SRI LANKA STANDARD 1197 : 1999

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SPECIFICATION FOR

ACCESS & ENTRY OPENING FOR INSPECTION OF PRESSURE VESSELS

SRI LANKA STANDARDS INSTITUTION

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SLS 1197 : 1999

Gr. 4

SRI LANKA STANDARDS INSTITUTION
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SRI LANKA

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 ACCESS AND ENTRY OPENINGS FOR INSPECTION OF PRESSURE VESSELS

FOREWORD

This standard was approved by the Sectoral Committee on LP Gas Industry and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1999-12-09.

This standard covers the requirement for the provision and dimensions of access, and entry openings for inspection of pressure vessels.

For the purpose of deciding whether a particular requirement of this specification is complied with the final value observed or calculated, expressing the result of a test or an analysis, shall be rounded off in accordance with **CS 102**. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

For the preparation of this standard specification the assistance obtained from the following publication of the British Standards Institution is gratefully acknowledged.

BS 470 : 1984 Specification for Inspection, access and entry opening for pressure vessels.

1 SCOPE

This standard specifies requirements for the provision and dimensions of sighthole, handhold, headhole and manhole openings into static and mobile pressure vessels requiring inspection facilities. It does not include openings for steam raising plant because of the different problems associated with those vessels, which may require separate consideration.

2 DEFINITIONS

For the purposes of this standard the following definitions shall apply:

2.1 access : Insertion into a vessel of no more than a person's head and arm.

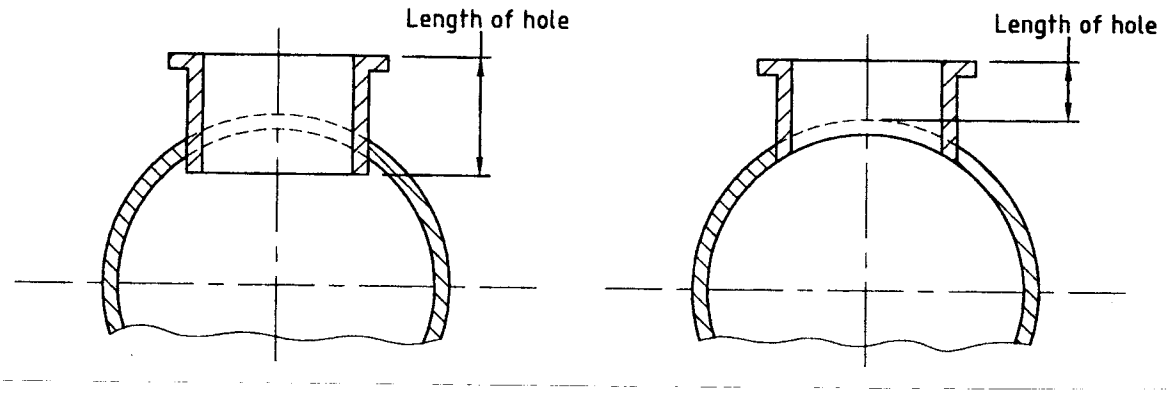
2.2 entry : Insertion into a vessel of more than a person's head and arm.

2.3 handholes : Holes that are intended for insertion of one hand gripping a lamp during viewing.

2.4 headholes : Holes that are intended for insertion of the head and one arm.

2.5 inspecting authority : The body or association that checks that the design, materials and construction comply with the purchaser's specification.

2.6 length of hole : The perpendicular distance from the face of the flange to the inside of the opening including lining or any projection of the branch within the vessel. In the case of a hole in a cylindrical shell the length is measured as indicated in the Figure **1(a)** and **1(b).** In the case of flush branch the shortest distance shall be as indicated in the Figure **1(b)** (see Figure **1**).



a) Projecting branch **b) Flush branch**

FIGURE 1 - Length of hole

2.7 manholes : Holes that permit a person entry and exit.

2.8 manufacturer : The organization that designs and fabricates the pressure vessel in accordance with the purchaser's specification. The design and fabrication may be carried out by separate organizations

2.9 purchaser : The organization or individual who buys the finished pressure vessel for its own use or as an agent for the owner.

2.10 sightholes : Holes that are intended for viewing only.

3 REQUIREMENTS

3.1 General

3.1.1 Holes shall be either large enough to permit entry and the rescue of persons, or so small that persons cannot enter.

NOTE

It is for this reason that the headhole sizes given in this standard are maximum values.

3.1.2 Detachable ends, or covers, or branches and fittings that are easily removed shall be used as access openings, if their dimensions are at least equal to the minimum dimensions required by this standard, and permit a general view of the interior at least equal to that obtained by the examination holes that would otherwise be required.

3.1.3 The dimensions of openings in lined vessels shall be maintained after the lining is applied.

NOTE

It is recommended that in large vessels, consideration be given to the provision of footholds and/or hand-holds on the vessel surfaces.

3.2 Sizes

3.2.1 *General*
The sizes of inspection, access and entry opening shall be as specified in **3.2.2** to **3.2.5**, Diameters and axis dimensions refer to actual internal measurements. Where lengths of sightholes and handholes exceed the stated limits, the size shall be modified to give an equivalent inspection facility, either by increasing the size of the hole or by providing a conical hole. In the case of vessels having non-interconnecting pressure compartments, the requirements of this standard shall apply to each compartment as it is a separate vessel.

3.2.2 *Sightholes*
The minimum diameter shall be 30 mm for vessels up to 300 mm diameter when the length does not exceed 30 mm; the minimum diameter shall be 50 mm for vessels above 300 mm diameter when the length does not exceed 50 mm (see Figure **1**). For greater lengths of holes should comply with the conditions stated in **3.2.1**

3.2.3 *Handholes*
Where one hole only is provided, the minimum size shall be 180 mm diameter or 180 mm x 120 mm oval; where more than one hole is provided, the minimum size shall be 130 mm diameter or 130 mm x 110 mm oval. The above sizes are related to a length of hole not greater than 65 mm. For greater lengths of holes should comply with the conditions stated in **3.2.1**.

3.2.4 *Headholes.*
The maximum size shall be 320 mm diameter or 320 mm x 200 mm oval. The maximum length of the hole shall be 100 mm.

NOTE

The minimum size should not be substantially less than 320 mm diameter or 320 mm x 200 mm oval.

3.2.5 *Manholes*
The minimum size shall be 460 mm diameter or 460 mm x 410 mm oval. The minimum size to afford full rescue facilities with self - contained breathing apparatus shall be 575 mm diameter or minor axis.

The maximum length of a manhole is dependent on the diameter, or, if oval, the major axis, and shall be in the relationship given in Table **1**.

TABLE 1 - Maximum lengths of manholes

Diameter or major axis mm	**Maximum length mm**
460	250
575	500
over 575	not restricted

Maximum lengths shall be interpolated linearly for hole diameters between 460 mm and 575 mm.

NOTES

1 Minimum manhole sizes of 450 mm diameter or 450 mm x 400 mm in oval in line with current practice will be acceptable pending re-tooling by manufacturers.

2 Lengths should be kept to a practical minimum.

3 Where design considerations make it impossible to satisfy the maximum length requirement, the design of the manhole should be the subject of special consideration and agreement among manufacturer, purchaser and inspecting authority.

3.3 Minimum number of openings and their positions

3.3.1 In pressure vessels, the minimum number and type of openings provided shall be in accordance with Table **2** and **3.3.2**, except where suitable optical devices (e.g. fibre optic probes) are to be used.

Spherical vessels shall be treated as vessels with zero length of cylindrical section.

NOTES

1 This standard does not specify requirements for the minimum number, size and type of openings for optical devices and these should be agreed by the purchaser, manufacturer and inspecting authority.

2 For optic probe inspection openings, reference may be made to the SLS :....., Inspection and Testing of Bulk Liquefied Petroleum Gas Storage at Consumers' Premises'. (Under preparation)

TABLE 2 - Minimum number of openings

Vessel inside, diameter mm (1)	**Length of cylindrical section mm** (2)	**Minimum number and type of openings**			
		Sight (3)	**Hand** (4)	**Head** (5)	**Manholes** (6)
Up to 450	Unlimited	2 or	1 or	1	0
Over 450 up to 800	Up to 1500	2 or	1 or	1 or	1
	Over 1500	2 or	1 or	1 or	1
	Up to 2000	0	2 or	1 or	1
	Over 2000	0	3 or	1or	1
Over 800 up to 1500	Up to 2000	0	2 or	1 or	1
	Over 2000	0	3 or	1 or	1
Over 1500	Unlimited	0	0	0	1

3.3.2 All parts subject to inspection by means of sightholes, handholes or headholes shall be within a distance of 1200 mm of sightholes and handholes, and 1700 mm of headholes.

NOTE

*This facility may be achieved by any combination of the three types of holes, provided that the requirements of Table **1** are satisfied. The distances should be measured along a straight line from the area to be inspected to the centre to the opening at the external face of the flange, taking into account that the path of viewing need not be in a straight line. e.g. when optical devices are used (see Figure **2**).*

3.3.3 Where there are openings provided for entry into internal compartments of a vessel, the openings shall be not less than the size of the external manhole.

NOTES

1 In view of the difficulties associated with rescue through side entry manholes, their position should be sited with regard to platform access and the installation in a such a way to comply with the requirement.

Manholes should be provided at a location on the vessel which provides easy entry, especially for rescue.

2 The number and siting of holes should take into account the shape and the internal structure and fitting of the vessel. e.g. agitators, baffles, etc. and the need for adequate illumination to be provided.

When internal cleaning out of a vessel prior to inspection is required the opening(s) provided should be of adequate size, and be properly positioned for cleaning to be carried out effectively .

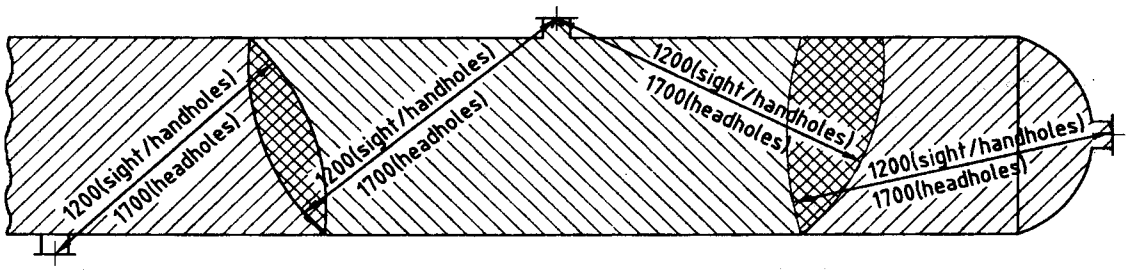


FIGURE 2 - Viewing for sightholes, handholes and headholes.

NOTE

This is a typical example illustrating the effective viewing range provided by sightholes, handholes and headholes (see 3.3.2). Hatching indicates the range of viewing for each hole.

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SRI LANKA STANDARDS INSTITUTION

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