BRITISH STANDARD

BS 1702:1950

Incorporating Amendment No. 1

Specification for

Mild steel drums (Heavy Duty — Fixed Ends)

Co-operating organizations

The Packaging Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:—

Association of British Chemical Manufacturers*
Association of British Pharmaceutical Industry
Association of Steel Drum Manufacturers*
Board of Trade*
British Carton Association
British Paper Bag Federation
British Paper Box Federation
British Railways, The Railway Executive*
British Tin Box Manufacturers' Federation*
Collapsible Tube Manufacturers' Federation
Co-operative Wholesale Society Ltd.
Cotton Bag Manufacturers' Association
Crown Agents for the Colonies
Envelope Makers' and Manufacturing Stationers' Association
Fibreboard Packing Case Manufacturers' Association
Food Manufacturers' Federation*
Glass Manufacturers' Federation
Industrial Management Research Association
Institute of Packaging
Institution of Production Engineers
National Federation of Box and Packing Case Manufacturers
National Federation of Employers of Coopers in the United Kingdom
National Federation of Grocers' and Provision Dealers' Associations
National Paint Federation*
Printing, Packaging and Allied Trades Research Association
Society of British Paint Manufacturers Ltd.*

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:—

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Air Ministry
Association of British Insecticide Manufacturers
Association of British Sheep and Cattle Dip Manufacturers
Bakers Sundries Defence Committee
British Disinfectant Manufacturers' Association
British Plastics Federation
Closure Manufacturers' Association
Council of British Manufacturers of Petroleum Equipment
Galvanized Hollow-ware Organization
Ministry of Defence (Standardization of Drums and Metal Containers Sub-Committee of and Joint Non-warlike Stores Standardization Committee)
Ministry of Food
Ministry of Labour and National Service (Factory Department)
Ministry of Supply
Ministry of Transport
Oil Companies Materials Committee.

This British Standard, having been approved by the Packaging Standards Committee, was published under the authority of the General Council on 30 December 1950

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BS 670 First published April 1936
BS 829 First published February 1939

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Amendments issued since publication

Amd. No.	Date of issue	Comments
5226	May 1964	Indicated by a sideline in the margin

Contents

Foreword

This British Standard requires reference to the following standard:—

BS 192, *B.S.W. and B.S.F. open-ended carbon steel spanners*.

This British Standard supersedes BS 670:1936, "*Welded mild steel drums*" and BS 829:1939, *"Mild steel drums for inflammable liquids,"* and is the first of a new series of British Standards for metal drums.

BS 670 was originally prepared at the joint request of the Association of British Chemical Manufacturers and the British Chemical Plant Manufacturers' Association. It covered drums for liquids which do not flash below 73 °F. (22.7 °C.) or develop a vapour pressure of more than 20 lb/sq. in. absolute below 45 °C. (113 °F.) and included provisions for corrosive and heavy liquids.

The preparation of BS 829 was undertaken at the request of the same two organizations as well as the petroleum industry. The standard covered drums for most inflammable liquids not completely miscible with water and flashing below 73 °F. when tested in accordance with the requirements of the Petroleum (Consolidation) Act, 1928, and represented an advance in the technique of transporting petroleum products of an inflammable nature. As a result of extensive tests carried out by the railways and the oil companies it was found possible to standardize lighter drums than those previously in use.

In arriving at the requirements for the constructional strength of the drum the conditions of transport normally associated with returnable packages were taken into consideration.

The present revision and amalgamation of these two standards has become necessary because of a demand from users that a wider range of drums should be specified, and that its details should be simplified.

In view of the alternative methods of construction frequently used for drums having bodies thinner than 18 B.G., such drums are omitted from the standard.

It is pointed out that, although compliance with this British Standard will ensure satisfactory drums, the continuance of their serviceability will depend on systematic and periodic inspection and maintenance.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard covers heavy duty welded mild steel drums with fixed ends, with capacities from 5–90 imperial gal. It does not apply to the special drums required for the storage and conveyance of the following liquids:—

carbon disulphide[1)]

any liquid not complying with the pressure test described in the Appendix.

The standard also covers the 44 imperial gallon drum used by the petroleum industry.

2 Materials (body, ends, hoops and bands)

a) *Quality.* The drums shall be made from thoroughly annealed good commercial quality low carbon mild steel sheets. End bands and rolling hoops shall be made of low carbon steel of good welding quality.

b) *Thickness.* The thickness of the sheet metal used for the body and the end of the drums shall conform to the dimensions given in Table 1. The permissible variation in each gauge shall be as specified in BS 1449 *"Steel plate, sheet and strip"*.

3 Construction and workmanship

a) *Body.* The body of the drums shall be made from a single sheet of metal.

b) *Ends.* The ends, after being flanged to the appropriate depth, shall be a good fit in the body of the drum.

c) *Welding.* All drums shall be welded by a suitable welding process.

d) *Rolling hoops and beads.* Drums under 20 imperial gal. in nominal capacity shall normally be supplied with a plain body, but if required by the purchaser two rolling hoops, not less than ⅝ in. deep, shall be pressed out from the body of the drum.

Round the body of drums of 20 imperial gal. and over nominal capacity shall be fitted two 1½ in. × 1 in. "I" section mild steel rolling hoops, weighing 2 lb/ft, or where agreed between manufacturer and customer there shall be pressed out from the body of the drum two rolling hoops not less than ¾ in deep. The "I" section mild steel rolling hoops shall be shrunk on or, where required, secured by means of a small bead formed in the body of the drum on each side of the rolling hoop.

NOTE The latter method is not recommended for galvanized drums.

e) *Reinforcement.* The circumferential junction of the body and ends shall be reinforced with mild steel bands of either lipped or convex feather edge section, as specified in Clause **4** (see Figure 1).

f) *Closures.* The drums shall be fitted with screw bungs, flanges and washers as specified in Clause **7**.

4 Reinforcement

The circumferential seam at each end of the drum shall be strengthened by either lipped or convex feather edge section bands, made from mild steel bars of the type and dimensions shown below:—

Drums under 20 *imperial gal. nominal capacity*

Lipped section external bands	1¾ in. × ⅜ in. × ⅝ in.	as Type A.
or		
Convex section external bands	1 in. × ¼ in.	as Type C.

Drums 20 *imperial gal. nominal capacity and over*

Lipped section external bands	1¾ in. × ⅜ in. × ⅝ in.	as Type A.
or		
Convex section external bands	1½ in. × ⅜ in.	as Type B.
Convex section internal bands	1 in. × ¼ in.	

When Type A construction is used the body and ends of the drum shall be welded together by a suitable process and the external lipped section band shrunk into position.

When Type B or C construction is used the body, ends and convex section bands shall be welded together.

[1)] The construction of drums for carbon disulphide is specified in Statutory Rules and Orders 1935, No. 283, 1st Schedule.

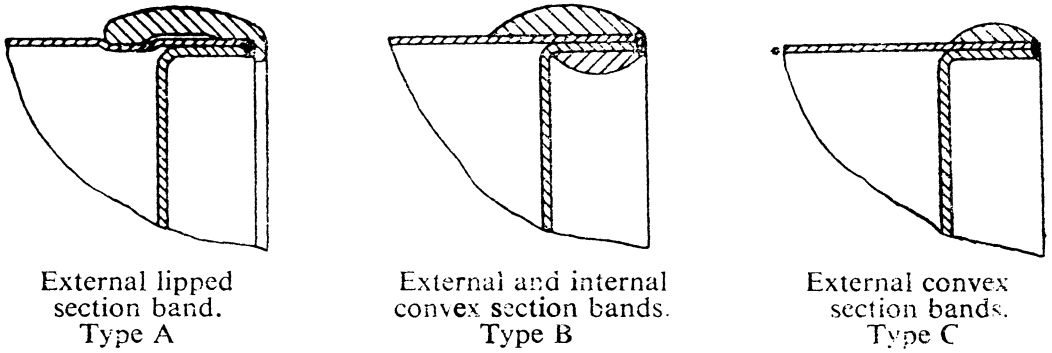

Figure 1 — Reinforcement

5 Size, type and class

Drums shall be designated by the appropriate nominal capacity, type and class shown in Table 1.

6 Dimensions, tolerances and ullage

a) *Dimensions.* The drums shall conform to the dimensions given in Table 1, subject to the tolerances specified in Clause **6** b). These dimensions provide for an ullage of not less than 5 per cent (e.g. a 50 imperial gal. drum would have a 52½ imperial gal. water capacity).

NOTE If an intermediate capacity or larger ullage is required, the diameter shall be the standard diameter of the drum of the next higher, or lower, capacity, as appropriate. The length shall be such as to provide the required capacity in conjunction with this diameter. The gauge of metal for the body and ends shall be that given for the next larger standard size of drum of the appropriate class.

b) *Tolerances.* The tolerances on internal diameter and external length shall be ± ⅛ in.

7 Closures

Drums shall be provided with bungs and flanges made from good welding quality mild steel drop forgings. The heads of the bungs shall be hexagonal to allow of removal by means of a spanner, and shall have a recess to allow of removal by means of a key.

The flange shall be continuously welded around its outer edge to the drum and shall not project into the interior.

The underside of the heads of the bungs and the top face of the flanges shall be machined surfaces and they shall be square to the threads.

Sealing holes shall be provided in the bungs and in lugs on the flanges to permit the closure to be sealed by means of wire and metal seals.

Each drum shall be fitted with a large bung and flange, screwed 2¼ in. B.S.F. thread, 6 threads per inch, and a small bung and flange, screwed ¾ in. B.S.P. thread, 14 threads per inch, conforming to the following dimensions:—

Dimensions of bungs and flanges

Bungs	2¼ in. B.S.F	¾ in. B.S.P.
	in.	in.
Width across flats of hexagonal head[a]	2.76	1.67
Minimum thickness of head	0.25	0.25
Length of shank measured from under head	0.625	0.625
Recess for bung key:		
Width across the square	0.875	0.500
Depth	0.625	0.375
Flanges:		
Overall diameter	3.500	2.375
Overall diameter of machined face	2.750	1.500
Minimum length of thread	0.500	0.375

[a] The manufacturing tolerances of these dimensions shall be minus, so as to permit the use of British Standard spanners specified in BS 192, *"B.S.W. and B.S.F. open-ended carbon steel spanners."*

NOTE Although the closures specified in this clause are standard, it is recognized that there are other equally effective methods of closure, and their use is not necessarily precluded. Attention is drawn, however, to the necessity of ascertaining that the closures are acceptable to the appropriate transport authorities.

Drums under 20 *imperial gal. nominal capacity*. The bungs and flanges fitted to these drums shall be placed in one end of the drum, each close to the chimb and diametrically opposed to each other.

Drums 20 *imperial gal. nominal capacity and over*. The bungs and flanges may be fitted in one end of the drum as above, or the large bung and flange may be fitted on the body of the drum between the rolling hoops, and the small bung and flange in one end near the chimb and diametrically opposed to the large bung and flange in the body of the drum.

The closures shall be completed with washers made of a material suitable for use with the liquid to be packed in the drum.

The closures, when fitted in the end or when fitted in the body of the drum, shall not project above the chimb or rolling hoops.

The ¾ in. fittings may be omitted when not required.

8 Finish

The purchaser shall specify in his inquiry and order the nature of the internal and external finish required.

9 Cleanliness

The drums, as delivered, shall be thoroughly clean, and shall be free from all traces of rust, loose scale and other foreign matter.

10 Testing

a) *Pressure test.* The drums shall be tested and shall withstand without leakage an air pressure test of 10 lb/sq. in. under water.[2)]

b) *Drop test.* If a drop test is required for special purposes the drum shall be capable of passing the following test, without leakage:—

The drum, filled with water to 98 per cent of its nominal capacity, shall be held diagonally and dropped from a height of 4 ft. 6 in. so that, with the drum at the same slant, the chimb hits a solid, level, concrete or brick surface.

[2)] Attention is drawn to the need for taking adequate precautions against the risks that may be involved in testing with compressed air.

The cost of the drum and the test shall be borne by the purchaser.

11 Marking

When specified by the purchaser the drum shall have the following marks embossed on one end, in type of a size appropriate to the gauge, but in no case exceeding 2 in. in height:—

a) The manufacturer's identification mark.

b) The number of this British Standard, and class of drum, e.g. "BS 1702/....."[3)]

c) The gauge of the material of the body, the capacity, and the year of manufacture, in the following manner:—

14 50 50

(i.e. a drum with a 14 B.G. body, having 50 imperial gal. capacity, made in 1950.)

12 Inspection

The manufacturer shall give the purchaser or his representative permission to witness the testing and inspection of the drums after manufacture.

13 Class 5 drum

The 44 imperial gal. drum for the petroleum industry (known as Class 5) shall comply in all respects with Clauses **2**–**12** inclusive, except that it shall be provided with two pressed out rolling hoops not less than ¾ in. deep, in place of "I" section hoops, and with additional strengthening corrugations if so ordered.

The dimensions of the drum shall be:

Capacity:	44 imperial gal.	
Internal diameter:	22 in.	
External length:	Type "A"	36⅛ in.
	Type "B"	35⅝ in.

The body and ends shall be of 14 B.G. steel.

[3)] NOTE Attention is directed to the fact that the following combinations of letters, among others, have been registered in South Africa as standardization marks:—

B.S.I.

B.S.S.

B.E.S.

These marks may be used only on goods for sale in South Africa under the authority of the South African Bureau of Standards. Information regarding the conditions under which the use of these marks will be authorized by the South African Bureau of Standards may be obtained on application to the Director of the British Standards Institution, 24/28 Victoria Street, London, S.W.1.

Table 1 — Dimensions of British Standard welded mild steel drums (heavy duty — fixed ends)

Nominal capacity	Internal diameter	External length		Thickness of steel sheet, B.G.[a]							
		Type "A"	Types "B" and "C"	Class 1		Class 2		Class 3		Class 4	
				Body	Ends	Body	Ends	Body	Ends	Body	Ends
Imperial gal.	in.	in.	in.								
5	11	18¼	17¾	18	16	16	14	14	12	12	10
10	14	22	21½	18	16	16	14	14	12	12	10
15	16	24¾	24¼	18	16	16	14	14	12	12	10
20	18	26	25½	18	16	16	14	14	12	12	10
25	20	26¼	25¾	16	14	15	14	14	12	12	10
30	20	30¾	30¼	16	14	15	14	14	12	12	10
35	20	35½	35	16	14	15	14	14	12	12	10
40	23	31	30½	16	14	15	14	14	12	12	10
45	23	34½	34	16	14	15	14	14	12	12	10
50	23	38	37½	16	14	15	14	14	12	12	10
55	25	35¾	35¼	16	14	15	14	14	12	12	10
60	25	38½	38	16	14	15	14	14	12	12	10
65	25	41½	41	16	14	15	14	14	12	12	10
90	28	45½	45	16	14	15	14	14	12	12	10

[a] Birmingham Gauge, legalized by Order in Council, 16th July, 1914.

Inch equivalents of birmingham gauges

Birmingham Gauge	Inch equivalent
10	0.1250
12	0.0991
14	0.0785
15	0.0699
16	0.0625
18	0.0495

Appendix Vapour pressure determination (See Clause 1)

Description of apparatus. The apparatus shown in Figure 2 consists of a thick-walled glass tube, about 1 mm. in bore and 30 in. in length, turned up at the lower end and fused to a wider tube about 1 in. in internal diameter and 6 in. in length, which terminates at its upper end in a tube about ¼ in. in external diameter and 1 in. in length. This short ¼ in. tube is fitted with a piece of stout rubber tubing, which covers it entirely and projects about ¾ in. above it. The rubber tube is firmly wired on to the glass tube in two or three places. A scale of inches divided into tenths is etched on the long limb of the apparatus, and the short limb has two marks, the lower of which is at the same level as the zero of the scale, and the upper mark measures 9/10ths of the capacity of the tube above the lower mark. A pattern is in the custody of the Railway Clearing House.

Method of making the test. Fix the apparatus upright, pour in mercury up to the lower mark on the bulb, draw a little air through the mercury into the bulb to ensure that the mercury column in the capillary tube is unbroken. Pour in the liquid to be tested until it is well up to the upper line, place the apparatus vertically in a vessel of water, cooled down to 50 °F. (10.0 °C.). When the liquid has attained this temperature, add a little more, if necessary, to bring the level to the upper mark, then fit a strong screw pinch-cock on to the rubber tubing close up to the glass tube, and screw up very firmly. Remove the apparatus from the cold water and place it in a vessel of water heated to 100 °F. (37.7 °C.), taking care that the level of the water is well above the top of the rubber tubing, so that any leakage may be observed. Maintain the water at this temperature for half an hour, at the end of which time observe the height of the mercury column by the scale etched on the capillary tube. The height should not exceed 24 in.

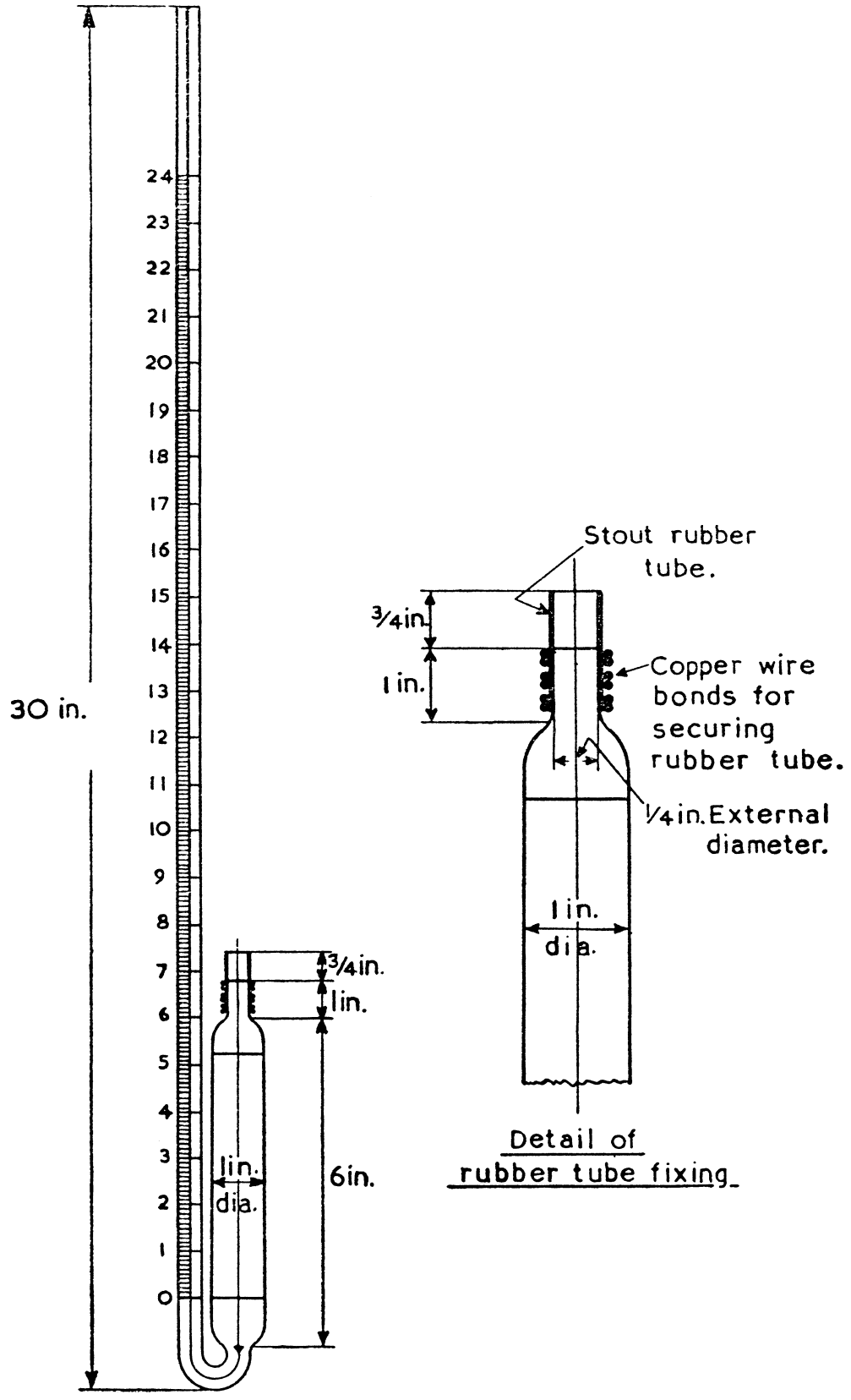

Figure 2 — Pressure test apparatus

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