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*Indian Standard*  
CODE OF PRACTICE FOR THE  
INSTALLATION OF ELECTRIC BELLS  
AND CALL SYSTEM

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# *Indian Standard*

## CODE OF PRACTICE FOR THE INSTALLATION OF ELECTRIC BELLS AND CALL SYSTEM

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# *Indian Standard*

## CODE OF PRACTICE FOR THE INSTALLATION OF ELECTRIC BELLS AND CALL SYSTEM

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 21 August 1978, after the draft finalized by the Code of Practice for Power Installation and Maintenance Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** Call bells and buzzers are commonly used in private dwellings, hotels, schools, offices, factories, etc. The requirements and methods of tests for electrically operated call bells and buzzers for indoor use are covered in detail in IS : 2268-1966\*.

**0.3** This code is intended to serve as a guide and provides information on the installation of electric bells and indicator call system (including time bells) in various types of buildings with a view to ensuring reliable operation, personal safety against electric shock and safety against the effects of excessive temperature and fire. Bells and buzzers that are to be used outdoor, such as on-board ships, involves special practices with regard to their installation, methods of protection against severe atmospheric conditions, etc, and guidelines on these do not form part of this code.

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### 1. SCOPE

**1.1** This standard covers installation of electric bells and buzzers covered in IS : 2268-1966\* and indicator call system (including time bells), in private dwellings, official buildings, hotels, hospitals, educational installations and factories.

**1.2** Bells associated with fire alarms, burglar alarms and call system using loudspeakers as sound distributing system are excluded from the scope of this code.

### 2. TERMINOLOGY

**2.0** For the purpose of this standard the following definitions shall apply.

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\*Specification for electric call bells and buzzers for indoor use (*revised*).

**2.1 Electric Bell** — A signalling device in which a hammer is actuated so as to strike a gong, bell, pipe, strip, etc.

**2.2 Buzzer** — A signalling device similar to an electric bell but without a hammer or gong, and serving to produce sound by the vibration of an armature.

**2.3 Annunciator** — It is a device attached to an electric bell or other signal system in which a shutter falling or lamp lighting in one of a series of windows in a frame, discloses the number of station calling.

**2.4 Relay ( Including Gas-Operated Relay )** — A device designed to produce sudden predetermined changes in one or more physical systems on the appearance of certain conditions in the physical system controlling it.

NOTE 1 — In case of a gas-operated relay, the cause of the response is considered indirectly electrical.

NOTE 2 — The term 'relay' includes all the accessories, such as intermediate transformers, rectifiers, resistors, etc, when used as integral part of the protective equipment conforming to the respective standards.

### **3. EXCHANGE OF INFORMATION**

**3.1** The initial and final requirements for the building should be ascertained as accurately as possible by consultation between the purchaser, architect or the consultant and the contractor.

**3.2** Information may also be obtained at an early stage regarding other services such as internal electrical installations.

**3.3** On the basis of information collected, plans should be prepared showing the following:

- a) Details of installation proposed;
- b) The accommodation required for central apparatus. The location of the central apparatus, distribution points, etc, should be agreed between the parties concerned and accommodation reserved at an early stage; and
- c) Details on the chases, ducts and conduits, etc, required for the wiring. The cabling plan should be agreed in collaboration with those responsible for other services to enable the architect to specify the required ducts, chases, steeves, etc, before building operations begin.

### **4. EQUIPMENT AND MATERIALS**

**4.1 Bells and Buzzers** — These shall conform to IS : 2268-1966\* and if wooden bases are used, the component parts should be rigidly held together independently of the base, so that they are unaffected by any warping.

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\*Specification for electric call bells and buzzers for indoor use ( revised ).



Bells and buzzers which have make and break contact should be provided with means for adjusting the contact gap and pressure and means for locking the adjustment.

Bells and buzzers for outdoor use shall be suitably protected against the environmental conditions.

**4.2 Bell Push Switches** — They shall be of robust construction. Terminals shall be of adequate size and should be so arranged that the loosening of a terminal screw does not disturb the contact assembly. Any flexible cords attached to them should be covered with hard wearing braid. These shall conform to IS : 3854-1966\* and IS : 4949-1968†.

**4.2.1** These may be of the wall, table or pendent type.

**4.2.2** In exposed situations, surface type of bell push switches should be suitably protected.

**4.2.3** Bell push switches shall be made of insulating material.

**4.3 Contact Points** — The material of contact points should be such that it gives long service without becoming pitted or corroded.

**4.4 Cables and Wires** — The cables used shall conform to IS : 434-1964‡ or IS : 694-1977§ for the installation of the system. The size of cable should not be less than 1.5 mm<sup>2</sup>. The wiring shall be done in accordance with IS : 732-1963||.

**4.5 Relays** — Relays where used shall be robust and totally enclosed in suitable boxes. The relays should conform to IS : 3637-1966¶. These may be required for the following situations:

- a) Where mains-operated device is to be controlled by a circuit operating at a voltage not exceeding 24 V,
- b) For repeating a call indication at a distant point or points, and
- c) For maintaining a call indication until an indicator is reset.

\*Specification for switches for domestic and similar purposes.

†Specification for 2-amp switches for domestic and similar purposes.

‡Specification for rubber-insulated cables:

Part I With copper conductors (*revised*).

Part II With aluminium conductors (*revised*).

§Specification for PVC insulated cables for working voltages up to and including 1100 V.

||Code of practice for electrical wiring installations (system voltage not exceeding 650 volts) (*revised*).

¶Specification for gas-operated relays.

**4.6 Indicators** — The indicators when used may be one of the following types:

- a) *Lamp Type* — This type is preferable, where sound of bell is undesirable, for example, in hospitals and noisy locations, such as forges, mills, etc.
- b) *Pendulum Type* — This type is suitable for small installations having up to 20 call points.
- c) *Flag Type* — A more positive indication is given by use of indicators which remain in the indicating position until they are restored by attendant, either mechanically or electrically.

## **5. PLANNING AND DESIGN OF CALL SYSTEM**

**5.1 General** — The type of building, the facilities desired and the size of installation are important factors in determining the most suitable system. If the system installed is capable of extension, provision should be made so that additional wiring and apparatus can be installed with the minimum disturbance to the original installation.

**5.2 Location** — The location of equipment and apparatus should be so chosen as to ensure efficient operation and ease of maintenance, keeping in view aesthetic considerations to secure freedom from damage due to unauthorized interference.

### **5.3 Simple Call Bell System**

**5.3.1 General** — This system is suitable for dwellings and small offices and provides means whereby service staff may be called to a particular position by the caller. A bell push switch or similar device is fitted at each such position and some form of visual indicator for each position is installed at a convenient point, which may be in the service room or kitchen together with a bell or buzzer to direct attention to the call. This visual-cum-audible indicator/bell panel is termed as annunciator. Figure 1 illustrates the simple call bell system.

### **5.4 Multiple Call System**

**5.4.1 General** — This system is suitable for use in large hotels and similar locations where the call points are too numerous for convenient indication on a single indicator board or panel. Bell push switches are fitted as described in 4.2 at each call point, but the circuits are grouped, for example, in corridor or floor groups, and each group gives an indication in the central room. Individual signals on the corridor or floor concerned are provided to indicate the origins of the calls. Group indicators may also be fitted if desired on each floor. Figure 2 illustrates the multiple call system.

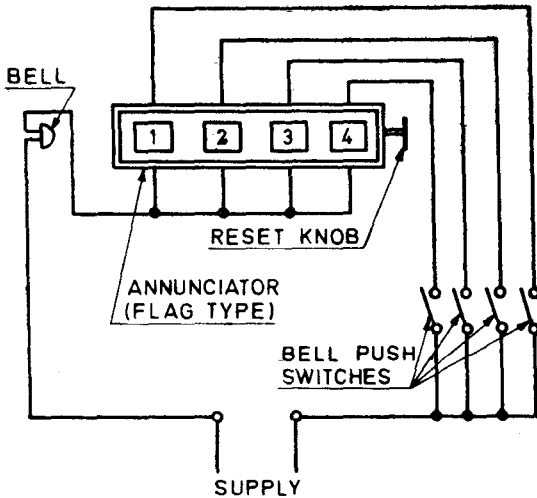


FIG. 1 SIMPLE ELECTRIC CALL BELL SYSTEM

**5.4.2 Layout** — It should be decided by local conditions such as building layout and staff, and may involve a complete scheme for the whole building or separate schemes for each floor.

**5.4.3 Indicators** — The number of indicators in each panel shall vary with the size and type of installation ( *see also 4.6* ).

## 5.5 Time Bell System

**5.5.1 General** — In factories, schools, etc, a system may be installed to give a 'start work' or 'stop work' signal or to give the times for changes of periods. Such systems normally employ one or two bell push switches or other switches in parallel and a number of electric bells suitably placed which are also in parallel.

**5.5.2 Time electric bell systems** installed in workshop and factories are liable to much rough use, hence robust construction is necessary. Such time bell system should preferably be operated *direct from the mains*, but if desired may be supplied from the transformer.

**5.5.3 Bell Push Switches** — Bell push switches which remain in 'ON' position for a predetermined time may also be installed ( *see 4.2* ).

**5.5.4 Bells and Buzzers** — Robust construction is particularly necessary.

**5.5.5 Automatic Time System** — Automatic system associated with either mechanical or electric clock may be installed and set to give predetermined signals at fixed times.

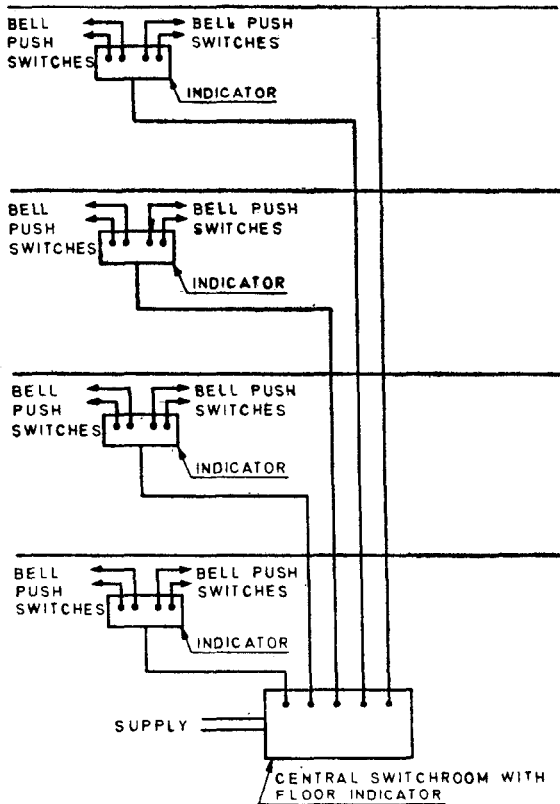


FIG. 2 MULTIPLE CALL SYSTEM

### 5.6 Hospital Call System

5.6.1 Where call system is provided in hospital in accordance with 4.5 of IS : 7733-1975\*, a gentle press of the bell push switch or the pull at pull switch should operate the lights and other signal lamps and bell push switch or pull switch should be so located as to be easily accessible to patient. There is a door light in corridor over the room door of the patient who has placed a call. This signals to nurse/attendant, he/she attends the patient and cancels the call at the bed side by resetting the control. The calling place (station) is the only place where the signal can be cancelled so that the nurse/attendant shall visit the patient to erase the signal. Only those signals operated by that station are extinguished by the cancellation of the call.

\*Code of practice for electrical wiring installations in hospitals.

The other lights called pilot lights are placed at intersections of hall ways, on kitchens and other suitable places. These pilot lights show when a call is registered from any room in corridor, the lights can be seen from an intersecting corridor. The nurse/attendant in the intersecting corridor goes to the intersection of two corridors and the door lights over the room doors indicate which patient is calling.

**5.6.2** A softened signal can also be connected in the circuit for night use and disconnected at will by the attendant/nurse.

**5.6.3** Audible signals may be in the form of a bell or buzzer muffled or lightly toned and placed near the nurse/attendant.

## 5.7 Power Supply

**5.7.1 Voltage of System Supply** — The system may be operated at the normal main voltage, if the wiring and apparatus are suitably designed and insulated for this voltage and suitably earthed. It is preferable for the control circuit to be operated at a voltage not exceeding 24 V.

**5.7.2 AC Mains Supply Through Transformers** — This is the most extensively used system. This system is reliable and gives good service with little maintenance. It may be used in the following ways:

- a) *Simple bell call system* — A simple call system uses one transformer which should be installed in consumer's supply control or near the indicator panel.

Where only a single bell is needed, it may be more convenient to use a bell incorporating its own transformer.

- b) *Multiple call system* — The rating of transformers and the number needed may depend on the system adopted. The transformer rating should be chosen having regard to ultimate capacity of the system or section, which is to be served. The location of transformer should be decided in light of general layout.

**5.7.3 Dry Batteries** — These are suitable for small installations only. These are preferred to secondary batteries due to ease in installation and maintenance. The location should be dry and cool and as near as practicable to indicator.

**5.7.4 Secondary Batteries** — These are suitable for any size of system but require regular attention. Two batteries should be provided with arrangements for charging one while the other is in use.

Enclosed type batteries should be preferably in order to reduce the fumes to a minimum.

## **6. INSTALLATION**

### **6.1 General**

**6.1.1** Detailed installation instructions shall be provided for all factory assembled units, particular attention being given to connections of multi-circuit wiring. Such instructions should, where possible, be packed with the equipment. The wiring terminals of all circuits shall be clearly marked for identification purposes.

**6.1.2** As much assembly and wiring of equipment and apparatus as possible should be carried out in the factory, to reduce installation work to a minimum.

**6.1.3** To avoid damage and deterioration, equipment and apparatus should not be delivered until installation can proceed. Other material may be delivered earlier, for use as required, provided suitable storage accommodation has been arranged.

**6.1.4** Careful attention should be given during the building operations for the provision of chases, ducts, cable holes, etc.

**6.1.5** Wiring in ducts, conduits, chases and like should be carried out at late stage of building work although conduit should be laid along with the progress of building work. The design of installation should take into account future possible extension and maintenance problems.

**6.1.6** To avoid and minimize the amount of alternation, the installation shall be examined by a competent person, while work is going on.

### **6.2 Cables and Wires**

**6.2.1** The choice of cables and wires is determined by the nature of the installation and supply voltage of the call system.

**6.2.2** The wiring shall be done in accordance with IS : 732-1963\*.

**6.2.3** Where a multi-core cable is necessary, as in multiple call system, the number of wires in the cable should provide for additional circuits to allow for eventual extensions of the system.

### **6.3 Earthing**

**6.3.1** Where the equipment of the system are working on mains voltage, proper earthing should be provided in accordance with IS : 3043-1966†. All the accessible metallic parts of the system should be earthed adequately.

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\*Code of practice for electrical wiring installations (systems voltage not exceeding 650 V) (*revised*).

†Code of practice for earthing.

## **7. INSPECTION AND TESTING**

**7.1** The complete installation of the system shall be examined, to ensure that the work done is in accordance with specification for the materials, components and equipment.

**7.2** An electrical and functional test of the installation should be made to ensure that it shall give satisfactory service under the extremes of working conditions likely to be experienced. When work is an extension of an existing installation the latter should be thoroughly tested to ensure that it shall function satisfactorily in conjunction with the new equipment.

**7.3** Secondary batteries should be given a test discharge to ensure that they are of the capacity specified. Routine inspection of such an installation should be carried out at regular intervals.

## **8. MAINTENANCE**

**8.1** On completion of installation, complete circuit diagrams of equipment should be supplied together with adequate instructions on its use and operation to facilitate maintenance. The rating of the fuses should be stated. Routine inspection of the installation should be carried out at regular intervals particularly in case of systems employing secondary batteries.

# INDIAN STANDARDS

## ON

### CODES OF PRACTICE FOR POWER INSTALLATION AND MAINTENANCE

IS :

- 732-1963 Code of practice for electrical wiring installations ( system voltage not exceeding 650 volts ) ( *revised* )
- 900-1965 Code of practice for installation and maintenance of induction motors ( *revised* )
- 1866-1961 Code of practice for maintenance of insulating oil
- 1885 ( Part XXX )-1971 Electrotechnical vocabulary: Part XXX Overhead transmission and distribution of electrical energy
- 1885 ( Part XXXVII )-1974 Electrotechnical vocabulary: Part XXXVII Tariffs for electricity
- 1886-1967 Code of practice for installation and maintenance of transformers ( *first revision* )
- 2032 ( Part XI )-1970 Graphical symbols used in electrotechnology: Part XI Electrical installation in buildings
- 2274-1963 Code of practice for electrical wiring installations ( system voltage exceeding 650 volts )
- 2309-1969 Code of practice for the protection of buildings and allied structures against lightning ( *first revision* )
- 2551-1963 Danger notice plates
- 3043-1966 Code of practice for earthing
- 3072-1975 Code of practice for installation and maintenance of switchgear ( *first revision* )
- 3106-1966 Code of practice for selection, installation and maintenance of fuses ( voltage not exceeding 650 volts )
- 3914-1967 Code of practice for selection of ac induction motor starters ( voltage not exceeding 1 000 volts )
- 4648-1968 Guide for electrical layout in residential buildings
- 5124-1969 Code of practice for installation and maintenance of ac induction motor starters ( voltage not exceeding 1 000 volts )
- 5216-1969 Guide for safety procedures and practices in electrical work
- 5578-1970 Guide for marking of insulated conductors
- 5613 ( Part I/Sec 1 )-1970 Code of practice for design, installation and maintenance of overhead power lines : Part I Lines up to and including 11 kV, Section 1 Design
- 5613 ( Part I/Sec 2 )-1971 Code of practice for design, installation and maintenance of overhead power lines : Part I Lines up to and including 11 kV, Section 2 Installation and maintenance
- 5613 ( Part II/Sec 1 )-1976 Code of practice for design, installation and maintenance of overhead power lines: Part II Lines above 11 kV and up to and including 220 kV, Section 1 Design
- 5613 ( Part II/Sec 2 )-1976 Code of practice for design, installation and maintenance of overhead power lines: Part II Lines above 11 kV up to and including 220 kV, Section 2 Installation and maintenance
- 5728-1970 Guide for short circuit calculations
- 5908-1970 Method of measurement of electrical installation in buildings
- 5987-1970 Code of practice for selection of switches ( voltage not exceeding 1 000 V )
- 7689-1974 Guide for the control of undesirable static electricity
- 7733-1975 Code of practice for electrical wiring installation in hospitals
- 7752 ( Part I )-1975 Guide for improvement of power factor in consumer installation: Part I Low and medium supply voltages
- 7987-1976 Guide for selection of high voltage circuit-breakers
- 8061-1976 Code of practice for design installation and maintenance of service lines
- 8437-1977 Guide on effects of currents passing through human body
- 8884-1978 Code of practice for the installation of electric bells and call system