General Series of Building Codes.

The Code of Functional Requirements of Buildings comprises ten Chapters:—

I. Daylight, sunlight and ventilation
II. Weather protection
III. Sound insulation
IV. Precautions against fire
V. Loading
VI. Acoustics
VII. Engineering and utility services
VIII. Heating and thermal insulation
IX. Durability
X. Precautions against vermin and dirt

The main divisions of the General Series of Building Codes are:—

**Series 100 (to 199) Carcase**

100/109 Foundations and substructure
110/119 Loadbearing superstructure
120/129 Walls and partitions
130/139 Flues and chimneys
140/149 Roof coverings
150/159 Doors, gates and windows, including frames glazing, hardware, surrounds and finishes

**Series 200 (to 299) Building finishes**

200/209 Finishes to floors and stairs
210/219 Applied wall and ceiling finishes (internal)
220/229 Applied wall finishes (external)
230/239 Painting and decoration

**Series 300 (to 399) Installation of services**

300/309 Building drainage, sanitary services and refuse disposal
310/319 Water supply
320/329 Electricity
330/339 Gas
340/349 Central heating and hot water supply
350/359 Ventilation, air heating and air conditioning

**Series 400 (to 499) Miscellaneous independent installations and equipment**

(No specified grouping)



## ELECTRICAL FIRE ALARMS

This Code has been prepared jointly by Committees convened by the Institution of Mechanical Engineers and the Institution of Electrical Engineers on behalf of the Council for Codes of Practice for Buildings. A draft of the Code was published for general comment and was also submitted for specific comment to all professional and trade organizations which are intimately concerned with its subject matter. All comments and views expressed have been taken into consideration in the preparation of the Code as now published.

The Code will be revised, if necessary, within a period of five years after publication.

27th *September*, 1951.

---

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**This Code of Practice represents a standard of good practice and therefore takes the form of recommendations. Compliance with it does not confer immunity from relevant legal requirements, including byelaws.**



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# ELECTRICAL FIRE ALARMS

## SECTION 1. GENERAL

**101. Scope.** This code, which forms part of the series dealing with telecommunication services in the group of codes on electrical installations in buildings,* deals with the installation of electrical fire-alarm systems, including manual call-points and automatic detectors. It does not include public fire-alarm systems or alarms forming part of automatic sprinkler installations, or manually or mechanically operated sounders. Sprinkler alarms are dealt with in Code 402.201.

Code 402.201

This code applies only to installations for use in temperate climates.

B.S. 204
B.S. 205

**102. Definitions.** The definitions given in B.S. 204 : 1943 and B.S. 205: 1943 have been followed in general.

Section 7 of B.S. 204 : 1943 deals with fire alarms, but relates principally to public fire-alarm systems and fire station practice. In view of the requirements of fire-alarm systems installed in buildings, it has been considered desirable to provide the following definitions of certain terms used in the present code:—

*Automatic system or circuit* — A system or circuit in which the alarm is originated without manual intervention.

*Closed circuit* — A circuit connecting a number of call-points in series to the indicating and control equipment wherein a steady current flows continuously and an alarm of fire is transmitted by its interruption.

*Control point* — The place or room where the main indicator board or, in an installation of the type referred to in clause 303 (*g*) (ii), zone and section indicating-panels are situated.

*Detector (or automatic call-point)* — A device, such as a thermostat, by means of which, on the occurrence of predetermined conditions, an alarm of fire is automatically given. In the case of detectors of the fluid-filled type, the detector includes the length of tube, associated electrical contact and its testing device.

*Fault signal* — A distinctive signal indicating a failure of electric supply, the presence of a break, an earth, or other electrical fault on a circuit or a system of circuits.

*Fire alarm system* — An arrangement of call-points, detectors, sounders and other equipment for the transmission and indication of alarm and supervisory signals, for the testing of circuits, and where required, for the operation of auxiliary services.

* Code Nos. 327.101—327.404.





*Indicator* — A device which reveals the number and/or name of the call-point and/or section from which a call has originated; in a drop indicator, this is accomplished by the dropping of a flag, and in a lamp indicator, by the glowing of a lamp or lamps.

*Manual call-point* — A manually-operated device by which an alarm of fire is given.

*Manual system or circuit* — A system or circuit in which the alarm is originated by hand.

*Open circuit* — A circuit connecting a number of call-points in parallel to the indicating and control equipment, wherein an alarm of fire is transmitted by the closing of the contacts of any call-point.

*Sounder* — A receiving instrument in which electric signals are translated into sound signals.

**103. Exchange of information.** (*a*) *General.* The initial and ultimate requirements for the building should be ascertained as accurately as possible by consultation between the client, architect or consultant, and contractor. On the basis of this information, plans should be prepared showing:—

(i) details of the installation proposed,
(ii) the accommodation required for the equipment,
(iii) the ducts, chases, conduits, etc. required for the wiring.

(*b*) *Approval of installation.* Approval of the installation proposed should be obtained from the client, and from any public or other authority concerned. Attention is called to the fact that certain statutory and other requirements exist which may apply to a particular installation.

(*c*) *Requirements of Fire Insurance Offices.* Where the premises are or will be insured, notice of the intention to install a fire alarm system should be given to the Fire Insurance Office so that any special requirements of the insurer may be considered.

(*d*) *Electricity supply authority.* Notice of the intention to install a fire-alarm system should be given to the electricity supply authority when any provision for fire risk is considered necessary in respect of its plant.

(*e*) *Interconnection with public fire service.* If interconnection with a public fire service is required, there should be early consultation with the Fire Officer concerned.

(*f*) *Accommodation.* The location of the equipment, distribution points, and the like, should be agreed between the parties concerned, and accommodation reserved at an early stage.



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(*g*) *Ducts, chases, sleeves, etc. and segregation of wiring*. The wiring plan should be agreed in collaboration with those responsible for other services, to enable the architect to specify the necessary ducts, chases, sleeves, etc. before building operations commence. The need for segregation of the fire-alarm wiring and equipment should be discussed at this stage. (See clause 308 (*c*).)

(*h*) *Record plans and operating instructions*. On completion of the installation, complete circuit diagrams of the equipment should be supplied, together with adequate instructions on its use and operation; the rating of fuses should be stated. Plans should also be supplied, if called for, showing, for maintenance and record purposes, the position of the various items of equipment, junction-boxes, etc. and the sizes and routes of all cables and wires. Junction-box and distribution-case diagrams should be included. The records should be permanent and suitable for convenient reference.

**104. Time schedule.** (*a*) *Ordering central equipment*. For large installations, the equipment may have to be specially manufactured, and should be ordered at an early date to ensure its availability for installation at the appropriate time.

(*b*) *Installation of central equipment*. Work on the installation of the central equipment may begin at any stage, provided that, in the actual room, all building work, including decoration, is finished, and that the room is dry. Electric light and power should be available at the commencement of installation.

Work of other contractors which is likely to give rise to dust (e.g. concrete mixing) should not be carried out near the central equipment after installation has begun.

(*c*) *Wiring*. Wiring in ducts, conduits, chases, and the like, should be carried out at a late stage of building construction. The ducts, etc. should be dried out before wiring is begun.

Surface wiring should be installed immediately prior to the final decoration.

(*d*) *Installation of equipment*. Detectors, sounders, indicators, and the like, should be installed as late as possible as a precaution against damage and loss, and, in any event, not until the building work and decoration in their immediate vicinity have been completed.

**105. Related codes.** Reference should be made to the following Codes:—

| | |
|---|---|
| CP 321 | Electrical installations—general. |
| CP 321.101 | Choice, installation and maintenance of electric wiring systems (for power, lighting and heating circuits) in buildings. |



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| | |
|---|---|
| CP 327.102 | Telephones and telegraphs—private services. |
| CP 402.201 | Sprinkler systems. |
| CP 413 | Design and construction of ducts for services. |
| CP 1003 | Installation and maintenance of flameproof and intrinsically-safe electrical equipment. |

## SECTION 2. MATERIALS, APPLIANCES AND COMPONENTS

**201. British Standards.** Materials, appliances and components should conform to the following British Standards, as far as they apply:—

| | |
|---|---|
| Cables, rubber and P.V.C. insulated | B.S. 7 |
| Cables, metal-sheathed, impregnated paper-insulated copper conductors for electricity supply | B.S. 480 |
| Cells and batteries, Leclanché type | B.S. 397 |
| Colour card for ready-mixed paint | B.S. 381C |
| Colour identification of pipe lines | B.S. 1710 |
| Conduits, steel, and fittings for electrical wiring | B.S. 31 |
| Ducts, under-floor, non-metallic, with fittings | B.S. 815 |
| Ducts, under-floor, steel, with fittings | B.S. 774 |
| Electric mains-operated radio and other apparatus for radio, acoustic and visual reproduction. (Safety requirements) | B.S. 415 |
| Engineering and utility services in buildings | B.S. 1043 |
| Fire resistance, incombustibility and non-inflammability of building materials and structures | B.S. 476 |
| Flameproof enclosure of electrical apparatus (including tests) | B.S. 229 |
| Fuses, cartridge, 250 volt (rated up to 5 amperes) | B.S. 646 |
| Fuses, electric, 250 volt (rated up to 1200 amperes) | B.S. 88 |
| Graphical symbols for interior electrical installations | B.S. 447 |
| Intrinsically safe electrical apparatus and circuits | B.S. 1259 |
| Limits of radio interference | B.S. 800 |
| Minimum requirements for electrical appliances and accessories | B.S. 816 |
| Non-ignitable and self-extinguishing boards (with mineral base) for electrical purposes | B.S. 737 |
| Non-ignitable and self-extinguishing properties of solid electrical insulating materials (including classification and methods of test) | B.S. 738 |
| Portable accumulators and secondary batteries (lead-acid type) | B.S. 439 |

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| | |
|---|---|
| Radio interference suppression devices, components for | B.S. 613 |
| Stationary accumulators (lead-acid Planté positive type), for general electrical purposes | B.S. 440 |
| Transformers, bell | B.S. 832 |

**202. Quality and performance.** (*a*) *General.* The quality of materials and finishes and the performance of all components, apparatus and equipment (other than cables) should be adequate to meet the test requirements specified in (i) to (iv) below and to ensure satisfactory operation of the system throughout the life of the building or the period for which the installation is designed.

(i) *Durability test.* Each component should be so constructed that it will be in good working order and undistorted after 10 000 operations.

(ii) *Vibration test.* Components should be tested to ensure freedom from false operation or failure through mechanical shock or vibration likely to be experienced in normal service.

(iii) *Operating test.* Tests should be made to verify that components, assemblies or complete equipments function satisfactorily at any specified limits of current or voltage. The limits specified should be such as to ensure compliance with clause 602(*a*).

(iv) *Insulation test.* The insulation between each current-carrying part and all other current-carrying parts connected together with any metal enclosure and all other metal parts of any components should withstand the application for one minute of a test voltage 1000 volts r.m.s. of approximately sine wave-form and of a frequency of approximately 50 cycles per second. Immediately after this test, the insulation resistance measured at 500 volts D.C. should be not less than 20 megohms.

(*b*) *Contacts.* All electrical contacts should be of platinum, or silver or other metal or alloy not less durable in performance.

Contacts should, whenever practicable, be housed in dust-tight enclosures.

**203. Manual call-points.** Manual call-points embodying the following features should be selected:—

B.S. 381C (*a*) Call-points should be coloured ' Signal red ' (see B.S. 381C).

(*b*) In order to discourage malicious calls, a glass cover should be provided so that a call-point cannot normally be operated until the glass cover has been broken. In exceptional cases, such as mental hospitals, call-points may be designed for operation by the use of keys.





(*c*) The method of operation, e.g. ' Fire Alarm: in case of fire, break glass,' should be clearly indicated by a concise inscription on the case or by a suitably inscribed metal plate behind the glass cover.

(*d*) No live parts should be exposed so that they can be touched by a person giving the alarm.

**204. Detectors.** Pending the issue of a British Standard, detectors or automatic call-points for use where the ambient ceiling temperature does not exceed 110°F. should comply with the recommendations of Appendix 803.2. Appendix 803 also describes methods of test which may be applied.

(*a*) *Expanding-metal detectors.* The temperature-sensitive elements should be corrosion-resistant and should be securely fixed.

(*b*) *Fluid-filled-tube detectors.* The maximum and minimum lengths of tube that may be associated with each contact-operating device should be stated by the maker.

The contact device should operate when not more than 30 ft. of the length of tube is exposed to the specified operating conditions (see Appendix 803).

Detectors should be so constructed that:—

(i) the tubing is of copper or of corrosion-resistant material, such as monel metal, of ample strength;

(ii) each length of tube is provided with its own independent electrical contact device;

(iii) an automatic indication is given of the development of any leakage of the operating fluid or, if this provision is not made, each length of tube is equipped with an easy means of testing for such defect.

**205. Indicators.** Drop indicators should be of the mechanical-replacement type. Lamp indicators should be readily intelligible and should not be affected by light spill from other indicators or light sources.

Each indicator when operated should indicate the origin of the call, e.g. by displaying the call-point or section number or by showing its location on a plan diagram of the premises.

Indicators should be enclosed in rigid and substantially dust-tight cases, preferably of metal, and should be clearly and permanently marked.

Lampholders should be of substantial construction ensuring dependable contact with the lamps, which should be arranged for easy replacement.

**206. Secondary cells.** Cells should preferably be of the enclosed type.



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**207. Terminals.** To facilitate the looping-in of wiring, the terminals of components should be of sufficient size to accommodate two 3/·036 in. conductors. Soldered connections are preferable, but robust terminals designed to provide secure connections may be used.

**208. Covers.** To minimize unauthorized interference, the covers of indicators, relays, call-points, and the like, and of assemblies of equipment should be adequately secured, preferably in such a manner as to require a key to obtain access to the apparatus.

**209. Corrosion resistance.** The materials and finishes of all components and appliances should be such as to resist effectively corrosion by moisture or any vapour likely to be encountered.

**210. Fire and explosion risk.** The installation of fire-alarm equipment and wiring, other than call-points or detectors and the wiring thereto, should be avoided in situations where there may be an explosive or inflammable atmosphere. If it is necessary to install equipment or wiring in such a situation, a location should be chosen, if possible, where the risk is not continuous, and the recommendations of CP 1003 should be observed.

CP 1003

## SECTION 3. DESIGN CONSIDERATIONS

**301. General.** (*a*) An electrical fire-alarm system should be designed to provide, in the event of fire, an early alarm to prevent loss of life by warning occupants to evacuate affected premises quickly, and to secure the immediate attention of fire-fighting and salvage staff.

(*b*) The equipment and wiring of the fire-alarm system should be exclusive to that system.

(*c*) Generally, an electrical fire-alarm system consists of one or more call-points from which a fire-alarm call may originate, and one or more sounders to announce an alarm.

(*d*) The system may be required, in addition, to actuate various auxiliary fire services. Alternatively, these auxiliary services may be independent of the system.

(*e*) Subject to statutory requirements, call-points may be operated either manually or automatically. The method of actuation of all manual call-points throughout an installation should be precisely the same unless there is a special reason for differentiation. (See clause 203 (*b*).) An adequate number of call-points is essential for an effective installation.

(*f*) Sounders may be bells, hooters, sirens or the like, but it is essential that all alarm sounders of the same kind on a particular installation should produce a similar sound.





(*g*) An indication of the origin of a call is necessary when the premises are large or intricate. This requires the sub-division of the premises into sections, all the call-points in each section being connected to the same indicator, so as to indicate the origin of the call. The various drop or lamp indicators will generally be grouped together on a main indicator-board, but, when the premises are extensive, the main indicator-board may be supplemented by, or replaced by, zone and section indicating-boards.

(*h*) In some circumstances, it may be desired to give initially a restricted instead of a general alarm on the actuation of some or all of the call-points or to supplement audible signals by visible signals. In the former case, there should be effective arrangements for giving a general alarm throughout the premises.

(*i*) The system may be designed to afford protection against fire risk associated with specific apparatus as indicated in clause 305.

(*j*) For every installation, a control-point should be provided situated as described in clause 354 (*a*). At that point the main indicator-board, or, in an installation of the kind referred to in clause 303 (*g*) (ii), zone and section indicating-panels and all common control apparatus and supervisory equipment should be located. The control-point should be under continuous and competent watch during the whole time the premises are occupied.

(*k*) In special cases, particularly where a restricted alarm facility is provided, consideration should be given to the provision of a direct telephone line between the control point and the nearest public fire station; alternatively, the alarm system may be connected directly to the station. Telephone communication may also be provided, if desired, between the control-point and some or all of the call-points.

(*l*) The design of a system should be determined having regard to the desired speed of response to dangerous fire conditions and the desired accuracy of indication of the origin of calls. The relative importance of these two factors will depend on the number and character of the people in the building, the nature of the work performed, the value and nature of the structure and its contents, its size and number of storeys, staircases and exits to the street, and its situation in relation to adjacent property and thoroughfares. In boarding-schools, hospitals and like institutions, the highest assessment possible, consistent with economic limits, should be placed on both factors.

**302. Call-points.** (*a*) *Identification.* Every call-point, either manual or automatic, should be allotted an identification number.

(*b*) *Manual call-points.* Manual call-points should be provided in all parts of the premises where any person may be present and should



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be so located that no person need walk more than 100 ft. from any position within the premises in order to give an alarm.

Manual call-points should be located on exit routes and, in particular, on the floor landings of staircases and at exits to the street. They should be fixed at a height of 4 ft. 6 in. above the floor, at easily accessible, well illuminated and conspicuous positions.

The method of operation of all manual call-points in an installation should be identical, unless there is a special reason for differentiation. (See clause 203 (*b*).)

(*c*) *Detectors* (*automatic call-points*). Detectors are of particular use in premises, or parts of premises, where fire risk is great, and where economic or other considerations make it desirable to provide continuous protection. Each detector should be regarded as serving a limited area and each separately enclosed space should be individually considered when the system is designed.

In hot situations such as kitchens, boiler rooms, furnace- or kiln-rooms, and the like, special care should be taken in the choice and installation of detectors. Detectors for use in ordinary environments, namely where the ambient ceiling temperature does not exceed 110°F., should conform to the recommendations of Appendix 803.2.

The installation characteristics of three types of detectors are indicated below:—

(i) *Detectors of the expanding-metal or other spot type.*

(1) Detectors should, normally, be placed in accordance with the distance determined by the tests prescribed in Appendix 803.6, provided that they are not more than 20 ft. apart or more than 10 ft. from any wall. In corridors and other narrow spaces up to 7 ft. in width, however, they may be spaced at the full distance determined by the tests up to a maximum of 50 ft. In corridors and other narrow spaces between 7 ft. and 10 ft. wide, the maximum spacing should be 40 ft. It may be necessary to reduce these distances if the ceiling is intersected by beams more than 20 in. in depth.

(2) At least one detector should be fixed at a position in each storey not more than 5 ft. distant from each well-light, area, lift well, staircase or other flue-like opening which is not enclosed by walls of fireproof construction having all openings therein provided with fire-resistant doors or shutters.

(3) Additional detectors should be provided to deal with any features presenting special fire risk.





(4) Below every detector, a space of 2 ft. radius should be kept clear. Notices to this effect should be posted in prominent positions.

(ii) *Detectors of the fluid-filled-tube type.*

(1) The spacing of the tubing should be in accordance with the distances determined by the test prescribed in Appendix 803.6, subject to the distance between any two adjacent lines being not greater than 20 ft. on flat ceilings. It may be necessary to reduce these distances if the ceiling is intersected by beams more than 20 in. in depth. The distance between a line of tubing and a main or partition wall should not exceed half that permissible between adjacent lines. In a space under a pitched roof, a line of tubing should be installed within 15 in. of the apex of each bay, with additional lines, if necessary, to comply with the distances determined as in Appendix 803.6.

The length of tubing to be installed in any single room or compartment should be not less than 30 ft.

(2) A line of tubing should be fixed at a position in each storey not more than 5 ft. distant from, and on every side of, each well-light, area, lift-well, staircase or other flue-like opening which is not enclosed by walls of fireproof construction having all openings therein provided with fire-resistant doors or shutters.

(3) Additional lines of tubing should be provided to deal with any features presenting special fire risk.

(4) Below every line of tubing, a space of 2 ft. radius should be kept clear. Notices to this effect should be posted in prominent positions.

(iii) *Detectors of the light-sensitive type.* Systems using detectors of the photo-electric type which operate on the occurrence of a certain smoke density, may, when designed and installed by specialists, be useful in special cases where smouldering fires are liable to occur in confined spaces. They should be so installed that false alarms will not be given through the accumulation of dust or moisture. A fault signal should be given in the event of a current failure in any part of the circuit.

**303. Indication of the origin of calls.** (*a*) *Delineation of sections.* The effectiveness of a system is dependent upon the accuracy with which the origin of a call is indicated, and, since each indicator is associated with a definite section of the premises, it follows that each section



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