BS 417 : Part 2 : 1987

UDC [621.642.34+696.113] –034.14

British Standard Specification for

Galvanized low carbon steel cisterns, cistern lids, tanks and cylinders

Part 2. Metric units

Citernes, couvercles de citernes, réservoirs et bouteilles en acier à bas carbone galvanisé — Spécifications
Partie 2. Unités métriques

Rechteckige offene und geschlossene Behälter, runde geschlossene Behälter und Behälterdeckel aus verzinktem weichen unlegierten Stahl
Teil 1. Metrische Einheiten

Foreword

This Part of BS 417 has been prepared under the direction of the Building Services Standards Committee and is a revision of BS 417 : Part 2 : 1973 which is withdrawn.

This revision became necessary in order to take account of the requirements of the New Model Water Byelaws 1986 and reflect the actions taken in the revision of other standards in this series.

Seven standards, covering water storage vessels mainly for domestic use, now form a series to which others may be added when such a course is considered necessary. The six other standards in this series are BS 699, BS 1565, BS 1566, BS 2777, BS 3198 and BS 4213.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Contents

Section one. General

1 Scope

This Part of BS 417 specifies requirements for galvanized cisterns (in two grades, A and B), cistern lids, tanks (in two grades, A and B) and cylinders (in three grades, A, B and C). The standard capacities are from 18 L to 3364 L in the cistern range, from 95 L to 155 L in the tank range and from 73 L to 441 L in the cylinder range. The cylinders are intended for fixing in the vertical position.

NOTE 1. The information to be supplied by the purchaser at the time of enquiry or order is given in appendix A.

NOTE 2. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 417, the following definitions apply.

2.1 cistern. An open top rectangular vessel.

2.2 tank. A closed rectangular vessel.

2.3 cylinder. A closed cylindrical vessel with domed ends.

2.4 water line. The highest water level at which a cistern is designed to work.

2.5 capacity (of a cistern). The capacity of a cistern when filled to the water line.

3 Effect of non-metallic materials on water quality

When used under the conditions for which they are designed, non-metallic materials in contact with or likely to come into contact with potable water shall not constitute a toxic hazard, shall not support microbial growth and shall not give rise to unpleasant taste or odour, cloudiness or discoloration of the water.

Concentrations of substances, chemicals and biological agents leached from materials in contact with potable water, and measurements of the relevant organoleptic/physical parameters shall not exceed the maximum values recommended by the World Health Organization in its publication 'Guidelines for drinking water quality' Vol. 1 'Recommendations' (WHO, Geneva, 1984) or as required by the EEC Council Directive of 15 July 1980 relating to the quality of water intended for human consumption (Official Journal of the European Communities L229, 11-29), whichever in each case is the more stringent.

NOTE 1. Requirements for the testing of non-metallic materials in these respects are set out in the UK Water Fittings Byelaws Scheme Information and Guidance Note No. 5-01-02, ISSN 0267 - 0313 obtainable from the Water Research Centre, Water Byelaws Advisory Service, 660 Ajax Avenue, Slough, Berkshire SL1 4BG.

NOTE 2. Pending the determination of suitable means of characterizing the toxicity of leachates from materials in contact with potable water, materials approved by the Department of the Environment Committee on Chemicals and Materials of Construction for use in Public Water Supply and Swimming Pools are considered free from toxic hazard for the purposes of compliance with this clause. A list of approved chemicals and materials is available from the Technical Secretary of that Committee at the Department of the Environment, Water Division, Romney House, 43 Marsham Street, London SW1P 3PY.

NOTE 3. Products manufactured for installation and use in the United Kingdom which are verified and listed under the UK Water Fittings Byelaws Scheme administered by the Water Research Centre (address as in note 1) are deemed to satisfy the requirements detailed in this clause.

Section two. Cisterns and lids

4 Designation

4.1 Cisterns

Galvanized low carbon steel cisterns shall be designated by the appropriate BS type reference in table 1, followed by the grade.

4.2 Lids

Galvanized low carbon steel lids for galvanized low carbon steel cisterns shall be designated as 'lid for* . . . . cistern' (see table 1).

5 Dimensions

5.1 Cisterns

The dimensions of cisterns shall be as given in table 1 subject to the tolerances specified in clause **6.** Cisterns shall be measured externally overall (see figure 1).

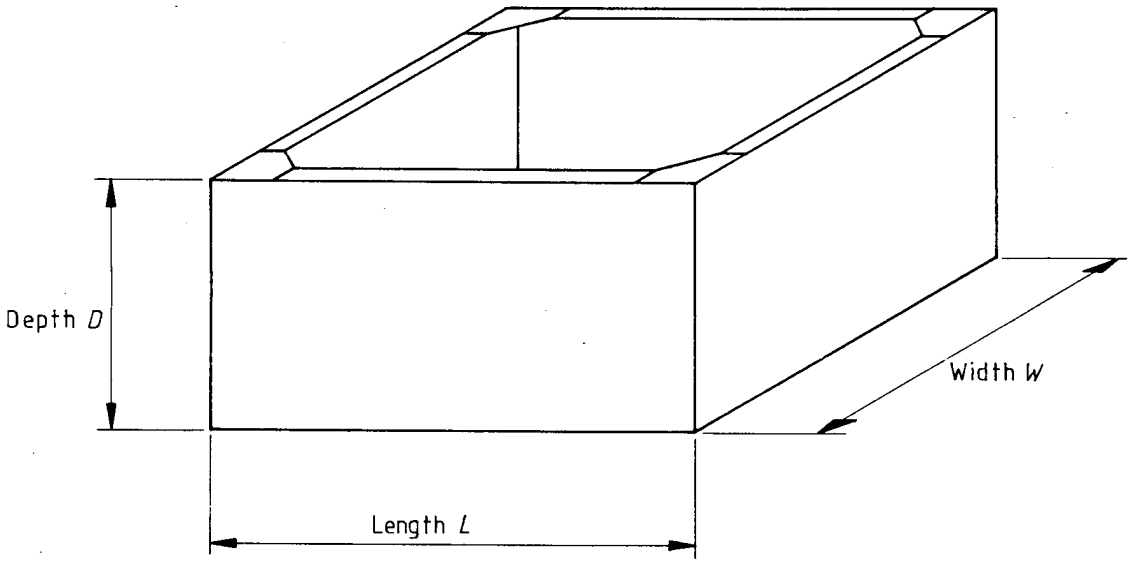
5.2 Lids

The dimensions of lids shall be as given in table 1 subject to the tolerances specified in clause **6.** Lids shall be measured as shown in figure 2.

6 Tolerances on dimensions

The tolerances on the dimensions of cisterns and covers given in table 1 shall be as follows:

(a) length:	± 13 mm;
(b) width:	± 13 mm;
(c) depth:	± 13 mm;
(d) thickness of low carbon steel plate and sheet before galvanizing:	the relevant tolerances given in BS 1449 or BS 4360 shall apply.



NOTE. This drawing is typical only and does not purport to indicate a standard method of construction.

Figure 1. Method of measuring cisterns

*Here insert the appropriate BS type reference from table 1, e.g. 'lid for SCM 1600 cistern'.

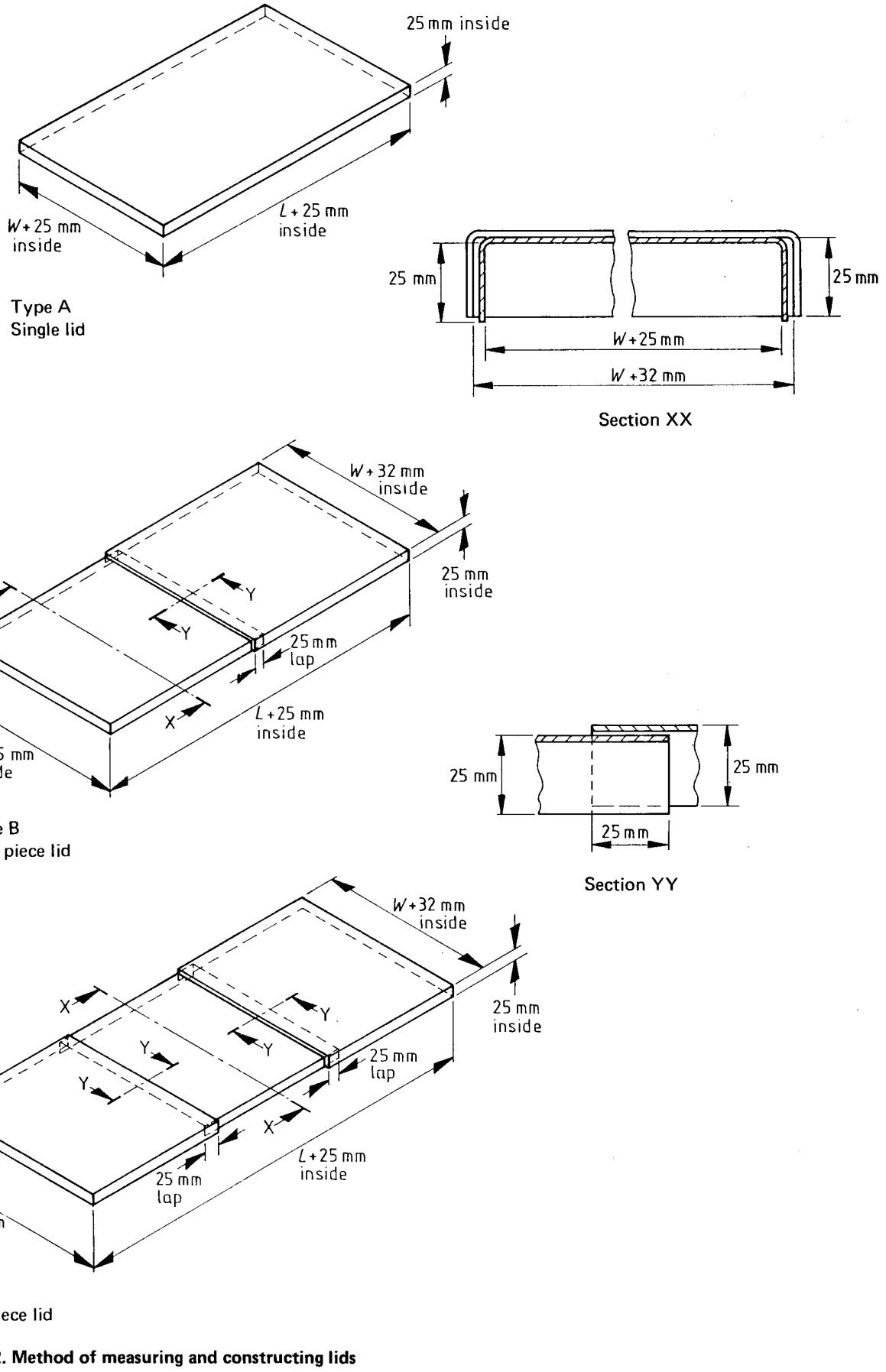


Figure 2. Method of measuring and constructing lids

Table 1. Dimensions of cisterns and lids

BS type reference*	Cisterns					Minimum thickness of steel before galvanizing, for cisterns and lids			Lids		
	Length†, *L*	Width†, *W*	Depth†, *D*	Minimum capacity	Distance of water line from top‡	Grade A cisterns	Grade B cisterns	Lids for cisterns	No. of pieces	Size of pieces	
										Length	Width
	mm	mm	mm	L	mm	mm	mm	mm		mm	mm
SCM 45	457	305	305	18	111	1.6		1.0	1	482	330
SCM 70	610	305	381	36	111	1.6		1.0	1	635	330
SCM 90	610	406	381	54	111	1.6		1.0	1	635	432
SCM 110	610	432	432	68	114	1.6		1.0	1	635	457
SCM 135	610	457	482	86	114	1.6		1.0	1	635	482
SCM 180	686	508	508	114	114	1.6		1.0	1	711	533
SCM 230	736	559	559	159	114	2.0	1.6	1.0	1	762	584
SCM 270	762	584	610	191	114	2.0	1.6	1.0	1	787	610
SCM 320	914	610	584	227	114	2.0	1.6	1.0	1	940	635
SCM 360	914	660	610	264	114	2.0	1.6	1.0	1	940	686
SCM 450/1	1219	610	610	327	114	2.0	1.6	1.0	1	1245	635
SCM 450/2	965	686	686	336	114	2.0	1.6	1.0	1	991	711
SCM 570	965	762	787	423	146	2.5	2.0	1.2	1	991	787
SCM 680	1092	864	736	491	146	2.5	2.0	1.2	1	1118	889
SCM 910	1168	889	889	709	146	2.5	2.0	1.2	1	1194	914
SCM 1130	1524	914	813	841	146	2.5	2.0	1.2	1	1549	940
SCM 1600	1524	1143	914	1227	146	3.2	2.5	1.6	2	787	1175§
SCM 2270	1829	1219	1016	1727	146	3.2	2.5	1.6	2	940	1251§
SCM 2720	1829	1219	1219	2137	190	3.2	2.5	1.6	2	940	1251§
SCM 4540	2438	1524	1219	3364	254	4.8	3.2	1.6	3	838	1566§

*Cisterns should be ordered by the BS type reference to avoid confusion.

†These dimensions are external.

‡ These dimensions were determined for the depths necessary to accommodate a float operated valve, inlet and overflow pipes in the sizes likely to be used, and in the positions, to satisfy water byelaws. The dimensions have been used in calculating the capacities.

§ The dimension is for the lapping piece; the lapped piece is 5 mm less.

NOTE. For tolerances see clause **6**.

7 Materials

7.1 General

Cisterns and lids shall be made from low carbon steel plate or sheet complying with BS 1449 or BS 4360.

NOTE. The plate or sheet should be free from any defects which would adversely affect the efficient functioning of the vessel or lid.

7.2 Galvanizing

7.2.1 *Cisterns.* Cisterns shall be galvanized, after manufacture, as specified in BS 729. Before galvanizing, any flux and/or slag remaining after welding shall be removed.

7.2.2 *Lids.* Lids shall be either:

(a) made from ungalvanized sheet and be galvanized after manufacture as specified in BS 729 except that where the thickness of a lid is less than 1.2 mm the average coating shall be not less than 330 g/m^2; or

(b) made from galvanized low carbon sheet complying with class 1A of BS 2989.

8 Manufacture

8.1 Cisterns

8.1.1 *General.* Cisterns shall be constructed by welding.

8.1.2 *Top edges.* Cisterns shall be made in one of the following ways:

(a) with turnover flange tops;

(b) with a continuous top stiffening of angle section;

(c) for cisterns of type references SCM 45 to SCM 270 inclusive, as in (a) or (b) or with their top edges stiffened by half inside rolling to a radius of not less than 12 mm, the intersections of the rolled sections being closely fitted and continuously welded;

(d) for cisterns of type references SCM 45 or SCM 70, as in (a), (b) or (c) or with their top edges stiffened by turning or by the addition, by welding, of a strip of low carbon steel at least 12 mm wide and not less in thickness than the body material.

Where cisterns are made with turnover flange tops, they shall have a double turnover except that:

(1) cisterns of type references SCM 90 to SCM 270 inclusive shall have either double turnover or single turnover flanges having a projection of not less than 28 mm;

(2) cisterns made of 4.8 mm plates shall have either single or double turnover flanges.

8.1.3 *Corner plates.* Cisterns shall be fitted with corner plates with the following exceptions:

(a) cisterns of type references SCM 45 and SCM 70;

(b) cisterns of type references SCM 90 to SCM 270 inclusive, where they have their top edges stiffened with either turnover or half inside rolled flanges, the intersections of which shall be closely fitted and continuously welded.

8.2 Lids

Lids shall be capable of being fitted in accordance with figure 2. For cisterns SCM 40 to SCM 1130 inclusive lids shall be in one piece and shall comply with the requirements for type A in figure 2. For cisterns SCM 1600, SCM 2270 and SCM 2720 lids shall be in two pieces and shall comply with the requirements for type B in figure 2.

Lids for cisterns SCM 4540 shall be in three pieces and shall comply with the requirements for type C in figure 2. Type A lids shall have 25 mm turned-down flanges on all edges. The pieces of type B lids and the end pieces of type C lids shall have 25 mm turned-down flanges on three edges as shown in figure 2.

The centre piece of a type C lid shall be flanged as shown in figure 2.

9 Staying of cisterns

9.1 Types of cisterns to be stayed

Cisterns shall be stayed as specified in table 2 (with reference to figure 3).

9.2 Cross ties

9.2.1 *General.* The cross ties used for staying cisterns shall have a cross-sectional area of not less than 200 mm^2 and shall be of either round, flat or angle section.

NOTE. The purchaser should state in his enquiry or order which type of cross tie he requires (see appendix A).

9.2.2 *Inside cross ties.* The inside cross ties shall be securely fastened to angle cleats which shall be not less than 40 mm × 40 mm × 5 mm in the case of cisterns made of steel 3.2 mm thick or less, and not less than 40 mm × 40 mm × 6 mm in the case of cisterns made of steel more than 3.2 mm thick. The angle cleats shall be not less than 150 mm long and shall be secured to the wall of the cistern by welding.

9.2.3 *Top cross ties.* The top cross ties shall be welded to the top flange as specified in BS 1140. The ends of the top cross ties shall be notched and fitted so that the vertical leg is inside the cistern as shown in figure 3(d).

Table 2. Staying of cisterns

BS type reference	Grade	Method of staying
SCM 1600	B	As in figure 3(a)
SCM 2270	A and B	As in figure 3(b)
SCM 2720	A and B	As in figure 3(b)
SCM 4540	A	As in figure 3(b)
SCM 4540	B	As in figure 3(c)

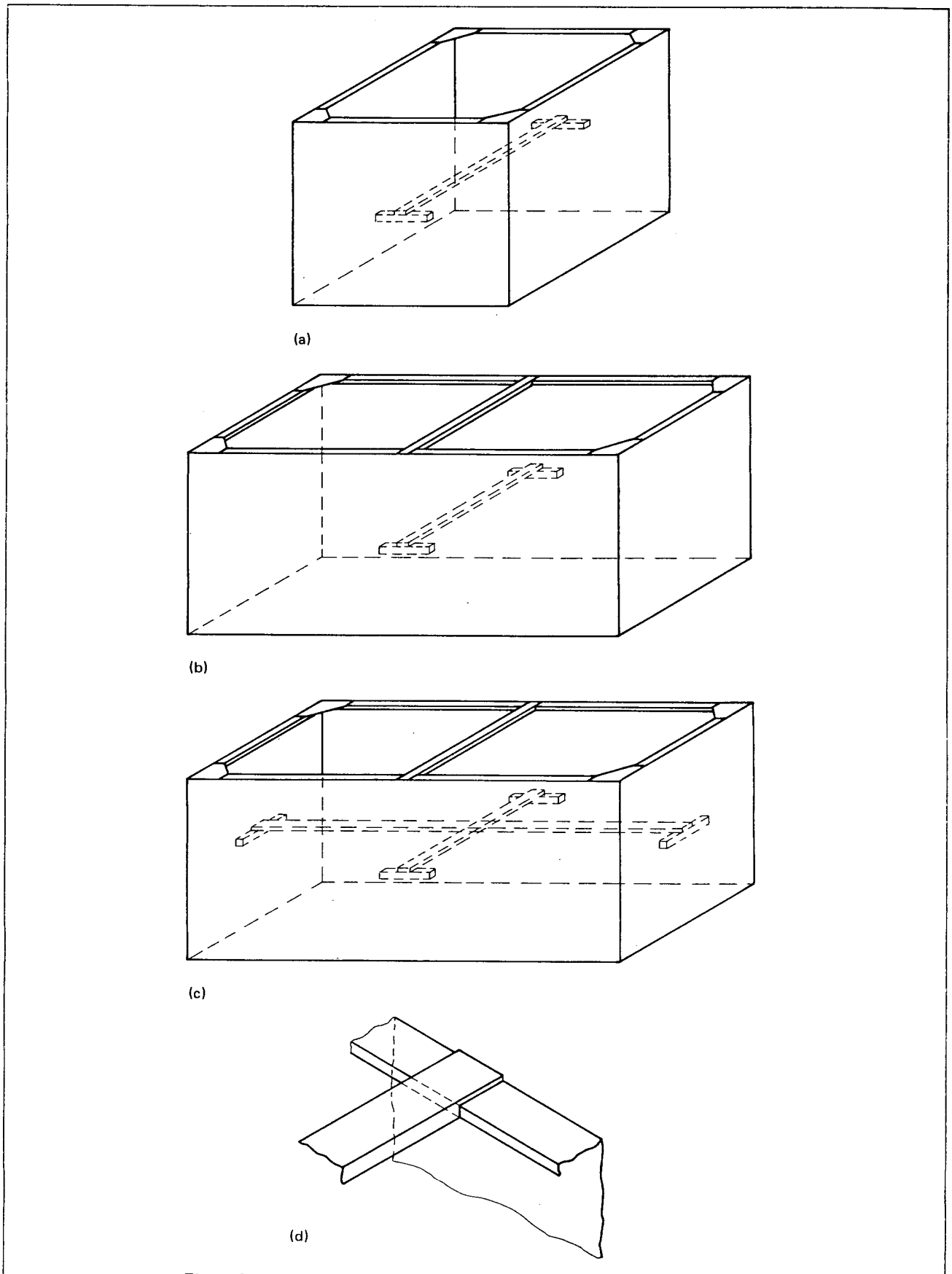


Figure 3. Methods of staying cisterns

10 Additional features

10.1 Internal coating of cisterns for potable water

Cisterns shall be supplied in either of the following conditions.

(a) The cistern shall not be coated internally.

(b) After testing in accordance with clause **11**, the internal surface shall be treated with an etch primer followed by two coats of bituminous solution complying with type 2 of BS 3416.

NOTE. Unless otherwise specified by the purchaser at the time of enquiry or order (see appendix A) the cisterns will be supplied without internal coating. Where coating is required the manufacturer should ensure full curing of the final coat before delivery.

10.2 Internal coating of cistern lids for potable water

Cistern lids shall be supplied in either of the following conditions.

(a) The cistern lid shall not be coated internally.

(b) The internal surface of the supplied lid shall be treated with an etch primer followed by two coats of bituminous solution complying with type 2 of BS 3416.

NOTE. Unless otherwise specified by the purchaser at the time of enquiry or order (see appendix A) the cistern lids will be supplied without internal coating.

11 Testing

11.1 Cisterns shall be tested as specified in **11.2** except cisterns of BS type reference SCM 40 to SCM 270 inclusive which shall be tested either as specified in **11.2** or as in **11.3.**

11.2 After galvanizing as specified in BS 729, the finished cisterns shall be filled with water to 25 mm above the water line after which they shall stand filled for a period of not less than 2 min, and shall show no leak or permanent distortion.

11.3 After galvanizing as specified in BS 729, the finished cisterns shall be tested by immersion in water to 25 mm above the water line for a period of not less than 30 s, and shall show no leak or permanent distortion.

12 Marking

12.1 Cisterns

Cisterns shall be permanently and clearly marked by means of a label complying with BS 4781 or BS 5609 with the following information:

(a) the number and date of this British Standard* and the BS type reference, grade and thickness, e.g. BS 417 : 1987 : SCM 360, Grade A, 2 mm;

(b) the manufacturer's name or identification mark;

(c) the capacity in litres.

The position of the marking shall be in the centre of one end or one side, as near the top edge as is practicable.

12.2 Lids

Each lid, or each piece, comprised in one set of lids, shall be marked with:

(a) the BS type reference appropriate to the cistern for which it is intended, e.g. SCM 360;

(b) the number and date of this British Standard, i.e. BS 417 : 1987.*

(c) the manufacturer's name or identification mark.

*Marking BS 417 : 1987 on or in relation to a product is a claim by the manufacturer that the product has been manufactured to the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification should be addressed to the appropriate certification body.

Section three. Tanks

13 Designation

Galvanized low carbon steel tanks shall be designated by the appropriate BS type reference in table 3, followed by the grade.

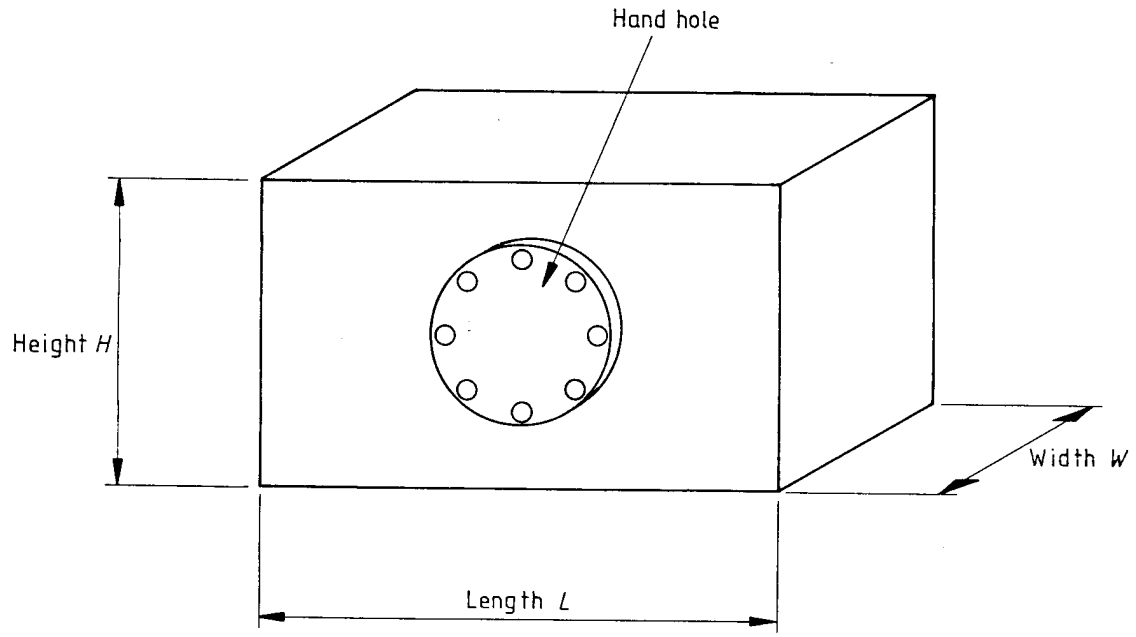
14 Dimensions

The dimensions of tanks shall be as given in table 3 subject to the tolerances specified in clause **15**. Tanks shall be measured externally overall, but excluding the access cover, set screws or bolts and nuts (see figure 4).

Table 3. Dimensions of tanks

BS type reference*	Outside dimensions			Minimum capacity	Thickness of steel before galvanizing	
	Length, *L*	Width, *W*	Height, *H*		Grade A	Grade B
					Test pressure 69 kN/m² † Max. working head of water: 4.5 m‡	Test pressure 52 kN/m² † Max. working head of water: 3.0 m‡
	mm	mm	mm	L	mm	mm
TM 114/1	610	432	432	95	3.2	2.5
TM 114/2	610	610	305	95	3.2	2.5
TM 136/1	610	457	482	114	3.2	2.5
TM 136/2	610	610	381	123	3.2	2.5
TM 182	686	508	508	155	3.2	2.5

*Tanks should be ordered by the BS type reference to avoid confusion.
† 1 kN/m² = 1 kPa.
‡ The working head is the vertical distance from the bottom of the tank to the water line of the cistern supplying the tank.
NOTE. For tolerances see clause **15**.



NOTE. This drawing is typical only and does not purport to indicate a standard method of construction of tank, hand hole or access cover.

Figure 4. Method of measuring tanks

15 Tolerances on dimensions

The tolerances on the dimensions of tanks given in table 3 shall be as follows:

(a) Length: ± 13 mm;

(b) Width: ± 13 mm;

(c) Height: ± 13 mm;

(d) Thickness of low carbon steel plate and sheet before galvanizing: the relevant tolerances given in BS 1449 or BS 4360 shall apply.

16 Materials

16.1 General

Tanks shall be made from low carbon steel plate or sheet, complying with BS 1449 or BS 4360.

NOTE. The plate or sheet should be free from any defects which would adversely affect the efficient functioning of the vessel.

16.2 Galvanizing

Tanks shall be galvanized, after manufacture, as specified in BS 729. Before galvanizing, any flux and/or slag remaining after welding shall be removed.

17 Manufacture

Tanks shall be constructed by welding.

Tanks shall have a hand hole not less than 150 mm in diameter. The hand hole shall be provided with a replaceable access cover of a thickness not less than that of the wall of the tank and shall also be supplied complete with a preformed joint ring. The seating for the access cover shall be stiffened.

NOTE. The preferred location of the hand hole is that shown in figure 4. The tank should be supplied with the hand hole in this position unless otherwise specified by the purchaser at the time of enquiry or order (see appendix A).

18 Additional features

18.1 Tanks shall be supplied in either of the following conditions:

(a) without fixing provision for combined immersion heaters and thermostats;

(b) with fixing provision for combined immersion heaters and thermostats as specified in **18.2.**

NOTE. Unless otherwise specified by the purchaser at the time of enquiry or order (see appendix A) the tank will be supplied without provision for combined immersion heater and thermostat.

18.2 Connections shall be threaded with a 2¼ in BSP. F normal class parallel thread complying with the requirements of table 7 of BS 2779 : 1973 and the length of engagement shall be not less than 13 mm.

NOTE. The recommended height of the centre line of a side entry immersion heater is 150 mm above the bottom of the tank.

19 Testing

After galvanizing, the finished tank shall withstand the appropriate test pressure given in table 3. The test shall be applied either:

(a) hydraulically for a period of at least 5 min; or

(b) pneumatically for a period of at least 2 min.

The tank shall show no leak or permanent distortion as a result of the test.

20 Marking

Every tank shall be permanently and clearly marked, by means of a label complying with BS 4781 or BS 5609 in the centre of the side containing the access cover, and as near the top edge as is practicable, with the following information:

(a) the number and date of this British Standard* followed by the BS type reference and grade, e.g. BS 417 : 1987, TM 136/1, Grade A;

(b) the manufacturer's name or identification mark;

(c) the capacity to the water line in litres;

(d) the maximum permissible working head of the tank in metres.

*Marking BS 417 : 1987 on or in relation to a product is a claim by the manufacturer that the product has been manufactured to the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification should be addressed to the appropriate certification body.

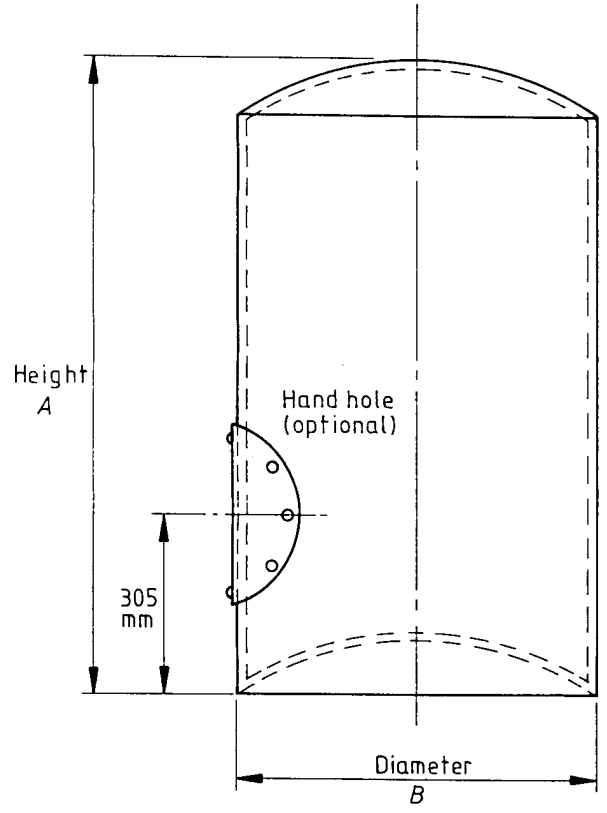
Section four. Cylinders

21 Designation

Galvanized low carbon steel cylinders shall be designated by the appropriate BS type reference in table 4, followed by the grade.

22 Dimensions

The dimensions of cylinders shall be as given in table 4 subject to the tolerances specified in clause **23**. The height of a cylinder shall be measured externally from base to top of dome, excluding any screwed connection, and the diameter shall be measured internally (see figure 5).



NOTE. This drawing is typical only and does not purport to indicate a standard method of construction.

Figure 5. Method of measuring cylinders

23 Tolerances on dimensions

The tolerances on the dimensions of cylinders given in table 4 shall be as follows:

(a) position of screwed connections: 3 mm in any direction;

(b) diameter: ± 5 mm;

(c) height: ± 13 mm;

(d) thickness of low carbon steel plate before galvanizing; the relevant tolerances given in BS 1449 or BS 4360 shall apply.

24 Materials

24.1 General

Cylinders shall be made from low carbon steel sheet or plate complying with BS 1449 or BS 4360.

NOTE. The plate or sheet should be free from any defects which would adversely affect the efficient functioning of the vessel.

24.2 Galvanizing

Cylinders shall be galvanized, after manufacture, as specified in BS 729. Before galvanizing any flux and/or slag remaining after welding shall be removed.

25 Manufacture

Cylinders shall be constructed by welding.

26 Design of cylinder top and bottom

26.1 Top

The top of the cylinder (see figure 6(a)) shall have a radius of curvature not exceeding three quarters of the nominal diameter of its body. The height of the top, excluding any spinning location recess, shall comply with table 5. The top curve shall be blended, by means of a radius not less than 25 mm or more than 50 mm, to form a straight portion to meet the body.

26.2 Bottom

The bottom of a cylinder shall have a radius of curvature not exceeding three quarters of the nominal diameter of its body.

The cylinder bottom shall be either:

(a) without an extended flange (see figure 6(b)); or

(b) with an extended flange (see figure 6(c)).

The radius at, and adjacent to, the flange connecting the curved end to the body shall be between 25 mm and 50 mm in both cases.

Where the flange is extended, as in option (b), to remove the welded seam from the curved portion, the maximum upstand of the flange shall be in accordance with figure 6(c).

Table 4. Dimensions of cylinders

BS type reference*	Inside diameter† (see figure 5), *B*	Height over dome (see figure 5), *A*	Minimum capacity	Thickness of steel sheet or plate before galvanizing, for sides and dished ends			Height of screwed connections (see figure 7)			Size of connections BSP. F parallel thread
				Grade A	Grade B	Grade C	*H* (min.)	*L*	*P*	
				Test pressure 483 kN/m² ‡ Max. working head of water: 30 m §	Test pressure 276 kN/m² ‡ Max. working head of water: 18 m §	Test pressure 138 kN/m² ‡ Max. working head of water: 9 m §				
	mm	mm	L	mm	mm	mm	mm	mm	mm	in
YM 91	381	762	73	3.2	2.5	2.0	584	102	159	1
YM 114	381	991	100	3.2	2.5	2.0	762	102	159	1
YM 127	457	787	114	3.2	2.5	2.0	584	102	159	1
YM 141	457	838	123	3.2	2.5	2.0	635	102	159	1
YM 150	457	914	136	3.2	2.5	2.0	686	102	159	1
YM 177	457	1067	159	3.2	2.5	2.0	813	102	159	1¼
YM 218	508	1067	195	4.8	3.2	2.5	813	102	159	1¼
YM 264	508	1295	241	4.8	3.2	2.5	991	102	159	1¼
YM 355	610	1219	332	4.8	3.2	2.5	914	127	159	1½
YM 455	610	1600	441	4.8	3.2	2.5	1194	127	159	1½

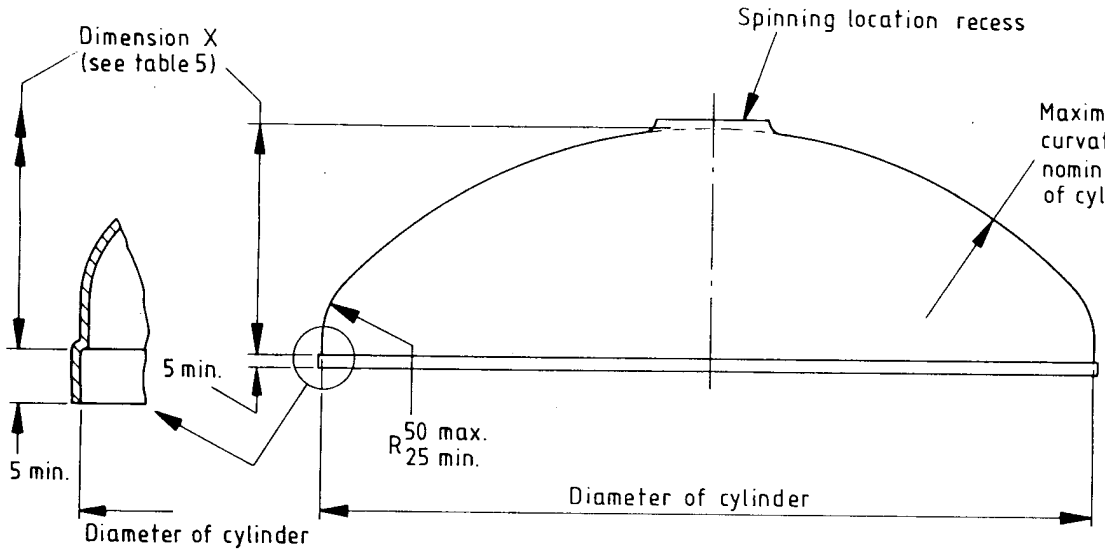
*Cylinders should be ordered by the BS type reference to avoid confusion.

†To obtain the approximate outside diameter, add 13 mm for welded seams.

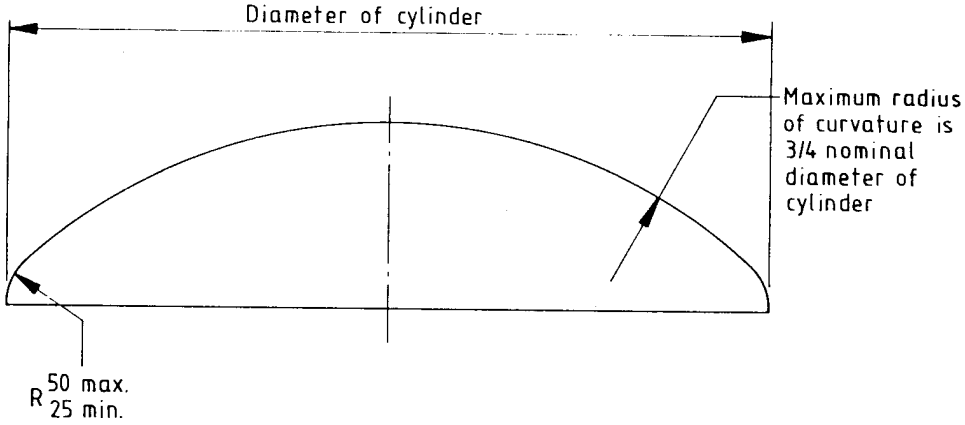
‡1 kN/m² = 1 kPa.

§ The working head is the vertical distance from the bottom of the cylinder to the water line of the cistern supplying the cylinder.

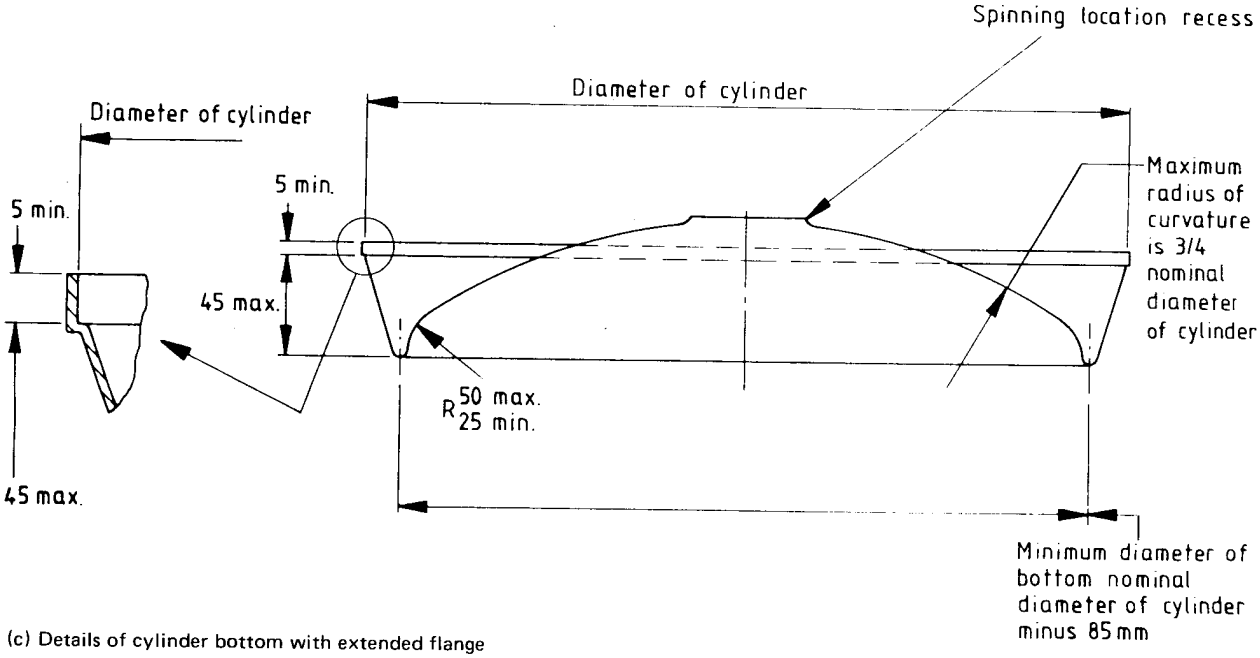
NOTE. For tolerances see clause **23**.



(a) Details of cylinder top



(b) Details of cylinder bottom without extended flange



(c) Details of cylinder bottom with extended flange

Figure 6. Cylinder top and bottom details

Table 5. Maximum height of cylinder top	
Inside diameter (see table 4)	**Maximum height dimension *X* (see figure 6(a))**
mm	mm
381	125
457	140
508	150
610	180

27 Screwed connections for pipes

27.1 Pipe connections shall be square to the face of the cylinder.

NOTE. The preferred number, position and size of screwed connections for pipes are shown in figure 7 and given in table 4. The connections should be in accordance with figure 7 and table 4 unless otherwise specified by the purchaser at the time of enquiry or order (see appendix A).

27.2 External threads shall comply with table 3M, class B of BS 2779 : 1973 with a length of threaded portion of not less than 13 mm.

Internal threads shall comply with table 4M of BS 2779 : 1973 with a length of threaded portion of not less than 11 mm.

The minimum thickness of metal below the root of any thread with the exclusion of one pitch from the free end shall be not less than 0.7 mm.

These connections shall be parallel threaded for use with fittings complying with BS 864 : Part 2. Taper thread attachments shall not be used.

27.3 Connections which are attached by mechanical means shall be capable of withstanding an applied torque of 100 N·m in both directions without rotating or distorting.

The connection in the top of a cylinder shall be housed in a projection in such a way as to prevent the formation of an air pocket.

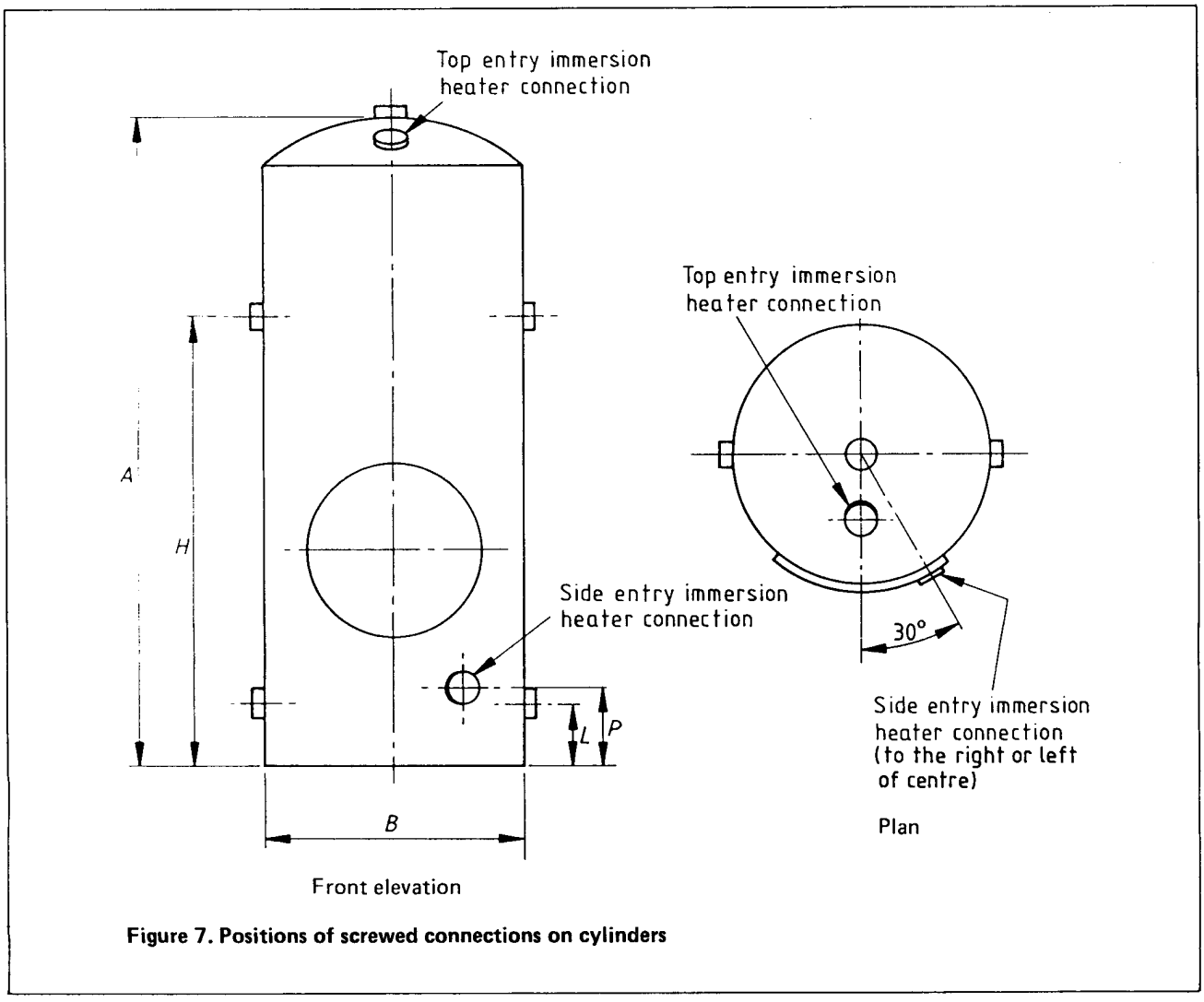


Figure 7. Positions of screwed connections on cylinders

28 Additional features

28.1 Fixing provision for combined immersion heaters and thermostats

28.1.1 Cylinders shall be supplied in either of the following conditions:

(a) without fixing provision for combined immersion heaters and thermostats;

(b) with fixing provision for combined heaters and thermostats as specified in **28.1.2.**

NOTE. Unless otherwise specified by the purchaser at the time of enquiry or order (see appendix A) the cylinder will be supplied without fixing provision for combined immersion heaters and thermostats.

It is recommended that any connections for immersion heaters should be fitted during manufacture of the cylinders and not subsequently. If not required immediately they may be temporarily blanked off.

28.1.2 Connections shall be threaded internally with a G 2¼ thread, complying with the requirements of table 4M of BS 2779 : 1973, and the length of threaded portion shall be between 13 mm and 15 mm. The minimum thickness of metal below the root of the thread, with the exclusion of one pitch from the free end, shall be not less than 0.7 mm.

The connection for a top entry immersion heater shall be fitted at a minimum distance of 25 mm from the centre connection as shown in figure 7 in such a way as to minimize the formation of an air pocket. It shall be possible to fit an immersion heater complying with the requirements of BS 3456 : Section 2.21 and of length (*B* minus 200) mm without it touching any part of the cylinder wall, cylinder bottom or primary heater (see figure 7).

The connection for side entry immersion heaters shall be situated as shown in figure 7 and at a height *P* (see table 4) above the base of the cylinder.

NOTE 1. Attention is directed to the fact that, with the top entry method of mounting, the quantity of water heated is dependent upon the length of the immersion heater and integral thermostat.

NOTE 2. Where an insulation jacket is fitted it should comply with the requirements of BS 5615.

28.2 Hand hole

28.2.1 Cylinders shall be supplied in either of the following conditions:

(a) without a hand hole;

(b) with a hand hole as specified in **28.2.2.**

NOTE. Unless otherwise specified by the purchaser at the time of enquiry or order (see appendix A) the cylinder will be supplied without a hand hole.

28.2.2 A hand hole shall be not less than 150 mm in diameter, and shall be provided with a replaceable access cover of a thickness not less than that of the wall of the cylinder and shall also be supplied complete with a suitable preformed joint ring. The seating for the outer access plate shall be adequately stiffened.

NOTE. The preferred location of the hand hole is that shown in figure 5. The cylinder should be supplied with the hand hole in this position unless otherwise specified by the purchaser at the time of enquiry or order (see appendix A).

29 Testing

After galvanizing, the finished cylinders shall be filled with water and shall withstand for a period of not less than 5 min the appropriate test pressures given in table 4, and shall show no leak or permanent distortion.

30 Marking

30.1 Permanent marking

Every cylinder shall be permanently and clearly marked, by stamping, embossing or etching on the body of the cylinder or on a metal plate soldered to the body of the cylinder, with the following information:

(a) the number and date of this British Standard* followed by the BS type reference and grade, e.g. BS 417 : 1987, YM 355, Grade A;

(b) the manufacturer's name, or identification mark.

30.2 Other marking

The following additional marking in indelible ink shall be applied by means of a label complying with BS 4781 or BS 5609 firmly adhering to the cylinder:

(a) the maximum permissible working head of the cylinder in metres;

(b) the storage capacity in litres;

(c) the maximum length of immersion heater that the cylinder is designed to accept;

(d) the recommended location for an immersion heater connection when not fitted at the time of manufacture (see note to **28.1.1**).

*Marking BS 417 : 1987 on or in relation to a product is a claim by the manufacturer that the product has been manufactured to the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification should be addressed to the appropriate certification body.

Appendix

Appendix A. Information to be supplied by the purchaser

When enquiring about or ordering cisterns, cistern lids, tanks or cylinders to comply with the requirements of this Part of BS 417, the purchaser should provide the manufacturer with the following information.

(a) BS type reference, such as SCM 360 or TM 136/1 or YM 355 (see tables 1, 3 and 4).

(b) Grade of cistern (A or B), tank (A or B) or cylinder (A, B or C) (see tables 1, 3 and 4).

(c) Details of screwed connections and holes, if required (see clauses **10**, **18**, and **28**).

(d) For cisterns:

(1) if lid is not required;

(2) type of cross ties (see clause **9**);

(3) if coating internally with bitumen is required (see clause **10**).

(e) For tanks: location of hand hole, if not as figure 4 (see clause **17**).

(f) For tanks and cylinders: whether accommodation for an immersion heater and thermostat is required, and in what position (see clauses **18** and **28**).

(g) For cylinders: if a hand hole is required and, if so, in what location (see clause **28**).

Publications referred to

BS 699*	Specification for copper direct cylinders for domestic purposes
BS 729	Specification for hot dip galvanized coatings on iron and steel articles
BS 864	Capillary and compression tube fittings of copper and copper alloy Part 2 Specification for capillary and compression fittings for copper tubes
BS 1140	Specification for resistance spot welding of uncoated and coated low carbon steel
BS 1449	Steel plate, sheet and strip
BS 1565*	Specification for galvanized mild steel indirect cylinders, annular or saddle-back type
BS 1566*	Copper indirect cylinders for domestic purposes Part 1 Specification for double feed indirect cylinders Part 2 Specification for single feed indirect cylinders
BS 2777*	Specification for asbestos-cement cisterns
BS 2779	Specification for pipe threads for tubes and fittings where pressure-tight joints are not made on the threads (metric dimensions)
BS 2989	Specification for continuously hot-dip zinc coated and iron-zinc alloy coated steel: wide strip, sheet/plate and slit wide strip
BS 3198*	Specification for copper hot water storage combination units for domestic purposes
BS 3416	Specification for black bitumen coating solutions for cold application
BS 3456	Specification for safety of household and similar electrical appliances Section 2.21 Electric immersion heaters
BS 4213*	Specification for cold water storage and feed and expansion cisterns (polyolefin or olefin copolymer) and cistern lids
BS 4360	Specification for weldable structural steels
BS 4781	Specification for self-adhesive plastics labels for permanent use
BS 5609	Specification for adhesive coated labels for marine use
BS 5615	Specification for insulating jackets for domestic hot water storage cylinders

*Referred to in the foreword only.

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Building Services Standards Committee (SEB/-) to Technical Committee SEB/9, upon which the following bodies were represented:

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