

Closets for use with chemicals —

Part 2: Specification for permanently installed closets

ICS 91.140.70

Confirmed
October 2008

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee B/505, Wastewater engineering, to Subcommittee B/505/40, Wastewater treatment plants, upon which the following bodies were represented:

British Precast Concrete Federation
Chartered Institution of Water and Environmental Management
Department of the Environment, Transport and the Regions
(Building Research Establishment)
Institution of Civil Engineers
Water Services Association of England and Wales

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

The Caravan Club
Individual Manufacturers
Inland Waterways Association
National Caravan Council

This British Standard, having been prepared under the direction of the Sector Committee for Building and Civil Engineering, was published under the authority of the Standards Committee and comes into effect on 15 December 1998

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First published December 1978
Second edition May 1981
Third edition December 1998

The following BSI references relate to the work on this standard:
Committee reference B/505/40
Draft for comment 96/105600 DC

ISBN 0 580 28220 1

Amendments issued since publication

Amd. No.	Date	Text affected

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Foreword

This part of BS 2081 has been prepared by Subcommittee B/505/40, Wastewater treatment plants. It supersedes BS 2081-2:1981, which is withdrawn.

Parts 1 and 2 of BS 2801 have been revised to reflect current practice in the provision and use of chemical closets. Part 1 deals specifically with portable chemical closets (i.e. closets which can be carried by one person without spillage when filled to their effective working capacity). Part 2 deals specifically with permanently installed closets (i.e. closets which require special tools to remove them from their installed position).

In order to allow the use of new materials and manufacturing methods in the future, this standard specifies performance requirements rather than precise materials and dimensions, except insofar as they are necessary for interchangeability.

Part 3 is in preparation. It will be a code of practice relating to the safe use, handling and storage of the chemicals used in chemical closets, and in particular, will provide guidance on the safe disposal of wastes from chemical closets.

Annexes A to I of this standard are normative.

Aircraft applications are specialized and remain outside the scope of this standard.

A British Standard does not purport to include all 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 6, an inside back cover and a back cover.

1 Scope

This standard specifies the performance requirements and test methods for permanently installed chemical closets.

It covers only those closets which may be permanently installed for the following applications:

- a) camping sites, caravan sites and marinas;
- b) caravans and motor caravans;
- c) small boats;
- d) remote facilities without access to other drainage.

It does not cover closet installations in aircraft.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 2893:1989, *Specification for chemical preparations for portable and transportable chemical closets.*

3 Terms and definitions

For the purposes of this part of BS 2081, the following terms and definitions apply.

3.1

chemical closet

sanitary appliance comprising integral or holding waste container, cover, seat, bowl and handle(s), designed to receive and contain human excreta to be treated by chemicals

3.2

permanently installed chemical closet

chemical closet which cannot be removed without the use of tools and which may have a removable waste container

3.3

effective waste capacity

maximum capacity in litres which the waste container is designed to hold

3.4

treatment tank

part of the closet in which excreta is chemically treated

3.5

manufacturer

chemical closet manufacturer

3.6

excreta

human body wastes

3.7

flushing closet

closet with a built-in pumped flushing facility which can be flushed from a position separate from the waste container

3.8

pumped chemical closet

chemical closet utilizing a pump to extract waste from the bowl to the waste container

4 Instructions for use

Closets shall be provided with instructions for use which shall include:

- a) information regarding the chemicals to be used, including the dosage and the method and frequency of charging and emptying the waste container;
- b) information on the use, cleaning and maintenance of the closet;
- c) information on the precautions to be taken when handling chemical preparations, including a warning that the mixing of incompatible chemicals may produce toxic results;
- d) advice and guidance relating to the safe disposal of closet wastes;
- e) comprehensive installation instructions.

5 Marking

Chemical closets shall be permanently marked in a readily visible position with the following information:

- a) the number of this British Standard¹⁾;
- b) the manufacturer's name or registered identification mark;
- c) the specified chemical(s) to be used;
- d) the words "for permanent installation";
- e) the effective waste capacity in litres.

¹⁾ Marking BS 2081-2:1998 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.

6 Design, construction and dimensions

6.1 General

The closet shall be so designed and constructed that it shall be capable of containing the excreta and the chemical preparation specified by the manufacturer in accordance with BS 2893 and, without ventilation, limit the odour. When used and maintained in accordance with the manufacturer's instructions, the design and finish of the product shall present no risk of personal injury or damage to clothing.

The total height above the base to the top face of the seat, excluding any cover, shall be not less than 300 mm and not more than 490 mm.

6.2 Waste container

The waste container shall have an effective working capacity of not less than 15 l.

The closet shall be so constructed that all solid and liquid excreta is directed into the waste container. Where a removable waste container is provided it shall be fitted with a means to facilitate handling without spillage.

The design of the waste container shall be free from features, fittings or internal structures which obstruct cleansing. If it includes an inner or detachable container, this shall be easily removable.

All working parts shall be removable for servicing.

The waste container shall be fitted with an indicator to show when it is more than 75 % full by volume.

The indicator shall be visible from a standing position in front of the unit and may either be fitted to the unit or remote from it.

Provision shall be made for discharging and cleansing treatment tanks without dismantling or removing the closet(s).

Access doors and inspection covers shall be provided with a minimum dimension of 75 mm.

These access doors shall be capable of being fitted with security locks.

6.3 Handles

The waste container, whether a separate unit or part of the case of the appliance, shall be provided with an attached carrying handle(s) by which the unit may be carried without risk of spillage of the contents. Handles shall be positioned so as not to be fouled by the contents of the container when the closet is being used or emptied.

6.4 Cover, seat and bowl

The cover and the seat shall be hinged or attached in another way to the installed unit. The dimensions of the seat opening shall be not less than 235 mm and not more than 300 mm in length and not less than 180 mm and not more than 250 mm in width at the widest point. The dimensions of the bowl aperture shall be not less than those of the seat opening.

The distance from the top of the seat to the lower aperture of the bowl shall be not less than 175 mm. When the lower aperture of the bowl is operated by the weight of the excreta, this distance shall be not less than 160 mm.

The internal diameter of the lower aperture of the bowl shall be not less than 70 mm. Pumped systems may have smaller lower apertures; the internal diameter of the aperture for pumped systems shall be not less than 38 mm.

6.5 Flushing mechanism

6.5.1 General

The pump or bellow of the flushing mechanism shall be capable of wetting the whole area of the bowl below the flush rim.

When a flushing unit is specified it shall be one of the types described in 6.5.2 or 6.5.3.

6.5.2 Recirculating flush

The closet shall be capable of being flushed with liquor from the treatment tank which shall contain the chemical specified by the manufacturer.

The filter or strainer through which the contents of the treatment tank pass prior to recirculation shall be capable of being unblocked without having to be removed.

6.5.3 Non-recirculating flush

The closet shall be capable of being flushed with liquor from a source separate from the treatment tank, into which the flushing material specified by the manufacturer shall be deposited.

6.6 Pumped chemical closets

Pumped chemical closets shall utilize a waste transfer pump to extract excreta and flushing fluid from the bowl of the closet to the waste container.

7 Materials and workmanship

7.1 General requirements

All materials and finishes shall conform to the appropriate British Standards for those products. When tested in accordance with annexes A to H, the materials and finishes of the closet shall show no deterioration.

7.2 Physical requirements

7.2.1 Stability of the closet assembly

When tested in accordance with annex A, the deflection of the closet shall not exceed 20 mm at any position around the closet periphery. One hour after removal of the load the residual deflection shall not exceed 5 mm. The closet shall not have sustained any damage or deformation during the test and any mechanical parts shall work freely after removal of the load. There shall be no leaks from the closet.

7.2.2 Impact resistance of the cover, seat and bowl

When tested in accordance with annex B, there shall be no damage to the seat cover or support surface. Each part shall continue to operate as intended after completion of the test.

7.3 Chemical resistance requirements

7.3.1 General

All materials with which excreta and/or the chemical specified by the manufacturer come into contact shall be capable of withstanding the expected corrosive action.

7.3.2 Chemical resistance of the bowl and container

When tested in accordance with C.1.1 and C.1.2, there shall be no physical deterioration of the container tank and bowl. There shall be no staining of the tank and bowl but internal staining or bleaching of the container tank is permissible.

7.3.3 Chemical resistance of the cover and seat

When tested in accordance with C.1.3, there shall be no physical deterioration or staining of the seat and cover.

7.3.4 Resistance to water absorption of the cover and seat

When tested in accordance with annex D, the percentage increase in weight shall be no greater than 0.75. There shall be no changes in dimensions and surface characteristics of either the seat or cover.

7.3.5 Stain transfer from the cover and seat

When tested in accordance with annex E, no transfer of colour pigment from the seat or cover to the white cloth shall occur.

7.4 Mechanical requirements

7.4.1 Efficiency and durability of the flushing mechanism

When tested in accordance with annex F, the variation in the flushing volume collected shall be less than $\pm 10\%$ over the range of samples collected. There shall be no obvious loosening or tightening of the flushing mechanism after the completion of the test. The pump or bellow shall continue to wet the whole area of the bowl below the flush rim on completion of the test.

7.4.2 Strength of the handles and fixings

When tested in accordance with annex G, there shall be no failure of a handle and after the test, when the container has been emptied, there shall be no permanent distortion of the assembly.

7.4.3 Efficiency and durability of the waste transfer pump

When tested in accordance with annex H, the waste transfer pump shall perform the specified number of operations without failure and shall clear the contents of the waste container at each cycle, showing no signs of deterioration, loss of efficiency or blockage.

Annex A (normative)

Load test on the closet assembly

A.1 Test conditions

Carry out the test at a temperature of $20\text{ °C} \pm 5\text{ °C}$.

A.2 Apparatus

A.2.1 Plywood board, of minimum thickness 25 mm.

A.3 Procedure

Place the closet upon a firm, flat, horizontal surface with the seat in the closed position and the cover in the raised position. Place the plywood board on the seat so as to cover the seat ring completely without it being in contact with any other part of the closet.

Measure the distance of this board above or below any convenient fixed datum level (e.g. the surface on which the closet stands).

Apply a steady load of $400\text{ kg} \pm 1\text{ kg}$ to the board at a position corresponding to the centre of the seat ring over an area of 0.025 m^2 and measure the distance of the board above or below the datum level at 1 min intervals. When this distance has remained constant for two successive readings, note this value and remove the load. Leave the closet unloaded for 1 h and then take the same measurement in this unloaded condition.

Annex B (normative)

Impact tests on the seat and cover

B.1 Test conditions

Carry out the test at a temperature of $20\text{ °C} \pm 5\text{ °C}$.

B.2 Procedure

B.2.1 Closet, seat and cover

Assemble the seat and cover in the closed position on the closet. Raise them into the vertical position and allow them to swing downwards together and freely onto their normal support surface.

Repeat the procedure 100 times.

B.2.2 Closet cover

Raise the cover into the vertical position and allow it to swing downwards and freely onto the seat.

Repeat the procedure 100 times.

B.2.3 Closet seat

Assemble the seat alone in the closed position on the closet. Raise it to the vertical position and allow it to swing downwards and freely onto its support surface. Repeat the procedure 100 times.

Annex C (normative)

Chemical resistance tests

C.1 Procedure

C.1.1 Container and bowl

Fill the container and bowl with a quantity of undiluted chemicals of a type as specified by the manufacturer and leave for a minimum of 24 h. If the chemicals are in powder form, use a saturated solution.

After 24 h, empty, rinse with clean water and examine for changes of dimension and deterioration in the materials of construction and in their surface finish.

C.1.2 Container tank

Fill the container with a diluted chemical solution as specified by the chemical manufacturer for normal use. Leave this charge in the container for a minimum period of four weeks.

After four weeks, empty, rinse with clean water and examine for changes of dimension and deterioration in the materials of construction and in their surface finish.

C.2 Seat and cover (splash test)

Fully immerse the seat and cover in undiluted chemicals as specified for use by the chemical manufacturer, then remove and leave for 1 h. If the chemicals are in powder form, use a saturated solution.

After 1 h, rinse with clean water and examine for change of dimension and deterioration in the materials of construction and in their surface finish.

Annex D (normative)

Water absorption tests on the seat and cover

D.1 Apparatus

D.1.1 Humidity cabinet, capable of maintaining a temperature of $20\text{ °C} \pm 2\text{ °C}$ and a relative humidity of $70\% \pm 10\%$.

D.1.2 Balance, capable of weighing the seat or cover to an accuracy of 0.1 g.

D.1.3 Vessel, capable of containing enough water to submerge the seat or cover.

D.2 Procedure

Condition the seat or cover in the humidity cabinet at $20\text{ °C} \pm 2\text{ °C}$ and at $70\% \pm 10\%$ relative humidity, for a minimum of 24 h.

Weigh the seat or cover and record this mass to the nearest 0.1 g (M_1).

Immerse the whole of the seat or cover in water at a temperature of $20\text{ °C} \pm 2\text{ °C}$ for a minimum of 24 h.

Remove the seat or cover from the water and immediately blot off the surface water and weigh the specimen again. Record this mass to the nearest 0.1 g (M_2).

D.3 Reporting

Calculate the percentage increase in mass, to two decimal places, using the following formula:

$$\text{percentage increase} = \frac{100(M_2 - M_1)}{M_1}$$

where

M_1 is the initial mass of the seat or cover;

M_2 is the mass of the seat or cover after immersion in water.

Annex E (normative)**Staining test on the cover and seat****E.1 Apparatus**

E.1.1 *A white cotton cloth.*

E.2 Procedure

Ensure that the seat and cover are dry. Rub the seat or cover rapidly with the cloth for a period of not less than 5 s.

Examine the white cloth and observe whether any stain has been transferred to it.

Annex F (normative)**Test for the flushing mechanism****F.1 Apparatus**

F.1.1 *A full flow three-way valve*, inserted into the feed hose from the pump to the bowl.

F.1.2 *Measuring cylinder*, capable of holding the full contents of a flushing cycle.

F.1.3 *Flexible pipe*, feeding from the side arm of the three-way valve into the measuring cylinder.

F.2 Procedure

Fill the tank to half its maximum capacity with water and add the requisite amount of undiluted chemical for normal operation of a tank of that capacity. With the three-way valve feeding to the bowl, operate the flushing mechanism for a minimum of 20 cycles to ensure thorough mixing of the water and chemical, and adequate priming of the pumping mechanism.

Change the three-way valve to discharge into the measuring cylinder and operate the flushing mechanism for one cycle, record the volume collected, and return this liquid to the bowl.

Change the three-way valve to feed to the bowl and operate for a minimum of 499 cycles.

Change the three-way valve to discharge into the measuring cylinder to collect the liquid from one cycle, record the volume and return the liquid to the bowl.

Repeat for a minimum of 5 000 cycles, collecting and recording the volume of a single cycle every 500 cycles.

Annex G (normative)**Strength test for handles and fixings****G.1 Procedure**

Fill the excreta container with sufficient sand to give an overload of 25 % by mass above its design limit.

Lift and suspend the container by the handle or handles for a minimum of 15 min.

Examine the handles, fixings and container tank for residual deformation and cracking.

Annex H (normative)**Test for the durability and efficiency of the waste transfer pump****H.1 Test for pump durability**

Fill the waste container to its maximum working capacity with a solution of treatment chemical and water. Operate the transfer pump for a minimum of 250 cycles, transferring a minimum volume equal to the maximum working capacity of the waste container at each cycle.

H.2 Test for pump efficiency (toilet paper test)**H.2.1 Apparatus**

H.2.1.1 *Paper*, with a saturation time of (15 ± 10) s as verified by the basket method (see annex I). Individual sheets shall have a size of (140 ± 5) mm \times (100 ± 5) mm. The mass per unit surface area of the toilet paper shall be (30 ± 3) g/m².

H.2.2 Procedure

Fill the waste container to its maximum working capacity with a solution of treatment chemical and water. Add ten sheets of toilet paper (roughly crumpled) per litre of capacity and leave for 24 h. After 24 h, operate the waste transfer pump to empty the contents of the container. Repeat this test five times, checking that on each occasion all the contents are emptied from the container.

Annex I (normative)**Saturation test for paper (basket method)****I.1 Apparatus**

I.1.1 *Paper*, of the dimensions and mass per unit surface area given in **H.2.1.1**.

I.1.2 *Cylindrical basket*, of the dimensions given in Figure 1, capable of holding approximately 5 g of the paper.

I.1.3 *Cylindrical glass vessel*, of the dimensions given in Figure 2, capable of holding the basket in an inverted position.

I.2 Procedure

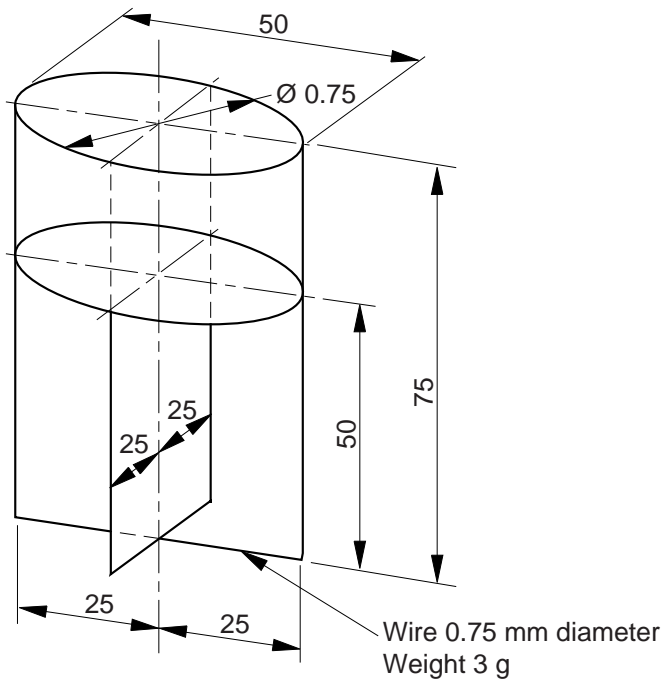
Weigh out exactly 5 g of paper and roll up in a transverse direction. Place the paper in the basket as shown in Figure 1.

Fill the glass vessel to 75 % of its capacity with water whose temperature is within ± 3 °C of the temperature of the water used for flushing.

Place the inverted basket containing the paper into the glass vessel as shown in Figure 2.

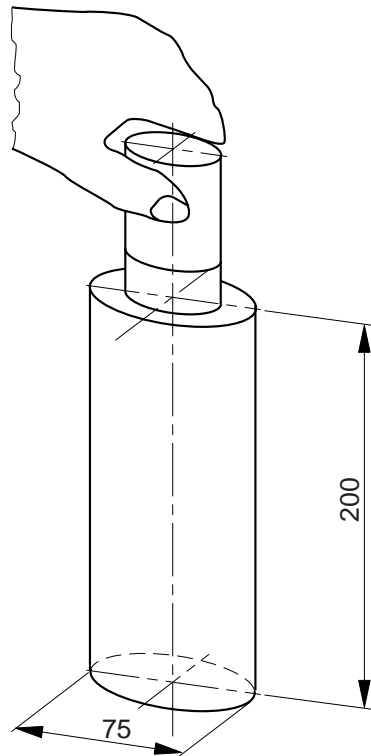
Record the time taken for the paper to become saturated, from the time it was placed in the water to the time it starts to sink.

Repeat the test three times and record the average time taken.



Dimensions in millimetres

Figure I.1 — Basket



Dimensions in millimetres

Figure I.2 — Glass vessel

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