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BRITISH STANDARD

Sanitary installations –

Part 3: Code of practice for the selection, installation and maintenance of sanitary and associated appliances

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 39 and a back cover.

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Foreword

Publishing information

This British Standard was published by BSI and came into effect on 31 October 2006. It was prepared by Technical Committee B/503, *Sanitary appliances*.

Supersession

Together with BS 6465-1, this part of BS 6465 supersedes BS 6465-1:1994, which is withdrawn.

Relationship with other publications

BS 6465, *Sanitary installations*, is issued in three parts:

- *Part 1: Code of practice for the design of sanitary facilities and scales of provision of sanitary and associated appliances;*
- *Part 2: Code of practice for space requirements for sanitary appliances;*
- *Part 3: Code of practice for the selection, installation and maintenance of sanitary and associated appliances.*

Part 1 provides recommendations on the design of sanitary facilities and scales of provision of sanitary and associated appliances in new buildings and buildings undergoing major refurbishment. It also covers the recommended scale of provision of portable toilets.

Part 2 provides recommendations on the space requirements around all sanitary appliances to ensure convenience in use and to facilitate maintenance and cleaning.

Information about this document

This part has been prepared to reflect general changes in the selection, installation and maintenance of sanitary and associated appliances.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

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

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

Contractual and legal considerations

This standard does not cover all the legal requirements of sanitary installations, and attention is drawn to acts, regulations and other statutory requirements (see Annex A), which relate to sanitary and associated appliances, water supplies and drainage.

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.

Section 1: General

1 Scope

This part of BS 6465 gives recommendations on the selection, installation and maintenance of the most commonly used sanitary and associated appliances to be provided in new and refurbished buildings.

It does not cover specialist appliances, such as those used for laundry or catering, or those found in hospitals, health spas, laboratories and similar establishments. It does not cover cultural variations/preferences.

NOTE 1 The recommendations for sanitary and associated appliances in hospitals and other healthcare buildings are covered by the general recommendations of this standard. However, information on the scale of provision, ergonomic data and the special requirements for sanitary and associated appliances in hospitals can be found in the various guidance documents produced by NHS, e.g. Health Technical Memorandum 64: Sanitary assemblies *[1].*

This part of BS 6465 does not deal with the detailed provisions of water supply, sanitary pipework or drainage.

NOTE 2 Information on water supply is covered in BS 6700 and BS EN 806 (all parts); sanitary pipework in BS EN 12056-2; and drainage in BS EN 752-1, BS EN 752-2, BS EN 752-3 and BS EN 752-4.

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 1125, *Specification for WC flushing cisterns (including dual flush cisterns and flush pipes)*

BS 1189, *Specification for baths made from porcelain enamelled cast iron*

BS 1206 *Specification for fireclay sinks – dimensions and workmanship*

BS 1212-2, *Float operated valves – Part 2: Specification for diaphragm type float operated valves (copper alloy body) (excluding floats)*

BS 1212-3, *Float operated valves – Pat 3: Specification for diaphragm type float operated valves (plastics bodied) for cold water services only (excluding floats)*

BS 1212-4, *Float operated valves – Part 4: Specification for compact type float operated valves for WC flushing cisterns (including floats)*

BS 1254, *Specification for WC seats (plastics)*

BS 1329, *Specification for metal hand rinse basins*

BS 1390, *Specification for baths made from vitreous enamelled sheet steel*

BS 1876, *Specification for automatic flushing cisterns for urinals*

BS 4305-1, EN 198, *Baths for domestic purposes made of acrylic material – Part 1: Specification for finished baths*

BS 4880-1, *Specification for urinals – Part 1: Stainless steel slab urinals*

BS 5505-3, *Specification for bidets – Part 3: Vitreous china bidets over rim supply only – Quality, workmanship and functional dimensions other than connecting dimensions*

BS 5506-3, *Specification for wash basins – Part 3: Wash basins (one or three tap holes) – Materials, quality, design and construction*

BS 5520, *Specification for vitreous china bowl urinals (rimless type)*

BS 5906, *Code of practice for storage and on-site treatment of solid waste from buildings*

BS 6100-3.3, *Glossary of building and civil engineering terms – Part 3: Services – Section 3.3: Sanitation*

BS 6340 (all parts), *Shower units*

BS 6465-1, *Sanitary installations – Part 1: Code of practice for the design of sanitary facilities and scales of provision of sanitary and associated appliances*

BS 6465-2, *Sanitary installations – Part 2: Code of practice for space requirements for sanitary appliances*

BS 6675, *Specification for servicing valves (copper alloy) for water services*

BS 6700, *Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages*

BS 7357, *Specification for 7.5 L WC flushing cisterns*

BS 7671, *Requirements for electrical installations – IEE Wiring Regulations. Sixteenth edition*

BS 8000-13, *Workmanship on building sites – Part 13: Code of practice for above ground drainage and sanitary appliances*

BS 8000-15, *Workmanship on building sites – Part 15: Code of practice for hot and cold water services (domestic scale)*

BS 8300:2001, *Design of buildings and their approaches to meet the needs of disabled people – Code of practice*

BS 8313, *Code of practice for accommodation of building services in ducts*

BS EN 31, *Pedestal wash basins – Connecting dimensions*

BS EN 32, *Wall-hung wash basins – Connecting dimensions*

BS EN 33, *Pedestal W.C. pans with close-coupled flushing cistern – Connecting dimensions*

BS EN 35, *Pedestal bidets with over-rim supply – Connecting dimensions*

BS EN 36, *Wall-hung bidets with over-rim supply – Connecting dimensions*

BS EN 37, *Pedestal W.C. pans with independent water supply – Connecting dimensions*

BS EN 111, *Wall-hung hand rinse basins – Connecting dimensions*

BS EN 232, *Baths – Connecting dimensions*

BS EN 251, *Shower trays – Connecting dimensions*

BS EN 695, *Kitchen sinks – Connecting dimensions*

BS EN 997:2003, *WC pans and WC suites with integral trap*

BS EN 12056-4, *Gravity drainage systems inside buildings – Part 4: Wastewater lifting plants – Layout and calculation*

BS EN 12109:1999, *Vacuum drainage systems inside buildings*

BS EN 12764, *Sanitary appliances – Specification for whirlpool baths*

BS EN 13310, *Kitchen sinks – Functional requirements and test methods*

BS EN 14296, *Sanitary appliances – Communal washing troughs*

BS EN 14428, *Shower enclosures – Functional requirements and test methods*

BS EN 14528, *Bidets – Functional requirements and test methods*

BS EN 60335-2-60, *Specification for safety of household and similar electrical appliances – Part 2-60: Particular requirements for whirlpool baths*

BS EN ISO 11600, *Building construction – Jointing products – Classification and requirements for sealants*

3 Terms and definitions

For the purposes of this part of BS 6465 the terms and definitions given in BS 6100-3.3 and the following apply.

3.1 associated appliance
non-plumbed appliance used in conjunction with sanitary appliances

*COMMENTARY ON **3.1***
Examples of associated appliances include hand-driers and sanitary disposal units.

3.2 bathroom
room primarily used for washing, which contains a bath and/or shower, and can contain a washbasin, bidet and WC

3.3 frame
metal structure used to support an individual sanitary or associated appliance or a collection of appliances complete with their associated pipework

3.4 private dwelling
dwelling for people living as a family or single household

3.5 public toilet
toilet for use of the public in a public area, which can be on or off street, and which is usually provided and maintained by a local authority or other corporate body

3.6 sanitary appliance
fixed appliance normally connected to a water supply and to a drain, used for the provision of water, or for cleaning, or for wastewater disposal

*COMMENTARY ON **3.6***
Sanitary appliances, include for example, WCs, urinals, baths, showers, washbasins, sinks, bidets, and drinking fountains. It includes appliances that are not connected to a water supply or a drain, for example, waterless urinals.

3.7 sanitary disposal unit
container for disposal of sanitary protection, disposable nappies or incontinence protection products

3.8 toilet
room in which a WC or WCs are installed and which is used solely for excretory purposes and associated washing

3.9 urinal
sanitary appliance used by men for reception and disposal of urine

3.10 washbasin
basin for general washing, or small basin used for handwashing only

3.11 washing trough
washbasin, of elongated rectangular shape in plan, at which more than one person can wash at the same time

3.12 waste disposal unit
electrically operated device that reduces kitchen or other waste and discharges to drain using a flow of water

3.13 waterless closet
WC that does not require a water flush and is not normally connected to a traditional drainage system

3.14 waterless urinal
urinal that is not connected to a water supply

3.15 WC (water closet)
pan receptacle for faecal matter, urine and toilet paper, plus any associated flushing device, plumbing and fittings

*COMMENTARY ON **3.15***
A cistern is an example of an associated flushing device.

3.16 wet room
shower room with waterproof walls and floor, which allows showering without crossing a threshold

4 Sanitary and associated appliances

4.1 General

Sanitary and associated appliances should be selected and installed to allow subsequent disconnection for maintenance or replacement.

4.2 Appliances subjected to heavy use

Where sanitary and associated appliances will be subjected to heavy use, they should be robust in construction.

4.3 Space heating devices

Care should be taken in locating any radiators or other space heating devices. Radiators should not be located close to urinals as splashing can lead to odours and damage to the surface of the radiator. Radiators should not be located close to WCs due to the danger of contact of bare skin with hot surfaces. Although radiators can be incorporated into bath panels conventional radiators should not be installed against a bath.

4.4 Drainage

In situations where appliances are located where conventional gravity drainage would be undesirable or impossible, consideration should be given to the use of small-bore-pumped discharge units (macerators) that conform to BS EN 12056-4 or vacuum drainage systems that conform to BS EN 12109.

NOTE 1 WCs incorporating small-bore-pumped discharge units require an electrical supply and are limited in the waste products they can handle, therefore, the buildings regulations listed in Annex A require that a conventionally plumbed WC is also incorporated into the building.

NOTE 2 Vacuum drainage systems can include vacuum toilets that use minimal water and provide ventilation during operation.

4.5 Facilities for disabled people

Sanitary and associated appliances for disabled people should be selected and installed in accordance with BS 8300.

NOTE Attention is drawn to the following regulations, which have additional requirements for the provision of toilets, baths and showers for disabled people:

- *Building Regulations 2000: Approved Document M – Access and facilities [2], for England and Wales;*
- *Building (Scotland) Regulations 2004: Technical Handbook – Non-domestic (see Section 3) [3]; and*
- *Building (Scotland) Regulations 2004: Technical Handbook – Domestic (see Section 3) [4], for Scotland;*
- *Building Regulations (Northern Ireland) 2000 Technical booklet R [5], for Northern Ireland.*

Attention is also drawn to the Disability Discrimination Act 1995: Code of practice – Rights of access – Goods, facilities, services, and premises *[6], which is helpful in determining requirements for disabled people in existing premises.*

4.6 Marking on controls for appliances

In rooms where spectacle wearers are likely to remove their glasses or steam may obscure vision (for example bathrooms and showers), consideration should be given to the use of appliances that have controls with clear markings so that temporary visual impairment does not endanger the user.

4.7 Water supply

4.7.1 Water outlet fittings such as taps and shower heads should be appropriate to the water supply system's flow rate and pressure.

4.7.2 For cistern fed low pressure systems (<1 bar static pressure) only low pressure fittings should be used, otherwise delivery rates will be very low, which could lead to customer dissatisfaction.

NOTE 1 For cisterns with both hot and cold high pressure supplies (>1 bar static pressure) any type of fitting may be used, but restrictors may need to be fitted to low pressure fittings to prevent splashing and the overloading of an overflow system.

NOTE 2 High pressure fittings may incorporate features, such as aerated outlets, producing a soft flow of water and alternative flow patterns (especially with shower heads).

NOTE 3 If only one of the supplies is of high pressure, e.g. from the mains, pressure balancing valves, pressure reducing valves or flow limiting valves may be used on the high pressure. Alternatively a pressure boost pump could be utilized to produce balanced pressures.

4.7.3 All sinks, basins, baths, showers and bidets should be connected to hot and cold water supplies.

NOTE For information on UK legislation for water supply, see Annex A.

4.7.4 Water supply fittings used and associated with sanitary appliances should be fitted with servicing valves conforming to BS 6675.

4.8 Water fittings

4.8.1 Appliances that have fittings that have water outlets which could cause splashing should be fitted with a flow regulator and a flow straightening device.

4.8.2 Adequate space should be left around taps to enable ease of use, maintenance and cleaning.

4.9 Hygiene

4.9.1 It is particularly important that sanitary and associated appliances should be assembled and fitted to ensure easy cleaning. Where sanitary and associated appliances abut a floor and/or a wall or walls, the joint between the sanitary and associated appliances and the floor and/or wall or walls should be sealed (see **22.6**).

NOTE Overflows to sanitary appliances may be omitted where greater hygiene is a necessity.

4.9.2 Shower trays and surrounding areas should be easily cleaned to minimize the risk of cross infection of foot ailments.

NOTE This is particularly important in the case of communal showers.

4.9.3 Suitable materials to wipe or to temporarily cover the WC seats before use should be available to the public.

4.9.4 Cleaning products should be provided for hand cleansing.

NOTE 1 The best provision for hand cleansing is soap and warm water as this is the most effective way of removing bacteria from hands.

NOTE 2 In situations where a water supply is not available, germicidal gels can be used for hand cleansing. Although occasional use of germicidal gels is acceptable, it has been shown that reliance on alcohol based gels in cold conditions can lead to mould growths.

4.10 Support

4.10.1 General

4.10.1.1 Supports for sanitary and associated appliances should be fixed in accordance with the manufacturer's instructions. Where walls are used to support sanitary and associated appliances, they should be of a load-bearing construction, e.g. masonry, and be able to carry the applied loads without adverse effects.

4.10.1.2 Pipework or other plumbing should not be used for support or fixing.

4.10.1.3 All fixing screws should be of non-ferrous metal or stainless steel and any brackets or other supports should be protected against corrosion.

4.10.2 Brackets

Brackets should be securely fixed. Where brackets are fixed to thin or lightweight partitions or the inner leaves of cavity walls, special cavity fixing devices should be used.

4.10.3 Floor supports

When sanitary and associated appliances are fixed to floors, the surfaces to which they are fixed should be level. Appliances on pedestals or legs should also be fastened to walls to give added stability, except in those cases where the whole fitting is designed to be self-supporting.

4.10.4 Frames

The suitability of frames for use with particular sanitary and associated appliances should be verified with the manufacturer.

NOTE Frames can be wall mounted or secured to the floor.

Section 2: Selection

5 Baths and shower units

5.1 General

Baths and shower units should be selected in accordance with **5.2** and **5.3** respectively and should also take into account the factors as given in Table 1.

NOTE Although bathing used to have primarily an ablutionary function, it now often has a wellness function that goes beyond simple cleansing into areas of therapy and entertainment. In addition, buildings, and private dwellings in particular, are increasingly for all people's use, so consideration needs to be given to age and disabled access.

Table 1 **Factors to be considered for baths and shower units**

Factor	**Facility/sanitary appliance**					
	Bath	**Whirlpool-bath**	**Shower**	**Recycling-shower**	**Sauna**	**Steam shower**
Space (m^2)	≥2	≥2	≥1	≥1	≥2	≥1
Typical use time (min)	>15	>15	>3	>10	>20	>20
Typical resource use	100 l water at 40 °C	>100 l water at 40 °C	30 l water at 38 °C	10 l/min water at 38 °C when recycling, but pumped producing 300 l/min flows >30 l water at 38 °C at other times, pump power ~400 W	0.5 l water to raise the humidity	20 l/min water at 38 °C when in normal shower mode 0.5 l/min water heated to 100 °C when in steam mode
Hygiene risks (if not thoroughly maintained)	Bath scum can contain faecal matter. Bathing water will contain washed off dirt	As for bath, plus: biofilm in pipes and pumps can develop and enable bacteria to develop. Aerosols from bubbling water can transmit bacteria	Surfaces of cubicle and curtain can enable mould to develop that can exacerbate respiratory problems. Although dirt is washed away from body, the shower heads can develop bacteria leading to contamination of the shower water	As for shower, plus: if recycling is used too early, dirty water will be circulated. The sump and pump may develop biofilms that could encourage bacteria	The wooden surfaces could absorb sweat from users and faecal material, if personal towels are not used. Prolonged exposure to steam can be detrimental to respiratory system	The steam ought to help sterilize the cubicle as long as it is used regularly. Otherwise, as for shower

Table 1 **Factors to be considered for baths and shower units** (*continued*)

Factor	**Facility/sanitary appliance**					
	Bath	**Whirlpool-bath**	**Shower**	**Recycling-shower**	**Sauna**	**Steam shower**
Running cost factors	Water and heat energy	Water and heat energy and pump energy	Water and heat energy	Water, heat energy and pump energy	Water, fuel for coal heater and coals	Water, heat energy and latent heat energy
Function	Ablutionary	Ablutionary and wellness	Ablutionary	Ablutionary and wellness	Wellness	Ablutionary and wellness
Users	All ages with appropriate depths of water	Whirlpool baths need to be filled to at least the level of the jets to function. Users who only require a shallow bath, e.g. children, might not be able to have the moving water functions operating	Not suitable for babies. Level access showers might be acceptable to older people who cannot get in/out of baths	Not suitable for babies. Current models do not have level access due to sump beneath shower floor.	Not suitable for babies or children. Level access might be acceptable to older people who cannot get in/out of baths	Not suitable for babies. Level access showers might be acceptable to older people who cannot get in/out of baths
Accessibility	Need to step in and out, or be assisted	As for bath	Smaller step than a bath, but user will have to stand if a seat is not provided	Smaller step than a bath, but user will not have to stand as a seat is usually incorporated	Walk in through a door and sit on bench	Smaller step than a bath, but user will not have to stand as a seat is usually incorporated
Other	–	Similar attributes would apply to a hot tub	–	Some fully recycling showers are available which use a fixed volume of water	–	Multifunction showers may also be fitted with entertainment, therapy and communication systems

The capital cost should be taken into account.

In all bathing facilities, temperature limited supplies should be used to prevent scalding. This is best achieved by the installation of thermostatic terminal fittings (see Clause **18** and Clause **23**).

If bathing facilities are to be used for prolonged periods, additional ventilation and/or a heat recovery system should be selected and installed to minimize mould and condensation problems.

The dimensions of the space to accommodate and use the sanitary appliances should be determined in accordance with BS 6465-2.

NOTE 1 There will be a wide variation in the sanitary appliances selected due to materials, size, shape and budgets. Family bathrooms will generally be larger than en-suite bathrooms. Residential and hotel bathrooms might need to withstand abuse and limit water use by restriction of flow rates and capacities.

NOTE 2 There are various aids available to improve accessibility to sanitary appliances.

5.2 Baths

5.2.1 A bath should conform to:

a) BS 1189 for baths made from porcelain enamelled cast iron;

b) BS 1390 for baths made from vitreous enamelled sheet steel;

c) BS 4305-1 for baths made from acrylic material;

d) BS EN 232 for the connecting dimensions of all baths;

e) BS EN 12764 for whirlpool baths;

f) BS EN 60335-2-60 for whirlpool and other pumped baths.

NOTE Other baths are available for use by ambulant disabled people and attention is drawn to the various organizations which specialize in equipment for older people.

5.2.2 A bath should have a bottom with a fall to the outlet.

5.2.3 Where high bath sides are a problem, devices to assist the bather to enter and leave the bath, e.g. grab rails, should be considered.

NOTE 1 Baths with removable or hinged sides are available but bathers have to sit in the bath whilst it is filling and emptying, which will increase bathing time.

NOTE 2 A bath with a stepped bottom to form a seat (sitz bath) is useful where floor space is restricted.

5.3 Shower units

5.3.1 The type of shower (electric, mixer or power shower) should be selected so that it is compatible with the water supply system in the building.

NOTE Generally, electric showers only provide limited flows at acceptable temperatures. Pumped showers will require dedicated supplies and large volumes of stored water. High pressure mains fed systems may not need pumps to obtain "power-shower" flow rates.

5.3.2 Shower trays, available in various types, should conform to relevant parts of BS 6340 and should have connecting dimensions in accordance with BS EN 251.

5.3.3 Shower enclosures should conform to BS EN 14428.

5.3.4 Where it is necessary to provide unimpeded access to a shower facility a level floor should be used. This may require the construction of a wet room that has a fully water-tight floor, with a floor drain or appropriate shower drain.

*COMMENTARY ON **5.3***
A shower could be more economical in energy and water consumption and more convenient to use than a bath.

6 Bidets

Over rim supply bidets, both floor mounted and wall hung, should conform to BS 5505-3 and BS EN 14528 and should have connecting dimensions in accordance with BS EN 35 and BS EN 36.

*COMMENTARY ON CLAUSE **6***
There are two main types of bidets, over rim supply and rising spray. They can be either floor mounted or wall mounted (where an unrestricted floor is required).

Bidets are no longer fitted as standard in UK bathrooms, mainly due to space limitations and complexity of the plumbing. Although they are intended to be used to cleanse the parts of the body between the legs, they are used in various alternative ways, such as a wash basin for young children or as a foot-bath.

7 Sinks and drainers

7.1 General

7.1.1 Domestic sinks should be fitted with a drainer or drainers, preferably integral with the sink. Certain types of sinks, including combination sinks, are not reversible and should be ordered with the bowl/drainer to the right- or left-hand side for right- or left-handed use as needed.

7.1.2 Sinks and drainers made from glazed fireclay should conform to BS 1206 and/or BS EN 13310.

7.1.3 Sinks made from enamelled steel, enamelled cast iron, stainless steel and synthetic materials should conform to BS EN 13310.

7.1.4 Connecting dimensions for kitchen sinks should be in accordance with BS EN 695.

7.2 Sinks

The type of sink to be installed should be selected according to its intended use as given in Table 2.

7.3 Drainers

Wherever possible, drainers should be an integral part of a sink and should be designed to direct water freely into the sink. There should be raised edges on three sides to prevent spillage.

Table 2 **Sinks**

Type of sink	**Comment**
Belfast sink	Belfast sinks have an integral weir overflow. They are usually reversible and made in a range of standard external sizes, some of which are covered in BS 1206
London sink	London sinks are similar to Belfast sinks but do not incorporate an overflow
Shelf sink	Shelf sinks have an integral back shelf having tap holes to receive the supply fittings. They are available with or without an overflow
Combination sink	Combination sinks are sinks with single or double integral drainers
Double sink	Double sinks have two separate compartments that have separate waste outlets
Multiple bowl sink	Multiple bowl sinks are formed, or inset, with various numbers of whole and or half bowls. The bowls often have large outlets with basket strainers and these can be easily fitted with waste disposal units (see Clause **12**)
Drip sink	Drip sinks are small sinks designed to catch drips from taps after vessel filling
Bucket sink	Bucket sinks are fitted at or near floor level and are provided with a hinged or removable metal grating on which to rest buckets. Some have a high back skirting to protect the adjacent wall surface from splashing. These should be provided with hot and cold water taps mounted either through holes in the high back or on the wall above the sink. Where pressures are low, size 3/4 taps should be fitted so that buckets can be filled quickly. Bucket sinks are normally fitted with a plug and chain waste. Bucket sinks are preferable to cleaner's sinks for health and safety purposes where buckets of water needed for cleaning will be lifted
Cleaner's sink	Cleaner's sinks are fitted at normal height. They are fitted with hot and cold water taps and where pressures are low, these should be size 3/4. If made of fireclay, they should be fitted with a protective strip on the front edge to prevent damage. They are normally fitted with a plug and chain waste

8 WC suites, WC pans, WC seats and urinals

8.1 WC suites

8.1.1 General

8.1.1.1 All WC suites should conform to BS EN 997:2003, Class 2. Vacuum toilets should also conform to BS EN 12109:1999, Annex D.

NOTE Attention is drawn to Annex A for legislation on water supply, which includes requirements for the performance of WC suites.

8.1.1.2 WCs for disabled people should conform to BS 8300:2001, Clause **12**.

8.1.1.3 When selecting the type of WC suite to be used, the options for the WC features as given in Table 3 should be taken into account.

NOTE The use of a WC with a dual or other reduced flush cistern saves water because a smaller volume of water is used during flushing.

8.1.1.4 A single operation of the WC flushing device should clear all normal waste matter from a WC pan, the flush being distributed over the internal surface of the pan to cleanse every part without splashing onto the seat or the floor.

8.1.1.5 The resulting assembly of components, especially when selected from different manufacturers, should be adjusted for correct fit and operation as necessary.

NOTE 1 Adjustments could include modifications to flush pipe size or adjusting the height of the cistern and changing the height and make of siphon or valve.

NOTE 2 WCs produce noise from use, flushing and refilling. Refilling noise depends on water pressure, valve action and pipework detailing. WCs and associated pipework fitted to lightweight walls and floors will transmit more noise than those fitted to heavy masonry walls and concrete floors.

8.1.1.6 WCs and urinals should be ordered as a suite to ensure compatibility. The component parts of the suites should be identifiable at all times including during delivery, storage and handling on site.

Table 3 **WC feature**

Cistern location	Pan location	Flushing
High-level	Wall-hung	Siphon-flushed
Low-level	Floor-mounted	Valve-flushed
Close-coupled	Back-to-wall	Dual-flush
Concealed		Interruptible-flush
		Single-flush
		Waterless closet

8.1.2 Cistern and cistern location

8.1.2.1 Selection

8.1.2.1.1 Cisterns should conform to BS EN 997:2003, Class 2 unless they are replacement cisterns conforming to BS 1125 or BS 7357.

8.1.2.1.2 Float operated valves should be selected to suit the water pressure and conform to BS 1212-2, BS 1212-3 or BS 1212-4.

8.1.2.2 High-level WC suite

NOTE The arrangement for high-level WC suites with wall-mounted cistern approximately 2 m above the floor provides the greatest amount of potential energy for flushing. The flush pipe connecting the cistern to the pan can be supplied, in one, two or more sections. The typical diameter of a high-level flush pipe is 35 mm. It is essential that pans for use with high-level cisterns have flushing rims designed to utilize the high velocity flush water without undue splashing. Although this arrangement used to be commonplace in both domestic and other situations, where the cistern was often concealed in a duct, it is now generally only used for replacement purposes.

8.1.2.3 Low-level WC suite

In the case of the low-level suite, the cistern should be wall mounted with its base about 0.3 m above the pan.

NOTE 1 The pan and cistern are usually connected using a 38 mm diameter flush pipe. A low-level suite can have its cistern duct mounted.

NOTE 2 The low-level suite is the most common and usually the cheapest to purchase.

8.1.2.4 Close-coupled WC suite

NOTE For the close-coupled suite, the cistern is directly attached to the pan. Although some suites are free-standing some also require wall fixing for stability. The low head of water available from the cistern requires careful design of the pan's waterways to produce an effective flush action. Due to the compact dimensions of this type of suite they have become very popular in domestic situations.

8.1.3 WC pan location

8.1.3.1 Wall-hung WC pans should only be used with loadbearing walls or where support frames are provided.

8.1.3.2 Back-to-wall type WC pans should be used where easy cleaning and a greater degree of hygiene is of importance.

*COMMENTARY ON **8.1.3***
WC pans can be fixed to the floor, wall or both. Pans are generally floor-mounted for ease. However, wall-hung WC pans can have the advantage that the floor is unrestricted, a matter that could be of importance in hospitals, schools, public toilets, factories and similar buildings.

8.1.4 Flushing

The type of flush should be selected in accordance with the flush characteristics described in Table 4.

NOTE Concerns have been raised regarding the bacteria spreading aerosols that can be generated when flushing a WC. Such aerosols can rise 2 m and cover a large area. One way of limiting the aerosol spread is to flush the WC with the cover closed. This is possible with single and dual flush WCs, but not practicable with interruptible flush operation.

Table 4 **Flush characteristics**

Characteristic	**Flush**	**Comments**
Flush mechanism	Siphon	Although siphons require little maintenance, when a diaphragm does eventually require replacement, the whole siphon normally has to be removed. A two-part siphon simplifies this task by enabling the operation to take place without turning off the water or removing the siphon base from the cistern. Siphons are inherently failsafe. Siphons are also known as wastewater preventors (WWPs)
	Valve	Valves are generally easier to operate than siphons due to the lower masses that have to be moved. Valves are more likely to leak than siphons. Replacement of valve seals is usually accomplished without having to remove the outlet fitting from the cistern
Type of flush	Single	A single flush volume delivers the same amount of water at each operation (assuming that the cistern has been fully refilled)
	Dual	A dual-flush option provides users with a choice, a short flush for liquid waste and a longer flush for solid waste. The default flush is the full flush, the short flush needs to be selected. Previously, with siphons the default flush was the short flush (or half flush) which was terminated when the water level dropped below the top of the piston chamber, admitting air into the water flow and breaking the siphon action. However, since the introduction of Water Supply (Water Fittings) Regulations 1999 (as amended) [7] into England and Wales, the default has been the full flush and action must be taken to reduce it. For a siphon flush, the flush is controlled by the handle being pushed and either released (default) or held down. With a valve flush, a dual flush action usually utilizes two separate buttons (or equivalent) and operation rods. The controls may open or close additional valves or effect the duration of valve opening by some means; the result is a short and a long flush
	Interruptible	An interruptible flush is an interactive operation mode that requires the user to operate the flushing device until they think that the pan is clear of waste. For an interruptible-flush siphon, the flush handle is held until the pan clears, and then released. However, if when the water flow has ceased it is apparent that the pan is not completely clear, the siphon action cannot be restarted until the cistern has refilled. With an interruptible-flush valve, if the flush is stopped, by releasing the operation button, it may be re-started immediately (if there is sufficient water left in the cistern) as no siphon priming is required. Interruptible and, to a lesser extent, dual flush is not as applicable to non-domestic applications as to domestic. This is due to the level of participation required by the user could lead to partial flushing of WCs and associated drain blockages due to too little flush water. However, in an environmentally conscious organization such options might be applicable

Table 4 **Flush characteristics** (*continued*)

Characteristic	Flush	Comments
Alternative flushing options	Electronic control	One way of achieving accurate flush volume control is to minimize user variations by utilizing electronic controls and electric water flow valves. The valves can be operated by low voltage or mains supplies. Electronic controls can be programmed to provide a choice of flush volume or a consistent flush volume. Such systems also offer the options of no-touch operation, no moving parts for the operator, easier operation by blind or disabled people, anti-ligature controls and easier cleaning
	Pressure flushing valves	Pressure flushing valves are especially suited to high usage situations. The absence of flushing cisterns allows rapid availability of WCs with no waiting for cistern to refill. However, if a valve fails, or is held open, a significant volume of water can be wasted. Pressure flushing valves conforming to BS EN 12541 are available. Attention is drawn to UK legislation for water supply (see Annex A), which does not permit the use of pressure flushing valves in private dwellings. Although pressure flushing valves are compact, they are required to be used with backflow prevention devices to protect the quality of the water supply. UK legislation (see Annex A) requires that where pressure flushing valves are connected to supply or distributing pipes, the flushing arrangement has to incorporate a permanently vented pipe interrupter mounted not less than 300 mm above the spillover level of the WC. Also, the water supply system is required to be capable of delivering a minimum flow rate of 1.2 l/s at the appliance
	Flush or no-flush	In most situations a conventional flushing cistern will be applicable. However, where nutrient recycling is required, separating WCs are available that collect urine and solids separately for subsequent composting and soil fertilization. Also, conventional WCs can be fitted with external vortex separators to divide the solids from the liquid waste. Separation is not required if water flushing is not used. Not all WCs need to be flushed, dry or waterless closets are available. These range from individual units to multiple units. Individual units tend to be less ecological as they often require heat energy to decompose the waste matter; this may be by combustion, desiccation or drying. Large units usually have sufficient waste matter decomposing to produce exothermic reactions that need no additional energy to compost the waste. A fan might be required to help ventilation or produce a negative pressure in the container (vault) to contain odours. If there are no drains or sewers nearby, or an ecological environment is required, a waterless closet might be applicable. However, additional space will be required for the "soak" bulking and covering material such as sawdust, wood shavings and other degradable waste. Some types will compost general household degradable waste. Generally, the larger the system the more tolerant of waste type it will be. Waterless closets tend to be more expensive than conventional WCs, especially the smaller capacity ones, but are often perceived as cheap and objectionable to use by the public. The sight of previous user's waste in the vault below the seat can be off-putting and the need to sprinkle sawdust, or other soak material, into the vault after every use requires interaction by the user. Further information on waterless urinals is given in **8.4.6**

NOTE Attention is drawn to water supply legislation in Annex A for information on overflow options and provision. The choice between valve and siphon has become less distinct since the legal requirement for an external overflow has been relaxed.

8.2 WC pans

8.2.1 General

8.2.1.1 When selecting WC pans with connecting dimensions conforming to BS EN 33 and BS EN 37, due to the wide dimensional tolerances within these standards, the height of the horizontal outlet of the selected pan should be appropriate for the drainage pipework on site.

8.2.1.2 WCs pans should be selected depending on the features of the WC suite (see **8.1.1**).

8.2.1.3 Special WC pans, such as squatting WC pans and children's WC pans, should be selected in accordance with **8.2.2** and **8.2.3** respectively.

8.2.2 Squatting WC pans

The squatting plate should be integral with or designed to suit the pan.

NOTE Squatting WC pans are designed to be used without a seat. They consist of a bowl and a squatting plate, i.e. an impervious surround which normally has slightly raised foot treads.

8.2.3 Children's WC pans

The height of the WC pan should be appropriate to the intended age group.

NOTE Children's WC pans have similar dimensions to conventional pans except that they are considerably lower in height and can be fitted with smaller seats.

With some designs of conventional wall-hung pans their fixing height can be lowered to enable children to use them easily.

*WC seats are available that incorporate smaller seats within the lid to accommodate children (see **8.3**).*

8.3 WC seats

8.3.1 General

8.3.1.1 WC seats and covers should be impermeable.

NOTE Plastic seats and covers conforming to BS 1254 are available.

8.3.1.2 For public toilets, seats should preferably be flat on the underside as they are easier to clean than seats that are hollow on the underside.

8.3.1.3 There should be a complete absence of ribs or recesses on the underside of any seat cover.

8.3.2 Ring seat

The ring seat is the simplest type of seat and should be selected as the most suitable for general use.

NOTE Open front seats are available but BS 8300 states that these are not suitable for use by disabled people.

8.3.3 Seat with cover

8.3.3.1 A ring seat with cover should be selected as the most suitable for domestic use.

8.3.3.2 When deciding whether to use a seat with a cover, consideration should be given to the advantages and disadvantages shown in Table 5.

NOTE Seats are available with covers that form small seats that are suitable for children. By providing such seats in appropriate facilities, children can more safely use conventional (adult) WCs.

Table 5 **WC seat cover**

Advantages	Disadvantages
Provides a bathroom seat	Encourages overload of the seat if used as a step
Reduces risk of foreign objects falling into the WC pan and leading to drain blockages	Can fall onto WC pan or anatomy causing damage or pain
Minimizes aerosol effect of bacteria dispersal during flushing	Can lead to bacterial transfer if not thoroughly and frequently cleaned

8.3.4 Hinges

Where WC suites are to be selected for use in public areas, hinges should be robust, for example chromium plated brass or stainless steel hinges in accordance with BS 1254.

8.4 Urinals

8.4.1 General

Urinals should conform to:

a) **8.4.2** for bowl urinals;

b) **8.4.3** for slab urinals;

c) **8.4.4** for stall urinals;

d) **8.4.5** for trough urinals;

e) **8.4.6** for waterless urinals.

*COMMENTARY ON **8.4.1***
The provision of urinals, instead of WCs, can reduce installation costs and water consumption. However, substitution of WCs by urinals can limit the flexibility of sanitary installations with varying ratios or locations of female users.

Urinals can be installed individually or in ranges. Some slab urinals are manufactured in one piece thus reducing the number of joints in the installation.

The traditional material for slab urinals is glazed fireclay. Vitreous china is commonly used for bowl type urinals. Stainless steel and glass reinforced plastics (GRP) are alternatives for both slab and bowl urinals. They have the advantage in some applications of lighter weight.

Stainless steel provides freedom from breakage and chipping.

Urinals are also produced in moulded plastics. Like stainless steel and GRP, they have the advantage that a range can be moulded in one piece, thereby eliminating joints.

Moulded plastic and GRP urinals are susceptible to cigarette burns.

Shoe protection screens can be fitted to slab and stall urinals. They are applicable in locations where dress shoes are likely to be worn, such as restaurants, conference centres and opera houses. They are usually glass and require careful cleaning.

8.4.2 Bowl urinals

8.4.2.1 Bowl urinals are less restrictive to planning and should be used where floor movement might occur.

8.4.2.2 Vitreous china bowl type urinals should conform to BS 5520.

*COMMENTARY ON **8.4.2***
Bowl urinals are the most commonly used type. They are wall hung and feature an extended lip.

An individual spreader is usually provided to ensure that the flushing water washes the whole of the internal surface of the bowl likely to be fouled.

Independent divisions can be fitted between bowl urinals to increase privacy for users but they introduce additional surfaces to be cleaned.

8.4.3 Slab urinals

8.4.3.1 The ends of ranges of slab urinals or both sides of an individual slab urinal should be returned, i.e. have finishing sides, in the same material.

8.4.3.2 Sparge pipes or individual spreaders should be provided to flush the whole of the surface likely to be fouled.

8.4.3.3 Stainless steel slab urinals should conform to BS 4880-1.

*COMMENTARY ON **8.4.3***
Slab urinals consist of flat impervious slabs which can be ordered in various lengths and can be provided with divisions projecting approximately 230 mm for part of the height to increase privacy. Stainless steel and glass fibre can be provided as one piece units. Longer glazed fireclay slab urinals are made up of components approximately 600 mm long.

The discharge from the slab is by a channel provided with a trapped outlet.

Concealed flushing is preferred to deter vandalism.

8.4.4 Stall urinals

Flushing should be by means of a spreader to each stall to cleanse the surface likely to be fouled.

*COMMENTARY ON **8.4.4***
Stall urinals consist of curved backs with integral side divisions supplemented by rolls and wings which cover the joints when stalls are fixed in ranges. The discharge from stalls is by means of an integral channel which is connected to a trapped outlet. Individual stalls are available, each provided with a trapped outlet.

Stall urinals can be heavy, might take up more space and, unless designed with great care with all angles rounded, are more difficult to keep clean. They can afford greater privacy than other types.

8.4.5 Trough urinals

The back of the trough should extend to at least 450 mm above the level of the front lip.

NOTE Trough urinals are similar to slab urinals but instead of a floor level channel they use a wall mounted trough. Flushing can be by sparge pipe or spreader.

8.4.6 Waterless urinals

*COMMENTARY ON **8.4.6***
Waterless urinals may be complete units, or devices that can be installed in the waste outlets of conventional bowls and troughs.

Waterless urinals do not need a fixed water supply, but may be regularly wet cleaned for aesthetic and hygienic purposes.

Waterless urinals can be divided into two main classes, those that require maintenance – serviced, and those that do not require regular maintenance – non-serviced.

Serviced urinals contain elements that need regular replacement. The elements may perform one or more of the following functions:

a) odour suppression;

b) pipe deposit suppression and removal;

c) improve drainage of urine from surfaces.

The elements may be solids, liquids, cartridges or surface coatings. Due to their servicing needs, they may be rented or on contract hire, and not owned by the building owners.

Non-serviced urinals do not use replaceable elements. Their operating fluids may be air, oil or urine.

Air-flushed urinals may require a low power fan to generate airflow, this can be solar powered, battery or mains operated.

The urine from a waterless urinal may be collected for garden fertilization, or disposed of conventionally.

9 Washbasins, wash fountains and washing troughs

9.1 Washbasins and related types of basin

9.1.1 General

The type of basin to be installed should be selected from **9.1.2** to **9.2** according to its intended use.

9.1.2 Washbasins

Washbasins should conform to BS 5506-3 and should have connecting dimensions conforming to BS EN 31or BS EN 32.

NOTE Washbasins are usually made from ceramic, metal or plastics. However, plastic materials are susceptible to cigarette burns.

9.1.3 Hand rinse basins

Hand rinse basins should have connecting dimensions in accordance with BS EN 111. Hand rinse basins made of metal should conform to BS 1329.

NOTE Hand rinse basins are smaller than washbasins and used for hand washing only.

9.1.4 Pedestal-mounted washbasins

Pedestal-mounted washbasins should have connecting dimensions in accordance with BS EN 31.

9.1.5 Semi-pedestal washbasins

Semi-pedestal washbasins should have connecting dimensions in accordance with BS EN 31 or BS EN 32.

NOTE They usually conceal pipework.

9.1.6 Vanity basins

Vanity basins should be inset into or fixed beneath a vanity top or installed into bathroom furniture.

9.1.7 Hospital basins

NOTE Hospital basins can be used where hygiene is of prime importance. They have no tap holes or an overflow hole.

9.2 Wash fountains and washing troughs

9.2.1 A washing trough should comply with BS EN 14296.

9.2.2 Wash fountains and washing troughs should be provided with a supply of temperature-controlled water delivered through spray outlets.

*COMMENTARY ON **9.2***
Wash fountains consist of a large bowl supported on a pedestal, having a central column rising from the bowl carrying a number of spray heads.

Washing troughs can be used where the layout of the building or operational circumstances indicate a linear arrangement of washing facilities. Units can be fixed individually or in ranges with the top of the rim about 900 mm above finished floor level for adult use.

10 Drinking water dispensers

The type of drinking water dispenser should be selected according to its intended use.

*COMMENTARY ON CLAUSE **10***
A large variety of drinking water dispensers are available for installation in commercial and industrial buildings, leisure and other locations. All these machines are available in sizes to suit the situation of installation and use.

A drinking water dispenser can be:

a) a mains fed water cooler;

b) a bottle fed water cooler;

c) a cup filling water dispenser providing hot (85 °C) and/or cold (10 °C) water; or

d) a drinks vending machine.

11 Drinking fountains

The jet nozzle should be at least 25 mm above the spill-over level of the bowl and should be shielded in order to protect it from contamination by the mouth of users.

NOTE Drinking fountains can be wall or floor mounted according to their location.

12 Waste disposal units

12.1 Industrial waste disposal units should be designed to operate automatically when the water is turned on.

12.2 Units which have a means of reversing the impeller should also be fitted with safety guards.

*COMMENTARY ON CLAUSE **12***
Industrial waste disposal units can be self-contained, free standing units or of a type which can be fitted into a worktop with a purpose made stainless steel hopper inlet. Free standing types are available with stainless steel or enamelled metal cabinets.

Domestic waste disposal units can be either batch or continuous fed. They are usually fitted in kitchen sink waste outlets. Some units are provided with a means of reversing the impeller, thus prolonging the life of the cutter ring.

13 Associated appliances

13.1 Hand-drying facilities

13.1.1 Hand-drying facilities should be selected taking account of the advantages and disadvantages shown in Table 6.

13.1.2 More than one hand drying option should be selected in toilets to safeguard against power cuts, product failure and laundry failures.

*COMMENTARY ON **13.1***
It is important to dry hands after washing as the rubbing and drying process can remove significant numbers of bacteria.

The bacterial transfer and proliferation issues associated with each form of hand-drying facility are mainly dependent upon the level of maintenance and servicing to which they are exposed.

The level of anticipated supervision and frequency of maintenance will also be deciding factors in selecting from the options.

Table 6 **Hand drying options**

Option	Advantages	Disadvantages
Individual terry towels	Low risk of cross-contamination Luxury status	Higher running cost (only used in limited establishments) Regular supervision of toilets required to check supply levels Laundry costs Risk of theft Storage of clean and used towels is required
Paper towel dispenser	No laundry costs Low risk of cross-contamination	Regular supervision of toilets required to check supply levels Storage and disposal of used paper towels is required Generates waste Risk of improper disposal of paper towels, e.g. being flushed down the WC, leading to blockages
Electric dryer	No laundry costs No waste generated Low risk of cross-contamination No regular supervision of toilets required to check supply levels Heat generated during operation may raise the air temperature reducing the need for additional space heating	Requires mains electricity supply (2 kW to 3 kW consumption) Can create queues as only one person can use a dryer at any time Can be noisy in operation Heat generated during operation may raise the air temperature increasing the need for ventilation or space cooling
Roller towel	No waste generated Used towel stored within the machine	Regular supervision of toilets required to check supply level If the towel jams or runs out a high risk of cross-contamination is created
Loop towel	Low cost	High risk of cross-contamination Difficult to determine when laundry of towel is required
Integrated wash and dry unit	Relatively compact No waste generated Vandal resistant	High purchase and installation cost Can create queues as only one person can use the device at a time Requires mains electricity supply (2 kW to 3 kW power consumption)
Combined paper towel and electric dryer	Reduces time of drying compared to just electric dryer	Regular supervision of toilets required to check supply levels Storage and disposal of used paper towels is required Generates waste Requires mains electricity supply (2 kW to 3 kW power consumption)

13.2 Sanitary protection vending machine

A sanitary protection vending machine should be provided in a toilet for females but not within a WC cubicle.

13.3 Sanitary disposal units

13.3.1 General

Solid waste should be stored in accordance with BS 5906.

13.3.2 Female sanitary protection

A sanitary disposal unit should be provided in every female WC cubicle with sufficient space provided to ensure that it does not encroach into the area around the WC pan and come into contact with a seated user.

13.3.3 Babies' nappies

A baby changing facility should be provided with a sanitary disposal unit and include access to a WC to act as a sluice and a washbasin with hot and cold water. Also, an impervious surface large enough for the child to lie upon should be provided.

13.3.4 Continence aids

A sanitary disposal unit should be provided for people using continence aids and placed in all toilets for disabled people, in order to ensure privacy for the user.

Section 3: Installation

14 General

14.1 The minimum number of sanitary and associated appliances should be determined in accordance with BS 6465-1.

14.2 The dimensions of the space to accommodate the sanitary and associated appliances should be determined in accordance with BS 6465-2.

14.3 Where the sanitary and associated appliances are to be installed in an existing room, BS 6465-2 should be referenced to ensure that the proposed number of sanitary and associated appliances can be accommodated.

14.4 Installation of sanitary appliances should be in accordance with BS 8000-13. The arrangement of sanitary appliances should be such as to facilitate simple drainage. Excessive pipe runs and the need for pumps should be avoided.

*COMMENTARY ON CLAUSE **14***
In England and Wales, levels of provision of sanitary appliances is covered by Building Regulations 2000: Approved document G – Hygiene *[8], and* Approved document M – Access to and use of buildings *[2].*

In Scotland, levels of provision of sanitary appliances are covered by Building (Scotland) Regulations 2004: Technical Handbook – Non-domestic *(see Section 3) [3] and* Building (Scotland) Regulations 2004: Technical Handbook – Domestic *(see Section 3) [4].*

In Northern Ireland, some aspects of levels of provision of sanitary appliances is covered by the Building Regulations (Northern Ireland) 2000 Technical booklet P – Unvented hot water storage systems *[9] and* Technical booklet R – Access and facilities for disabled people *[5].*

In general, the requirements of the national regulations will be met by complying with the requirements and guidance of these British Standards:

- *BS 6700 for water supply pipework;*
- *BS EN 12056 (all parts) for above ground drainage;*
- *BS EN 752 (all parts) for below ground drainage;*
- *BS 7671 for electrical installations.*

15 Baths, shower units and bidets

15.1 Baths

15.1.1 Supports should be adjustable to permit a bath to be properly levelled when installed.

15.1.2 Bearing plates should be provided under bath feet to protect compressible floors.

15.1.3 The rim of the bath should be near horizontal and there should be a permanently watertight seal between the wall and edges of the bath (see **22.6**).

15.1.4 Bathrooms are usually planned so that the bath has one long side against the wall, but this should not be under a window.

NOTE *For hospital or similar uses, baths might need to be end on to a wall or free standing to facilitate the care of patients.*

15.2 Shower units

15.2.1 Adequate space should be provided in accordance with BS 6465-2 to ensure convenience in use, including the storage of clothes and towels, and also to facilitate maintenance and cleaning.

15.2.2 Tiled surfaces in shower units should be laid with waterproof adhesive and grout.

15.2.3 Wallboards in shower units should be waterproof.

15.2.4 Provision should be made to enable access to the shower tray trap for maintenance. In addition, the shower waste system should be adequate for the discharge.

NOTE *This is especially important if high flow rate multi-head shower systems are used.*

15.2.5 The floor and tanking in a wet room should be completely sealed to prevent ingress of water.

15.2.6 As high levels of humidity can be produced in shower rooms, ventilation should be provided to minimize condensation and mould growth.

NOTE *As the air in a shower room is likely to be warm, the use of a heat recovery ventilation system would be beneficial in terms of conserving energy.*

15.3 Bidets

15.3.1 A bidet should be installed with approximately 200 mm of clear space either side so the user can sit astride it.

NOTE *An 800 mm wide space would be adequate to accommodate a bidet and its user. BS 6465-2 gives further recommendations for the space requirements.*

15.3.2 Floor-mounted bidets should be set on a level floor. Where fixing screws are used, they should be non-ferrous or stainless steel. Wall-hung type bidets should be fixed directly to load bearing walls by bolts, or alternatively and for non-load bearing walls, by bolting to a support frame.

NOTE *Support frames, depending on their design, are either fully or partially fixed within the walls or are fixed to walls/floor within a duct.*

15.3.3 The water supply to a bidet should be installed in accordance with BS 6700.

NOTE *Attention is drawn to water supply legislation in Annex A for information on minimizing backflow, scalding and contamination risks.*

16 Sinks and drainers

16.1 Sinks

16.1.1 Sinks and drainers fitted as independent sanitary appliances should be supported on cantilever brackets, in order to avoid the use of leg supports. Where the sink and drainer are fitted as part of a kitchen unit, the methods of support should be incorporated in the unit.

16.1.2 The height from the top of the surround edge of a sink with integral drainer should not exceed 900 mm.

16.1.3 The sink should be manufactured so that water drains readily to the outlet when the top edge is level.

16.1.4 Where individual taps are used, they should be situated so that the outlets are close enough to enable filling of a vessel simultaneously.

16.1.5 Tap outlets should be at an appropriate height above the inner base of the sink to facilitate vessel filling.

16.1.6 Where sinks are built into worktops or units, the joint between the rim of the sink and the surrounding worktop should be sealed.

16.2 Drainers

Where drainers are not an integral part of the sink unit, they should be separate but set angled for good drainage and have adequate throating, or an overhanging lip on the sink-edge to prevent water running back on the underside of the drainer.

NOTE Long industrial type drainers might need intermediate support.

17 WC suites, WC pans, WC seats, urinals and flushing cisterns

17.1 WC pans

17.1.1 When floor-mounted WC pans are installed on flexible floors or on a sound absorbent pad, it is essential that a flexible joint is made on the outlet of the WC pan.

17.1.2 The joint between the underside of the WC pan and the floor should be sealed.

17.1.3 Back-to-wall and wall-hung pans should be sealed where contact is made with the wall and the floor.

17.1.4 All floor-mounted WC pans should be secured to the floor using non-ferrous or stainless steel fixing screws or manufacturer's specialist fixings.

17.1.5 Where WC pans are installed on solid floors, it is essential that provision is made in the floor to receive the fixing screws.

17.1.6 Cement/sand mortar should not be used for bedding. Where it is used for pointing, it should not be richer than 1:6, not thicker than 5 mm and should only be applied around the bottom edge of the pan. Alternatively, the bottom edge can be sealed with mastic.

17.1.7 Wall-hung WC pans should be fixed directly to load bearing walls by bolts, or alternatively for non-load bearing walls, by bolting to a support frame. It essential that the correct fixings are used in accordance with manufacturers' instructions to prevent the wall-hung WC pans becoming detached from the wall during use.

NOTE Support frames, depending on their design, are either fully or partially fixed within the wall and/or floor.

17.1.8 A WC pan should not be fitted against internal walls, especially bedroom walls, so that sound transmittance problems are minimized.

*COMMENTARY ON **17.1***
There are various methods of jointing the outlets of WC pans to drains or discharge pipes of different materials to achieve rigid or flexible joints. Purpose made flexible connectors are available and are preferred because their use enables the WC pans to be removed for the clearance of an obstruction.

17.2 WC seats

17.2.1 A seat, and cover where fitted, should be fitted directly to the WC pan or suite with robust hinges, for example, hinges as specified in BS 1254.

17.2.2 The seat should be stable in both the raised and lower positions.

17.3 Urinals

17.3.1 General

17.3.1.1 The likelihood of water and urine penetration should be taken into account when considering the exact location for installation, i.e. the areas behind, under and around the urinal.

17.3.1.2 The floors of urinal compartments should be impervious.

17.3.1.3 With bowl type urinals, the floor and wall are likely to become soiled and so it is essential that the surrounding walls and floor are covered with non-absorbent materials.

17.3.1.4 Ranges of slab or stall urinals should be provided with floor treads draining towards the channel. The divisions and channel blocks should be jointed in cement and all pointing carried out in waterproof grout. A waterproof membrane should also be provided under the slab and adjoining floor, dressed into the outlet, to avoid seepage through the joints in the floor.The waterproof membrane should be carried up the face of the wall to the height of the fitting. Slab urinals should slope forwards towards the channel to ensure that the flushing water flows over the surface.

17.3.1.5 Bowl urinals and trough urinals should be installed so that the front lip is 610 mm from the finished floor level; however, provision should be made for use by shorter people and/or children. In all cases, the manufacturer's installation instructions should be followed.

17.3.1.6 Where independent divisions are used between bowl urinals to increase privacy, they should be securely fixed to the wall surface.

17.3.1.7 Trough urinals should be rigidly supported along the whole of their length and should discharge into a trapped outlet.

17.3.2 Waterless urinal

17.3.2.1 New installation

When installing a waterless urinal from new:

a) steep gradient discharge pipework should be used to minimize urine pooling and assist the flow of urine sludge;

NOTE Angles of between 20° and 40° are suitable.

b) due to the corrosive nature of urine, pipework for waterless urinals should not be metal, in particular copper pipes and traps should not be used.

NOTE Push-fit joints may be used in the waterless urinal pipework to aid maintenance because they enable the pipework to be more easily disassembled. However, to reduce the risk of unwanted disassembly, demountable threaded fittings may be used.

17.3.2.2 Conversion of existing water flushed urinal

If an existing urinal is to be converted to waterless operation, as much as possible of the pipework solely used by the urinal should be replaced in accordance with **17.3.2.1**.

17.4 Flushing cisterns for WCs

17.4.1 Cisterns should be:

a) supported by direct wall fixing;

b) supported by brackets;

c) close coupled to the WC pan; or

d) installed using a combination of a) to c).

NOTE Attention is drawn to water supply legislation in Annex A for information on overflow options and provision.

17.4.2 For non-domestic situations, a cistern should be checked to ensure that a maximum cistern filling time of 50 s is obtained.

NOTE This may be achieved by changing the seating of the water inlet valve or adjusting an inlet flow restrictor.

17.5 Pressure flushing valves for WCs and urinals

17.5.1 Pressure flushing valves should not be installed in a house or in any other building, where a minimum water supply flow rate of 1.2 l/s cannot be achieved at the sanitary appliance.

17.5.2 Where a pressure flushing valve is connected to a supply pipe or distributing pipe the flushing arrangement should incorporate a backflow prevention device consisting of a permanently vented pipe interrupter located not less than 300 mm above the spillover level of the WC pan or urinal.

17.6 Flushing cisterns for urinals

17.6.1 Flushing is usually by means of an automatic cistern which should conform to BS 1876 and be arranged to discharge its contents by siphonage at intervals determined by the rate at which the water is fed into the cistern.

17.6.2 The filling rate for a single bowl, stall or slab of 700 mm width or less, should not exceed 10 l/h. For multiple bowls, stalls or widths of slab greater than 700 mm, the maximum filling rate should not exceed 7.5 l/h.

17.6.3 The flush pipe should be such that the contents of the cistern are discharged in accordance with BS 1876 and the flush should be evenly distributed to the urinals. All pipework and spreaders should be of non-ferrous metal or stainless steel.

*COMMENTARY ON **17.6.3***
Electronic detectors are also available which ensure that flushing only occurs when a room or the urinals are in use.

Attention is drawn to water supply legislation in Annex A.

18 Washbasins, wash fountains and washing troughs

18.1 Water supply and waste connections should not be used to support the sanitary appliance.

18.2 Where spray taps or aerated taps are installed, water supply pressure and temperature should be provided as appropriate to the design of the water supply system.

NOTE For example, a re-circulated loop is required for spray taps and there are implications for legionella prevention regarding the required water supply temperature.

18.3 Where children or older people are likely to use sanitary appliances with hot water supplies, temperature limited terminal fittings should be used to provide safe hot water temperatures.

NOTE This may necessitate the use of thermostatic mixing valves (TMVs). For further information on TMVs see BS EN 1111 and BS EN 1287 and BS 7942.

19 Drinking water dispensers

19.1 Some drinking water dispensers may need an electrical supply which should be in accordance with BS 7671.

NOTE Vending machines dispensing bottled water require no water supply connection. Bubblers and some types of vending machines, including cup filling models, require a drain connection. Other drinking water dispensers, such as drinking fountains, require both a water supply and a drain connection.

19.2 Drinking water dispensers (including drinking fountains) should be fitted at a height that will permit use by all intended users including children and wheelchair users.

19.3 Firm anchorage of these appliances should be ensured, particularly when they are installed in a vandal-prone location.

19.4 Materials should be selected having regard to the intended use of the appliance, and adequate precautions should be taken to guard against frost damage.

20 Waste disposal units

20.1 In a household waste disposal unit:

a) the outlet of the unit should be positioned so as to allow ready access to and removal of the waste trap;

NOTE Household types when fitted to kitchen sinks, need a large sink outlet diameter.

b) it is essential that all associated electrical services conform to BS 7671.

20.2 In industrial installations, other connections should be fitted upstream of the waste disposal unit connection to assist transportation of the waste material. Where the establishment is served by an individual wastewater treatment plant, consultation should be made with the plant manufacturer to ensure the plant can cope and to check on any change required to desludging and maintenance procedures.

21 Associated appliances

21.1 General

Where associated appliances need an electrical supply, the electrical supply should conform to BS 7671.

21.2 Hand drying

21.2.1 Hand drying facilities provided in non-domestic toilets should be designed to withstand rough usage and vandalism.

21.2.2 Warm air hand dryers should be wall mounted and they should be operated, for a pre-set period, by a push button or foot plate or activated by a proximity device.

21.2.3 The electrical supply to warm air hand dryers should be robust and be arranged so that it is not possible for water to penetrate the appliance. In existing buildings where additional facilities are provided, care should be taken to avoid overloading the existing electrical circuits.

21.2.4 If paper towels are supplied in toilets, a suitable dispenser for the clean paper towels and a waste receptacle for the used paper towels should be provided.

21.3 Sanitary disposal units

Sanitary disposal units should be positioned so as not to interfere with the operation of the cubicle, which should be sized in accordance with the recommendations of BS 6465-2.

22 Work on site

22.1 General

The workmanship on site should be in accordance with BS 8000-13 or BS 8000-15, as appropriate.

22.2 Chases and ducts

A check should be made to ensure that all holes, chases and ducts required for pipework have been properly provided in accordance with BS 8313.

22.3 Delivery and storage

22.3.1 Before delivery takes place, arrangements should be made for storage of sanitary and associated appliances under cover to prevent damage on site.

22.3.2 Upon delivery, all sanitary appliances should be checked to ensure that they are free from defects and or damage. All associated equipment such as traps, taps, brackets, seats and cisterns should be checked and, if appropriate, stored together.

22.4 Protection of sanitary and associated appliances

Sanitary and associated appliances should be protected from damage when fixing, as careless handling could irreparably damage glazed, enamelled and plated surfaces of sanitary and associated appliances.

22.5 Fixing

22.5.1 Water supply and discharge pipes should be installed before the sanitary appliances are fixed.

22.5.2 Before fixing sanitary appliances into position, the discharge pipe should be clear of obstruction.

22.5.3 Before connecting non full-bore fittings, such as thermostatic mixing valves (TMVs), thermostatic shower mixers, shower heads and aerated taps, water supply pipes should be flushed to remove any debris.

22.5.4 Sinks, baths and shower trays should be installed so that they drain to the outlet by gravity.

22.5.5 External cistern overflows should be arranged to give visible warning of discharge and any pipework should have continuous falls to the outlet. Where an overflow pipe discharges outside a building, it should be installed in accordance with BS 6700 so as not to cause a hazard through freezing.

22.6 Sealant

22.6.1 Sealant should conform to BS EN ISO 11600 and should have a fungicide incorporated.

22.6.2 Sealant should be applied using a purpose-made gun or device.

22.7 Inspection

Upon completion of the installation, all sanitary and associated appliances, materials and workmanship should be carefully examined for defects and for faults, which should be corrected before the facilities are handed over for use.

Section 4: Maintenance

23 General

COMMENTARY ON 23
Generally the frequencies required for maintenance will depend upon the level of use and the degree of soiling. In domestic situations weekly cleaning can be sufficient but in heavily used public facilities, such as a motorway service area, a continuous programme of cleaning and maintenance might be needed.

23.1 Sanitary and associated appliances should be cleaned frequently to maintain their surfaces in a good sanitary condition.

23.2 Sanitary disposal units should be maintained on a regular basis with frequent collection of waste.

23.3 Whirlpool baths should be cleaned in accordance with the manufacturer's instructions to ensure that any concealed pipework is kept clean.

23.4 Tap and valve washers, ceramic cartridges and gland seals should be renewed to avoid waste of water, damage to the valve and/or seating and the surface of the sanitary appliance.

23.5 Where thermostatic mixing valves (TMVs) are used, monitoring of outlet temperatures and effective shut off in the event of cold water supply failure should be recorded at least annually.

NOTE The details of required maintenance and testing will be set-out in the appropriate scheme document and manufacturer's instructions. The TMV scheme has different requirements for TMV3 valves, which are mainly for institutional applications, and TMV2 valves, which are mainly for domestic applications. Guidance on the maintenance of TMVs can be found in BRE Information Paper IP 14/03 *[10] (obtainable free of charge from www.tmva.org.uk).*

24 Daily cleaning

24.1 Cleaning materials incorporating corrosive alkalis, abrasives or acids should not be used because they can damage the sanitary and associated appliance and/or supply and discharge pipework.

24.2 The instructions of the manufacturer of the sanitary and associated appliances and of the cleaning and/or descaling materials should be followed.

25 Removal of scale and limescale encrustation

25.1 For the removal of scale, encrustation and other deposits, acid and alkali based cleaning materials should be used with caution to avoid damage to sanitary and associated appliances, pipework and water supply fittings and/or injury to those doing the cleaning. As an aid to avoiding such damage, descaling materials containing corrosion inhibitors should be used.

25.2 Wherever possible, cleaning materials that do not cause environmental or health and safety hazards should be used.

NOTE 1 For further information on the installation and maintenance of wastewater and rainwater gravity drainage systems, see BS EN 12056-5.

NOTE 2 Attention is drawn to the Control of Substances Hazardous to Health Regulations 2002 [11] (see Annex A).

26 Sanitary and associated appliances

26.1 Urinal

26.1.1 General

Where they are intended to be used, cleaning products for urinals should be regularly checked and replaced as required.

*COMMENTARY ON **26.1.1***
The type of cleaning products to be used on urinals depends upon their location, design, use and fittings associated with the urinals. The types of cleaning product that can be used include dissolvable blocks, flush additives, pipe cleaning enzymes and odour reducers. Depending on the product, the maintenance may be daily, weekly, monthly or even less frequent.

Blockages due to rubbish being deposited in the urinals may have to be removed on a daily basis. Blockages due to deposits may require specialist contractors to remove them. In any case, it is important that blockages in flushed urinals are cleared immediately or there is a risk of flooding with automatic flushing apparatus. If the blockage cannot be removed quickly, it is essential that the water supply for flushing is turned off and the facilities closed until the fault is rectified.

26.1.2 Water flushed

NOTE Urinals flushed with hard water are prone to develop very hard waste pipe deposits that may need to be drilled out or the pipework replaced.

26.1.3 Waterless

NOTE Waterless urinals may require the regular replacement of a disposable element and an annual clean, or replacement, of the associated pipework. With waterless urinals, more frequent use does not always equate to more frequent maintenance, as the deposition of urine crystals is reduced if the retention time is minimized.

26.2 Waterless closet

*COMMENTARY ON **26.2***
Electrical waterless closets might need to have their moisture levels monitored and adjusted.

Eventually all waterless closets will need to be emptied and the contents removed to a location where the composting process can continue to completion.

If composting waterless closets are used, the supply of bulking material (e.g. wood shaving) should be maintained and added to the pile in the collecting chamber, as necessary. The inside of the chamber should be inspected for non-compostable material, the moisture of the pile and the height of the pile. Excess urine should be drawn off, so that the pile does not get too wet and anaerobic decomposition takes place. Also, if the pile is too dry, water should be added to ensure decomposition takes place.

NOTE The peak of the pile may need to be knocked off to ensure that the whole chamber volume is used.

26.3 Cisterns

26.3.1 With outlet valves

Cisterns that appear to be filling when not being used should be suspected of having leaking outlet valves.

NOTE Leaks from WC flush valves are not always easy to see. By sprinkling a suitable powder (e.g. talcum powder) on the back plate of the WC pan, any moving film of water will become visible.

26.3.2 With siphons

NOTE The diaphragm in a siphon may break or tear as it reaches the end of its lifespan. This will be evident by difficulty in priming the siphon. Replacement of the diaphragm may be simple if a demountable siphon has been fitted, otherwise it may be simplest to replace the complete siphon assembly.

26.4 Paper towel dispensers

Paper towels dispensers should be refilled and the associated waste receptacles should be emptied on a regular basis.

26.5 Washable towels

Where towels that require removal for washing are provided, adequate supplies should be available at all times.

26.6 Toilet seat hygiene

Where cleaning materials or temporary disposable covers are provided, adequate supplies should be available at all times (see **4.9.3**).

Annex A (informative) Related legislation

Table A.1 shows the main water supply, drainage and related legislation in the UK.

Table A.1 **Main water supply, drainage and related legislation in the UK**

Subject	England and Wales	Scotland	Northern Ireland
Water supply[A)]	Water Supply (Water Fittings) Regulations 1999 [7]	Scottish Water Byelaws 2004 [12]	Water Supply (Water Quality) Regulations (Northern Ireland) 2002 [13]
Unvented hot water	*Building Regulations 2000: Approved document G – Hygiene* (see Requirement G3 – *Hot water storage*) [8]	*Building (Scotland) Regulations 2004: Technical Handbook – Non-domestic* (see Section 3) [3]; *Building (Scotland) Regulations 2004: Technical Handbook – Domestic* (see Section 3) [4]	*Building Regulations (Northern Ireland) 2000 Technical booklet P – Unvented hot water storage systems* [9]
Above ground drainage	*Approved document H – Drainage and waste disposal* (see Requirement H1 – *Foul water drainage*) [14]	*Building (Scotland) Regulations 2004: Technical Handbook – Non-domestic* (see Section 3) [3]; *Building (Scotland) Regulations 2004: Technical Handbook – Domestic* (see Section 3) [4]	*Building Regulations (Northern Ireland) 2000 Technical booklet N – Drainage* [15]
Below ground drainage	*Approved document H – Drainage and waste disposal* (see Requirement H1 – *Foul water drainage*) [14]	*Building (Scotland) Regulations 2004: Technical Handbook – Non-domestic* (see Section 3) [3]; *Building (Scotland) Regulations 2004: Technical Handbook – Domestic* (see Section 3) [4]	*Building Regulations (Northern Ireland) 2000 Technical booklet N – Drainage* [15]
Electrical connections	*Approved document P – Electrical safety* [16]	*Building (Scotland) Regulations 2004: Technical Handbook – Non-domestic* (see 4.5 and 4.6) [3]; *Building (Scotland) Regulations 2004: Technical Handbook – Domestic* (see 4.5) [4]	–

A) Authoritative guidance to this legislation is provided in WRAS *Water regulations guide including Water Byelaws 2000 (Scotland)* [17].

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 7942, *Thermostatic mixing valves for use in care establishments*

BS EN 752-1, *Drain and sewer systems outside buildings – Part 1: Generalities and definitions*

BS EN 752-2, *Drain and sewer systems outside buildings – Part 2: Performance requirements*

BS EN 752-3, *Drain and sewer systems outside buildings – Part 3: Planning*

BS EN 752-4, *Drain and sewer systems outside buildings – Part 4: Hydraulic design and environmental considerations*

BS EN 806 (all parts), *Specifications for installations inside buildings conveying water for human consumption*

BS EN 1111, *Sanitary tapware – Thermostatic mixing valves (PN 10) – General technical specification*

BS EN 1287, *Sanitary tapware – Low pressure thermostatic mixing valves – General technical specifications*

BS EN 12056-1, *Gravity drainage systems inside buildings – Part 1: General and performance requirements*

BS EN 12056-2, *Gravity drainage systems inside buildings – Part 2: Sanitary pipework, layout and calculation*

BS EN 12056-3, *Gravity drainage systems inside buildings – Part 3: Roof drainage, layout and calculation*

BS EN 12056-5, *Gravity drainage systems inside buildings – Part 5: Installation and testing, instructions for operation, maintenance and use*

BS EN 12541, *Sanitary tapware – Pressure flushing valves and automatic closing urinal valves PN 10*

Other publications

[1] DEPARTMENT OF HEALTH. *Health Technical Memorandum 64: Sanitary assemblies*. London: TSO, 2006.

[2] DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT. *The Building Regulations 2000: Approved document M – Access and facilities.* London: NBS, 2004.

[3] SCOTTISH BUILDING STANDARDS AGENCY. *Building (Scotland) Regulations 2004: Technical Handbook – Non-domestic*. Livingstone: SBSA, 2006.

[4] SCOTTISH BUILDING STANDARDS AGENCY. *Building (Scotland) Regulations 2004: Technical Handbook – Domestic*. Livingstone: SBSA, 2006.

[5] DEPARTMENT OF THE ENVIRONMENT NORTHERN IRELAND. *Building Regulations (Northern Ireland) 2000 Technical booklet R – Access and facilities for disabled people.* London: TSO, 2001.

[6] DISABILITY RIGHTS COMMISSION. *Disability Discrimination Act 1995: Code of practice – Rights of access – Goods, facilities, services, and premises*. London: TSO, 2002.

[7] GREAT BRITAIN. Water Supply (Water Fittings) Regulations 1999 (as amended). SI 1999 No 1148. London: TSO.

[8] DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT. *The Building Regulations 2000: Approved document G – Hygiene*. London: NBS, 1992 (as amended).

[9] DEPARTMENT OF THE ENVIRONMENT NORTHERN IRELAND. *Building Regulations (Northern Ireland) 1990 Technical booklet P – Unvented hot water storage systems.* London: TSO, 1994.

[10] BRE/THERMOSTATIC MIXING VALVE ASSOCIATION. *Preventing hot water scalding in bathrooms: using TMVs*. IP 14/03. Garston: BRE, 2003.

[11] GREAT BRITAIN. Control of Substances Hazardous to Health Regulations 2002. London: TSO.

[12] SCOTTISH WATER. Water Byelaws 2004. Edinburgh: Scottish Water, 2004.

[13] NORTHERN IRELAND. Water Supply (Water Quality) Regulations (Northern Ireland) 2002. SI 2002 No 331. London: TSO.

[14] DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT. *The Building Regulations 2000: Approved Document H – Drainage and waste disposal*. London: NBS, 2002.

[15] DEPARTMENT OF THE ENVIRONMENT NORTHERN IRELAND. *Building Regulations (Northern Ireland) 2000 Technical booklet N – Drainage.* London: TSO, 1994.

[16] DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT. *The Building Regulations 2000: Approved Document P – Electrical safety*. London: NBS, 2006.

[17] WATER REGULATIONS ADVISORY SCHEME. *Water Regulations Guide including Water Byelaws 2000 (Scotland*). Newport: WRAS 2000.

Further reading

BS 1968, *Specification for floats for ballvalves (copper)*

BS 3402, *Specification for quality of vitreous china sanitary appliances*

BS 3831, *Specification for vitreous enamel finishes for domestic and catering appliances*

BS 5388, *Specification for spray taps*

BS 5588-9, *Fire precautions in the design and construction of buildings – Part 9: Code of practice for ventilation and air conditioning ductwork*

BS EN 200, *Sanitary tapware – General technical specifications for single taps and mixer taps (nominal size 1/2) PN 10 – Minimum flow pressure of 0.05 MPa (0.5 bar)*

BS EN 246, *Sanitary tapware – General specification for flow rate regulators*

BS EN 248, *Sanitary tapware – General specification for electrodeposited coatings of Ni-Cr*

BS EN 263, *Crosslinked cast acrylic sheets for baths and shower trays for domestic purposes*

BS EN 274-1, *Waste fittings for sanitary appliances – Part 1: Requirements*

BS EN 274-2, *Waste fittings for sanitary appliances – Part 2: Test methods*

BS EN 274-3, *Waste fittings for sanitary appliances – Part 3: Quality control*

BS EN 817, *Sanitary tapware – Mechanical mixers (PN 10) – General technical specifications*

BS EN 1286, *Sanitary tapware – Low pressure mechanical mixing valves – General technical specification*

BS EN 60335-2-75, *Household and similar electrical appliances – Safety – Part 2-75: Particular requirements for commercial dispensing appliances and vending machines*

BS EN 60335-2-84, *Household and similar electrical appliances – Safety – Part 2-84: Particular requirements for toilets*

BRITISH TOILET ASSOCIATION. *Better public toilets guide*. Winchester: BTA, 2000.

BRITISH TOILET ASSOCIATION. *Public conveniences: A problem guide*. Winchester: BTA, 2001.

CENTRE FOR ACCESSIBLE ENVIRONMENTS. *The good loo design guide*. London: RIBA Enterprises, 2004.

KIRA, A. *The bathroom*. Revised edition. Harmondsworth: Penguin, 1976.

GREED, C. *Inclusive urban design: Public toilets*. Oxford: Architectural Press, 2003.

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