

SRI LANKA STANDARD 815 : 1988

UDC 614 . 845

**SPECIFICATION FOR
PORTABLE FIRE EXTINGUISHERS, WATER
(STORED PRESSURE) TYPE**

SRI LANKA STANDARDS INSTITUTION

SPECIFICATION FOR PORTABLE FIRE EXTINGUISHERS,
WATER (STORED PRESSURE) TYPE

SLS 815:1988

Gr. 8

Copyright Reserved.

SRI LANKA STANDARDS INSTITUTION

53, Dharmapala Mawatha,

Colombo 3,

Sri Lanka.

CONSTITUTION OF THE DRAFTING COMMITTEE

CHAIRMAN

REPRESENTING

Mr. K.M.I. de Silva Fire Service Department

MEMBERS

Wg. Cdr. C.A.O. Directze Airport & Aviation Services (Sri Lanka) Ltd.
Mr. E.G.P. Kalpage State Fertilizer Manufacturing Corporation
Mr. J. Kannangara Sri Lanka Ports Authority
Mr. R.F. Perera Department of Labour
Mr. N.V. Surasena Janatha Estates Development Board
Mr. K.D.B. Udugama Fire Service Department
Mr. K.M.D. Weerasinghe Insurance Corporation of Sri Lanka

TECHNICAL SECRETARIAT
SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

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

SRI LANKA STANDARD
SPECIFICATION FOR PORTABLE FIRE EXTINGUISHERS,
WATER (STORED PRESSURE) TYPE

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1988-03-14, after the draft, finalized by the Drafting Committee on Fire Protection and Fire Fighting, had been approved by the Mechanical Engineering Divisional Committee.

All standard values given in this specification are in metric units.

This standard applies to rechargeable metal bodied portable fire extinguishers of water type in which water is expelled by pressure of gas stored under pressure in the body of 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 an 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 Bureau of Indian Standards 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 (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 standard 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 water (stored pressure) type extinguisher : An extinguisher in which water is expelled by means of an inert gas or air, stored with, or dissolved in water under pressure.

4 REQUIREMENTS

4.1 Material

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.

NOTE - If stainless steel is used for the manufacture as given in 4.1.1 and 4.1.2 it may be any austenitic stainless steel which does not exhibit susceptibility to intergranular corrosion.

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 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.

4.2.1.1 Wall thickness

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

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

$$\text{and } t = 0.6 \text{ mm}$$

where,

D is the internal diameter of body, in millimetres, and
 T is the tensile strength of metal used for the body, in megapascals.

4.2.1.2 Standard 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.

4.2.2 *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 or of stainless steel as applicable 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 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 Appendix A and Appendix B.

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 surfaces completely protected against corrosion by means of suitable metallic 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 C 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 surface

The external surface of the body shall be finished to comply with the requirements for marking and colour identification in 5 and 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*

The 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 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 *Operating head*

The operating head 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 operating head shall have two side lugs or hand wheel or hand grip to help the removal of head 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 head. The centres of the vent holes shall be 6.5 mm from the face of the head joint washer. The head 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 268 : Part 2.

4.2.6 *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 allow the contents to be discharged. It shall be designed to prevent jamming.

4.2.7 *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 into or on which it can be mounted and from which it can be readily removed.

4.2.8 *Liquid level indicator*

The liquid level to which the extinguisher should be filled shall be clearly indicated inside the extinguisher by embossing the container. Where a siphon tube forms part of the body assembly, the liquid level may be clearly indicated by a permanent projection on the siphon tube.

Means to prevent overfilling may be used as an alternative.

4.2.9 *Pressure indicating device*

A pressure gauge or other suitable device shall be fitted to the extinguisher, to indicate the pressure inside the extinguisher. 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 *Discharge fittings*

4.2.10.1 Siphon tube

The siphon tube shall be of a length sufficient to ensure the discharge of 95 per cent of the extinguishing medium when the extinguisher is operated in the normal upright position. The tube shall be as straight as practicable and located so as not to make difficult the cleaning of the interior of the body.

The siphon tube and its attachment (s) shall be located and fixed so as not to disengage when subjected to a steadily applied force of 50 N. at a

temperature of 20 °C.

4.2.10.2 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.

4.2.10.3 Discharge nozzle

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

4.2.10.4 Discharge hose and fittings

A discharge hose shall be provided. The hose and its fittings shall be of durable material and of sufficient strength to comply with the 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. The discharge hose and its attachment (s) shall be located and fixed to the siphon tube so as not to disengage when subjected to a steadily applied force of 50 N at a temperature of 20°C.

4.3 Colour

Colour of the extinguisher shall be signal red.

4.4 Size

The liquid capacity of the extinguisher, when filled, to the marked liquid level or when an overflow 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, 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.

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 for the extinguisher shall consist of the following.

- (a) Water to which may be added corrosion inhibitors, freezing point depressants, and wetting agents. Such additions shall be non-flammable and non-corrosive and shall not produce toxic fumes.
- (b) Inert gas or air stored under pressure.

A non-combustible, non-toxic trace gas that is compatible with the extinguishing medium and materials of construction may be added to the charge to facilitate the testing for leakage of gas.

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 4 of SLS 374 : 1976 and under still air conditions, 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 60 s and the required discharge shall take place in not more than 120 s. 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 60 s and the required discharge shall take place in not more than 120 s.

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

Not more than 3 s 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 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*

Fire tests for this type of extinguisher shall be carried out in accordance with SLS 752, and appropriate fire rating given.

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) and country of origin ;
- (b) The words "WATER (STORED PRESSURE) TYPE" ;
- (c) Method of operation ;
- (d) The net charge of the liquid in litres ;
- (e) Fire rating ;
- (f) The liquid level to which the extinguisher is to be recharged ;
- (g) A declaration to the effect that the extinguisher conforms to the standard test pressure ;
- (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 ;
- (l) The words

' WARNING

DO NOT USE ON LIVE ELECTRICAL EQUIPMENT AND WIRING'.

NOTE -1. Information b), c), h), and l) should be given in Sinhala, Tamil and English. Refer Appendix D for Sinhala and Tamil translations.

2. Attention is drawn to Certification facilities offered by SLSI, see inside back cover of this specification.

5.2 Serial number

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

6 TESTS

6.1 Standard test

Every extinguisher body shall be tested and shall be capable of withstanding for a period of 5 minutes and internal pressure of 1.5 times the equilibrium pressure (see 4.2.1) or 2.5 MPa, whichever is the greater, 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, or 4.13 times the equilibrium pressure if failure occurs at a joint.

6.3 Test for fittings

Every hose, operating head and associated fittings shall be checked for clear passage and shall be capable of satisfactorily withstanding for 5 minutes the standard test pressure specified in 6.1. Safety devices need not be tested. Fittings may be tested separately.

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 insulation tester 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

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 in 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 clean water for 24 h. Means shall be provided 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 five years in (b) and (c) above shall be rejected.

7 INSTRUCTIONS

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

The extinguishers shall be test discharged as specified in 4.7.1 and the body pressure tested as specified in 6.1 para 1 at intervals not exceeding 5 years.

8 SAMPLING

8.1 Lot

All water (stored pressure) type fire extinguishers of same size produced by the same manufacturer from similar material 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, 6.4, and 6.5 as applicable.

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 to 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 relevant requirements given in 4 and 5.

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 selected to requirements given in 4.7.

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

8.4 Criteria for conformity

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

8.4.1.1 Each fire extinguisher examined as in 8.3.1 satisfies the relevant requirements given in 4 and 5.

8.4.1.2 All fire extinguishers of the sub sample tested as in 8.3.2 satisfy the relevant requirements.

8.4.1.3 The fire extinguisher tested as in 8.3.3 satisfies the relevant requirements.

APPENDIX A

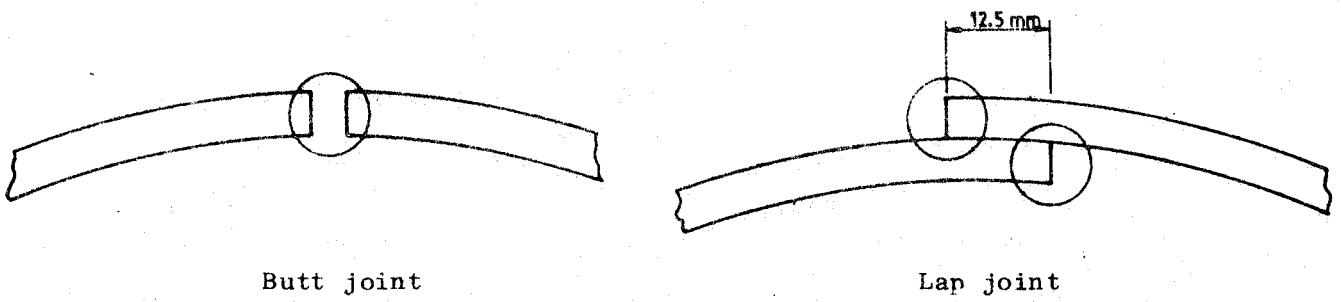
FUSION WELDING

B.1 Fusion welding joints

The type of fusion welded joints 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.



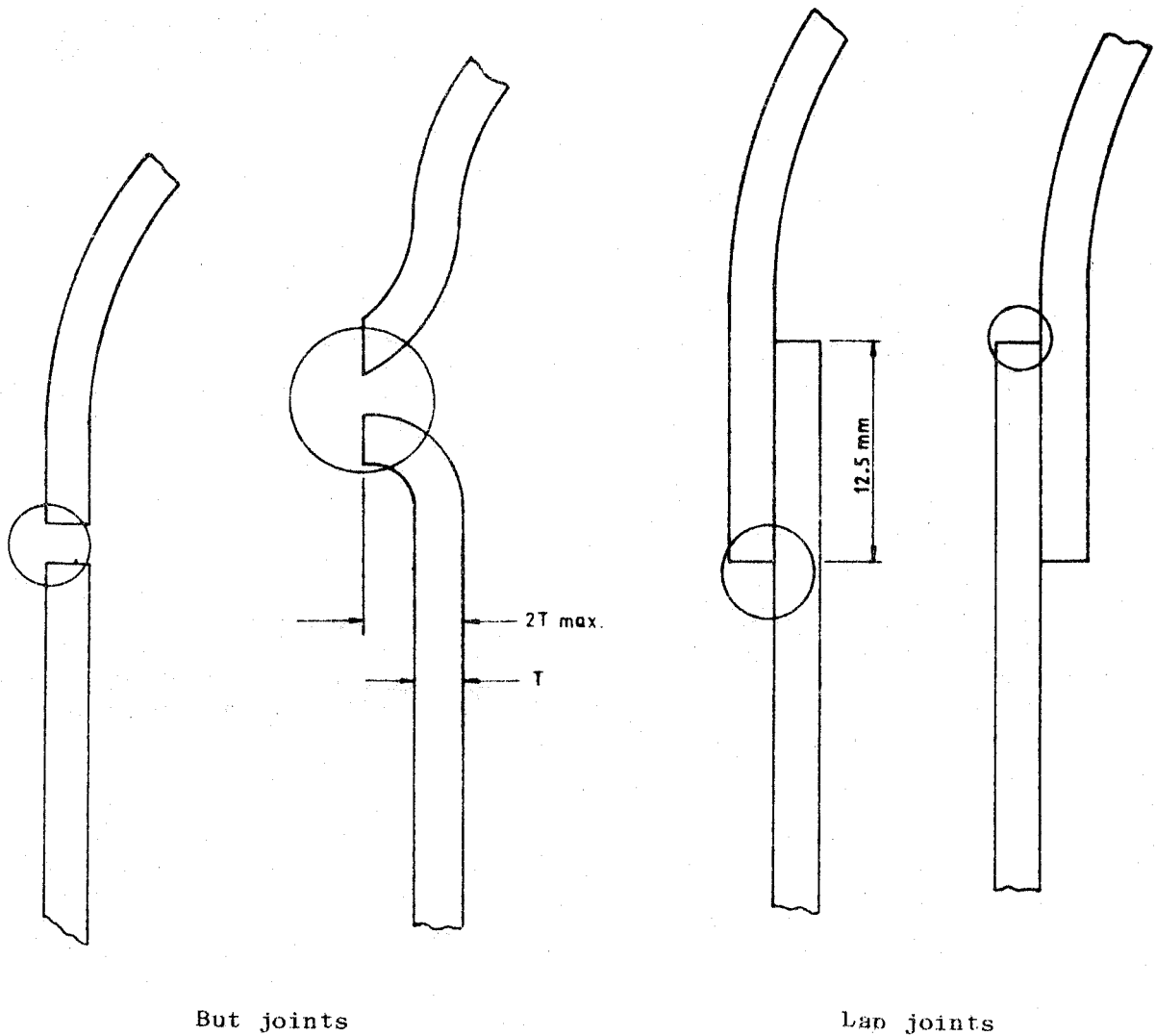
Butt joint

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.



But joints

Lap joints

FIGURE 2 - Circumferential joints

APPENDIX B

ADDITIONAL REQUIREMENTS FOR RESISTANCE WELDING

B.1 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 10 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.2 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.

APPENDIX C

TYPE APPROVAL TEST

C.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.

C.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.



SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

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.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

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.