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मानक

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“Step Out From the Old to the New”

IS 550-3 (2005): Safes, Part 3 Tests for fire resistance
[MED 24: Security Equipment]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
तिजोरियाँ

भाग 3 अग्नि प्रतिरोधी परीक्षण
(चौथा पुनरीक्षण)

Indian Standard
SAFES

PART 3 TESTS FOR FIRE RESISTANCE
(*Fourth Revision*)

ICS 13.310

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

FOREWORD

This Indian Standard (Part 3) (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Security Equipment Sectional Committee had been approved by the Mechanical Engineering Division Council.

Requirements for safes were earlier laid down in IS 550 : 1979 'Safes (*second revision*)'. IS 10486 : 1983 covered the performance requirements for a particular type of safes, namely, Class A safes. However, with technological advancements and experience of the industry, the standard on safes was revised and brought out in three parts to cover performance requirements, test for burglary resistance and test for fire resistance respectively. Accordingly IS 10486 : 1983 was withdrawn.

With further experience in implementation of the standard and the fact that the risk of attack with explosives has increased, the standard has been revised again.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

SAFES

PART 3 TESTS FOR FIRE RESISTANCE

(Fourth Revision)

1 SCOPE

This standard (Part 3) lays down the methods of test for assessing the fire resistance capacity of the safes. Tests conducted in accordance with these requirements are intended to demonstrate the performance of equipment during exposure to fire, but are not intended to determine acceptability for use after exposure to fire.

2 SAMPLE FOR TESTING

Two samples, known to be fully representative of a lot of safes of similar design and construction, shall be subjected to test. Such samples shall be selected on the basis of random sampling by inspecting agency.

3 TESTS

3.1 Test for verifying fire resistant property of safes consists of fire endurance test and fire and impact tests. For this purpose, one sample each selected in accordance with 2 shall be subjected to 3.4 and 3.5 respectively.

3.2 Test Equipment

3.2.1 Contents

Contents of the safe subjected to these tests shall include currency-note-grade paper. A file, letter, record-form paper (printed, typed or hand written in files or envelopes).

3.2.2 Thermocouple

Thermocouple enclosed in protection tubes of materials and dimensions shall have time constant of protected thermocouple assembly within the range from 3 to 7.2 min.

3.2.2.1 A typical thermocouple assembly conforming to these requirements may be fabricated by fusion welding the twisted ends of chromel-alumel wire not smaller than 0.52 mm² and not larger than 0.82 mm² in cross section.

3.2.3 Furnace

3.2.3.1 The furnace fuel and air supplies shall be adjusted such that the fire is uniformly distributed over the exposed faces of the safe and regulated to temperatures in accordance with the Standard Time Temperature Curve.

3.2.3.2 The furnace temperature corresponding to time elapsed as given below, shall follow the equation:

$$T - T_0 = 345 \text{ Log}_{10} (8t + 1)$$

where

T = furnace temperature in °C at any time t in minutes,

T_0 = ambient temperature in °C, and

t = time elapsed.

<i>Time</i>	<i>Furnace Temperature</i>
min	°C
5	538
10	704
15	760
20	793
25	821
30	843
40	878
50	905
60	927

3.2.3.3 The accuracy of the furnace control shall be such that the area under the time temperature curve, obtained by averaging all the furnace thermocouple readings, shall be within 10 percent of the corresponding area under the standard time temperature curve for one hour.

3.3 Preparations for Tests

3.3.1 The safe to be subjected to fire endurance test shall have a 16 mm diameter through hole at the bottom. A pipe of the same external diameter shall be welded to outer and inner body sheets of the safe. This hole shall be used for insertion of thermocouple wires through the hole; it shall be sealed by proper insulating compound from both ends of the hole.

3.3.2 All thermocouples shall be located 150 mm from the top of the safe interior. Four thermocouples shall be located 25 mm from the side walls, two of these being 150 mm from back and the other two 25 mm from the inner face of the doors. For double door safes, a fifth thermocouple shall be located 25 mm from the inner face of the doors opposite the centre door joint.

3.3.3 The furnace temperature shall be recorded by thermocouples symmetrically distributed. At least four thermocouples shall be used, placed 50 mm from the exposed faces of the test sample including the door face.

3.4 Fire Endurance Test

3.4.1 The sample of safe prepared in manner specified in 3.3.1 is placed in the furnace. The storage area shall then be evenly filled with contents (see 3.2.1) occupying volume equal to 20 to 50 percent of the volume of safe. The safe is then locked.

3.4.2 The thermocouples to be placed inside the safes shall be mounted in porcelain insulators so that the thermocouple head is 12 mm from the sealed end of a standard mass of nominal 12 mm diameter iron, steel or inconel pipe.

3.4.3 The furnace shall then be put on and the temperatures shall be read at intervals not exceeding 5 min during the test. Average of all the thermocouples inside and outside the safes shall be recorded and shall be taken as the required value.

3.4.4 The pressure in the furnace chamber during the test shall be maintained as close as within ± 5 percent of the atmospheric pressure.

3.4.5 The furnace fire shall be continued for 30 min. During the fire endurance test, it is essential that at no time the internal temperature of the safe, as shown by any of the thermocouples placed inside the safe shall exceed 177°C irrespective of ambient temperature.

3.4.6 After the specified period, the furnace is switched off. The safe is continued to be kept in the furnace and temperature of the interior of the sample safe is to be continuously recorded until a definite drop is noted.

3.4.7 After the safe, inside the furnace has cooled to about 47°C temperature, it shall be taken out from the furnace and its door shall be opened. The contents shall be examined to determine their usability in

accordance with 4. The security and integrity of the locking mechanism shall also be checked.

3.5 Fire and Impact Test

3.5.1 The safe to be subjected to this test shall have contents as specified in 3.2.1 and shall be subjected to test without any thermocouple inside the safe.

3.5.2 The safe shall be subjected to a standard fire exposure in a manner similar to the fire endurance test, for the period as shown below:

- a) Exposure time : 15 min
- b) Reheat time : 15 min

3.5.3 After the fire exposure time, the furnace shall be switched off. The safe shall then be hoisted so that its bottom is 4.0 m above a layer of brick rubble (30 cm depth) on a heavy concrete base and then dropped. A maximum of 15 min shall elapse from the time the furnace fire is extinguished till the safe is loaded again into the furnace.

3.5.4 After the impact, the safe shall be examined for deformation/damage.

3.5.5 Immediately after the impact, the safe shall be inverted, put back in the test furnace, and again subjected to a standard fire exposure for the period of reheat time indicated in 3.5.2 then the furnace shall be switched off and shall be allowed to cool to less than 47°C without opening the furnace.

3.5.6 After the safe has cooled to less than 47°C , the door shall be opened to examine its heat insulating properties, as evident by the usability of the contents and the security and integrity of the locking mechanism.

4 CRITERIA FOR CONFORMITY

The contents of the fire resisting safe shall be considered to be usable after tests, if they are able to withstand ordinary handling without crumbling or falling apart, and legible and reproducible.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Security Equipment Sectional Committee, ME 24

<i>Organization</i>	<i>Representative(s)</i>
Reserve Bank of India, Mumbai	SHRI B. K. KATYAL (<i>Chairman</i>) SHRI K. RAGHUNATHAN (<i>Alternate</i>)
Bank of India, Mumbai	SHRI S. HARIHARAN
Bharat Diamond Bourse, Mumbai	SHRI MEHUL N. SHAH
Center for Environment and Explosive Safety (DRDO), New Delhi	SHRI A. K. KAPOOR SHRI V. K. CHAUDHARY (<i>Alternate</i>)
Central Bank of India, Mumbai	LT- COL M. L. KANAUIA CAPT S. KANNAN (<i>Alternate</i>)
Central Building Research Institute, Roorkee	DR T. P. SHARMA SHRI SUVIR SINGH (<i>Alternate</i>)
Chandan Metal Products Pvt Ltd, Vadodara	SHRI NITIN P. PATNI SHRI G. D. VERMA (<i>Alternate</i>)
General Insurance Corporation of India, Tariff Advisory Committee, Mumbai	SHRI S. K. CHOWDHARY
Godrej and Boyce Mfg Co Ltd, Mumbai	SHRI D. E. BYRAMJEE SHRI AJIT NIRVANE (<i>Alternate</i>)
Loss Prevention Association of India Ltd, New Delhi	SHRI D. K. SARKAR SHRI T. P. RAO (<i>Alternate</i>)
Methodex Systems Ltd, New Delhi	SHRI A. K. VERMA SHRI SUNIL WALI (<i>Alternate</i>)
Punjab National Bank, New Delhi	CAPT S. P. SINGH SHRI K. L. JAGGA (<i>Alternate</i>)
Standard Chartered Bank, Mumbai	LT- CDR KISHAN GOPAL
State Bank of India, Mumbai	SHRI G. V. CHANANA SHRI S. D. SUMANI (<i>Alternate</i>)
Steelage Industries Ltd, Mumbai	SHRI R. RAGHUPATI SHRI N. S. JOSHI (<i>Alternate</i>)
Tata Consultancy Services, Mumbai	SHRI SANJAY BAHL SHRI R. K. RAGHAVAN (<i>Alternate</i>)
The Gem and Jewellery Export Promotion Council, Kolkata	SHRI PANKAJ KUMAR PAREK
Union Bank of India, Mumbai	BRIG S. SREERAMULU CAPT E. RAJARAM (<i>Alternate</i>)
BIS Directorate General	SHRI A. S. BASU, Scientist 'F' & Head (MED) [Representing Director General (<i>Ex-officio</i>)]

*Member Secretary*SHRI P. VENKATESWARA RAO
Scientist 'E' (MED), BIS

Bureau of Indian Standards

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Amendments Issued Since Publication

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