SLS 785 : 1987

Sri Lanka Standard

SPECIFICATION FOR PORTABLE FIRE EXTINGUISHERS - POWDER TYPE

SRI LANKA STANDARDS INSTITUTION

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SPECIFICATION FOR PORTABLE FIRE EXTINGUISHERS, POWDER TYPE

FOREWORD

This Sri Lanka Standard was authorised for adoption and publication by the Council of the Sri Lanka Standards Institution on 87-05-19. after the draft, finalised by the Drafting Committee on Fire Protection and Fire Fighting, had been approved by the Mechanical Engineering Divisional Committee.

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

This standard applies to rechargeable metal bodied portable fire extinguishers of powder type in which powder is expelled by pressure of gas released from compressed or liquefied gas from a gas cartridge attached to or fitted into the extinguisher or from pressure stored within 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 significant 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 extinguishers of the powder type. It provides for two types viz. :

a) The gas cartridge type
b) The stored pressure type.

2. REFERENCES

CS 102 Presentation of numerical values.

SLS 268 ISO metric screw threads

Part 1 : Basic and design profiles
Part 2 : Pitch/diameter combination

SLS 374 Standard atmospheric conditions for conditioning and testing

SLS 428 Random sampling methods

SLS 752 Rating and fire testing of fire extinguishers.

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 mass not exceeding 20 kg.

3.2 powder type portable fire extinguisher : A portable fire extinguisher containing a powder as the extinguishing medium.

3.3 gas cartridge type : An extinguisher in which the extinguishing medium is expelled by means of a compressed gas released from a gas cartridge.

3.4 stored pressure type : An extinguisher in which the extinguishing medium is expelled by means of a dry inert gas or dry air stored within the extinguishing medium under pressure.

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 internal 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.

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 and yield toxic gases or vapours.

4.2 Design and construction

4.2.1 Basis for design

4.2.1.1 Design pressure

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 as follows :

(1) For gas cartridge type extinguisher - the pressure developed in a correctly charged extinguisher when the extinguisher is operated at a temperature of 65°C with the outlet blocked.

(2) For stored pressure type extinguisher - the pressure in the extinguisher when the extinguisher is correctly charged and heated to a temperature of 65° C.

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

4.2.1.2 Standard test pressure

The standard 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.

Contd....3/-

4.2.1.3 Wall thickness

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

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

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, and 4.2.2.3.

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 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) Oxy-acetylene welding, or
b) Resistance welding
   i) Spot welding
   ii) Stitch welding
   iii) 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.

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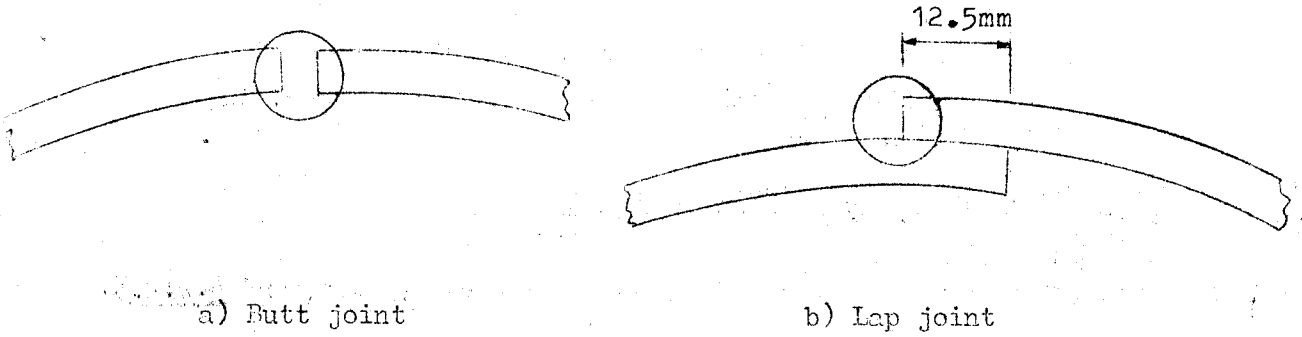
4.2.2.5 Fusion welding

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

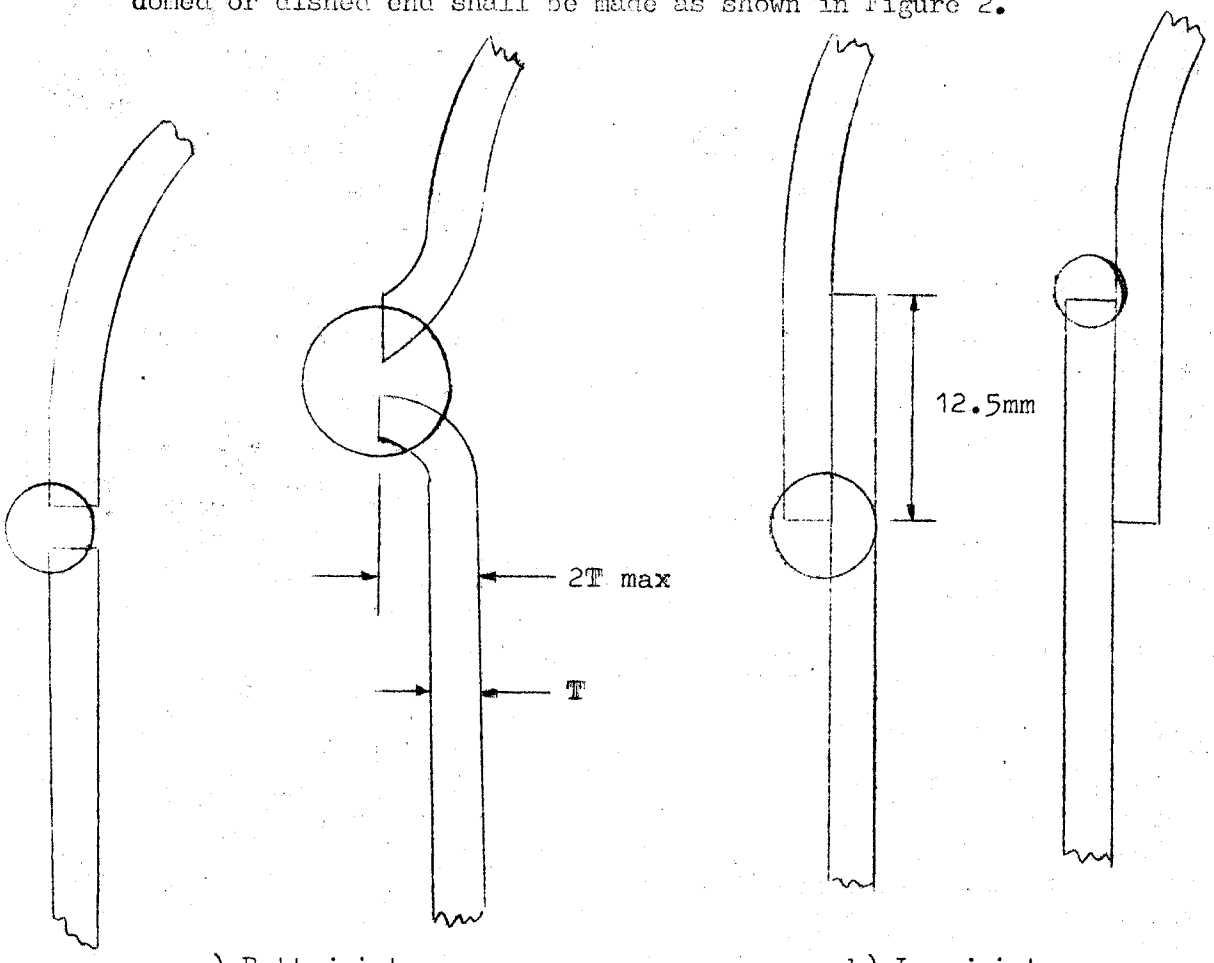
a) Longitudinal joints - Longitudinal joints shall be made as shown in Figure 1.



a) Butt joint b) Lap joint

FIGURE 1 - Longitudinal joints

b) Circumferential joints - Circumferential joints between the body and the domed or dished end shall be made as shown in Figure 2.



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 endin position while pressure is applied. The joints shall finally be soldered, brazed or welded.

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4.2.3 Protective finishes

4.2.3.1 Internal surfaces

Where there is incompatibility between the internal surfaces and components of the extinguisher and the extinguishing medium, the internal surfaces shall be suitably protected to resist corrosion. For the purpose of this requirement, incompatibility shall mean contact between the extinguishant, expellant and body and fittings that may precipitate corrosion.

At the commencement of filling, the interior of the extinguisher shall be clean, dry free from corrosion.

4.2.3.2 External surfaces

Unless made of a corrosion - resistant metal the body and fittings shall be suitably protected to resist corrosion.

Prior to painting or other protective finishing, the body and fittings of the extinguisher shall be determined by visual examination to be clean, dry, and free from corrosion.

The external surface of the body shall be finished to comply with the requirements for colour identification specified in 4.3.

4.2.4 Neck ring

The neck ring shall be of austentic 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.

The neck ring shall provide a clear opening of not less than 25 mm diameter to permit inspection of the interior of the extinguisher.

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 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 Part 1 and Part 2 of SLS 268.

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.

Contd.....6/-

4.2.8 Handle and supporting fittings

The 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 Pressure indicating device

In the stored pressure type a pressure gauge or other suitable device shall be fitted to the extinguisher, to indicate the pressure inside the extinguishers The gauge/device shall be suitably marked to indicate the pressure at which the extinguisher shall be charged and also to indicate when it is wholly or partially discharged.

4.2.10 Gas space

A gas space shall be provided above the dry powder level in the body of the extinguisher. It shall be of sufficient volume to ensure that when the discharge nozzle is temporarily closed and the extinguisher is operated at a temperature of 27 + 2 °C, the internal pressure shall not exceed 1.5 MPa and the body shall not show any sign of leakage.

4.2.11 Sealing device

4.2.11.1 Extinguishers utilising gas cartridges to expel the extinguishing medium shall be effectively sealed to prevent the ingress of moisture.

4.2.11.2 The contents of extinguishers of the stored pressure type shall be sealed under pressure by a suitable device which is readily pierced, broken or opened by the actuating mechanism, so that the contents can then be freely discharged through the nozzle.

4.2.12 Gas cartridge

Gas cartridge shall be of either high pressure type or low pressure type which shall comply with the requirements laid down in SLS 724.

4.2.13 Discharge fittings

4.2.13.1 Siphon tube

The Siphon tube shall be of sufficient length to ensure the discharge of 85 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.

4.2.13.2 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.

4.2.13.3 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 10mm above the base of the extinguisher.

Contd.....7/-

4.2.8 Handle and supporting fittings

The 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.

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4.2.13.3 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 C.3.

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

Contd.....7/-

4.2.13.4 Inner shell

Where the gas cartridge is fitted inside the extinguisher, an inner shell shall be provided, if some other means of diffusing the gas within the extinguisher is not employed, its design shall be such as to enable it to be held in the mouth of the extinguisher and to surround both the cartridge and the cartridge holder. It shall be of adequate size to allow free movement of the gas cartridge in it when the extinguisher cap is tightened with the cartridge fixed to the cartridge holder.

4.3 Colour

Colour of the extinguisher shall be french blue.

4.4 Size

The size of the extinguisher shall be taken as the mass of the charge of the extinguishing medium, which shall be not less than 0.9 kg and not more than 14 kg.

4.5 Method of operation

4.5.1 General

The extinguisher shall be designed to be operated in the normal upright position, i.e. with the operating head at the top.

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.

4.5.2 Discharge of contents

The contents shall be discharged as follows:

a) Gas cartridge type : Suitable mechanical means shall be provided whereby the sealing device is 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.

b) Stored pressure type : Suitable mechanical means shall be provided whereby the sealing device is opened or pierced, thus allowing the contents of the extinguisher to be discharged.

4.6 Charge

The charge shall consist of the following :

a) Powder used as the extinguishing medium. The powder shall retain its free-flowing properties at all times and shall be capable of complying with the powder compaction test given in 6.5.

b) For a gas cartridge type extinguisher, compressed gas in a gas cartridge.

c) For a stored pressure type extinguisher, inert gas or air stored under pressure.

For stored pressure type extinguishers, a non-combustible, non-toxic trace gas that is compatible with the extinguishing medium and materials or construction may be added to the charge to facilitate the testing for leakage of gas.

4.7 Performance requirements

4.7.1 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 in its normal working position under standard atmospheric conditions as given in 4, of SLS 374 : 1976, it shall discharge not less than 85 per cent of its contents.

Contd.....8/-

The period of continuous discharge shall be as follows :

Charge of extinguisher kg	Minimum duration s
Up to and including 3	6
More than 3 but less than or equal to 6	9
More than 6 but less than or equal to 10	12
More than 10	15

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 3 s open and 10 s shut, and not more than 3 s shall elapse between the opening of the control valve and the recommencement of the discharge.

4.7.3 Fire test

The classification and rating for this type of extinguisher shall be determined from the results of the appropriate fire test set out in SLS 752.

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 'POWDER TYPE (followed by the type designation in accordance with 1. e.g. 'Gas Cartridge' or 'Stored Pressure' ;

c) Method of operation ;

d) The net charge - powder in kg.
- expellent gas in g (gas cartridge type only)

e) Fire rating as per SLS 752 ;

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

g) Marking of suitability for various classes of fires ;

h) The year of manufacture ;

j) The words, 'RECHARGE AFTER USE' and 'IT IS DANGEROUS TO USE OTHER THAN THE RECOMMENDED REFILL', and legible instructions for recharging.

5.2 Information (b), (c) and (j) 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.

5.2 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 SLS 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

Where 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 satisfactorily withstanding the standard test pressure specified for 6.1 for five minutes.

6.4 Checking for leakage of gas

6.4.1 Stored pressure type

Every stored pressure type extinguisher shall be correctly charged and shall be tested for leakage of gas by one of the following methods :

(a) The extinguisher shall be stored for a period of not less than 21 days, following which the pressure-indicating device shall be checked to determine whether there has been any loss in pressure (corrected for temperature). Any extinguisher showing loss of pressure shall be rejected.

(b) A leak detector method may be used to check the contents.

(c) When the immersion method is used to check the contents, the extinguisher shall be filled and then completely immersed in a tank of clear water for 24h. Provisions shall be made for trapping escaping gas.
An immersion test may be applied to an extinguisher, provided that it does not have long-term deleterious effects on the extinguisher.

Extinguishers showing loss of contents exceeding the equivalent of 5 per cent by mass in 5 years in (b) and (c) shall be rejected.

6.4.2 Gas cartridge type

For gas cartridge type extinguishers the gas cartridge shall be tested for leakage of gas and shall comply with the requirements laid down in 7.3 of SLS 724 : 1985.

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6.5 Powder compaction test

The extinguisher shall be correctly charged and ready for operation. It shall be held in a vertical position and dropped vertically 500 times from a height of 15 mm at frequency of 1 Hz onto a rigid horizontal steel plate having dimensions greater than those of the base of the extinguisher. The extinguisher shall then be stored at standard test temperature (SLS 374) for three months. At the completion of this period, the discharge time of the extinguisher shall be within 10 per cent of the discharge time of an extinguisher which has not been subjected to the powder compaction test. Care shall be taken to ensure that the extinguisher is not disturbed in the time between the completion of the compaction and the commencement of the discharge.

7. INSTRUCTIONS

Written instructions shall be issued by the manufacturer to the customer covering maintenance procedure and stipulating that the gas cartridge shall be tested every twelve months in accordance with 6.4.2.

8. SAMPLING

8.1 Lot

All powder type portable fire extinguishers of the same type and size produced by the same manufacturer from similar materials 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 Each fire extinguisher in the lot shall be examined for tests specified in 6.1, 6.3 and 6.4.

NOTE - The manufacturer shall satisfy himself that the items of the lot conform to these requirements. If requested he shall issue a certificate to this effect.

8.2.3 The number of items (fire extinguishers) to be selected from a lot shall be in accordance with Column 1 and Column 2 of Table 1.

TABLE 1 - Scale of sampling

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

8.2.4 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 selected as in 8.2.3 shall be examined visually for the requirements given in 4 and 5 as far as possible.

8.3.2 From the items examined visually and found satisfactory, a sub sample of size as given in Column 3 of Table 1 shall be taken at random and subjected to the requirements specified in 4.7 and 6.5.

8.3.3 One item shall be selected from the sub-sample and tested for the requirement specified in 6.2.

8.4 Criteria for conformity

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 satisfies the relevant requirements specified in 4 and 5.

8.4.2 All fire extinguishers of the sub sample 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.

-/1a.

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