

Glass fibre reinforced plastics cisterns for cold water storage —

Part 3: Specification for sectional tanks

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Committees responsible for this British Standard

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- Association of Consulting Engineers
- Association of GRP and Plastic Moulders
- British Plastics Federation
- Composites Processing Association
- National GRP Construction and Engineering Federation
- PSA Projects Ltd.
- Plastic Tanks and Cisterns Manufacturers' Association
- Water Services Association of England and Wales

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Foreword

This Part of BS 7491 has been prepared under the direction of the Plastics and Rubber Standards Policy Committee. BS 7491 comprises three Parts.

- *Part 1:1991, Specification for one-piece cisterns of capacity up to 500 l;*
- *Part 2:1992, Specification for one-piece cisterns of nominal capacities from 500 l to 25 000 l;*
- *Part 3:1994, Specification for sectional tanks.*

This Part of BS 7491 is applicable to glass fibre reinforced plastics sectional tanks, used for the domestic and industrial storage of cold water, and recognizes new requirements for water quality embodied in the European Standards for drinking water. It specifies performance requirements for tank panels and the assembled tanks together with the required test methods. The specification covers only rectangular tanks.

New Water Byelaws implemented in January 1989 require detailed provisions to safeguard the integrity of stored water for domestic purposes. The specification for tanks for use in domestic water storage includes covers, vents, warning and/or overflow pipes, and, where appropriate, insulation against heat and frost, to assist in safeguarding against waste and contamination.

Recommendations are given for foundations and supporting systems and reference is made to wind and snow loading and loads imposed during erection and maintenance. Attention is also drawn to the design criteria given in BS 4994:1987.

Because of the large number of materials which may be used in construction, attention is drawn to the need to avoid bimetallic corrosion.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against the appropriate Part of BS 5750 by a third party certification body.

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 12, 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 Part of BS 7491 specifies requirements for rectangular glass fibre reinforced plastics (GRP) sectional tanks, constructed from square or rectangular panels, for storage of cold water for both domestic and industrial use. The water is in contact with the GRP tank surface and the working pressures do not exceed those produced by the static heads of water when the tanks are filled to their maximum working depths.

The tanks may be manufactured by the hot press moulding, hand lay-up or resin transfer moulding processes.

NOTE Recommendations for thermal insulation are given in Annex A, and information which should be supplied by the purchaser is given in Annex B. Recommendations concerning dimensional requirements of foundations are given in Annex C, but the specification of the foundation itself is outside the scope of this standard.

2 References

2.1 Normative references

This Part of BS 7491 incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on page 12. Subsequent amendments to, or revisions of, any of these publications apply to this Part of BS 7491 only when incorporated in it by updating or revision.

2.2 Informative references

This Part of BS 7491 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this Part of BS 7491 the following definitions apply.

3.1

sectional tank

rectangular fixed container assembled from panels for the storage of water at atmospheric pressure and at a maximum temperature of 39 °C

NOTE This temperature is higher than is acceptable for drinking water, which should not normally exceed 20 °C.

3.2

water for domestic purposes

water supplied for drinking, washing, cooking and sanitary purposes

3.3

nominal capacity

volume contained in the tank, measured up to the top edge of the side walls

3.4

actual capacity

volume contained in the tank up to the maximum working level

3.5

top edge of tank

top edge of the upper side panels or the lowest point of the cover, whichever is the lower

3.6

raised level control valve chamber

enclosed chamber containing an access hatch above the level of the cover, permitting the level control mechanism to be mounted at a higher level than would otherwise be possible

3.7

maximum working depth

depth of water to the lower edge of the overflow pipe or warning pipe, whichever is the lower

3.8

jointing sealant

material used to effect a watertight seal between the modular panels

3.9

vent

opening to the atmosphere to allow for the movement of air resulting from changes in the water level so that the water always remains at atmospheric pressure

3.10

warning pipe

pipe so fixed that its outlet, whether inside or outside a building, is in a conspicuous position where the discharge of water can be readily seen

3.11

overflow pipe

pipe connected to the tank to discharge any overflow therefrom

3.12

bracing system

internal or external structure which provides support to the side walls, divisions, weirs and baffles of the tank

3.13

corsetry

external supports, protected against corrosion and fitted to the side walls of the tank

3.14 baffle

construction of one or more panels within a tank, which partially subdivides the tank in order to increase the length of the flowpath between the inlet to and outlet from the tank

3.15 weir

construction of one or more panels within a tank, which divides the tank but to less than its full depth such that the contents can spill over from one side of the weir to the other

3.16 division plate

construction of one or more panels within a tank which divides the tank into watertight compartments

3.17 tank base

panel or panels, principally in the horizontal mode, which form the bottom of the sectional tank

3.18 foundation

structure upon which the tank is constructed

3.19 rupture

complete or catastrophic structural failure

4 Designation

Each tank shall be designated by a code with the following components, in the order presented.

- a) The number and date of this British Standard, i.e. BS 7491-3:1994.
- b) The capital letters "GRP".

- c) The capital letters and numbers "A1", "A2" or "B", where:

"A1" indicates a class A tank, which is for use in potable water storage, and is supplied for use with the additional fittings specified in clause 10;

"A2" indicates a class A tank, which is for use in potable water storage and is supplied for use without the additional fittings specified in clause 10;

NOTE These fittings are required for use in potable water storage but in that case are supplied and fitted by other parties.

"B" indicates a class B tank which is for use in the storing of cold non-potable water;

- d) A number representing the nominal capacity in litres.

For example, a tank of nominal capacity 20 000 l intended for use in potable water storage and supplied without the additional fittings specified in clause 10 would be designated as BS 7491-3:1994/GRP/A2/20 000.

5 Materials

5.1 Resin

Polyester resin systems, where used, shall conform to BS 3532:1990.

NOTE Resin systems in common use include polyester or epoxy based systems, but there are many thermosetting resin systems and the properties vary especially with respect to chemical resistance and heat distortion point.

5.2 Fibrous reinforcement

The glass fibre reinforcement used shall be of type "E" glass as follows:

- a) glass fibre rovings conforming to BS 3691:1990;
- b) glass fibre chopped strand mat conforming to BS 3496:1989;
- c) glass fibre woven fabrics conforming to BS 3396-1:1991;
- d) glass fibre woven roving fabrics conforming to BS 3749:1991.

NOTE 1 Any construction of the reinforcement is acceptable.

NOTE 2 The glass fibre should have a surface treatment compatible with the resin.

NOTE 3 Sandwich structures including fibre and inert core materials may also be used.

5.3 Other materials

5.3.1 Aggregates

Where required, inert granular materials of particle size between 5 mm and 0.05 mm shall be used as a design part of the structure, e.g. graded silica sands.

5.3.2 Inert fillers

Where required, an inert filler with a particle size below 60 µm shall be used if required as a resin extender and incorporated either on its own or together with the aggregate.

5.4 Sheet moulding compound

5.4.1 General

Sheet moulding compound (SMC), where used, shall conform to the requirements of BS 5734-5:1990.

5.4.2 Resin

Polyester resin used in (SMC) shall conform to BS 3532:1990.

5.4.3 Reinforcement

The glass fibre reinforcement in the SMC shall contain 25 mm and/or 50 mm long "E" glass strands, cut from glass fibre rovings conforming to BS 3691:1990.