

BS 799-5:2010



BSI Standards Publication

Oil burning equipment – Part 5: Carbon steel oil storage tanks – Specification

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This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 30, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 799 is published by BSI and came into effect on 30 April 2010. It was prepared by Technical Committee RHE/13, *Oil burning equipment*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 799 supersedes BS 799-5:1987, which is withdrawn.

Information about this document

This is a full revision of the standard, and introduces the following principal changes.

- a) The maximum capacity of primary storage tanks of types I, II and III is now 4 500 L.
- b) Methods for leak testing and pressure testing of tanks have been brought up to date in line with current practice.

Product certification/inspection/testing. Users of this British Standard are advised to consider the desirability of third-party certification/inspection/testing of product conformity with this British Standard. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

Hazard warnings

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This part of BS 799 specifies requirements for the construction and testing of static carbon steel tanks for the storage of liquid fuel of classes A2, C1, C2, D, E, F, G and H conforming to BS 2869:2006 and FAME (fatty acid methyl esters) conforming to BS EN 14213, for use in conjunction with oil burning equipment. The standard is applicable to tanks of the following types intended for use above ground, either externally or internally to a building:

- a) service tanks;
- b) primary storage tanks with a capacity of 90 L or more with a maximum height of 10 m.

This standard is not applicable to tanks that are to be buried.

NOTE Steel tanks for underground storage of flammable and non-flammable water polluting liquids are specified in BS EN 12285-1.

In addition to the definitive requirements, this standard also requires the items detailed in Clause 4 to be documented. For compliance with this standard, both the definitive requirements and the documented items have to be met.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 21, *Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions)*

BS 2869:2006, *Fuel oils for agricultural, domestic and industrial engines and boilers – Specification*

BS EN 1011-1, *Welding – Recommendations for welding of metallic materials – Part 1: General guidance for arc welding*

BS EN 10025-2:2004, *Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels*

BS EN 10111:2008, *Continuously hot rolled low carbon steel sheet and strip for cold forming – Technical delivery conditions*

BS EN 14213, *Heating fuels – Fatty acid methyl esters (FAME) – Requirements and test methods*

PD 5500, *Specification for unfired fusion welded pressure vessels*

3 Terms and definitions

For the purposes of this part of BS 799, the following terms and definitions apply.

3.1 brimful capacity

volume of water held by a tank filled through the filling orifice to the point of overflowing

3.2 bund

containment vessel to hold spillage from a primary tank, or tanks, caused by leakage or overfilling

- 3.3 design pressure**
pressure, or equivalent head of water, acting on the bottom, sides and top of a tank at brimful capacity
- 3.4 dipstick**
rigid measuring device that provides a manual method of measuring the level of liquid in a tank
- 3.5 dip tape**
measuring device made of tape that provides a manual method of measuring the level of liquid in a tank
- NOTE 1 A dip tape usually has a weight on the end.*
- NOTE 2 Dip tapes are normally used on tall vertical cylindrical tanks.*
- 3.6 fill connection**
flange or socket to which the delivery pipework is connected
- 3.7 gauge**
device to indicate the level of liquid in a tank
- 3.8 gauge connection**
flange or socket for the connection of a gauge
- 3.9 nominal capacity**
<for a tank with a brimful capacity of 20 000 L or less> 95% of the brimful capacity
- 3.10 nominal capacity**
<for a tank with a brimful capacity of more than 20 000 L> 97.5% of the brimful capacity
- 3.11 outlet connection**
flange or socket for the pipe that carries the contents from a tank
- 3.12 overfill alarm connection**
flange or socket in the roof of a tank for connection of a device that generates an audible and/or visual warning to indicate when the tank which is being filled is reaching its permissible fill capacity
- 3.13 overfill prevention connection**
flange or socket in the roof of a tank for connection of a device that automatically shuts off the delivery when the nominal capacity of the tank has been reached
- 3.14 return connection**
flange or socket for the connection of a return pipe
- 3.15 service tank**
tank that isolates the main storage tank or tanks from the burner installation
- 3.16 sludge removal connection**
flange or socket for the connection of a drain used for removal of water and sludge from a tank
- 3.17 striker plate**
reinforced plate welded to the bottom of a tank directly below the dipstick or dip tape connection
- 3.18 tank**
primary container used for the storage of liquids

3.19 valve

device used to control the flow of a liquid

3.20 vent connection

flange or socket in the roof of a tank for connection of a vent pipe to prevent over-pressurization of, or vacuum in, the tank

4 Information to be supplied by the purchaser

The following information shall be supplied by the purchaser at the time of enquiry and/or order:

- a) the tank required, i.e. a service tank or a primary storage tank;
- b) the type, size and design pressure of the tank required;
- c) for type III and types J and K primary tanks, if transverse supports are required (see 6.3.3 and 6.3.11);
- d) for tanks 1 250 mm or less in diameter, rectangular tanks 4 500 L capacity or less and vertical tanks 4.5 m or less in height, whether manholes are required and if so how many (see Clause 7);
- e) whether a tank oil heater is required and, if so, the heating medium to be used (see 5.3, 6.4 and Clause 9);
- f) for tanks of types I, II, A, B and C, if a steel cradle is required to support the tank (see 6.15);
- g) if external protection of tanks with a rust inhibiting priming paint prior to despatch is *not* required (see 6.13.1);
- h) if a return connection is required (see 5.5 and 6.9);
- i) if an overfill alarm connection is required;
- j) if an overfill prevention connection is required;
- k) if an outlet pipe is to be fitted to the tank by the tank manufacturer (see 15.1).

5 Service tanks

5.1 Types

Service tanks shall be of the following types.

- Type S1: cylindrical tanks having a capacity up to and including 200 L.
- Type S2: rectangular tanks having a capacity up to and including 200 L.
- Type S3: horizontal cylindrical tanks having a capacity over 200 L but not exceeding 1 000 L.
- Type S4: rectangular tanks having a capacity over 200 L but not exceeding 1 000 L.
- Type S5: horizontal oval tanks having a capacity not exceeding 1 000 L.

5.2 Construction and plate thickness

5.2.1 Service tanks shall be of welded construction and shall be made of rolled steel sheets which conform to BS EN 10025-2:2004, Grade S275 or, for steel not exceeding 3 mm thickness, which conform either to BS EN 10025-2:2004 Grade S275 or to BS EN 10111:2008, grade DD11. All welding shall be in accordance with BS EN 1011-1. For rectangular tanks and cylindrical vertical tanks, all seams, excluding the seams attaching the roof to the sides of the tank, shall be welded inside and outside. The seams attaching the roof to the sides of the tank shall be welded on the outside only.

5.2.2 For service tanks having a capacity up to and including 200 L (types S1 and S2) the minimum thickness of the steel sheets shall be 1.6 mm.

5.2.3 For cylindrical service tanks (type S1), the maximum height shall not exceed 750 mm and the maximum diameter shall not exceed 600 mm.

5.2.4 Rectangular service tanks (type S4) shall be stayed or stiffened and the thickness of the steel sheets shall be not less than the relevant value given in Figure 1.

5.2.5 For cylindrical service tanks (type S3) the maximum diameter shall be as given in Table 1 and the thickness of the shell and ends shall be not less than the relevant values given in Table 1. For oval service tanks (type S5) the maximum major axis of the shell shall be as given in Table 1 and the thickness of the shell and ends shall be not less than the relevant value given in Table 1.

Table 1 Maximum diameter or major axis and minimum thicknesses of the shell and ends for service tanks of types S3 and S5

Capacity	Minimum thickness				Maximum diameter or major axis
	Shell	Dished and flanged ends	Ends dished only Flat flanged ends Flat unflanged ends (stiffened)	Flat unflanged ends (not stiffened)	
L	mm	mm	mm	mm	m
Up to and including 500	1.6	1.6	2.0	3.0	0.25
Over 500 up to and including 1 000	2.0	2.0	2.5	4.0	1.0

5.3 Tank oil heaters

If the provision of a tank oil heater is specified by the purchaser [see Clause 4e)] the tank shall be fitted with a heater conforming to Clause 9.

5.4 Sludge removal connection and outlet connection

The tank shall be fitted with a sludge removal connection and an outlet connection as specified in Clause 11 and Clause 15, respectively.

5.5 Vent connection and return connection

The tank shall be fitted with a vent connection and, if specified by the purchaser [see Clause 4h)], a return connection.

5.6 Manholes and inspection openings

Fitting of manholes and inspection openings shall be in accordance with Clause 7 and Clause 8, respectively.

5.7 Pressure testing

Each tank shall be pressure tested before being painted.

When tested in accordance with Annex A, at the manufacturer's works, or on site in the case of tanks fabricated on site, the tank shall show no visible evidence of leakage.

The manufacturer shall provide the purchaser with a copy of the test certificate for each tank supplied, including a statement of the design pressure of the tank.

5.8 Marking

The following information shall be permanently and clearly marked on the tank:

- a) the number and date of this British Standard (i.e. BS 799-5:2010)¹⁾;
- b) nominal capacity (in litres);
- c) manufacturer's name or trade mark;
- d) manufacturer's reference number;
- e) type of tank (e.g. type S1);
- f) design pressure;
- g) test pressure and date of testing.

6 Primary storage tanks

6.1 Types of tanks

6.1.1 Primary storage tanks shall be single skinned.

NOTE Double skinned tanks are specified in BS EN 12285-2.

6.1.2 Primary storage tanks shall be of the following types.

- a) Tanks having a capacity of not more than 4 500 L and a design pressure equivalent to a height of 0.5 m above the roof of the tank:
 - Type I: horizontal cylindrical tanks;
 - Type II: horizontal oval tanks (with the major axis horizontal);
 - Type III: rectangular tanks.

¹⁾ Marking BS 799-5:2010 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

- b) Tanks having a capacity exceeding 4 500 L and not exceeding 10 m in height:

Type A: horizontal cylindrical tanks having a capacity of not more than 60 000 L, with dished or flat ends, and a design pressure equivalent to a height of 0.5 m above the roof of the tank;

Type B: horizontal cylindrical tanks having a capacity of not more than 60 000 L, with dished ends, and a design pressure equivalent to a height of 4.5 m above the roof of the tank;

Type C: horizontal cylindrical tanks having a capacity of not more than 60 000 L, with dished ends, and a design pressure equivalent to a height of more than 4.5 m above the roof of the tank;

Type D: vertical cylindrical tanks having a capacity of not more than 65 000 L, with dished ends, and a design pressure equivalent to a height of 0.5 m above the roof of the tank;

Type E: vertical cylindrical tanks having a capacity of not more than 145 000 L, with dished ends, and a design pressure equivalent to a height of 7.5 m above the roof of the tank;

Type F: vertical cylindrical tanks having a capacity of not more than 65 000 L, with dished ends, and a design pressure equivalent to a height of more than 7.5 m above the roof of the tank;

Type G: vertical cylindrical tanks having a capacity of not more than 145 000 L, with flat bottom end plates, and a design pressure equivalent to a height of 0.5 m above the roof of the tank;

Type J: rectangular tanks having a capacity of not more than 150 000 L, and a design pressure equivalent to a height of 0.5 m above the roof of the tank;

Type K: rectangular tanks having a capacity of not more than 150 000 L, and a design pressure equivalent to a height of 7.5 m above the roof of the tank.

6.2 Construction

6.2.1 Types I, II and III

Primary storage tanks of types I, II and III shall be of welded construction and made of rolled carbon steel sheets or plates conforming to BS EN 10111:2008, grade D11. Galvanized steel shall not be used. All welding shall be in accordance with BS EN 1011-1.

6.2.2 Types A to K

Primary storage tanks of types A to K shall be of welded construction and made of rolled carbon steel plates conforming to BS EN 10025-2:2004, grade S275. Galvanized steel shall not be used. All welding shall be in accordance with BS EN 1011-1.