SRI LANKA STANDARD 752 : 1986

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SPECIFICATION FOR

RATING AND FIRE TESTING OF FIRE EXTINGUISHERS

SRI LANKA STANDARDS INSTITUTION

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SLS 752:1986

Gr. 6

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This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

SPECIFICATION FOR RATING AND FIRE TESTING OF FIRE EXTINGUISHERS

FOREWORD

This Sri Lanka Standard was authorised for adoption and publication by the Council of the Sri Lanka Standards Institution on 1986-09-02, after the draft, finalised by the Drafting Committee on Fire Protection and Fire Fighting, has been approved by the Mechanical Engineering Divisional Committee.

This standard deals with fire tests and rating for Classes A and B only. There are no tests and rating for Classes C and D at present.

All values in this standard have been given in metric units.

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 observation shall be rounded off in accordance with CS 102. The number of figures to be retained in the rounded off value shall be the same as that of the specified value in this standard.

The assistance derived from the publications of the Standard Association of Australia and the British Standards Institution in the preparation of this standard is gratefully acknowledged.

1 SCOPE

This standard sets out the fire testing and rating of fire extinguishers used in extinguishing fires as calssified in SLS 550.

2 REFERENCES

CS 102 Presentation of numerical values

SLS 550 Classification of fires

SLS 599 Portable fire extinguisher water (soda-acid) type

SLS 704 Portable fire extinguisher water (gas cartridge) type

SLS * Portable fire extinguisher water (stored pressure) type.

* *Under preparation*

3 CLASSIFICATION

Extinguishers shall be classified by letter or letters designating the general class or calsses of fire for which the extinguisher has been to be effective.

For the purpose of classification, the following letters shall apply:

Class A - Fires involving solid materials, usually of an organic nature in which combustion normally takes place with the formation of glowing embers.

Class B - Fires involving liquids or liquefiable solids.

4 REQUIREMENTS

4.1 Rating

The rating of extinguishers shall be shown by a numeral designation in which the numeral indicates the maximum relative extinguishing potential of the extinguisher under prescribed test conditions (see **5.1.2.2** and **5.2.2.2**).

The numerical rating for the various classes of extinguishers shall be determined as follows:

a) Class A extinguishers - on the basis of comparative fire tests using specified sizes of wood crib fires.

b) Class B extinguishers - on the basis of comparative fire tests using a flammable liquid fuel of specified area and volume.

While the tests assess aspects of the extinguishers, no single test will provide a full assessment of the performance under all fire conditions. Therefore, in the interpretation of test results, any uncontrolled variables relating to environmental conditions, both with respect to actual fire and the use of extinguishers, shall be taken into account.

4.2 Requirements for test fires

4.2.1 *Application*

To qualify for a classification, an extinguisher shall comply with the requirements of **5.1** or **5.2** as appropriate. To qualify for a rating an extinguisher shall extinguish under conditions of continuous or intermittent discharge the relevant test fire in **5.1** or **5.2** as appropriate.

4.2.2 *End-point*

For the fire test to be successful, all flames shall be extinguished and there shall be no recurrence of flaming during the 3 minutes following the complete discharge of the extinguisher.

4.2.3 *Number of test fires*

An extinguisher shall extinguish at least two of a total of three test fires except that the third test may not be required when the first two tests are successful. Each test shall be conducted with a fully charged extinguisher.

4.2.4 *Storage and test temperature*

Extinguishers shall be stored at a temperature within the range 15 °C to 30 °C for at least 24 h before test. Immediately prior to test, the temperature of the extinguisher body shall be not less than 15 °C and not greater than 30 °C.

NOTE - It is desirable that the tests be conducted as soon as possible after the extinguisher has been removed from the temperature stabilized storage.

4.2.5 *Use of screen*

For wood crib test fire, a screen may be used to provide for even fire development, but the screen shall be removed before the fire is attacked.

5 TESTS

5.1 Class A - Test fire

5.1.1 *Application*

Extinguishers for which a Class A classification and rating is sought shall comply with the requirements of following tests with the wood crib test fire as described below except as provided under **5.1.1.1**.

5.1.1.1 Water type extinguishers

Water type extinguishers complying with the performance requirements of **SLS 599**, **SLS 704** Portable fire extinguisher - water (gas cartridge) type, and **SLS** Portable fire extinguisher - water (stored pressure) type for discharge capacity, effective range and duration of discharge, shall be given a classification and rating of 2A without a fire test being carried out.

5.1.1.2 Other extinguishers

Extinguishers other than those specified in **5.1.1.1**, for which a Class A rating is sought shall extinguish the wood crib test fire appropriate to the rating sought.

5.1.2 *Wood crib test fire*

5.1.2.1 Characteristics

Class A test fires (see **3**) shall consist of a crib of wooden sticks supported on a metal frame 250 mm high, 900 mm wide and of a length equal to that of

the test fire. The steel frame (see Figure 1 and 2) shall be constructed from 50 mm x 50 mm angle sections.

NOTE - The larger test fires are liable to sag if supported only at the ends. Fires larger than 21A (see Table 1) should be given additional support to prevent this, either by the use of two (or more) shorter frames to give the required length or by a full size frame with additional cross pieces. The additional support should not exceed that consistent with a maximum unsupported crib length of 2 100 mm.

For fires greater in size than 21A the longitudinal layers may be made up by using two or more sticks per length. The lengths should be unequal, and the stick arrangement staggered so that there is no tendency for the crib to separate in the plane of the joints.

The wooden sticks shall be of the pinus family containing 12.5 per cent to 17.5 per cent of moisture by mass, and be of square section of side 38^{+3}_{-1} mm. The moisture content of the sticks shall be determined using commercially available instruments which measure electrical conductivity between two needle probes pushed into the sticks.

NOTE - Some variation of reading may be obtained due to structural variation of the timber and the direction of the grain. This type of instrument should therefore be calibrated in case of doubt by drying at 103 ± 2 °C samples of the sticks, cut to convenient length, to constant mass, weighing at 24 h intervals.

The moisture content is given by

$$\text{Per cent moisture} = \frac{\text{Initial mass} - \text{Dry mass}}{\text{Dry mass}} \times 100$$

The wooden sticks shall be stacked in 14 layers on the metal frame, as shown in Figures 1 and 2.

The sticks in each layer shall be spaced at regular intervals with gaps of 60 mm between the sticks.

The sticks laid transversely (layers 2, 4, 6, 8, 10, 12 and 14) shall have a fixed length of 500 ± 10 mm.

The sticks laid longitudinally (layers 1, 3, 5, 7, 9, 11 and 13) shall have lengths which vary according to the test fire as shown in Table 1, again with a tolerance of ± 10 mm.

The range of test fires may be extended beyond 55A according to the progression indicated in Note 1 to Table 1. Each test fire is designated by a number followed by the letter A. The designating number of the test fire represents the following:

a) the length of the test fire in decimetres, i.e. the length of the wooden sticks arranged in the longitudinal direction of the test fire;

b) the number of 500 mm wooden sticks for each layer arranged in the transverse direction of the test fire.

TABLE 1 - D mensions of Class A test fires

Designation of test fire	Number of 500 mm wooden sticks in each transverse layer	Length of test fire m
3A	3	0.3
5A	5	0.5
8A	8	0.8
13A	13	1.3
21A	21	2.1
27A	(27)	(2.7)
34A	34	3.4
43A	(43)	(4.3)
55A	55	5.5

NOTES

1 Each test fire is designated by a number in a series in which each term is equal to the sum of the two preceding terms, i.e. this series is equivalent to a geometrical progression having a common ratio of about 1.62.

2 The additional fires shown in parentheses in the table represent the product of the preceding term and $\sqrt{1.62}$.

Example :

$$21 \times \sqrt{1.62} = 21 \times 1.27 = 27$$

5.1.2.2 Test conditions

The test fire shall be located indoors and shall be sheltered from draughts. The test chamber shall not impede the natural development of the test fire or effective fire fighting.

Immediately prior to the fuel being ignited the extinguisher shall be placed 5 m from the centre of the test fire.

The lighting tray, which shall have a length 100 mm greater than that of the test fire, a width of 600 mm and a depth of 100 mm shall be placed symmetrically beneath the crib forming the test fire. In the tray a quantity of a fuel complying with the requirements of Table 2 shall be poured to a depth of 5 mm on a layer of water 3 mm deep.

TABLE 2 - Fuel specification

Fuel	Initial boiling point	Final boiling point
Aliphatic hydrocarbon*	not less than 88 °C	not more than 105 °C

* *Generally refers to heptanes and octanes.*

Long lighting trays are difficult to handle, and it is convenient to use any number of smaller trays to give the required length. There shall be no appreciable gap between trays and each tray shall contain fuel to the required depth.

The fuel shall be ignited.

After the fire has burnt for 2 min the lighting tray shall be withdrawn from beneath the crib.

The crib shall then be permitted to burn for a further time of 6 min, making a total pre-burn time of 8 min, for the test fire to be established. The extinguisher shall then be operated and applied to the test fire, the operator moving round the fire in order to obtain the best result. The contents of the extinguisher may be discharged continuously or in successive bursts.

For the test to be successful, all flames shall be extinguished and there shall be no recurrence of flaming during the 3 min period following the complete discharge of the extinguisher.

5.1.2.3 Test rating

The test rating shall be the largest test fire which the extinguisher will extinguish when tested under the conditions specified in **5.1.2.**

5.2 Class B - test fire

5.2.1 *Application*

Extinguishers for which a Class B classification and rating is sought shall comply with the full requirements of the standard appropriate to the extinguishant under test.

5.2.2 *Flammable liquid test fire*

5.2.2.1 Characteristics

Class B test fires (see **3**) shall be made in a range of welded sheet steel circular cylindrical trays, the dimensions of which shall be as given in Table 3.

These test fires are designated by a number followed by the letter B, this number represents the volume of fuel, in litres, contained in the tray.

The area of the tray calculated in square decimetres is equal to this number multiplied by π. The depth of fuel in the trays is approximately 30 mm, there being no water base.

Details of Class B test fires are given in Table 3. The range of test fires may be extended beyond 233B according to the progression indicated in the Note to Table 3.

TABLE 3 - D mensions of Class B test fires

Designation of test fire	Volume of fuel	Dimensions of tray			
		Approximate diameter	Depth	Thickness of walls	Surfaces of fire
	litres	m	mm	mm	m^2
8B	8	0.57	100	2.0	0.251
13B	13	0.72	150	2.0	0.408
21B	21	0.92	150	2.0	0.660
34B	34	1.17	150	2.5	1.070
55B	55	1.48	150	2.5	1.730
(70B)	(70)	(1.67)	(150)	(2.5)	(2.200)
89B	89	1.89	200	2.5	2.800
(113B)	(113)	(2.13)	(200)	(2.5)	(3.550)
144B	144	2.40	200	2.5	4.520
(183B)	(183)	(2.71)	(200)	(2.5)	(5.750)
233B	233	3.05	200	2.5	7.320

NOTES

1 Each test fire is designated by a number in a series in which each term is equal to the sum of the two preceding terms, i.e. this series is equivalent to a geometrical progression having a common ratio of about 1.62.

2 The additional fires shown in parentheses in the table represent the product of the preceding term and $\sqrt{1.62}$.

Example :

$$55 \times \sqrt{1.62} = 55 \times 1.27 = 70$$

5.2.2.2 Test conditions

The wind speed shall not be greater than 3 m/s.

The fuel shall be as specified in Table 2.

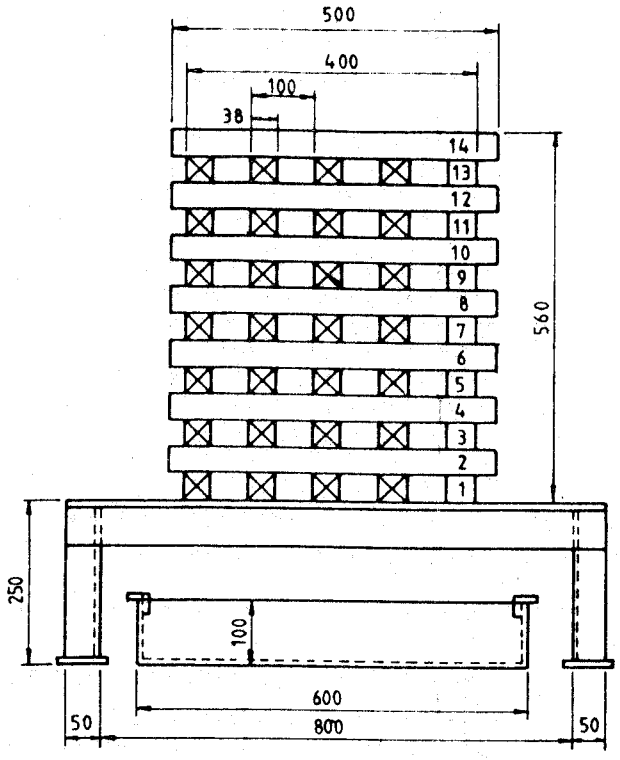
For the testing of foam or halon extinguishers fresh fuel shall be used for each test. When testing extinguishers of other types it is not necessary to use fresh fuel for each test, provided that the previous tests have not contaminated the fuel so that the efficiency of the test fire is impaired.

The fire shall be ignited and allowed to burn freely for 60 s. The extinguisher shall then be operated and applied to the test fire, the operator moving round the fire in order to obtain the best result. The contents of the extinguisher may be discharged continuously or in successive bursts.

For the test to be successful, all flames shall be extinguished and there shall be no recurrence of flaming during the 3 min period following the complete discharge of the extinguisher.

5.2.2.3 Test rating

The test rating shall be the largest test fire which the extinguisher will extinguish when tested under the conditions specified in **5.2.2.**



Front view identical for all test fires

FIGURE 1 - Class A test fire front view

(Dimensions are in millimetres)

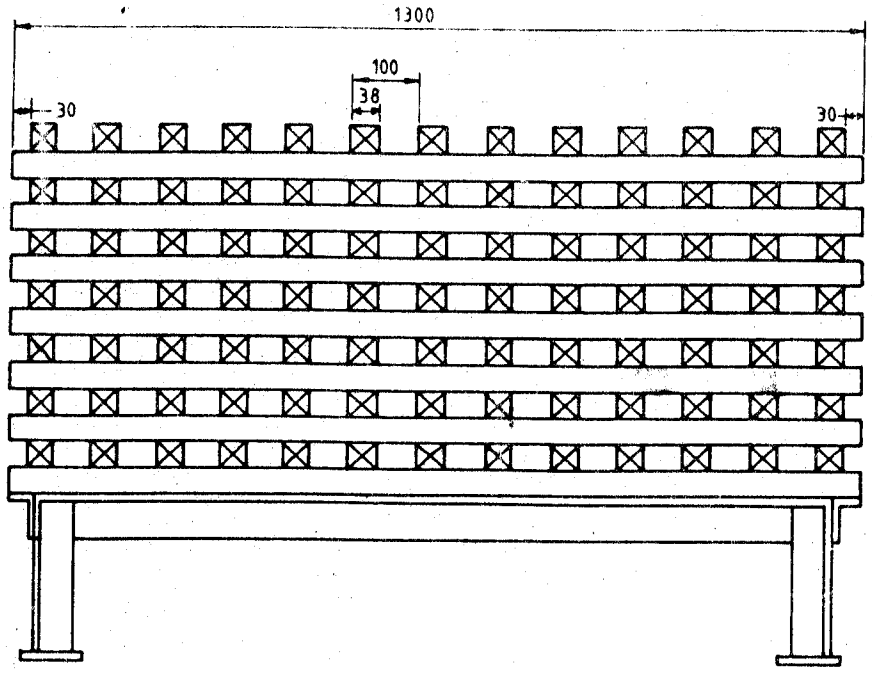


FIGURE 2 - Class A test fire side view showing 13A fire

(Dimensions are in millimetres)

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the national standards organization of Sri Lanka established by the Sri Lanka Standards Institution Act No. 6 of 1984 which repeals the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Industries and Scientific Affairs.

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