IS 14850 (2000): Fire Safety of Museums - Code of Practice
[CED 36: Fire Safety]

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संग्रहालयों में अग्नि शमन के लिए रीति संहिता

Indian Standard

FIRE SAFETY OF MUSEUMS — CODE OF PRACTICE

ICS 13.220.20; 91.120.99

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 3

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Fire Safety Sectional Commitee had been approved by the Civil Engineering Division Council.

Museums are Institutions in which objects of work or art, historical artifacts or scientific specimens are collected, preserved, studied and exhibited. Most of these objects are irreplaceable. The museums are deposited with valuable objects dating back from many centuries. These museums form an important part of man's cultural heritage. However, because of their nature, they are especially vulnerable to damage by heat, fire, smoke and water.

To preserve this rich heritage of India, the Government of India have come up with a number of national museums for preservation of irreplaceable objects. Also a large number of public and private organizations have an enviable store of such colllections of art. If these are ever damaged by fire, heat and smoke or water application, this will be a severe blow to our national heritage. The purpose of this standard is therefore to give guidance for fire safety and prevention to the trustees of museums, and government body of Museum, who are responsible for museum collections and for the safety of the persons who visit the museum or work in them.

This standard, therefore lays down guidelines how to design fire safety measures in a new buildings and how to improve these factors in existing museums also which had come up much earlier. Possibly many of the safety factors have been overlooked while designing these buildings. This standard gives social attention to time and place in museum which increase the danger of fire and recommends measures in which the management can prevent fires or reduce fire loss. The governing body and management have also greater responsibility for the lives of the visitors and staff. This aspect becomes more critical when class of school children are taken for a visit to such museums and is crowded in a make shift auditorium. At times, visitors numbering thousands may flock in to see a new acquisition or special exhibition. In such cases, visitors easily loose their way in the unfamiliar maze of gallaries.

The composition of the technical committee responsible for tthe formulation of this standard is given at Annex B.

Indian Standard

FIRE SAFETY OF MUSEUMS — CODE OF PRACTICE

1 SCOPE

This standard covers the fire safety and fire protection measures of museums.

2 REFERENCE

The Indian Standards listed at Annex A contain provisions which, through reference in the text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standad are encouraged to investigate the possibility of applying the most recent editions of the standards given at Annex A.

3 PLANNING OF SITE

The site selected for the proposed museum should have adequate and reliable water supply for fire fighting and also within easy accessibility from the nearest fire fighting station. The consultation with the local fire authority is suggested.

4 PROTECTION AGAINST EXTERNAL EXPOSURE

4.1 All new museums should be so located that in case of any fire out break in the neighbouring building the same should not spread to the museum. Therefore, there shall be sufficient space around to provide a natural fire break.

4.2 If sufficient clear space cannot be provided, the exterior walls facing the adjacent buildings should be of adequate fire resistive construction of 4 hour rating conforming to IS 1642 and shall be without doors, windows or other openings. When such openings are absolutely essential, these should be protected with wired glazing and the doors shall be fire check doors. Further, the external face or such openings shall be protected by water drenching system combined with automatic fire shutters, if possible. Roof covering of the museum building and window frames also required to be of non-combustible material.

5 TYPE OF CONSTRUCTION

The type of construction for exterior walls shall be 4 hour rating in conformity with IS 1642. All internal walls shall be of 2 hour resistance minimum. The staircase shall be on the exterior wall and enclosed from 3 sides and accessible only through a fire check door. Relaxation in regard to interior wall/ceilings/ partitions, etc, can be permitted only when the building is totally sprinklered. However, if only part of the building is sprinklered, the non-sprinklered area must be cut off with a fire resistance wall of 4 hour rating.

6 AIR CONDITIONING AND FALSE CEILING

For the comfort of the visitors and also to prevent some of the exhibits getting damaged due to heat, etc many museums are centrally air conditioned. When this is so, the installation of the air conditioning system including its ducting, insulation and outer coverage of insulation shall be totally non-combustible and in conformity with IS 1642. The false ceiling, if it is used in such air conditioned buildings, shall be of non-combustible materials preferably wood wool board having a minimum of 1 hour fire resistance. There, shall be arrangement to cut off the air handling unit by automatic means in case of fire.

7 COMPARTMENTATION

While large halls are essential for display of exhibits, so that the maximum number of persons can gather and see the same, it is also important to note that such large areas with suitable quantity of exhibits, some of which may be combustible also, will cause a fire spread uninterrupted through the entire area and may be too big to control. Therefore, it is essential that proper compatmentation should be made to the extent possible. Such compatmentation shall be with fire resistive walls of 4 hour rating.

8 BASEMENT AREA

In some of the new museums usually a basment is used as a repository of exhibits and art objects, etc which required to be given finishing touches before being put up for public exhibition. Such situation pose special problem for the persons working in such basements because the chance of fire spread is much greater, fire fighting is more difficult and with reduced visibility due to smoke logging escape to safety severely jeopardized. Such area shall be ventilated through mechanical means. Therefore, to ensure safety of visitors/workers in such places, it shall be ensured that the escape route is always kept clear of all obstructions, and mechanical ventilating system is fully functional to exhaust all smoke in case of any fire outbreak. The guidelines given in the National Building Code of India for escape from basement shall be fully implemented.

9 INTERIOR FINISH

Extreme care should be taken in selecting materials

for interior finish. To make the interior more decorative, frequently extensive interior finish materials are employed. It should be ensured that any such interior finished do not add to the spread of fire by any way. So far as possible, all materials used in connection with such interior finished like wall panelling, ceiling decoration, drop clothes etc, shall be of non-combustible nature. Where for practical reasons, some limited quantity of combustible materials like wood-panelling/partitions or decorative drop clothes, Hessions have to be used, it should be ensured that these materials are properly treated with appropriate fire retardant paints to improve its surface spread as flame from Class IV to Class I as defined in the National Building Code.

10 LIMITING IN CONCENTRATION OF VALUES

Since many of the exhibits though not combustible, may be of irreplaceable nature whose value cannot be counted in terms of money, it is advisable that the management of each museum should limit storage of materials to the minimum quantity in one particular room, and spread over the exhibits in different adjoining rooms/halls with properly segregated fire walls and fire doors. This action will ensure that even in case of a fire outbreak, the damage to such invaluable exhibit is contained to the minimum. Such exhibits may be coated with colourless fire retardent paints.

11 HAZARDOUS AREAS

In almost all museums, some amount of hazardous operations are unavoidable. These are carpentry shops, painting shops, display shops, conservation laboratories, packing rooms, etc. It is apparent that all such hazardous operation area shall be segregated from the exhibit area, other valuable stores by proper fire resisting wall and door. Preferably, such hazardous operations shall be on upper floors of the building that is above the exhibit area. In no case such haradous operations are in lower floor than the exhibit area unless all such areas are totally sprinkler protected. In any other circumstances, the hazardous operation areas shall be segregated from exhibit areas and in addition should be protected by automatic fire detection cum alarm system as per IS 2189.

12 COMPACT STORAGE

To save space, some museums do keep exhibits in rows of cabinets or shelf units mounted on tracks which can be moved from place to place for exhibition purpose. While saving much space, such arrangements severely impede fire fighting operations because of difficulty in access to the site of fire. In such cases, suitable automatic fire protection measures should be installed.

13 LIGHTING SYSTEM

In museums special provisions are often necessary to cater for extra demand for lighting, in the form of flood lights, search lights, T.V. lighting system, concealed lighting, etc. In every case of lighting installation, it should in general conform to National Electrical Code. Since major number of fires do originate from electical faults, particular care should be taken about the following :

a) *Electrical Wiring* — Wiring should be in conduit only. Where this is not practicable, only armoured and sheathed copper cable should be used.

b) For very sensitive areas or where extreme high value exhibits have been kept, fire resistance low sulphur cables (F.R.L.S.) should be used.

c) Distribution boards shall be housed inside metal enclosure openable in front. Alternatively, treated timber of at least 40 mm thick may be employed with coating of fire rettardent solutions.

d) *Cables* — Particularly heavy cables should be coated with fire paints. A band of fire resistant paint of 1 m width at every 10 m intternal in horizontal plane; complete run of cable in vertical plane, 1 m on either side of cable, when the cable is running from one room to other room etc through wall opening/ conducts, etc, should be provided.

e) Electrical shafts should be sealed at every floor level with non-combustible material, in conformity with National Building Code.

14 EXIT WAYS LOCKED

Normally in all museums during closing time only 1 Exit way/door is kept open to funnel all visitors and off-duty staff to go through by the single exit, while other entry gates are usually kept closed for reasons of security. While this risk cannot be overlooked, it is equally important that in case of an emergency all the entry gates shall be also available for exit in addition to the main exit gate. As such, the practice of locking other gates/doors should be avoided at all costs. Except main door, all the doors of the hall of museum should be lockable type only from inside.

15 LIGHTENING PROTECTION

The building should be protected against lightening as per the requirements given in NBC and IS 1646.

16 FIRE PROTECTION AND FIRE FIGHTING

16.1 Considering the extreme high value of exhibits, it is extremely important that the fire protection and fire fighting device should be carefully chosen. In deciding these, the following points should be carefully considered as these have a direct impact on the system to be chosen.

a) Importance of early detection of fire cannot be overlooked, specially in a museum where the exhibits are likely to be damaged even by smoke.

b) While water is the most effective media for extinguishing such fires, no water damage is permissible either. Besides, there are areas like very old documents or clay exhibits in original or painting in original, etc, where unjudicious use of water may cause more harm than good.

c) Also the fire fighting system should be automatic in action, coming into operation alongwith first indication of smoke signal. Therefore, keeping these factors in view, the following methods may be adopted by the management.

d) The entire building should be protected with automatic fire detection cum alarm system with all panels, hooters, break glass, etc.

e) In maximum areas, only ionisation type smoke detectors should be used. Only for areas which are dust prone, like above false ceiling area, open corridors, etc. Heat detector of rate of rise cum fixed temperature type should be used.

f) Fire Hydrant System, if installed, shall conform to IS 3844 except with the following deviations:

   i) Only re-inforced rubber line hose of 38mm dia should be used.

   ii) Only diffuser or fog nozzle type spray branch with hand control shall be used. Open jet branch pipe should not be used.

   iii) Maximum possible use of hose reel is desirable, which will restrict water damage to the minimum. In this case also, the hose reel nozzle should be spray / jet type.

g) Use of automatic sprinkler is strongly recommended in all areas except as listed in **16.1**(b). However, even in such cases only special type of sprinklers, quick responses, and with 10 mm outlet may be used.

h) To cut off water immediately after the fire has been extinguished, there should be more number of isolating valves/alarm valves-instead of normal practice to have only 1 control valve.

j) For areas mentioned in **11**, a gas based automatic extinguishing system should be used.

16.2 First aid fire fighting appliances shall be properly maintained, checked, tested and refilled as specified in IS 2190. The following type of extinguishers shall be used:

a) Carbon dioxide type, conforming to IS 2878

b) Halon type, conforming to IS 11108

c) Dry powder type, only for sub-station/main electrical room, kitchen, etc, conforming to IS 2171

17 OLD/EXISTING MUSEUMS

The recommended guidelines as given in **16.1** and **16.2** may be made applicable for the new/proposed museums. It may not be practicable to follow those for the existing institutions. Compartmentation with 4 hour resistant wall may not be possible, nor installation of automatic sprinkler for most areas. Internal hydrants also may pose difficulty to install. Therefore, in such cases relaxation from provisions of standard may have to be considered. But such relaxations should be to the minimum extent possible. There should be not much difficulty in adopting the following:

a) Compressed wood wool boards may be very conveniently used for achieving same result as masonry partitions, while installation of such framed partitions will pose no problem even in old building.

b) Wherever possible and it is not difficult to paint all wooden surfaces like panelling, false ceiling underside, internal timber frame, etc, with fire retardant paints to improve their flame spread factor.

c) Provision of fire check doors [*see* IS 3614 (Part I)] by replacing existing timber doors.

d) Provision of automatic fire detection system, which can be done in any building, old or new.

e) Installation of automatic halon 1211 system for certain specific areas, until a better substitute is available.

f) Cable protection including electrical rooms, shaft sealing, etc.

g) Provide extinguishers as suggested in **16.2** and discard other types which do not fit in for such risks.

18 TRAINING

All members of staff of the museum should be trained in action to be taken in the event of an outbreak of fire and in the operation and use of first aid free extinguishers and hose reels.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1642 : 1989	Code of practice for fire safety of buildings (general) : Details of construction (*first revision*)
1646 : 1997	Code of practice for fire safety of buildings (General): Electrical installations (*second revision*)
2171 : 1985	Portable fire extinguishers, dry powder (cartridge type) (*third revision*)
2189 : 1988	Code of practice for selection, installation and maintenance of automatic fire detection and alarm system (*second revision*)
2190 : 1992	Selection, installation and maintenance of first-aid fire extinguishers — Code of practice (*second revision*)
2878 : 1986	Specification for fire extinguisher, carbon dioxide type (portable and trolly mounted) (*second revision*)
3614 (Part 1) : 1966	Fire check doors: Part 1 Plate metal covered and rolling type
3844 : 1989	Code of practice for installation and maintenance of internal fire hydrants and hose reel on premises (*first revision*)
11108 : 1984	Portable fire extinguisher halons-1211 type
National Building Code (Part 4) Fire protection	
National Electrical Code	

ANNEX B

(Foreword)

COMMITTEE COMPOSITION

Fire Safety Sectional Committee, CED 36

Chariman	*Representing*
SHRI J. N.VAKIL	Tariff Adivsory Committee, Ahmedabad
Members	
ASSISTANT SECURITY COMMISSIONER	Ministry of Railways, New Delhi
DIRECTOR (FIRE SAFETY)	Ministry of Defence, (CEESO), New Delhi
DY DIRECTOR (FIRE SAFETY) (*Alternate*)	
CHIEF FIRE OFFICER	Municipal Corporation of Mumbai (Mumbai Fire Brigade), Mumbai
CHIEF FIRE OFFICER	Bhabha Atomic Research Centre, Mumbai
SHRI R.N. CHACHRA	Metallurgical and Engineering Consultants (India) Ltd, Ranchi
SHRI SUNIL DAS (*Alternate*)	
SHRI S. K. DHERI	Delhi Fire Service, Government of Delhi, New Delhi
SHRI SURINDER KUMAR (*Alternate*)	
SHRI S. M. DESAI	In personal capacity (*B-4/5 A.G. Khan Road Municipal Officers Society, Worli, Mumbai*)
SHRI OM PRAKASH	Ministry of Home Affairs, New Delhi
SHRI D. K. SHAMI (*Alternate*)	
CHIEF ENGINEER (E-I)	Central Public Works Department, New Delhi
SHRI P. N. GHOSH	In personal capacity (*J-1916, Chittranjan Park, New Delhi-19*)
SHRI J. S. GAHLAUT	State Bank of India, Mumbai
SHRI S. C. GUPTA	Lloyd Insulation (India) Pvt Ltd, New Delhi
SHRI SANJEEV ANGRA (*Alternate*)	
SHRI M. M. KAPOOR	Engineers India Ltd, New Delhi
SHRI P. C. SINGHAL (*Alternate*)	
SHRI T. R. A. KRISHNAN	Tariff, Advisory Committee, Delhi/Ahmedabad
SHRI P. K. MAJUMDAR (*Alternate*)	
COL. KULDEEP SINGH	Controllerate of Quality Assurance, Pune
SHRI A. J. PAWAR (*Alternate*)	
SHRI A. R. KHAN	Bharat Heavy Electricals Ltd, Bhopal/Trichy
SHRI NATRAJAN (*Alternate*)	
SHRI G. B. MENON	In personal capacity (*16, Aniket Society Manjalpur, Vadodara*)
MEMBER	Hydro-Construction Central Electricity Monitoring Authority, New Delhi
MANAGING DIRECTOR	Loss Prevention Association of India Ltd, Mumbai
SHRI D. K. SARKAR (*Alternate*)	
SHRI V. B. NIKAM	In personal capacity (*4/34, Haji Ali Municipal Officers Cooperative Housing Society, Mumbai*)
SHRI P. N. PANCHAL	In personal capacity (*46, Block E-1, Pocket II, Sector 15, Rohini, Delhi*)
PRESIDENT	Institution of Fire Engineers (India), New Delhi
SHRI D. PADAMHABHA	Tata Consulting Engineers, Mumbai
SHRI B. S. VENKATESH (*Alternate*)	
SHRI V. M. RANALKAR	Ministry of Petroleum and Natural Gas, New Delhi
SHRI P. MADHUSUNDAVA RAO	Directorate General Factory Advice Service and Labour Insitute, Mumbai
SHRI D. R. KRISHNA (*Alternate*)	
DR. T. P. SHARMA	Central Building Reserach Institute, Roorkee
DR GOPAL KRISHNAN (*Alternate*)	
SHRI R. SUNDARAJAN	National Thermal Power Corporation Ltd, New Delhi
SHRI S. K. CHATTOPADHYAY (*Alternate*)	
SHRI S. K. SHANGARI	Engineer-in-Chief's Branch, New Delhi
LT-COL A. T. PARNAIK (*Alternate*)	
SHRI P. K. SUNKARIA	Department of Industrial Policy and Promotion, Ministry of Industry, New Delhi
SHRI K. C. MATHUR (*Alternate*)	
SHRI S. S. SETHI, Director (Civ Engg)	Directorate General, BIS (*Ex-officio Member*)
Member-Secretary	
SHRI S. CHATURVEDI	
Joint Director (Civ Engg), BIS	

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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