



BS 799 : Part 5 : 1975

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Specification for
Oil burning equipment

Part 5. Oil storage tanks

British Standards Institution

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Committee references RHE/MECP/13 and RHE/13/5 Draft for comment 71/37399

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Association of Manufacturers of Domestic Electrical Appliances
*Boiler and Radiator Manufacturer's Association
British Gas Corporation
British Mechanical Engineering Confederation
*British Oil and Gas Firing Equipment Manufacturers' Association
British Refrigeration and Air Conditioning Association
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Associated Offices Technical Committee
Association of Shell Boilermakers
British Tar Industry Association
Chief Fire Officers' Association
Department of Employment (HM Factory Inspectorate)
Department of Trade and Industry
Domestic Oil Burning Equipment Testing Association
Engineering Industries Association
Fire Offices Committee

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Institution of Fire Engineers
Oil Companies Materials Association
Process Plant Association
Water-tube Boiler Makers' Association



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Foreword

This Part has been prepared under the authority of the Refrigeration, Heating and Air Conditioning Industry Standards Committee and forms Part 5 of BS 799 'Oil burning equipment'. It deals with tanks used for the storage of liquid fuel used in conjunction with oil burning equipment. Such tanks were previously dealt with in sections 6, 7 and 8 of BS 799 : Part 1 : 1962 and in sections 8, 9 and 10 of BS 799 : Part 2 : 1964.

BS 799 is in course of revision, as follows:

- Part 1 Atomizing burners and associated equipment: withdrawn.
- Part 2 Vaporizing burners and associated equipment: an amendment has been issued withdrawing sections 8, 9 and 10.
- Part 3 Automatic and semi-automatic atomizing burners up to 36 litres per hour and associated equipment.

Part 4 Atomizing burners over 36 litres per hour and associated equipment for single-burner and multi-burner installations.

For some of the cylindrical tanks, the committee have made certain changes from the values previously shown in Part 1 and in Part 2 in the design pressures, plate thicknesses and types of dished end so as to take account of the stresses which may occur in use.

The tank plate thicknesses are in accordance with table 1 of DD 5 : 1971 'Recommendations for metric plate and sheet thickness and width/length combinations for metallic materials'.

General rules for the design and staying of tanks are given in this Part.

Certification. Attention is drawn to the certification facilities described on the inside back cover of this standard.

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British Standard Specification for Oil burning equipment Part 5. Oil storage tanks

1. Scope

This Part of this British Standard specifies requirements for integral tanks which form a part of a complete oil fired unit, for service tanks, and for storage tanks of unlimited capacity with a maximum height of 10 m.

The Part applies to tanks constructed of carbon steel. It does not apply to tanks constructed of plastics, galvanized tanks or to tanks other than those constructed of carbon steel.

2. References

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

3. Definitions

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

3.1 oil. Petroleum oil fuels classes C, D, E, F and G in accordance with BS 2869 : 1970 and/or coal tar liquid fuels (C.T.F. 50, 100, 200 and 250) in accordance with BS 1469 : 1962.

3.2 integral tank. A small tank up to 25 litres capacity which forms an integral part of an oil fired unit or appliance.

3.3 service tank. An auxiliary tank having a capacity of not more than 1000 litres, which isolates the main storage tank or tanks from the burner installation. The tanks shall be located and fitted in accordance with CP 3002.

3.4 design pressure or head. That pressure or equivalent head of water acting at the bottom, sides and top of the tank, defined as follows.

3.4.1 bottom. Equal to the sum of the tank depth plus a vent height of 0.5 m. If the height of the vent pipe exceeds 0.5 m or where it is not possible to provide an unloading device, the full equivalent height of the vent pipe including frictional loss shall be taken into account when calculating the design pressure (see appendix A).

3.4.2 top. Equal to a vent height of 0.5 m. If the height of the vent pipe exceeds 0.5 m or where it is not possible to provide an unloading device, the full equivalent height of the vent pipe including frictional loss shall be taken into account when calculating the design pressure (see appendix A).

3.4.3 side. Equal to two-thirds the pressure at the bottom of the tank.

4. Integral tanks

This clause deals with integral tanks which require filling by hand and which form part of complete oil fired units.

The gross capacity of one of these tanks shall not exceed 25 litres.

Integral tanks are not service tanks as defined in 3.3.

Each integral tank shall carry a prominent notice at the filling point to indicate that the tank shall not be filled whilst the burner is alight and specifying the grade of oil to be used.

Every integral tank shall be so mounted and positioned that when the ambient temperature is 25 °C, the temperature of the oil in the tank shall not exceed 35 °C with class C oil or 65 °C with class D oil.

The tank shall be mounted in such a position that oil accidentally spilled during filling or escaping is unable to come into contact with any heated surface.

Integral tanks shall be resistant to corrosion. The construction and the strength of materials shall be such that harmful distortion does not take place under normal conditions of use. Adequate regard shall be paid to safety and durability and the tanks shall be sufficiently rigid to resist hazardous discharge of oil or vapour.

All joints below the full fuel level shall be made by brazing or welding.

Each tank shall be tested by the manufacturer to 1.5 times the design pressure.

5. Service tanks

5.1 General requirements. This clause deals with service tanks (see 3.3) of up to and including 1000 litres capacity.

5.2 Tank types

Type S1. Cylindrical tanks up to and including 250 litres gross capacity.

Type S2. Rectangular tanks up to and including 250 litres gross capacity.

Type S3. Horizontal cylindrical tanks over 250 litres but not exceeding 1000 litres gross capacity.

Type S4. Rectangular tanks over 250 litres but not exceeding 1000 litres gross capacity.

Type S5. Other tanks not exceeding 1000 litres gross capacity.

5.3 Pressure conditions. Each tank shall be able to withstand the working conditions at site, taking into consideration any pressure to which the tank may be

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subjected. The tank manufacturer shall be informed of the design pressure (see 3.4).

5.4 Test conditions. Before being painted, each tank shall be tested at the manufacturer's works or on site when the tank is fabricated on site.

The test shall be with a total head of water, measured from the base of the tank, equal to 1.5 times the sum of:

- (a) the height of the tank, and
- (b) the design pressure above the top of the tank (see 3.4).

The test pressure shall be increased slowly and steadily and shall be maintained for a period long enough to permit a thorough examination being made to ensure that the tank is sound and shows no leaks or undue distortion. Tanks tested on site shall be tested hydraulically.

IMPORTANT NOTE. Attention is drawn to the hazards involved in pressure tests involving compressible fluid such as air or gas; essential precautions shall be carefully considered by the manufacturer and/or the purchaser. See BS 1515 : Part 1 : 1965, 5.5.4 and 5.5.5.

Due to the presence of one or more undetected defects in the vessel or for some other unforeseen reason, a major rupture of the tank may occur at some stage during the first application of pressure. The test procedure to be followed, therefore, shall be agreed upon after consultation by the manufacturer and/or the purchaser and shall ensure, as far as is practicable, that no person is exposed to injury should the vessel fail during the testing operation.

5.5 Manholes and inspection openings. The provision of manholes or inspection openings if required for access to internal fittings shall be specified by the purchaser.

Manholes shall be not less than 460 mm diameter or 410 mm x 460 mm if oval. Inspection openings shall be not less than 150 mm diameter.

Manholes or inspection openings shall be provided with a cover, securely fitted, having a thickness of not less than the thickness of the body plate and having a liquid and vapour tight joint made with a gasket of oil-resistant material.

5.6 Construction and plate thickness

5.6.1 Service tanks up to and including 250 litres gross capacity shall be of welded construction and made of black mild steel sheets which shall comply with the requirements of BS 1449 : Part 1 : 1972, material specification CR4, suitable for welding. Galvanized material shall not be used. All welding shall be sound and of good penetration. The minimum thickness of the mild steel sheets shall be 1.2 mm. For cylindrical service tanks, the maximum height shall not exceed 750 mm and the maximum diameter shall not exceed 600 mm.

5.6.2 Service tanks over 250 litres but not exceeding 1000 litres gross capacity shall be of welded construction and made of black mild steel sheets or plates complying with the requirements of BS 1449 : Part 1 : 1972, material specification CR4, suitable for welding. Galvanized materials shall not be used. All welding shall be to the requirements of BS 5135 and BS 693.

Rectangular tanks shall be stayed and have a thickness of plate not less than as shown in figure 1.

For cylindrical service tanks, the diameter of shell and the thickness of the shell and ends shall be not less than as shown in table 1.

6. Oil storage tanks, types I to IV

6.1 General. This clause deals with oil storage tanks not exceeding 10 m in height up to and including 3500 litres gross capacity, and having a venting device or pipe not exceeding 0.5 m in height or equivalent friction head.

6.2 Tank types

Type I. Horizontal cylindrical tanks not exceeding 3500 litres gross capacity

Type II. Horizontal oval tanks (with the major axis horizontal) not exceeding 3500 litres gross capacity

Type III. Rectangular tanks not exceeding 3500 litres gross capacity

Type IV. Other tanks not exceeding 3500 litres gross capacity

6.3 Pressure conditions. Tanks shall be able to withstand the working conditions at site. Tanks shall not

Table 1. Minimum plate thicknesses for tanks type S3

Gross capacity	Minimum thickness of plate				
	Shell	Dished and flanged ends	Ends dished only Flat flanged ends Flat unflanged ends (stiffened)	Flat unflanged ends (not stiffened)	Maximum diameter
litres	mm	mm	mm	mm	m
Up to and including 500	1.6	1.6	2.0	3.5	0.25
Over 500 and including 1000	2.0	2.0	2.5	4.0	1.0

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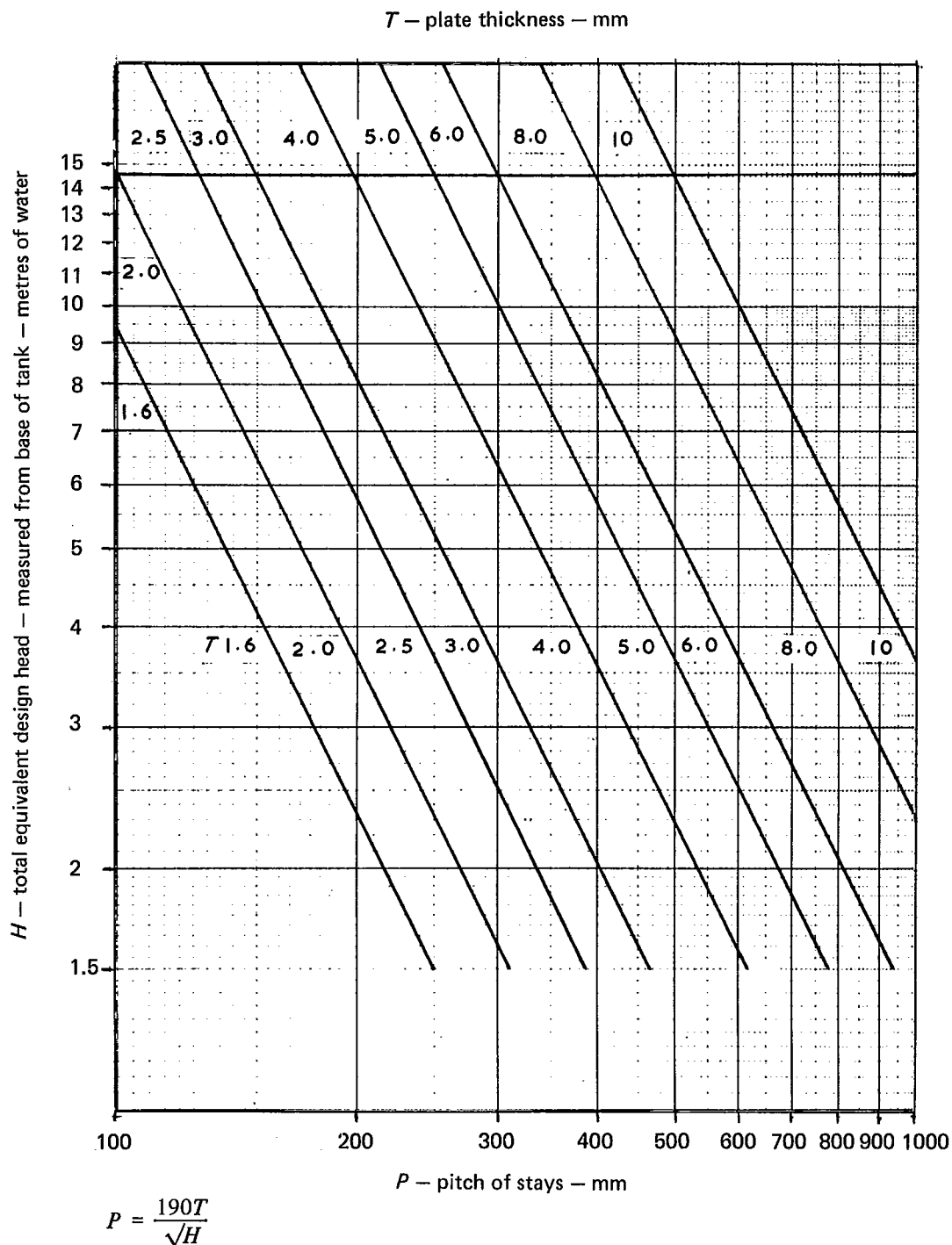


Figure 1. Relationship between design head, pitch of stays and plate thickness

be used on any site that requires a vent pipe exceeding 0.5 m in height (and equivalent friction head) unless an unloading device is fitted.

The tank manufacturers shall be informed of the type of tank (see 6.2).

6.4 Test conditions. Each tank before being painted shall be tested at the manufacturer's works or, on site, when the tank is fabricated on site.

The test shall be with a head of water, or equivalent pressure, 1.5 times the height or diameter of the tank plus 0.5 m maximum equivalent vent height.

The test pressure shall be increased slowly and steadily and shall be maintained for a period long enough to permit a thorough examination to be made to ensure that the tank is sound and shows no leaks or undue distortion. Tanks tested on site shall be tested hydraulically.

6.5 Manholes and inspection openings. Manholes or inspection openings, if required, shall be specified by the purchaser.

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Manholes shall be not less than 460 mm diameter or 410 mm x 460 mm if oval, and inspection openings shall be not less than 150 mm diameter.

Manholes or inspection openings shall be provided with a cover, securely fitted, having a thickness of not less than the thickness of the body plate and having a liquid and vapour tight joint made with a gasket of oil-resistant material.

Manholes and other large inspection openings shall be stiffened by the provision of a flanged neck or by a flat-faced compensating ring welded or riveted round the opening. Holes for studs and set screws shall not penetrate the tank plate.

6.6 Painting and cleaning. Tanks types I to IV fabricated at the manufacturer's work shall before despatch be cleaned externally and protected with a rust inhibiting priming paint, unless otherwise specified. The inside shall be cleaned and all openings suitably sealed to prevent ingress of foreign matter. Tanks built on site shall be cleaned externally and internally after testing and painted externally.

6.7 Marking. The following information shall be permanently and clearly marked on the tank on the vertical centre line near the outlet connection.

- Gross capacity in litres;
- Date of manufacture;
- Manufacturer's name or trade mark;
- Manufacturer's reference number;
- The number of this British Standard and type of tank (e.g. BS 799/5 type 1).

NOTE. The mark BS 799/5 type (insert ref. I to IV) on the product is a claim by the manufacturer that it complies with the requirements of the standard.

6.8 Construction and plate thickness

6.8.1 Type I. Horizontal cylindrical tanks not exceeding 3500 litres gross capacity. These tanks shall be of welded construction and made of black mild steel sheets or plates which shall comply with the requirements of BS 1449 : Part 1 : 1972, material specification CR4, suitable for welding. Galvanized materials shall not be used. All welding shall be to the requirements of BS 5135 and BS 693.

The maximum diameter of the shell and the minimum thickness of the shell and ends shall be as shown in table 2.

Tanks shall be supported above ground level by two cradles having the dimensions specified in table 3. Cradles shall be arranged so that the storage tank shall slope downwards at the rate of 1 in 50 towards the drain valve.

6.8.2 Type II. Horizontal oval tanks (major axis horizontal) not exceeding 3500 litres gross capacity. These tanks shall conform in construction, thickness of sheet and welding to the specification laid down for horizontal cylindrical tanks (see 6.8.1).

Tanks shall be supported above ground level by two cradles having the dimensions specified in table 4.

Cradles shall be arranged so that the storage tank shall slope downwards at the rate of 1 in 50 towards the drain valve.

6.8.3 Type III. Rectangular tanks not exceeding 3500 litres gross capacity. These tanks shall be of welded construction and made of black mild steel sheet or plates which shall comply with the requirements of BS 1449 : Part 1 : 1972, material specification CR4, suitable for welding. Galvanized materials shall not be used. All welding shall be to the requirements of BS 5135 and BS 693.

The thickness of the sheet and the pitch of the staying shall be as shown in figure 1.

Table 2. Minimum plate thicknesses for tanks type I

Gross capacity	Minimum thickness of plate				
	Shell	Dished and flanged ends	Ends dished only Flat flanged ends Flat unflanged ends (stiffened)	Flat unflanged ends (not stiffened)	Maximum diameter
litres	mm	mm	mm	mm	m
Up to and including 500	1.6	1.6	2.0	4.0	0.75
Over 500 up to and including 1400	2.0	2.0	2.5	4.0	1.0
Over 1400 up to and including 2300	2.5	2.5	4.0	5.0	1.2
Over 2300 up to and including 3500	4.0	4.0	5.0	8.0	1.4