IS 12459 (1988): Code of Practice for Fire Safety in Cable Runs [CED 36: Fire Safety]

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(Reaffirmed 2007)

Indian Standard

CODE OF PRACTICE FOR FIRE SAFETY IN CABLE RUNS

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BUREAU OF INDIAN STANDARDS
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April 1989

AMENDMENT NO. 1 MAY 2005
TO
IS 12459 : 1988 CODE OF PRACTICE
FOR FIRE PROTECTION OF CABLE RUNS

[*Page* 3, *clause* 6.2(c)] — Substitute 'clean agents' *for* 'Halon

(CED 36)

Reprography Unit, BIS, New Delhi, India

Indian Standard

CODE OF PRACTICE FOR FIRE SAFETY IN CABLE RUNS

0. FOREWORD

0.1 The Indian Standard was adopted by Bureau of Indian Standards on 2 September 1988, after the draft finalized by the Fire Safety Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 All major industries (including high rise buildings) use electrical cables extensively. The cables are mostly run through underground cable tunnels, trenches, overhead cable trays and ducts. Modern production facilities demand long runs of power and control cables.

0.3 The importance of electrical cables in industries and high-rise buildings should be fully appreciated. In the former, they are the nerve cords of the industry and in the latter, they are essential for operating lifts, pumps, emergency lighting, communication systems of the building, etc. Based on experience gained so far, guidelines from point of view of fire safety have been covered in this standard for general cases.

0.4 Electrical cables are usually insulated with polyvinylchloride, which contributes to the rapid spread of fire. The insulation also give-off highly toxic products combustion including corrosive gases, when it is exposed to intense heat or is involved in fire. One kilogram of soft PVC with 35 percent chlorine content, when involved in fire will omit 360 g of HCl gas which, when dissolved in water vapour, results in one litre concentrated smoking hydrochloric acid. A cable run carrying PVC cables with 10 kg/m of combustible insulation, when involved in a fire, produces as much as 10 000 m^3 of smoke and acidic atmosphere. The fumes given off by the burning cables combine with water vapour to form hydrogen chloride. This gas is carried by the thermic draft of the fire throughout the entire structure. The humidity in the atmosphere, and the cooler surfaces of the structures and equipment condense the HCl fumes into droplets of hydrochloric acid which is highly corrosive. This leads to gradual destruction of metal surface, electrical contacts, equipments, structures and reinforcements. Dense smoke from cable fires hinders fire fighting efforts and approach to the seat of fire. Fire in cable runs can spread as fast as 20 m/min.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This code of practice covers the requirements of fire safety in respect of cable runs in trenches, vaults, tunnels, shafts, risers, trays, etc, in industrial complexes, high-rise buildings and other premises.

2. TERMINOLOGY

2.1 For the purpose of this standard, the following definitions will apply.

2.1.1 *Cable Run* — A stretch of cable(s) for carrying electrical current from one point to the other.

2.1.2 *Cable Tray* — A horizontal or vertical metal support for cable run. A cable tray may support one or more cables.

2.1.3 *Cable Rack* — Two or more cable trays arranged one above the other.

2.1.4 *Cable Trench/Tunnel/Gallery* — Any closed section of the structure or building which primarily serves as a distribution route for cables for electrical power and/or the control and monitoring of equipment. These may range in size from small conduits to walk-through corridors. Trenches may at times also be laid in the open ground. All cable trenches are usually equipped with removable covers.

2.1.5 *Cable Shaft and Risers* — Vertical ways for carrying cables are called cable shafts/risers. They are either of concrete/masonry or fabricated from steel.

2.1.6 *Fire Stop* — A through penetration fire stop is a specific construction consisting of the materials that fill the opening around penetrating items, such as cables, cable trays, conduits, ducts and pipes, and their means of support through the wall or opening to prevent spread of fire.

2.1.7 *Cables Vaults* — Cable vaults are generally built below a control room wherein cables from various facilities terminate before entering the control panels.

NOTE — Since cable trenches, tunnels, shafts, trays, etc, generally terminate into a cable vault. This is considered to be a most critical area. Maximum density of cables are generally in cable vault.

3. GENERAL

3.1 The concept of fire protection of cable trenches/tunnels/galleries is based on the following basic considerations:

a) Preventing/delaying fire damage to the cables to preserve their functioning and increasing their resistance to fire/heat;

b) Preventing/retarding flame propagation through cable runs;

c) Segregating cable runs into compartments with a view to localizing a possible cable fire and its spread;

d) Providing effective fire detection and alarm system; and

e) Providing effective fire extinguishing system.

3.2 The cables for critical area (*see* **3.2.2**) used should be fire resistant to avoid spread of fire. The means of protection (physical/chemical) may be provided to enhance capability of cable to resist severity of fire. These can be obtained by: (a) providing physical protection of encasing the cables by suitable non-combustible insulating material, and (b) providing chemical protection by incorporating either surface coating of the cable or rendering the cable fire retardant in the manufacturing stage itself. These should conform to the requirements given in **3.2.1**.

3.2.1 When tested according to IS : 10810 (Part 53)-1984*, after all burning has ceased, the surface of the sample shall be wiped clean and the charred or affected portion shall not have reached within 50 mm of the lower edge of the top clamp.

NOTE — The requirements of fire resistant cables are being covered in separate Indian Standard and when this Indian Standard is formulated, reference of the same will be given here and **3.2.1** will be deleted.

3.2.2 The critical areas are as under:

a) Immediately after end termination or joints up to a length of not less than 1 m in either direction.

b) Crossing or T-crossings or joints up to a length of not less than 1 m in either direction.

c) Cable passing through high temperature area/high vulnerable area, entire length.

d) Exposed vertical length, entire length.

*Methods of test for cables: Part 53 Flammability test.

4. COMPARTMENTATION

4.1 In order to prevent vertical/lateral spread of fire through cables, all cable tunnels/galleries through which cable/cable trays pass should be subdivided into smaller compartments irrespective of type of cable used. This should be done by provision of walls at interval not more than 30 m and by sealing the apertures openings with the use of fire stops. The fire rating of fire stop when tested according to the method given in IS : 12458-1988* and of barrier wall, when tested according to IS : 3809-1979†, should not be less than the rating of building component. Passage through barrier wall should be provided with fire check doors of the same fire rating.

4.2 No other services than that of fire protection should be allowed in the cable tunnels. All cable runs should be provided with adequate number of fire escape evenly distributed so that the maximum distance for man trapped in fire does not exceed 30 m to the nearest fire.

4.3 Cable runs laid in open spaces of the building where compartmentation is not feasible should be provided with barriers. Physical barriers not less than 1 m in length should be provided at intervals not more than 30 m. Barriers should be provided, where the cable change direction and at cable crossings. The fire resistance of barriers should be same as the type of construction of the building.

5. FIRE DETECTION AND ALARM SYSTEMS

5.1 The entire cable run should be protected by automatic fire alarm system. The following types of detectors may be used depending upon the circumstances:

a) Smoke detectors (*see* IS : 11360-1985‡);

b) Heat detectors linear type, and

c) Heat detectors (*see* IS : 2175-1988§).

5.2 Long cable runs should be compartmented and each compartment should be considered as a separate zone for installation of detectors (*see* IS : 2189-1988‖).

5.2.1 The linear detectors may be used for each cable or for bunch of cables.

6. FIRE EXTINGUISHING SYSTEM

6.1 In addition to the fire detection and alarm system, an automatic fixed fire extinguishing installation should also be provided for long cable runs as in case of heavy industries, electricity generating stations, etc.

*Method of fire resistance test of firestops.

†Fire resistance test of structure (*first revision*).

‡Specification for smoke detectors for use in automatic electric fire alarm system.

§Specification for heat sensitive fire detectors for use in automatic fire alarm system (*second revision*).

‖Code of practice for selection, installation and maintenance of automatic fire detection and alarm system (*second revision*).

6.2 The automatic fixed fire extinguishing installation employ any of the following extinguishing media, according to the operation requirements:

a) Water,

b) Carbon dioxide (*see* IS : 6382-1984*),

c) Halon, and

d) High expansion foam.

7. MISCELLANEOUS

7.1 Self-contained emergency lightening unit should be installed in sub-stations, cable basements, cable tunnels, tall escape routes and exits where ventilation for the cables have not been provided.

*Code of practice for design and installation of fixed carbon dioxide fire extinguishing system (*first revision*).

7.2 Cable tunnels floor should have a slope leading to a sump for collecting seepage and other water including that used for fire fighting and should be provided with sump pump.

7.3 Entry of personnel into cable tunnels and galleries should be strictly controlled. No one should use these premises for rest and carrying eatables.

7.4 No welding or naked fire should be allowed.

7.5 All cotton wastes and waste paper should be disposed in container filled with water.

7.6 Where forced ventilation is provided, the same should be capable of exhausting the smoke generated by fire.

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