SLS ..857... 1989

~~Draft~~ Sri Lanka Standard

SPECIFICATION FOR PORTABLE FIRE EXTINGUISHERS (HALON) TYPE

SRI LANKA STANDARDS INSTITUTION

DRAFTING COMMITTEE ON PORTABLE FIRE EXTINGUISHERS(HALON) TYPE

C O N S T T U T I O N

NAME	ORGANIZATION
MR. E.S.P. Kalpage (Chairman)	State Fertilizer Manufacturing Corporation
Wg. Cdr. C.A.O. Dirckze	Airport and Aviation Services (Sri Lanka) Ltd. (Fire Service)
Mr. J. Kannangara	Sri Lanka Ports Authority, (Fire Service)
Mr R.F. Perera	Department of Labour
Mr. N.V. Surasena	Janatha Estates Development Board.
Mr. K.D.B. Udugama	Colombo Municipal Council, (Fire Service)
Mr. K.M.D. Weerasinghe	Insurance Corporation of Sri Lanka
Mrs. G.G.S. Warusavithana (Secretary)	SLSI.

~~Draft~~ Sri Lanka Standard

SPECIFICATION FOR PORTABLE FIRE EXTINGUISHERS (HALON) TYPE

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on ~~29/09/95~~ after the draft, finalized by the Drafting Committee on portable fire extinguishers (halon) type 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 halon (stored pressure) type in which halon is expelled by pressure of dry inert 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 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 extinguishers of halon (stored pressure) type.

2 REFERENCES

ISO	3882	Metallic and other non-organic coatings - Review of methods of measurement of thickness.
BS	381 C	Colours for specific purposes.
CS	102	Presentation of numerical values.
SLS	268	ISO metric screw threads. Part 1 Basic and design profiles Part 2 Pitch/diameter combination
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 halon (stored pressure) type extinguisher : An extinguisher in which halogenated hydrocarbon is expelled by means of an inert gas, stored 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 carbon steel, a suitable grade of austenitic stainless 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

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.

NOTE - The equilibrium pressure is 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 :

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

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.

4.2.1.2 Standard test pressure

The standard test pressure shall be not less than 1.5 times the equilibrium pressure (see 4.2.1) or 2.5 MPa, whichever is the greater (see 6.1).

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 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 alloy bodies. In either case rivets shall be not less than 5 mm diameter. The joints shall be finally soldered or brazed as applicable.

4.2.2.3 Welded construction

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

(a) Fusion welding ;
  (i) Oxy-acetylene welding
  (ii) Electric arc welding

(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 joint 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 joint 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).

Metallic linings based on zinc shall be applied either by electrical deposition to a thickness of not less than Ø.Ø13 mm or by spraying to a thickness of not less than Ø.Ø75 mm. The thickness of the coating shall be measured by any suitable method given in **ISO 3882**. There shall be no visible uncoated areas.

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 carbon steel , austenitic stainless 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 carbon steel, austenitic stainless steel, or copper alloy or other equally durable material of adequate strength as defined in **4.1.2.** 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 Washers and seals
Washers and seals shall be of a material that is resistant to the action of the extinguishing medium.

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 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 .

4.2.8 Sealing device
The extinguisher shall incorporate means for sealing the extinguishing medium from the atmosphere to prevent the ingress of moisture.

4.2.9 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.

4.2.10 Pressure indicating device
A pressure gauge or other suitable device shall be fitted 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.

4.2.11 Discharge fittings

4.2.11.1 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.

4.2.11.2 Discharge nozzle
The discharge nozzle shall be constructed of copper alloy or other corrosion resistant material of adequate strength.

4.2.11.3 Discharge hose and fittings
Where a discharge hose is provided, the hose and its fittings shall be of durable material which will not be attacked by the contents of the extinguisher and of sufficient strength to comply with the requirement 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 emerald green to BS 381 C reference 228.

4.4 Size
The size of the extinguisher shall be taken as the mass of the charge of extinguishing medium which shall be not less than Ø.9 kg and not more than 14 kg subject to the total mass of the extinguisher not exceeding 2Ø kg.

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

4.6.1 The charge of the extinguishing medium shall consist of either of the following approved halongenated hydrocarbons :

(a) Bromochlorodifluoromethane (BCF - Halon 1211) The bromochlorodifluoro methane used shall be not less than 98.5 percent pure. The moisture content shall not exceed Ø.ØØ5 percent by mass. The vapour space at 6Ø°C shall be not less than 5 percent by volume.

(b) Bromotrifluoromethane (BTM - Halon 13Ø1) The bromotrifluoromethame used shall be not less than 99 percent pure. The moisture content shall not exceed Ø.ØØ1 percent by mass.

4.6.2 Filling
The filling of the extinguisher shall be carried out in a closed system which shall have been adequately purged to remove free moisture.

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 is operated in its normal working position in a temperature range of 1Ø° C to 25° C under still - air conditions, it shall discharge not less than 85 percent of its contents.

The minimum duration of discharge of extinguishing medium shall be as follows

Charge of extinguisher (kg)	Minimum duration of discharge (s)
Upto 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

Fire test 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;
b) The words "HALON (STORED PRESSURE) TYPE" (specify whether BCF of BTM).
C) Method of operation ;
d) The net charge of the halon in Kg ;
e) Fire rating;
f) A declaration to the effect that the extinguisher conforms to the standard test pressure;
g) Marking of suitability for various classes of fire;
h) The year of manufacture;

NOTE - Information b) and C) should be given in Sinhala, Tamil and English. Refer Appendix **D** for Sinhala and Tamil translations.

5.2 Serial number

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 a period of 5 minutes an 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 resistance shall not be less than 500 M .

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

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

d) 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 (c) and (d) above shall be rejected.

7 INSTRUCTIONS ON MAINTENANCE

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** the body pressure tested as specified in **6.1 para 1** at intervals not exceeding 5 years.

8 SAMPLING

8.1 Lot

All halon 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 Eeach 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 Coloumn **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 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 tested 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.

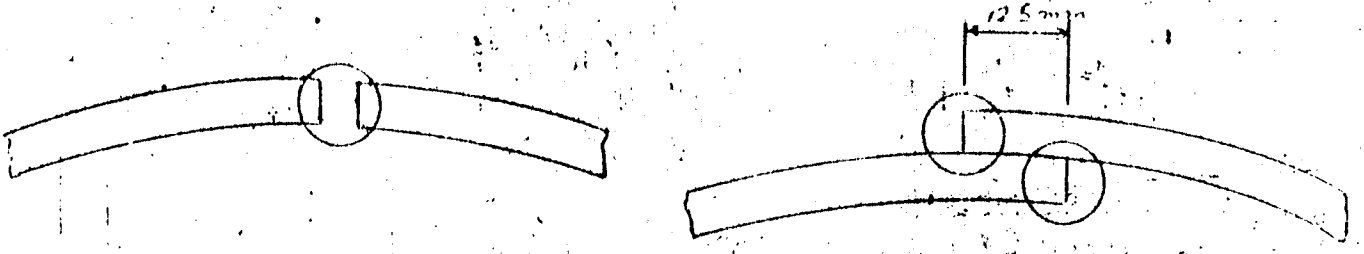
APPENDIX A
FUSION WELDING JOINTS

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.



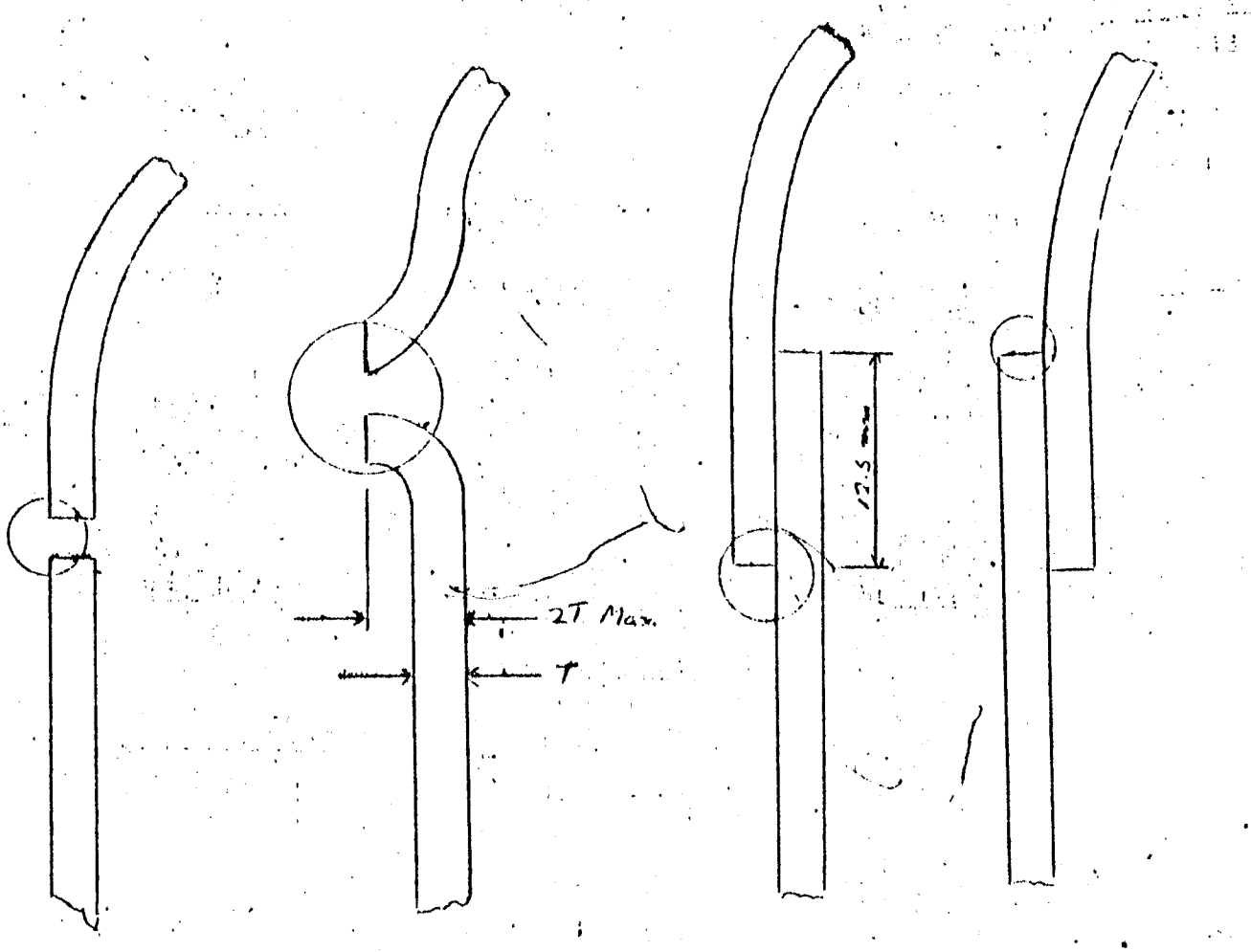
a) Butt joint

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

Cont...

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 joint 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.

APPENDIX D

D.1 Sinhala translations of information b) and c) of 5.1 are as follows :

b) [illegible]

c) [illegible]

D.2 Tamil translations of information b) and c) of 5.1 are as follows :

b) [illegible]

c) [illegible]

- Blank Page -