SRI LANKA STANDARD 599:1982
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SPECIFICATION FOR
PORTABLE FIRE EXTINGUISHER WATER (SODA - ACID) TYPE

BUREAU OF CEYLON STANDARDS

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SLS 599 : 1982

Gr. 8

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

SRI LANKA STANDARD

SPECIFICATION FOR PORTABLE FIRE EXTINGUISHER WATER (SODA-ACID) TYPE

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Bureau of Ceylon Standards on 1982-11-24, 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 specification applies to metal bodied, portable, upright model fire extinguishers of water type in which, water is expelled by pressure generated as a result of chemical reaction between sodium bicarbonate solution and sulphuric acid in the extinguisher.

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 values shall be the same as that of the specified value in this standard.

The assistance derived from 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, principle materials, construction, chemical charge, and tests of portable fire extinguisher, of water (Soda-acid) type.

2 REFERENCES

ISO 228 Pipe threads where pressure tight joints are not made on the threads

ISO 3882 Metallic and other non-organic coatings - review of methods of measurement of thickness

CS 102 Presentation of numerical values

SLS 428 Random sampling methods

3 DEFINITIONS

For the purpose of this specification the following definitions 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 should not exceed 20 kg.

3.2 water (soda-acid) type extinguisher: Extinguisher in which the water is expelled by means of pressure developed due to the chemical action of the acid with the bicarbonate solution herein after called alkali solution. This type of extinguisher shall operate without the necessity to have it inverted.

3.3 equilibrium pressure: The pressure generated within the extinguisher when it is discharged with the nozzle completely blocked. Magnitude of this pressure will be approximately 0.7 MPa.

4 REQUIREMENTS

4.1 Material

The material used shall in no way react adversely with the extinguishing agent used.

4.1.1 *Body*

The body of the extinguisher shall be of metal designed to meet the specific strength requirements (see 6).

The metal used in the construction of the body should be of 1.25 mm (approx. 18 gauge) thickness. The container shall be cylindrical or conical and the top end (dome) and the bottom end (dish) shall be concave to pressure to a radius not exceeding the maximum diameter of the body. Reversed ends shall not be used.

The heel radius shall be not less than four times the thickness of the material used in the construction of the body.

4.1.2 *Fittings*

Fittings shall be constructed of austenitic stainless steel, carbon steel or 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*

a) The extinguisher shall be designed to withstand without rupture or leak at a pressure of not less than 3.75 times the equilibrium pressure of the extinguisher.

or

b) 4.13 times the equilibrium pressure of the extinguisher, if the failure occurs at a joint at a test of destruction. The equilibrium pressure for this purpose is the pressure developed in a correctly charged extinguisher when the extinguisher is operated at 65 °C with the outlet block. The charged extinguisher shall be maintained at a temperature of 65 °C for minimum period of 24 hours to the determination of the equilibrium pressure.

4.2.1.1 The standard test pressure shall be not less than 1.5 times the equilibrium pressure or 2.5 MPa whichever is greater' for a continued period of 5 minutes without leakage or visible distortion. This test shall be carried out before the extinguisher is painted.

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 the cylindrical portion of the body. Rivet holes in both longitudinal 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) Oxyacetylene welding, or

b) Resistance welding

1) Spot welding

2) Stitch welding

3) Seam welding.

4.2.2.4 Additional requirements for resistance welding

a) Types of joints

All joints to be resistance welded shall be lap joints with an overlap of not less than 10 mm, except for a distance of 10 mm from each end of the longitudinal joint where it may be reduced to 1.5 mm to provide a flush weld. The centre line of the circumferential joints shall be not less than 20 mm from the point where the dome or dish become cylindrical. The cylindrical portion and the ends shall fit tightly together when assembled before welding. All the joints shall be seam or stitch welded. Before seam welding the joints shall be tacked together by spot welds not more than 100 mm apart.

b) Surface conditions

The surface of the material shall normally be coated with lead, tin or zinc to a thickness of not more than 0.025 mm before welding. Where this is not done, the surface shall be free from scale, grease, paint, dirt and oxide film.

4.2.2.5 Fusion welding

The type of fusion welded joint used in the construction of the body of the extinguisher and of the pressure containers shall be as follows:

a) Longitudinal joints

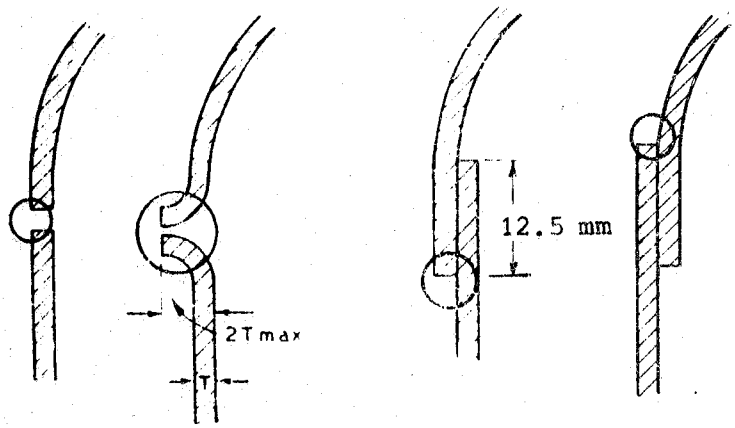
Longitudinal joints shall be made as shown in Fig. 1.

b) Circumferential joints

Circumferential joints between the body and the domed or dished end shall be made as shown in Fig. 2.

a) Butt joint b) Lap joint

FIGURE 1 - Longitudinal joints



a) Butt joints b) Lap joints

FIGURE 2 - Circumferential joints

c) 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.

4.2.2.6 Protective finishes

a) Unless made of corrosion resistance metal the extinguisher shall have internal surface completely protected against corrosion by means of anti-corrosive coating of lead-tin, lead alloy or zinc alloy or other suitable metal applied by hot dipping process or by electrolytic process to a thickness of not less than 0.012 mm. The thickness of the coating shall be measured by any suitable method given in ISO 3882:1976. The external surface of the body and both surfaces of the component that is: cage, spring, strainer, syphon tube where ever applicable shall always be subjected to this anticorrosive treatment. There shall be no visible uncoated areas, both inside and outside.

b) All internal components of carbon steel or non ferrous material within the body of extinguisher shall be suitably protected against corrosion and not contribute towards corrosion of the body.

c) The external surface of the body shall be finished to comply with the requirements for markings and colour identification.

4.2.3 *Neck ring*

Neck ring shall be of austenitic 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 57 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 ISO 228/1 and 228/2.

4.2.4 *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 hold to help the removal of cap in the absence of spanner. At least three 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 ISO 228/1, and ISO 228/2.

4.2.5 *Cap washer*

The cap washer shall be of good quality leather, rubber or plastic of suitable composition and shall be not less than 3 mm thick.

4.2.6 *Plunger-break bottle type*

The plunger rod shall be of corrosion resistance material of adequate strength and of such length that when driven at its maximum stroke it breaks the acid bottle. The plunger shall be located on top of the cap and shall be so fitted that it may freely drive along the axis of the extinguisher. The plunger shall be provided with an effective guard against accidental operations.

4.2.7 *Handle 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 copper 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.

4.2.8 *Liquid level indications*

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. This mark shall preferably be embossed. Means to prevent over filling may be used as an alternative.

4.2.9 *Acid container*

This shall be a hermetically sealed phial. It shall contain 78 ml of sulphuric acid of relative density as given in **4.5 (b)**. This glass phial shall be designed with a strong base and the fracturing part to be of thinner construction in order that in the process of breaking the tube, it shall not fracture into small pieces which could obstruct the discharge passage by clogging the nozzle.

4.2.10 *Cage/holder for acid container*

The cage or holder for the acid bottle shall be of adequate strength and rigid and be without fracture or distortion for blow delivered to the acid bottle.

The cage shall be removed from the container, if it does not allow the inspection of the interior of the container. The cage shall hold the acid bottle in correct position and permit rapid mixing of the acid with the alkali solution when the extinguisher is operated.

4.2.11 *Discharge fitting*

4.2.11.1 Syphon tube

Where a syphon tube is fitted it 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.

4.2.11.2 Strainer

A suitable strainer shall be provided at the intake of the syphon tube. The area of each hole in the strainer shall be less than the area of the nozzle and the aggregate areas of the holes in the strainer shall be not less than twice the area of the syphon tube.

4.2.11.3 Discharge nozzle

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

4.2.11.4 Discharge hose fittings

A discharge hose shall be provided in all extinguishers except in conical shape units and the hose and its fittings shall be resistant to acid and alkali and shall be of sufficient strength to meet the test requirements of **6.4**.

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 Capacity

The liquid capacity of the extinguisher when filled to the marked liquid level shall be not less than 9 litres subject to the maximum weight capacity of the extinguisher.

4.4 Method of operation

The extinguisher shall be operated by striking the knob and maintaining the extinguisher in the upright position.

4.5 Charge

The charge for the 9 litre extinguisher shall consist of the following:

a) Soda solution

Not less than 500 grams of sodium bicarbonate made into a solution of such strength that no precipitation takes place at room temperature.

b) Acid

Sulphuric acid of commercial grade with the relative density 1.72 to 1.82 contained in a bottle.

c) The strength of sodium bicarbonate solution and the quantity of acid in bottle should be in such proportion that when the soda solution and the acid are mixed the solution shall be substantially neutral or slightly alkaline.

4.6 Performance

4.6.1 *Discharge time*

The form of the nozzle and the area of the orifice shall be such that when the extinguisher is correctly charged and operated under its normal working position under normal temperature conditions and under still air condition, it shall discharge not less than 95 per cent of its contents within 120 seconds. The discharge jet shall maintain an effective range of not less than 6 metres for a period of 60 seconds and the discharging of 95 per cent of the contents shall take place in not more than 120 seconds.

5 MARKING

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

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

b) The words "WATER (SODA-ACID) TYPE".

c) The following as the method of operation;

1) Remove the protective cap or the safety pin.

2) Strike the plunger hard.

3) Direct the jet of water at the base of fire while keeping the extinguisher upright.

d) The net charge of the liquid in litres;

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

f) The words "AFTER DISCHARGE THE EXTINGUISHER MUST BE WASHED OUT CAREFULLY WITH FRESH WATER USING AT LEAST TWO CHANGES BEFORE REFILLING".

g) A declaration to the effect that the extinguisher has been tested to a hydraulic pressure of 2.5 MPa;

h) The words "KEEP THIS END UP" in the top dome of the extinguisher,

j) Marking of suitability for various classes of fires;

k) The year of manufacture;

m) *Warning*

DO NOT USE ON LIVE ELECTRICAL EQUIPMENT AND WIRING

n) Information b), c), h), j) and m) should be given in Sinhala, Tamil and English.

5.2 Colour

Colour of the extinguisher shall be signal red.

6 TESTS

6.1 The extinguisher shall be capable of withstanding an internal hydraulic pressure of 2.5 MPa for a continuous period of 5 minutes without leakage or visible distortion. This test shall be carried out before the extinguisher is painted.

6.2 In case of ultimate failure test, the failure shall not occur at a pressure less than 3.5 MPa.

6.3 When an extinguisher is set in operation under normal temperature conditions the solution shall be expelled in the form of a jet which shall maintain an effective throw of not less than 6 m for the minimum periods of time given below provided that the solution shall be 95 per cent discharged from the extinguisher within maximum periods specified.

a) Minimum period during which the jet shall be maintained at a length of not less than 6 m is 60 seconds.

b) Maximum period for 95 per cent discharge of solution is 120 seconds.

6.4 Every hose, operating head and associated fittings shall be checked for clear passage and shall be capable of withstanding test pressure of 1.5 MPa.

NOTE - Written instructions shall be issued by the manufacturer to the customer covering maintenance procedure and the frequency of hydraulic test.

7 SAMPLING

7.1 Lot

All portable fire extinguishers of the same type, shape, design and capacity produced by the same manufacturer from similar material under almost identical conditions of manufacturer shall be grouped together to constitute a lot.

7.2 Scale of sampling

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

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

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

TABLE 1 - Scale of sampling

Number of items in the lot	Number of items to be selected	Sub-sample for testing
Up to 25	5	3
26 to 50	8	5
51 to 100	13	8
101 and above	20	13

7.3 Number of tests

7.3.1 Each item in the sample shall be examined in respect of the requirements specified in 4 and 5.

7.3.2 From the items examined visually and found satisfactory a sub sample of size as given in Column 3 of the Table 1 shall be drown at random and subjected to the performance tests (**6.1** and **6.3**).

7.3.3 From a sample of fire extinguishers one item each of all the component parts and fittings shall be taken separately and examined individually in respect of the relevant requirements laid down in this specification for raw materials, component parts and fittings (**6.4**).

8 CRITERIA FOR CONFORMITY

The lot shall be considered to be in conformity to the requirements of this specification if the following conditions are satisfied:

8.1 All the items inspected visually as in **7.3.1** satisfy the relevant requirements.

8.2 Items of sub-sample tested as in **7.3.2** satisfy the relevant requirements.

8.3 All the material, and components parts tested as in **7.3.3** satisfy the relevant requirements of this specification.

8.4 In case of ultimate failure test the manufacturer shall produce a certificate from an independent testing authority with the lot to the effect that this test had been performed and found satisfactory in respect of the type of fire extinguisher in the lot.

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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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.

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