SRI LANKA STANDARD 704 : 1985

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SPECIFICATION FOR

PORTABLE FIRE EXTINGUISHERS WATER (GAS CARTRIDGE) TYPE

SRI LANKA STANDARDS INSTITUTION

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SLS 704:1985

Gr. 8

SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

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SRI LANKA STANDARD

SPECIFICATION FOR PORTABLE FIRE EXTINGUISHER WATER (GAS CARTRIDGE) TYPE

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1985-10-11 after the draft, finalized by the Drafting Committee on Fire Protection and Fire Fighting has been approved by the Mechanical Engineering Divisional Committee.

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

This standard applies to metal bodied portable fire extinguishers of water type in which water is expelled by pressure of gas released from a compressed gas cartridge.

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 Standards Association of Australia, the British Standards Institution and the Indian Standards Institution in the preparation of this standard is gratefully acknowledged.

1 SCOPE

This standard lays down requirements regarding capacity, principal materials, construction, method of operation, performance and tests of portable fire extinguisher of water (gas cartridge) type.

2 REFERENCES

ISO 3832 Metalic and other non-organic coatings-review of methods of measurement of thickness

CS 102 Presentation of numerical values

SLS 268 ISO metric screw thread -
Part 1 Basic and design profiles
Part 2 Pitch/diameter combinations

SLS 374 Standard atmospheric conditions

SLS 428 Random sampling methods

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

SLS* ... Rating and fire testing for portable fire extinguishers

SLS* ... Gas cartridge for fire extinguishers.

3 DEFINITIONS

For the purpose of this specification the following difinitions shall apply:

3.1 **portable fire extinguisher**: A first aid fire fighting appliance which can be carried by hand and operated by hand and the maximum mass not exceeding 20 kg.

3.2 water (gas cartridge) type extinguisher: An extinguisher which relies on compressed gas from a cartridge to expel the water.

3.3 equilibrium pressure: The pressure generated within the extinguisher when it is actuated with the nozzle completely blocked. Magnitude of this pressure will be approximately 1.7 MPa.

4 REQUIREMENTS

4.1 Materials

4.1.1 *Body*

The body of the extinguisher shall be of metal and so designed as to meet the specified strength requirements (see **4.2.1**, **6.1** and **6.2**). The metal used in the construction of the body shall be of a suitable grade of austenitic stainless steel, carbon steel or a non-ferrous metal.

The top end (dome) and the bottom end (dish) shall be concave to pressure to a radius not exceeding the diameter of the body. Reversed curvature ends shall not be used.

A skirt/base ring shall be provided to keep the extinguisher in the upright position. The heel radius of the skirt/base ring shall be not less than four times the thickness of the material used in the construction of the body.

**Under preparation.*

4.1.2 *Fittings*

Fittings shall be constructed of austenitic stainless steel, carbon steel or a non-ferrous metal or of other equally durable material of adequate strength which should not decompose under fire fighting conditions to yield toxic gases or vapours.

4.2 Design and construction

4.2.1 *Basis for design*

The extinguisher shall be designed to withstand without rupture or leak at a pressure of not less than:

a) 3.75 times the equilibrium pressure; or

b) 4.13 times the equilibrium pressure if failure occurs at a joint in a test to destruction.

The equilibrium pressure being the pressure developed in a correctly charged extinguisher when the extinguisher is operated at a temperature of 65 °C with the outlet blocked.

The charged extinguisher shall be maintained at a temperature of 65 °C for a minimum period of 24 hours prior to equilibrium pressure determination.

4.2.1.1 Design test pressure

The design test pressure shall be not less than 1.5 times the equilibrium pressure or 2.5 MPa, whichever is the greater, for a continuous period of 5 minutes without leakage or visible distortion. This test shall be carried out before any external finish is applied to the extinguisher.

4.2.1.2 Wall thickness

The minimum wall thickness t, expressed in millimetres, of any extinguisher body shall be the greater of:

$$t = 2.5 \frac{D}{T}$$

and $t = 0.6$ mm

where,

D is the internal diameter of body, in millimetres and

T is the tensile strength of metal used for the body, in megapascals.

4.2.2 *Circumferential and longitudinal joints*

4.2.2.1 Methods

Joints shall be made by one of the methods set out in 4.2.2.2, 4.2.2.3 and 4.2.2.4.

4.2.2.2 Riveted construction

The overlap of the lap joints and the width of the flanges of domes or dishes shall be not less than 20 mm.

The overlap in the case of flanges shall be wholly overlapped by cylindrical portion of the body. Rivet holes in both lingitudinal and circumferential joints shall be precisely punched or drilled not less than 20 mm and not more than 25 mm pitch. Rivets shall be of carbon steel for steel bodies and of annealed copper for copper bodies. In either case rivets shall be not less than 5 mm diameter. The joints shall be finally soldered.

4.2.2.3 Welded construction

Welded construction shall be of one of the following fusion types as appropriate to material:

a) Oxy-acetylene welding, or

b) Resistance welding.

   i) Spot welding

   ii) Stitch welding

   iii) Seam welding.

For further details refer 4.2.2.4 and 4.2.2.5 of **SLS 599:1982**.

4.2.2.4 Swaged construction

Swaged construction may be applied only to the joints between body and the bottom end. An internal swage of not less than 6 mm deep shall be formed in the body at least 25 mm from the end of the body to retain the bottom end in position while pressure is applied. The joints shall finally be soldered, brazed or welded.

4.2.3 *Protective finishes*

4.2.3.1 Internal surfaces

Unless made of a corrosion-resistant metal or of austenitic stainless steel, the body of the extinguisher shall have all internal surface completely protected against corrosion by means of suitable metalic and/or organic lining(s). There shall be no visible uncoated areas.

Metallic linings based on zinc shall be applied either by electrical deposition to a thickness of not less than 0.013 mm or by spraying to a thickness of not less than 0.075 mm. The thickness of the coating shall be measured by any suitable method given in ISO 3882.

The linings shall be capable of withstanding the type approval tests specified in Appendix A without cracking of the internal surface or loss of adhesion between the lining and the body (see 6.4).

4.2.3.2 Internal components

All components of carbon steel or non-ferrous metal within the body of the extinguisher shall be suitably protected against corrosion and not contribute towards corrosion of the body.

4.2.3.3 External surfaces

The external surface of the body shall be finished to comply with the requirements for markings and colour indentification in 4.3.

Unless made of a corrosion resistant metal or of austenitic stainless steel, the body of the extinguisher shall have all external surfaces completely protected against corrosion.

4.2.4 *Neck ring*

Neck ring shall be of austenitic stainless steel, carbon steel or copper alloy. The neck ring shall be firmly secured to the body by brazing or by welding using one of the methods in 4.2.2.3.

If fitted with an internal flange it may be secured by soldering and with an adequate number of rivets of not less than 5 mm in diameter. The neck ring shall provide a clear opening of not less than 25 mm diameter. The parallel screw thread for the attachment of the cap shall be not less than 16 mm in effective length and shall be in accordance with SLS 268 Part 1 and SLS 268 Part 2.

4.2.5 *Head cap*

The cap shall be of austenitic stainless steel, carbon steel or copper alloy, or other equally durable material of adequate strength as defined in 4.1.2. The cap shall have two side lugs or hand wheel or hand grip to help the removal of cap in the absence of a spanner. At least three equidistant holes shall be drilled through the cap to form a vent for the release of any pressure remaining in the body during removal of cap. The centres of the vent holes shall be 6.5 mm from the face of the cap joint washer. The cap shall be threaded for fixing to the neck ring on the body for not more than 16 mm in effective length and the parallel threads shall be in accordance with SLS 268:Part 1 and SLS :Part 2.

4.2.6 *Head cap washer*

The cap washer shall be of good quality leather, rubber or plastics, of suitable composition.

4.2.7 *Actuating mechanism*

The actuating mechanism shall be of corrosion-resistant material of adequate strength.

Where a piercer is employed, it shall be of sufficient length to ensure that when driven to its maximum stroke it will effectively pierce the sealing device and cause the contents to be discharged. It shall be designed to prevent jamming.

4.2.8 *Handle and supporting fittings*

Carrying handles and supporting fittings fixed to the steel body shall be riveted, welded or brazed thereto. Any carrying handles and supporting fittings fixed to a non-ferrous metal body shall be riveted. A carrying handle shall provide sufficient clearance for convenient hand grip and shall be of adequate strength.

The extinguisher shall be provided with a bracket or a holder which can be mounted and which can be readily removed.

4.2.9 *Liquid level indicator*

The specific level of solution in the extinguisher to which the extinguisher has to be filled shall be indicated inside the extinguisher by a permanent mark in the container, preferably be embossed or by a permanent projection on the siphon tube.

Means to prevent overfilling may be used as an alternative.

4.2.10 *Expansion device*

Means shall be provide to prevent the liquid content in the siphon tube being raised above the normal level by the expansion of air in the body with a rise in temperature.

4.2.11 *Gas cartridge*

Gas cartridge shall be of either high pressure or low pressure type which shall comply with the requirements laid down in **SLS ...***.

4.2.12 *Discharge fittings*

4.2.12.1 Siphon tube

The siphon tube shall be of sufficient length to ensure the discharge of 95 per cent of the extinguishing medium. The tube shall be as straight as practicable and located so that the cleaning of the interior of the body of the extinguisher is not made difficult.

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4.2.12.2 Strainer

A suitable strainer shall be provided at the intake end of the siphon tube. The area of each hole in the strainer shall be less than the area of the smallest orifice between the strainer and the discharge nozzle and shall be less than the area of the discharge nozzle outlet. The aggregate area of the holes in the strainer shall be such that the requirements of **4.7.1** are complied with when 50 per cent of the holes are blocked.

4.2.12.3 Discharge nozzle

The discharge nozzle shall be made of any corrosion resistant material of adequate strength. The discharge nozzle shall be fitted with a protective cap capable of being readily removable or being blown off once the extinguisher is operated.

4.2.12.4 Discharge hose and fittings

A discharge hose shall be provided in all extinguishers. The hose and its fittings shall be resistant to acid and alkali and shall be of sufficient strength to meet the test requirements of **6.3.**

The hose shall be of such length that the nozzle terminates at a point not less than 10 mm above the base of the extinguisher.

4.3 Colour

Colour of the extinguisher shall be signal red.

4.4 Capacity

The liquid capacity of the extinguisher, when filled to the marked liquid level or when an overfill device is used, shall be not less than 9 litres.

4.5 Method of operation

The extinguisher shall be designed to be operated in the normal upright position.

The extinguisher shall incorporate a safety device to prevent accidental operation. This device may form part of the actuating mechanism or of the support bracket.

Suitable mechanical means shall be provided whereby the sealing device are opened or pierced and the compressed gas is released into the body of the extinguisher thus causing the contents of the extinguisher to be discharged.

4.6 Charge

The charge for the extinguisher shall consist of the following:

a) Water, to which may be added corrosion inhibitors, freezing point depresants and wetting agents. Such additions shall be non-flammable and non-corrosive, and shall not produce toxic fumes; and

b) Compressed gas in a gas cartridge.

4.7 Performance requirements

4.7.1 *Discharge time and pattern*

The form of the nozzle and the area of the orifice shall be such that when the extinguisher is correctly charged and operated in its normal working position under standard atmospheric conditions as given in Clause 4 of SLS 374:1976, it shall discharge not less than 95 per cent of its contents. The jet shall be maintained at an effective range of not less than 6 m for a period of 60s and the required discharge shall take place in not more than 120s. Where the spray pattern is used the spray shall be maintained at an effective range of not less than 4 m for a period of 60s and the required discharge shall take place in not more than 120s.

In the case of jet and spray pattern, the performance should meet the requirements of the respective patterns given above.

Not more than 3s shall elapse between the operation of the control mechanism and commencement or recommencement of the discharge.

4.7.2 *Intermittent discharge*

Where the extinguisher is designed for intermittent discharge, it shall be capable of operating satisfactorily with an interrupted discharge cycle of 3s open and 10s shut, and not more than 3s shall elapse between the opening of the control value and the recommencement of the discharge.

4.7.3 *Fire test*

Fire tests for this type of extinguisher shall where necessary comply with the appropriate requirements of SLS ...*.

5 MARKING

5.1 Every extinguisher shall be marked legibly and indelibly with the following information:

a) The manufacturer's name, address and brand name (if any);

b) The words " **WATER (GAS CARTRIDGE) TYPE** " ;

c) Method of operation;

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* *Under preparation.*

d) The net charge of the liquid in litres;

e) The liquid level to which the extinguisher is to be recharged;

f) A declaration to the effect that the extinguisher conforms to the design test pressure;

g) The words "**KEEP THIS END UP**" in the top dome of the extinguisher;

h) Marking of suitability for various classes of fires;

j) The year of manufacture;

k) The words,

"**WARNING**

DO NOT USE ON LIVE ELECTRICAL EQUIPMENT AND WIRING".

5.2 Information b), c), g) and k) should be given in Sinhala, Tamil and English.

5.3 Serial number

Serial number shall be legibly stamped on the skirt/base ring.

5.4 SLS Certification marking

The extinguishers may also be marked with the Certification Mark of the Sri Lanka Standards Institution illustrated below on permission being granted for such marking by the Sri Lanka Standards Institution.

NOTE - The use of the Sri Lanka Standards Institution Certification Mark (SLS Mark) is governed by the provisions of the Sri Lanka Standards Institution Act and the regulations framed thereunder. The SES mark on products covered by a Sri Lanka Standard is an assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control, which is devised and supervised by the Institution and operated by the producer. SLS marked products are also continuously checked by the Institution for conformity to that standard as a further safeguard. Details of conditions under which a permit for the use of the Certification Mark may be granted to manufacturers or processors may be obtained from the Sri Lanka Standards Institution.

6 TESTS

6.1 Standard test

Every extinguisher body shall be tested and shall be capable of withstanding an internal hydraulic pressure of 1.5 times the equilibrium pressure or 2.5 MPa, whichever is the greater, for a continuous period of 5 minutes without leakage or visible distortion.

This test shall be carried out before any external finish is applied to the extinguisher.

6.2 Test to destruction

There required, an extinguisher body shall be tested to destruction by internal hydrostatic pressure. Rupture shall not occur at a pressure of less than 3.75 times the equilibrium pressure of less than 4.13 times the equilibrium pressure if failure occurs at a joint.

6.3 Fittings

Every hose, operating head and associated fittings shall be checked for clear passage and shall be capable of satisfactroily withstanding the standard test pressure specified in **6.1** for 5 minutes.

6.4 Test for continuity of organic lining

Every extinguisher, the internal surface of which is coated with an organic lining, shall be tested by one of the following methods:

6.4.1 *Resistance test*

The lining shall be checked for continuity by a 500 V megohmmeter connected between the metal body and an electrode immersed in water in the extinguisher body.

The test should give a reading of infinity.

NOTE - It may be necessary to add salt to the water to ensure its conductivity.

6.4.2 *High frequency spark test*

The lining shall be checked for continuity and freedom from pinholes by combing over the entire surface with a suitable high frequency probe.

NOTES

1 In this test a high voltage spark discharge is directed to the lining. Where a defect occurs in the lining the discharge is earthed producing a strong bluish white continuous spark.

2 The surface of the lining should be clean and dry when the test is carried out. Excessive voltage or long residence time, or both, may puncture the lining, and care should therefore be taken to select the correct voltage. The voltage governs the spark length; a length of between 12 mm and 32 mm depending on the thickness of the lining will normally be adequate.

6.5 Test for leakage of gas from compressed gas cartridge

Every compressed gas cartridge shall be tested for leakage of gas by one of the following methods:

a) When the contents are checked by mass, the mass of the cartridge shall be determined before and after a bond period of not less than 21 days.

b) When a leak detector is used to check the contents, it shall give results at least as accurate as the 21 days bond period.

c) When the immersion method is used to check the contents, the cartridge shall be filled and be completely immersed in a tank of clean water for 24 hours. Means shall be provided for trapping escaping gas.

Care shall be taken to ensure that the cartridge and the gas are free from moisture. Cartridges showing loss of contents in excess of 0.025 per cent per day (subject to a maximum loss of 10 per cent at any given time) in any of the above tests shall be rejected.

7 INSTRUCTIONS

Written instructions shall be issued by the manufacturer to the customer covering maintenance procedure.

a) The gas cartridge shall be tested every twelve months in accordance with **6.5**.

b) The extinguishers shall be test discharged as per **4.7.1**, the body pressure tested as per **6.1 para 1** at intervals not exceeding 5 years.

8 SAMPLING

8.1 Lot

All portable gas cartridge type fire extinguisher of the same design and produced by the same manufacturer under almost identical conditions of manufacture shall be grouped together to constitute a lot.

8.2 Scale of sampling

8.2.1 Each lot shall be considered individually for the purpose of evaluation of quality in accordance with this specification.

8.2.2 The number of items (fire extinguishers) to be taken from a lot for testing shall be in accordance with Columns 1 and 2 of Table 1.

TABLE 1 - Scale of sampling

Number of items in the lot (1)	Number of items to be selected (2)	Sub sample size (3)
Up to 25	5	2
26 to 50	8	3
51 to 100	13	5
101 and above	20	8

8.2.3 Items shall be selected at random. In order to ensure randomness of selection random number tables as given in **SLS 428** shall be used.

8.3 Number of tests

8.3.1 Each item in the sample selected as in **8.2.2** shall be examined visually for the requirements specified in **4** and **5**.

8.3.2 If the lot has been found satisfactory in respect of requirements given in **4** and **5** when examined as in **8.3.1** a sub sample of size as given in Column 3 of Table 1 shall be drawn at random and subjected to the performance requirements given.

8.3.3 An item shall be selected from the sub-sample and tested for tests specified in **6**.

8.4 Conformity to standard

A lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied:

8.4.1 Each fire extinguisher examined as in **8.3.1** satisfied the relevant requirements.

8.4.2 The fire extinguishers of the sub-sample when tested as in **8.3.2** satisfy the relevant requirements.

8.4.3 The item tested as in **8.3.3** satisfies the relevant requirements.

APPENDIX A

TYPE APPROVAL TEST

A.1 INTERNAL CORROSION TEST

Fire extinguishers complying with the requirements of this standard, correctly charged and ready for operation, shall be stored for a period of 3 months.

They shall then be discharged and inspected. There shall be no signs of corrosion of the parent metal.

A.2 ORGANIC LININGS IMPACT TEST

A specimen extinguisher body shall be laid on its side and a mass of 4.5 kg having a spherical contact area of 25 mm diameter shall be dropped on to the extinguisher body from a height of 450 mm. The lining shall not crack or be separated from the wall of the body.

The specimen extinguisher shall then be charged and stored at room temperature at its working pressure for 5 days, after which it shall be discharged and inspected. There shall be no bubbles between the lining and the body shell or signs of lifting of the lining.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

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SRI LANKA STANDARDS INSTITUTION

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The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

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All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

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