

BRITISH STANDARD

Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – Specification

ICS 91.140.60

BSi
British Standards

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This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 138, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard was published by BSI and came into effect on 29 December 2006. It was prepared by Subcommittee B/504/2, *Water supply internal*, under the authority of Technical Committee B/504, *Water supply*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

BS 6700:2006+A1:2009 supersedes BS 6700:2006, which is withdrawn.

Relationship with other publications

This is a revision of BS 6700:1997. It is anticipated that this standard will be superseded by the publication of all parts of prEN 806 but that is not expected for some time yet.

In 1999, the Water Suppliers of England and Wales ceased to enforce their own Water Bylaws and instead began enforcing the Water Supply (Water Fittings) Regulations 1999 (Statutory Instruments 1148 and 1506). In 2004 the Water Authorities in Scotland began enforcing the Water Byelaws 2004. In Northern Ireland, water regulations made under Water and Sewerage Services (Northern Ireland) Order 1973 are enforced by the Northern Ireland Water Service. These bodies are collectively referred to in this standard as “water undertakers” and regulations are collectively referred to as “the WFRs [1]” in this standard.

Publication of the WFRs [1] was accompanied by the creation of the Water Regulations Advisory Scheme (WRAS) to promote knowledge of the WFRs [1] and to encourage their consistent interpretation and enforcement. WRAS publications include guidance on the WFRs [1] in the *Water Regulations Guide* [2] and Water Fittings and Materials Directory [3]. This British Standard has some overlap with these WRAS publications, but also makes specifications within the framework of national and international standards.

Several aspects of water installation are covered by the Building Regulations in England and Wales, the Building Standards (Scotland) Regulations in Scotland and the Building (Northern Ireland) Regulations in Northern Ireland. These regulations are collectively referred to as “the Building Regulations [4]” in this standard. The applicability of particular parts of the Building Regulations [4] are explained in Annex A.

Information about this document

The start and finish of text introduced or altered by Amendment No. 1 is indicated in the text by tags **A1** and **A1**.

Use of this document

This British Standard is intended for the use of engineers, architects, surveyors, contractors, plumbers and inspection authorities and to also be of general interest. Centralized hot water supply for buildings other than individual dwellings is still covered by CP 342-2 which is intended to be used in conjunction with this standard.

The design of large scale underground reticulations are not included. Whilst certain aspects of underground systems and the larger storage facilities are dealt with in this standard, it will also be necessary for reference to be made to the procedures of the water supply industry when designing large installations of this nature.

This standard interfaces and overlaps with standards dealing with space heating by hot water. The transmission of heat by whatever medium (including water) clearly ought to be the province of other standards. However, where hot water is the heat transfer medium, the pipework carrying the hot water to the heating apparatus will be of common interest.

The control of the safety of unvented domestic hot water storage systems is included in the Building Regulations [4] (see **A.1**).

The normative references listed are predominantly British Standards. As European Standards are published they will replace the relevant British Standards and be the subject of amendment to this publication.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced. The WFRs [1] permit water undertakers and organizations specified in writing by the regulator to certify plumbers as “approved contractors”.

Presentational conventions

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

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

Contractual and legal considerations

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

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

1 Scope

This British Standard specifies requirements for and gives recommendations on the design, installation, alteration, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. It covers the system of pipes, fittings and connected appliances installed to supply any building, whether domestic or not, with water for drinking, culinary, domestic laundry, ablutionary, cleaning and sanitary purposes¹⁾.

This standard deals only with low temperature systems; it does not cover systems that are designed to operate with steam or high temperature hot water.

This standard does not cover domestic central heating systems.

Although many of its recommendations will be applicable, this standard does not cover fire fighting services nor water supply for industrial or other specialist purposes other than to indicate precautions that should be taken when these are used in association with other water services. The point at which a domestic activity becomes an industrial process, e.g. in food preparation, has not been defined and the applicability of this standard will need to be considered in each case.

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 amendments) applies.

BS 417-2, *Specification for galvanized low carbon steel cisterns, cistern lids, tanks and cylinders – Part 2: Metric units*

BS 853-1, *Specification for vessels for use in heating systems – Part 1: Calorifiers and storage vessels for central heating and hot water supply*

BS 1010-2, *Specification for draw-off taps and stopvalves for water services (screw-down pattern) – Draw-off taps and above-ground stopvalves*

BS 1212-1, *Float-operated valves – Part 1: Specification for piston type float operated valves (copper alloy body) (excluding floats)*

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 – Part 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 1566-1, *Open vented copper cylinders – Part 1: Requirements and test methods*

¹⁾ Referred to hereafter as “drinking water”.

- BS 1566-2, *Copper indirect cylinders for domestic purposes – Part 2: Specification for single feed indirect cylinders*
- BS 1710, *Specification for identification of pipelines and services*
- BS 1968, *Specification for floats for ballvalves (copper)*
- BS 2456, *Specification for floats (plastics) for float operated valves for cold water services*
- BS 2580, *Specification for underground plug cocks for cold water services*
- BS 2879, *Specification for draining taps (screw-down pattern)*
- BS 3198, *Specification for copper hot water storage combination units for domestic purposes*
- BS 3251, *Specification – Indicator plates for fire hydrants and emergency water supplies*
- BS 4213, *Specification for cold water storage and combined feed and expansion cisterns (polyolefin or olefin copolymer) up to 500 L capacity used for domestic purposes*
- BS 4346-1, *Joints and fittings for use with unplasticized PVC pressure pipes – Part 1: Injection moulded unplasticized PVC fittings for solvent welding for use with pressure pipes, including potable water supply*
- BS 4346-3, *Joints and fittings for use with unplasticized PVC pressure pipes – Part 3: Specification for solvent cement*
- BS 4814, *Specification for expansion vessels using an internal diaphragm, for sealed hot water heating systems*
- BS 5163-2, *Valves for waterworks purposes – Stem caps for use on isolating valves and associated water control apparatus – Specification*
- BS 5391-1, *Specification for acrylonitrile-butadiene-styrene (ABS) pressure pipe – Part 1: Pipe for industrial uses*
- BS 5392-1, *Specification for acrylonitrile-butadiene-styrene (ABS) fittings for use with ABS pressure pipe – Part 1: Fittings for use with pipe for industrial uses*
- BS 5422, *Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating in the temperature range –40 °C to +700 °C*
- BS 5433, *Specification for underground stopvalves for water services*
- BS 5440-1, *Installation and maintenance of flues and ventilation for gas appliances of rated heat input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 1: Specification for installation and maintenance of flues*
- BS 5440-2, *Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 2: Specification for installation and maintenance of ventilation for gas appliances*
- BS 5449:1990, *Specification for forced circulation hot water central heating systems for domestic premises*

BS 5493:1977, *Code of practice for protective coating of iron and steel structures against corrosion*

BS 5546, *Specification for installation of gas hot water supplies for domestic purposes (1st, 2nd and 3rd family gases)*

BS 5615, *Specification for insulating jackets for domestic hot water storage cylinders*

BS 5970, *Code of practice for thermal insulation of pipework and equipment in the temperature range of $-100\text{ }^{\circ}\text{C}$ to $+870\text{ }^{\circ}\text{C}$*

BS 6100 (all parts), *Glossary of building and civil engineering terms*

BS 6144, *Specification for expansion vessels using an internal diaphragm, for unvented hot water supply systems*

BS 6280, *Method of vacuum (backsiphonage) test for water-using appliances*

BS 6282-1, *Devices with moving parts for the prevention of contamination of water by backflow – Specification for check valves of nominal size up to and including DN 54*

BS 6282-2, *Devices with moving parts for the prevention of contamination of water by backflow – Specification for terminal anti-vacuum valves of nominal size up to and including DN 54*

BS 6282-4, *Devices with moving parts for the prevention of contamination of water by backflow – Specification for combined check and anti-vacuum valves of nominal size up to and including DN 42*

BS 6283-2, *Safety and control devices for use in hot water systems – Part 2: Specifications for temperature relief valves for pressures from 1 bar to 10 bar*

BS 6283-4, *Safety and control devices for use in hot water systems – Part 4: Specification for drop-tight pressure reducing valves of nominal size up to and including DN 50 for supply pressures up to and including 12 bar*

BS 6351-1, *Electric surface heating – Part 1: Specification for electric surface heating devices*

BS 6891, *Installation of low pressure gas pipework of up to 35 mm ($R1\frac{1}{4}$) in domestic premises (2nd family gas) – Specification*

BS 6920-1, *Suitability of non-metallic products for use in contact with water for human consumption with regard to their effect on the quality of the water – Part 1: Specification*

BS 6920-2 (all sections), *Suitability of non-metallic products for use in contact with water for human consumption with regard to their effect on the quality of the water – Part 2: Methods of test*

BS 6920-3, *Suitability of non-metallic products for use in contact with water for human consumption with regard to their effect on the quality of the water – Part 3: High temperature tests*

BS 6956-5, *Jointing materials and compounds – Part 5: Specification for jointing compounds for use with water, low pressure saturated steam, 1st family gases (excluding coal gas) and 2nd family gases*

BS 7206, *Specification for unvented hot water storage units and packages*

BS 7291-1, *Thermoplastics pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings – Part 1: General requirements*

BS 7291-2, *Thermoplastics pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings – Part 2: Specification for polybutylene (PB) pipes and associated fittings*

BS 7291-3, *Thermoplastics pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings – Part 3: Specification for crosslinked polyethylene (PE-X) pipes and associated fittings*

BS 7291-4, *Thermoplastics pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings – Part 4: Specification for chlorinated polyvinyl chloride (PVC-C) pipes and associated fittings and solvent cement*

BS 7430, *Code of practice for earthing*

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

BS 7977-2, *Specification for safety and rational use of energy of domestic gas appliances – Combined appliances – Gas fire/back boiler*

BS EN 26, *Gas-fired instantaneous water heaters for the production of domestic hot water, fitted with atmospheric burners*

BS EN 257, *Mechanical thermostats for gas-burning appliances*

BS EN 297, *Gas-fired central heating boilers – Type B₁₁ and B_{11BS} boilers fitted with atmospheric burners of nominal heat input not exceeding 70 kW*

BS EN 378-1, *Specification for refrigerating systems and heat pumps – Safety and environmental requirements – Part 1: Basic requirements, definitions, classification and selection criteria*

BS EN 483, *Gas-fired central heating boilers – Type C boilers of nominal heat input not exceeding 70 kW*

BS EN 545, *Ductile iron pipes, fittings, accessories and their joints for water pipelines – Requirements and test methods*

BS EN 598, *Ductile iron pipes, fittings, accessories and their joints for sewerage applications – Requirements and test methods*

BS EN 625, *Gas-fired central heating boilers – Specific requirements for the domestic hot water operation of combination boilers of nominal heat input not exceeding 70 kW*

BS EN 681-1:1996, *Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Part 1: Vulcanized rubber*

BS EN 806-1, *Specifications for installations inside buildings conveying water for human consumption – Part 1: General*

BS EN 816, *Sanitary tapware – Automatic shut-off valves PN 10*

BS EN 969, *Specification for ductile iron pipes, fittings, accessories and their joints for gas pipelines – Requirements and test methods*

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

BS EN 1044, *Brazing – Filler metals*

BS EN 1057:2006, *Copper and copper alloys – Seamless, round copper tubes for water and gas in sanitary and heating applications*

BS EN 1151-1, *Pumps – Rotodynamic pumps – Circulation pumps having a rated power input not exceeding 200 W for heating installations and domestic hot water installations – Part 1: Non-automatic circulation pumps, requirements, testing, marking*

BS EN 1254 (all parts), *Copper and copper alloys – Plumbing fittings*

BS EN 1452-2, *Plastic piping systems for water supply – Unplasticized poly (vinyl chloride) (PVC-U) – Part 2: Pipes*

BS EN 1452-3, *Plastic piping systems for water supply – Unplasticized poly (vinyl chloride) (PVC-U) – Part 3: Fittings*

BS EN 1490, *Building valves – Combined temperature and pressure relief valves – Tests and requirements*

BS EN 1491, *Building valves – Expansion valves – Tests and requirements*

BS EN 1717, *Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow*

BS EN 10312:2002, *Welded stainless steel tubes for the conveyance of aqueous liquids including water for human consumption – Technical delivery conditions*

BS EN 12201-2, *Plastic piping systems for water supply – Polyethylene (PE) – Part 2: Pipes*

BS EN 12976-1, *Thermal solar systems and components – Factory made systems – Part 1: General requirements*

DD ENV 12977-1, *Thermal solar systems – Custom built systems – Part 1: General requirements*

BS EN 13076, *Devices to prevent pollution by backflow of potable water – Unrestricted air gap – Family A, type A*

BS EN 13077, *Devices to prevent pollution by backflow of potable water – Air gap with non-circular overflow (unrestricted) – Family A, type B*

BS EN 14154-1, *Water meters – Part 1: General requirements*

BS EN 14451, *Devices to prevent pollution by backflow of potable water – In-line anti-vacuum valves DN 8 to DN 80 – Family D, type A*

BS EN 14623, *Devices to prevent pollution by backflow of potable water – Air gaps with minimum circular overflow – Family A, type G*

BS EN 29453:1994/ISO 9453:1990, *Soft solder alloys – Chemical compositions and forms*

BS EN 60335-2-21, *Specification for safety of household and similar electrical appliances – Part 2-21: Particular requirements – Storage water heaters*

BS EN 60335-2-35, *Specification for safety of household and similar electrical appliances – Part 2-35: Particular requirements – Instantaneous water heaters*

BS EN 60335-2-51, *Specification for safety of household and similar electrical appliances – Part 2-51: Particular requirements – Stationary circulation pumps for heating and service water installations*

BS EN 60730-2 (all sections), *Specification for automatic electrical controls for household and similar use – Particular requirements*

BS EN ISO 15493, *Plastics piping systems for industrial applications – Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) – Specifications for components and the system – Metric series*

CP 312-1, *Code of practice for plastics pipework (thermoplastics material) – Part 1: General principles and choice of material*

CP 312-2, *Code of practice for plastics pipework (thermoplastics material) – Part 2: Unplasticized PVC pipework for the conveyance of liquids under pressure*

CP 312-3, *Code of practice for plastics pipework (thermoplastics material) – Part 3: Polyethylene pipes for the conveyance of liquids under pressure*

CP 342-2, *Code of practice for centralized hot water supply – Part 2: Buildings other than individual dwellings*

INSTITUTION OF GAS ENGINEERS AND MANAGERS. IGE/UP/2: *Gas installation pipework, boosters and compressors on industrial and commercial premises*, London: 1994 (amended January 1995)²⁾

3 Terms and definitions

For the purposes of this British Standard, the terms, definitions and symbols given in BS EN 806-1 and BS 6100 (all parts) apply, together with the following.

3.1 backflow

flow upstream, that is in a direction contrary to the intended direction of flow, within or from a water fitting

3.2 building

structure (including a floating structure) of a permanent character or not, and movable or immovable, connected to the water supplier's mains

²⁾ Published by The Institution of Gas Engineers and Managers and available from IGEM Publications, PO Box 2584, Uttoxeter, ST14 9AB.

3.3 cavity wall

structural or partition wall, formed by two upright parts of similar or dissimilar building materials, suitably tied together with a gap formed between them, which might be (but need not be) filled with insulating material

3.4 chase

recess cut into an existing structure

3.5 cistern

fixed, vented container for holding water at atmospheric pressure

3.6 combined feed and expansion cistern

cistern for supplying cold water to a hot water system without a separate expansion cistern

3.7 composite fitting

combination of fittings or valves incorporated into one body

3.8 contamination

reduction in chemical or biological quality of water due to a change in temperature or the introduction of polluting substances

3.9 cover

panel or sheet of rigid material fixed over a chase, duct or access point, of sufficient strength to withstand surface loadings appropriate to its position

NOTE Except where providing access to joints or changes of direction (i.e. at an inspection access point), a cover may be plastered or screeded over.

3.10 direct hot water supply system

hot water supply system in which the water supplied to draw-off points is heated by a direct source of heat

[from BS 6100]

3.11 distributing pipe

pipe (other than a warning, overflow or flushing pipe) conveying water from a storage cistern, or from hot water apparatus supplied from a cistern and under pressure from that cistern

3.12 duct

enclosure designed to accommodate water pipes and fittings and other services, if required

NOTE Ideally, a duct should be constructed so that access to the interior can be obtained either throughout its length or at specified points by removal of a cover or covers.

3.13 dwelling

premises, buildings or part of a building providing accommodation, including a terraced house, a semi-detached house, a detached house, a flat in a block of flats, a unit in a block of maisonettes, a bungalow, a flat within any non-domestic premises, a maisonette in a block of flats, or any other habitable building and any caravan, vessel, boat or houseboat that can accommodate a single family unit connected to the water supplier's mains

- 3.14 expansion valve**
pressure-activated valve designed to release expansion water from an unvented water heating system
- 3.15 flushing cistern**
cistern provided with a valve or device for controlling the discharge of the stored water into a water closet pan or urinal
- 3.16 indirect hot water supply system**
hot water supply system in which the water supply to draw-off points is heated by an indirect cylinder or calorifier
[from BS 6100]
- 3.17 inspection access point**
position of access to a duct or chase whereby the pipe or pipes therein can be inspected by removing a cover which is fixed by removable fastenings but does not necessitate the removal of surface plaster, screed or continuous surface decoration
- 3.18 overflow pipe**
pipe from a cistern in which water flows only when the level in the cistern exceeds a predetermined level
- 3.19 pressure relief valve**
pressure-activated valve which opens automatically at a specified pressure to discharge fluid
- 3.20 primary circuit**
assembly of water fittings in which water circulates between a boiler or other source of heat and a primary heat exchanger inside a hot water storage vessel, and includes any space heating system
- 3.21 removable fastenings**
fastenings that can be removed readily and replaced without causing damage, including turn buckles, clips, magnetic or touch latches, coin operated screws and conventional screws, but not nails, pins or adhesives
- 3.22 RPZ valve**
Type BA backflow protection device that conforms to BS EN 1717
- 3.23 secondary circuit**
assembly of water fittings in which water circulates in supply pipes or distributing pipes of hot water storage system
- 3.24 secondary system**
assembly of water fittings comprising the cold feed pipe, any hot water storage vessel, water heater and pipework from which hot water is conveyed to all points of draw-off
- 3.25 servicing valve**
valve for shutting off, for the purpose of maintenance, the flow of water in a pipe connected to a water fitting or appliance

- 3.26 sleeve**
enclosure of tubular or other section of suitable material designed to provide a space through an obstruction to accommodate a single water pipe and to which access to the interior can be obtained only from either end
- 3.27 stopvalve**
valve, other than a servicing valve, used for shutting off the flow of water in a pipe
- 3.28 storage cistern**
cistern for storing water for subsequent use, not being a flushing cistern
- 3.29 tap size designations**
numbers directly related to the nominal size of the thread on the inlet of the tap, which in turn is unchanged from the nominal size in inches before metrication (e.g. ½ nominal size tap means a tap with an inlet having a G ½ thread)
- 3.30 temperature relief valve**
valve which opens automatically at a specified temperature to discharge fluid
- 3.31 terminal fitting**
water outlet device
- 3.32 tundish**
funnel for catching overflow or discharge
- 3.33 vent pipe**
pipe, open to the atmosphere, which exposes the system to atmospheric pressure
- 3.34 walkway
crawlway**
enclosure similar to a duct, but of such size as to provide access to the interior by persons through doors or manholes and which will accommodate water pipes and fittings and other services if required
- 3.35 warning pipe**
pipe from a cistern in which water flows only when the level in the cistern is about to exceed the predetermined overflow level to warn of impending overflow (see **3.18** overflow pipe)
- 3.36 tank**
closed vessel holding water at greater than atmospheric pressure

4 Materials

4.1 Choice of material

Pipes, fittings and jointing materials acceptable for the purposes of the Water Supply (Water Fittings) Regulations 1999 (Statutory Instruments 1148 and 1506), the Water Byelaws 2000 Scotland and the Water and Sewerage Services (Northern Ireland) Order 1973 (collectively referred to as “the WFRs [1]” in this standard; see Commentary) are listed in the *Water fittings and materials directory* [3] or approved by WRAS, and shall be used within the limits of the appropriate standard and manufacturer’s recommendations. For non-metallic materials, this requirement is deemed to be met by compliance with BS 6920-1. In cases where it is found that there is no current appropriate standard for a given water fitting, advice should be sought from the local water undertaker prior to installation.

Every pipe, pipe joint and connected fitting shall be capable of withstanding, without damage or deterioration, at a pressure of not less than one-and-a-half times the maximum pressure it is to be subjected to in operation, sustained temperatures of 40 °C for cold water installations and 95 °C, with occasional short-term excursions in excess of 100 °C to allow for malfunctions, for heated water installations. Discharge pipes connected to temperature or expansion relief valves in unvented hot water systems shall be capable of withstanding intermittent hot water or steam discharge at temperatures up to 114 °C.

If pipes, pipe joints or connected fittings are of dissimilar metals, measures shall be taken to reduce corrosion. To prevent corrosion through galvanic action, pipes of dissimilar metals shall only be joined in the following sequence: galvanized steel, uncoated iron, lead, copper.

COMMENTARY AND RECOMMENDATIONS ON 4.1

Attention is drawn to the Building Regulations [4] (see A.1) and the WFRs [1] (see A.2).

It is essential that the following factors, as regulatory requirements, are taken into account in selecting materials used in a water service:

- a) effect on water quality;*
- b) vibration, stress or settlement;*
- c) internal water pressure;*
- d) internal and external temperatures;*
- e) internal and external corrosion;*
- f) compatibility of different materials;*
- g) ageing, fatigue, durability and other mechanical factors;*
- h) permeation.*

Materials with a lesser durability than those recommended in this standard might be adequate where the use is for a temporary purpose during a period of one month, or three months with the written consent of the water undertaker.

Consideration should be given to the character of the water supply taking account of any anticipated future changes, and its effect on the choice of materials. Information on the composition of water is available from the local water undertaker.

The influence on water quality of the materials used in the construction of the water service installation, and of those in contact with the installation, is dealt with in 5.6.

Internal corrosion leading to premature failure of metal pipes can occur with certain waters. External corrosion of pipes and fittings laid below ground can be a serious local problem depending on the particular ground conditions. Protection by means of a lining internally or coating externally or by using a corrosion resistant material should be considered. In cases where contamination of the soil is suspected or where knowledge of the site raises concern, consideration should be given to obtaining an analysis of the soil (5.6.2.2).

(The water undertaker should be consulted as they might be able to offer advice on the choice of an effective lining or coating material.) Careful consideration should be given to how particular materials or products are likely to react in the long term in hot water installations. Ageing, creep and fatigue are important factors when using plastic materials.

4.2 Lead

No pipe or other water fitting or storage cistern made from lead or internally lined with lead shall be used in new installations or repairs on plumbing systems supplying drinking water.

Pipework shall not be connected to existing lead pipework without protection against galvanic corrosion. Where an insertion of non-metallic pipe is used, continuation of electrical earth bonding (5.2.8.3) shall be ensured.

Repairs to existing lead services shall be by replacement with other materials (see also 5.6.2.1).

Lead or any substance containing lead shall not be used in the jointing of pipes or fittings.

4.3 Copper

4.3.1 Copper tube shall conform to BS EN 1057:2006.

Copper tube fittings shall conform to BS EN 1254 (all parts).

Copper shall not be connected to other metals without protection against galvanic corrosion.

Solders for jointing copper tube shall be lead-free.

COMMENTARY AND RECOMMENDATIONS ON 4.3.1

It is strongly recommended that independent quality assurance certification of such tubes be obtained.

Copper is, in general, resistant to corrosion and is suitable for hot and cold water applications. Where supply waters are capable of dissolving an amount of copper such that unacceptable green staining is produced on pipework and fittings consideration should be given to the use of water treatment or alternative materials.

4.3.2 Cylinders with protector rods or other appropriate protection shall be fitted to avoid pitting corrosion.

COMMENTARY AND RECOMMENDATIONS ON 4.3.2

Protector rods (sacrificial anodes) should be fitted during manufacture. Pitting corrosion is more likely where there is hard or moderately hard deep-well water.

4.4 Copper alloys

Copper alloy in-line fittings shall conform to BS EN 1254 (all parts). Fittings for use with tube laid in the ground shall be resistant or immune to dezincification. Where compression fittings are used these shall be type B fittings (manipulative) conforming to BS EN 1254-2. Where it is known that the local water supply is capable of causing dezincification, or where distribution systems might introduce such water, or any doubt exists, fittings (except draw off fittings) manufactured from alloys subject to dezincification shall not be used.

COMMENTARY AND RECOMMENDATIONS ON 4.4

Copper cannot corrode by dezincification and other recommended materials are gunmetals, which are also immune to dezincification, or brasses inhibited and treated to be highly resistant to this form of corrosion. For alloys in the latter category a specific test of dezincification resistance is given in BS EN ISO 6509. For ease of identification, fittings manufactured from grade A dezincification resistant brasses are marked with the recognized dezincification symbol CR or "DRA".

4.5 Stainless steel

Stainless steel tubing shall conform to BS EN 10312:2002.

Stainless steel tubes shall not be joined by soft solder.

COMMENTARY AND RECOMMENDATIONS ON 4.5

Although mixed copper and stainless steel systems can be used, joining small copper areas to large stainless steel areas should be avoided.

Joining should be made using stainless steel or copper capillary or compression fittings (see 5.6.2).

Joining of stainless steel tubes by adhesive bonding may only be used where the water temperature does not exceed 85 °C.

The WFRs [1] preclude the use of adhesive for the jointing of metal pipes where the pipes are laid underground, enclosed in a chase or duct or in any other position where access is difficult.

4.6 Steel

4.6.1 When carbon steel is used the installer shall ensure that the degree of protection provided against corrosion is appropriate to the circumstances for which it is used.

COMMENTARY AND RECOMMENDATIONS ON 4.6.1

When used above ground for distributing pipes from a storage cistern, steel tube should be medium grade in accordance with BS 1387.

Steel pipes should be internally lined with an approved material and also be externally protected against corrosion where appropriate.

4.6.2 Galvanized steel tube shall be joined only by screwed connections. Where it is necessary to change direction, pre-formed bends shall be used.

COMMENTARY AND RECOMMENDATIONS ON 4.6.2

Galvanized tubes offer only marginal protection against corrosion. Welded or brazed joints should not be used because this would damage the galvanizing.

4.7 Plastics

Installations above ground shall accommodate thermal movement. Plastics pipes shall not be installed close to those sources of heat which would impair their performance.

Plastics pipework for hot water systems shall be capable of withstanding a temperature of 100 °C at the maximum working pressure for one hour.

COMMENTARY AND RECOMMENDATIONS ON 4.7

It is particularly important that plastics used in contact with drinking water are approved to meet the WFRs [1].

General selection criteria and relevant standards

Pipe should be in accordance with BS EN 1452-2 and the solvent cements to be used with the pipe should be in accordance with BS 4346-3.

Pipe for drinking water use should conform to series 1 of BS 4991.

Coefficients of expansion for plastics pipes are greater than those for metal pipes, but this is not generally a problem where pipes are buried.

Below ground and in confined locations above ground, mechanical joints should be used in preference to solvent cement joints due to the difficulty in making satisfactory solvent cement joints in such adverse conditions. Where mechanical joints are made with copper alloy fittings these should be dezincification resistant or immune. Where there is adequate access, in positions above ground, solvent cement joints can be used.

Taps should conform to BS 5412 or BS EN 200 and float-operated valves should conform to BS 1212-3 or BS 1212-4.

Plastics pipework systems for pressure applications are not automatically inter-compatible, and there are no specifications in British Standards for connector dimensions or methods of achieving a joint. It is recommended that plastics pipework systems should be comprised of a proprietary system package with third party approval.

Acetal

Fittings, mostly terminal water fittings, made from acetal are suitable for cold and most hot water applications. Jointing carried out by mechanical or push-fit methods is suitable.

Polybutylene (PB)

Pipes and fittings made from polybutylene (PB), conforming to BS 7291-1 and 2, are suitable for cold and hot water applications. The material is suitable where resistance to freezing temperatures and abrasion is required.

PB cannot be solvent welded. Jointing by push-fit mechanical joints or by thermal fusion is suitable.

Polyethylene (PE)

The use and installation of polyethylene (PE) pipelines for the supply of drinking water should be in accordance with CP 312-3. Requirements for pipes are specified in BS EN 12201-2. Copper alloy compression fittings for use with PE pipe should be in accordance with BS EN 1254-3 and joints should conform to BS 5114.

PE cold water storage cisterns in accordance with BS 4213 are suitable for storage and expansion purposes.

Propylene copolymer (PP)

Propylene copolymer (PP) cannot be solvent welded.

Cold water storage cisterns in PP conforming to BS 4213 are suitable for storage and expansion purposes.

Floats in PP for float-operated valves should conform to BS 2456.

Cross-linked polyethylene (PE-X)

Pipes and fittings made from cross-linked polyethylene (PE-X), conforming to BS 7291-1 and 3, are suitable for cold and hot water applications. The material is particularly suitable when resistance to freezing temperatures and abrasion is required.

PE-X cannot be solvent welded. Jointing carried out by mechanical or push-fit methods is suitable using fittings supplied for this purpose. These include fittings made from a plastics material that meets the applicable requirements of BS 7291, and copper and copper-alloy compression fittings conforming to BS EN 1254-2 and/or BS EN 1254-3.

Unplasticized polyvinyl chloride (PVC-U)

The use and installation of unplasticized polyvinylchloride (PVC-U) pipes should be in accordance with CP 312-2 and specific attention is drawn to the amendment relating to surge pressures.

As PVC-U pipes become increasingly brittle with reducing temperatures, particular care should be taken in handling them at temperatures below 5 °C.

Acrylonitrile butadiene styrene (ABS)

Pipes and fittings made from acrylonitrile butadiene styrene (ABS) conforming to BS 5391-1 and BS 5392-1, or to BS EN ISO 15493 are suitable for cold water applications. Joining by solvent welding, screwed joints or unions are suitable.

The use and installation of acrylonitrile butadiene styrene (ABS) pipes should be in accordance with CP 312-2 and specific attention is drawn to the amendment relating to surge pressures.

4.8 Coating and lining materials

No pipe, pipe fitting or storage cistern intended for conveying or storing water for drinking and food production purposes shall be lined or coated internally with coal tar or any substance that includes coal tar or other non-approved materials.

COMMENTARY AND RECOMMENDATIONS ON 4.8

See 5.6.2. BS 5493:1977 gives recommendations for the protective coating of iron and steel structures, including pipes, fittings and cisterns. This should be consulted where detailed guidance is required. BS 5493:1977 deals with non-saline water and is applicable to domestic water installations. Typical times to first maintenance, general descriptions of recommended coatings and their thicknesses are given. Other tables give more detailed information about the coating systems. Of particular relevance is note n) to Table 3, which concerns fittings used with drinking water.

Internal protection of steel pipes should be in accordance with Clause 27 of BS 534:1990.

Attention is drawn to Regulation 31 of the WFRs [1] on linings or membranes for ponds and similar.

4.9 Elastomeric materials

The materials of elastomeric sealing rings in contact with drinking water shall conform to the requirements of types WA, WB or WE of BS EN 681-1:1996. See also 5.6.2.1.

5 Design considerations

5.1 Initial procedures

5.1.1 Preliminary investigations

The following factors shall be accounted for in the design:

- a) the water supplier's requirements, including those of notification;
- b) the estimated daily consumption and the maximum and average flow rates required, together with the estimated time of peak flow;
- c) the location of the available supply;
- d) the quality, quantity and pressure required and the available pressures at various times during a typical day;
- e) the cold water storage capacity required;
- f) the likelihood of ground subsidence due to mining activities or any other reason;
- g) the likelihood of contamination of the site;
- h) transient or surge pressures that might arise during the operation of the system.

COMMENTARY AND RECOMMENDATIONS ON 5.1.1

Where water is to be supplied by a public water supplier, the WFRs [1] apply. WFRs [1] apply whenever the work involves either a new service or the modification or disconnection of existing services.

When designing plumbing installations, the Building Regulations [4] (particularly Approved Documents G, J, L, and P in England and Wales) apply.

5.1.2 Design

The installation shall be designed to avoid waste, undue consumption, misuse contamination and erroneous measurement, and to ensure continued conformance to the WFRs [1] (see **A.2**) throughout its useful life.

The installation shall be designed to avoid the trapping of air during filling and the formation of air locks during operation.

All systems shall conform to the recommendations of *Health and Safety Executive's Approved Code of Practice L8(rev)* [5].

COMMENTARY AND RECOMMENDATIONS ON 5.1.2

Where systems are being designed to include the provision of additional appliances that are likely to be installed in the future, due regard should be given to the WFRs [1].

*Bacteriological contamination is aggravated in buildings with multiple occupancy. Guidance on legionnaires' disease is contained in **5.6.3** (also see [5] to [8]).*

5.1.3 Extensions

Any extension to existing systems shall depend upon their capacity for extension and attention is drawn to the current water regulations (see **A.2**).

COMMENTARY AND RECOMMENDATIONS ON 5.1.3

If the existing supply is part of a common supply pipe, i.e. the supply pipe serves several properties, any additional demand can have an adverse effect on pressure/flow and quality; the water supplier might require a separate service pipe to be provided. Where properties are being supplied with a new service from a water supplier's main, it is strongly advised that a separate service pipe(s) should be provided wherever feasible and the supplier will normally require this.

5.1.4 Water mains

Where there is no water main available to serve the premises or the existing main is inadequate to provide a satisfactory supply, the water supplier shall be requested to lay new mains or extend an existing main, or an alternative water supply shall be arranged.

COMMENTARY AND RECOMMENDATIONS ON 5.1.4

Full information about proposals should be furnished as early as possible to the water supplier. Site plans should be supplied showing the layout of roads, footpaths, buildings and boundaries. The work programme should take into account the fact that the supplier will not normally lay a main until at least the line and level of the kerb are permanently established on site.

5.1.5 Private supply

Water from a private supply shall not be cross-connected (either temporarily or permanently) to a pipe that is under direct pressure from a water supplier's main.

COMMENTARY AND RECOMMENDATIONS ON 5.1.5

Where premises have a private supply and require a supplementary supply from a water supplier, it should be separated by an appropriate (Fluid Category 5) air gap.

5.1.6 Ground movement

In designing pipe layout, precautions shall be taken to minimize the effects of ground movement on the pipes and fittings.

COMMENTARY AND RECOMMENDATIONS ON 5.1.6

Ground movement can occur due to underground mining operations, natural movements of the earth's strata or movement of superficial deposits. These movements can occur in both the horizontal and vertical planes and will vary in magnitude over the affected area. The effects of undermining can be predicted with reasonable accuracy by the surveyor of the responsible company who should be consulted for advice on precautionary measures to be adopted. Movement of superficial deposits can be due to seasonal swelling and shrinkage, settlement (especially where fibrous organic soils are encountered) or to slope stability failures. An appreciation of ground conditions existing along the line of a proposed construction should be gained by site investigation so as to enable an assessment of likely movement to be made.

The extent of movements of superficial deposits can only be assessed by consideration of the findings of a site investigation.

Where ground is liable to movement a suitable type of pipework should be used to minimize the risk of damage. Where the pipes or the joints are not sufficiently flexible to accommodate movement in pipelines laid in recently disturbed ground, continuous longitudinal support should be provided.

In selecting the type of pipe or storage cistern, components of brittle materials should be more carefully protected from movement than those of materials containing some inherent flexibility.

Provision for change in length of pipelines can be made by the use of telescopic joints whilst angular deflections should be compensated by the use of flexible type joints. The continuity of gradient towards washouts and air valves could be affected by subsidence and therefore when such a situation could occur provision should be made to support pipelines and to ensure reasonable gradients between high and low points on the pipeline. Pipes passing through walls should be free to deflect.

5.1.7 Assessment of the site for contamination

Where pipes are to be laid in the ground, an assessment of the soil shall be made to detect any contamination (see 5.6.2.2).

COMMENTARY AND RECOMMENDATIONS ON 5.1.7

In making an assessment of a site, advice should be sought from the local authority, the site owner and the water supplier. Consideration should also be given to the previous uses of the site.

5.1.8 Pipework external to the building

Supply pipework shall be installed, ideally below ground, but in all cases shall be provided with protection from damage by frost, excessive heat, traffic loads, vibration and contamination, or from any other cause.

External pipework located above ground shall be lagged with waterproof insulation material in accordance with 5.7.3 and either: provision shall be made for draining of all water from such lengths of pipe in frosty weather through a drain tap, which shall not be buried in the ground or so placed that its outlet is in danger of being flooded; or the pipework shall be protected by trace heating and/or insulation to BS 5422.

COMMENTARY AND RECOMMENDATION ON 5.1.8

The normal minimum cover for protecting underground pipework against frost damage is achieved by laying pipework at a depth of at least 0.75 m but not greater than 1.35 m. If this is not possible, the water supplier should be notified. (See 5.7 for details on frost protection.)

The following are regarded as good practice.

- a) *The underground service pipe should be laid at right angles to the main and be laid in approximately straight lines to facilitate location for repairs but with slight deviations to allow for minor ground movements. Where non-metallic pipework is used, consideration should be given to the use of a trace wire.*
- b) *Where access for repair might be difficult, consideration should be given to the provision of some form of duct or sleeve.*

- c) *Consideration should be given to the possibility of future contamination from hydrocarbons (petrol/diesel/heating oil) or from any other possible contaminants through permeation.*
- d) *Where possible pipes should be laid in continuous lengths avoiding unnecessary joints.*

5.1.9 Design consultation

Consultations shall take place with the designer of the building, the building owner, his agent, or end user, the water supplier and all other public and private utilities, highway and local authorities, landowners and others involved.

Notices, applications and notifications (see 5.1.1) shall be completed and submitted by stipulated times.

A plan of those parts of the premises to which the proposal relates together with a diagram showing the pipework and fittings to be installed shall be submitted to the appropriate body.

Whenever other services are in close proximity to the water service pipes, any byelaws, regulations and requirements of all undertakers concerned shall be ascertained.

Where it is necessary to open the highway or ground for pipe laying or other works, the necessary notices, drawings, documents and applications for consent shall be lodged with the highway authority, public utility undertakers, landowners and any other interested parties as early as possible.

COMMENTARY AND RECOMMENDATIONS ON 5.1.9

The installer should be provided with detailed working drawings of the water services showing clearly the precise location of all pipe runs, indicating the method of ducting to be employed where appropriate, the location and full description of all appliances, valves and all other fittings, methods of fixing, protection and all other information which might be required to enable them to construct the work satisfactorily.

The drawings or an accompanying specification should set out clearly any precautions to be taken against damage from frost, corrosion, bursting, expansion and contraction, contamination, noise or damage from construction. They should also include consultation required with other public utilities or subcontractors and any notice to be served before or during the execution of the work.

In respect of all legal requirements, in particular highways, attention is drawn to the terms of the New Roads and Street Works Act 1991[9] (see A.3).

Where possible, the point of entry of the water service should be arranged to facilitate the equipotential bonding of incoming metallic services to the main electrical earth terminal as near as is practical to their point of entry into the premises.

The routing and laying of all services should be co-ordinated to ensure that they are laid in an orderly sequence, to the required line and level and at the appropriate time. A programme should be agreed that takes into consideration the method of construction to be employed, the sequence of hand-over of the buildings, the undertaker's method of working, the size of the services and the position of the incoming services to the site relative to the area to be developed.

In addition to gas, electricity and telephone, other services could include oil pipelines, television relay cables, district heating systems and drainage connections (see National Joint Utilities Group Publication No. 6 [10]).

5.2 Cold water services

5.2.1 General

5.2.1.1 Where required, drinking water shall be provided directly from the supply pipe. So far as is reasonably practical the temperature of water within cold water pipes shall not exceed 20 °C (although it is recognized that mains water can rise to 25 °C in the summer months) and adequate measures shall be taken to ensure that this temperature is not exceeded.

Pipe runs to cold water taps within buildings should not follow the routes of space heating or hot water pipes or pass through heated areas such as airing cupboards; where local proximity is unavoidable, the hot and cold pipes shall be insulated from each other and the hot pipes shall run above the cold pipes.

COMMENTARY AND RECOMMENDATIONS ON 5.2.1.1

The Water Supply (Water Quality) Regulations set out requirements for drinking water for all buildings. Drinking water is also required at places of work in accordance with the Workplace (Health, Safety and Welfare) Regulations 1992 [11] made under the Health and Safety at Work etc. Act 1974 [12] (see A.4).

The insulation requirements given in Table 8 will normally give adequate protection against heat gain in pipes and cisterns.

5.2.1.2 No drinking water point shall be installed at the end of a long pipe from which only small volumes of water are drawn or water is drawn infrequently.

COMMENTARY AND RECOMMENDATIONS ON 5.2.1.2

Attention is drawn to the Workplace (Health, Safety and Welfare) Regulations 1992 [11] (see A.4) with respect to drinking water provision in office and other commercial buildings.

Drinking water points should be located in areas intended for the preparation of food and for its consumption in addition to rooms provided for beverage making. Where beverage making facilities are not provided, drinking water points should be sited in the vicinity of, but not inside, toilets. Nevertheless, a drinking water fountain may be installed within a toilet area but sited as far away as possible from WCs and urinals and should be of the shrouded nozzle type discharging above the spillover level of the bowl (see BS 6465-1).

To reduce the risk of stagnation, the layout of pipework should be arranged, where possible, so that fittings downstream of a drinking water point have regular use.

Except in a house, all taps that are supplied with cold water that is not drinking water should be labelled "Not Drinking Water".

5.2.1.3 The design and installation of every tap shall conform to the backflow protection requirements of **5.6.4** in relation to its intended use.

COMMENTARY AND RECOMMENDATIONS ON 5.2.1.3

In order to enable buckets and similar utensils to be filled, the outlet of the kitchen tap should be not less than 275 mm above the bottom of the sink.

5.2.1.4 In order to avoid confusion and misuse, taps shall be fitted with hot on the left and cold on the right as viewed by the user.

5.2.1.5 A service valve shall be installed internally in a position that will allow water downstream of the service valve to drain from the outside tap.

COMMENTARY AND RECOMMENDATIONS ON 5.2.1.5

It is recommended that there is installed an electrically nonconductive section of supply pipe to the outside tap where metallic pipework is used to supply the outside tap.

5.2.1.6 When installing an ion exchange water softener, pipework shall be provided to bypass the water softener for the purpose of maintenance (see Figure 1).

COMMENTARY AND RECOMMENDATIONS ON 5.2.1.6

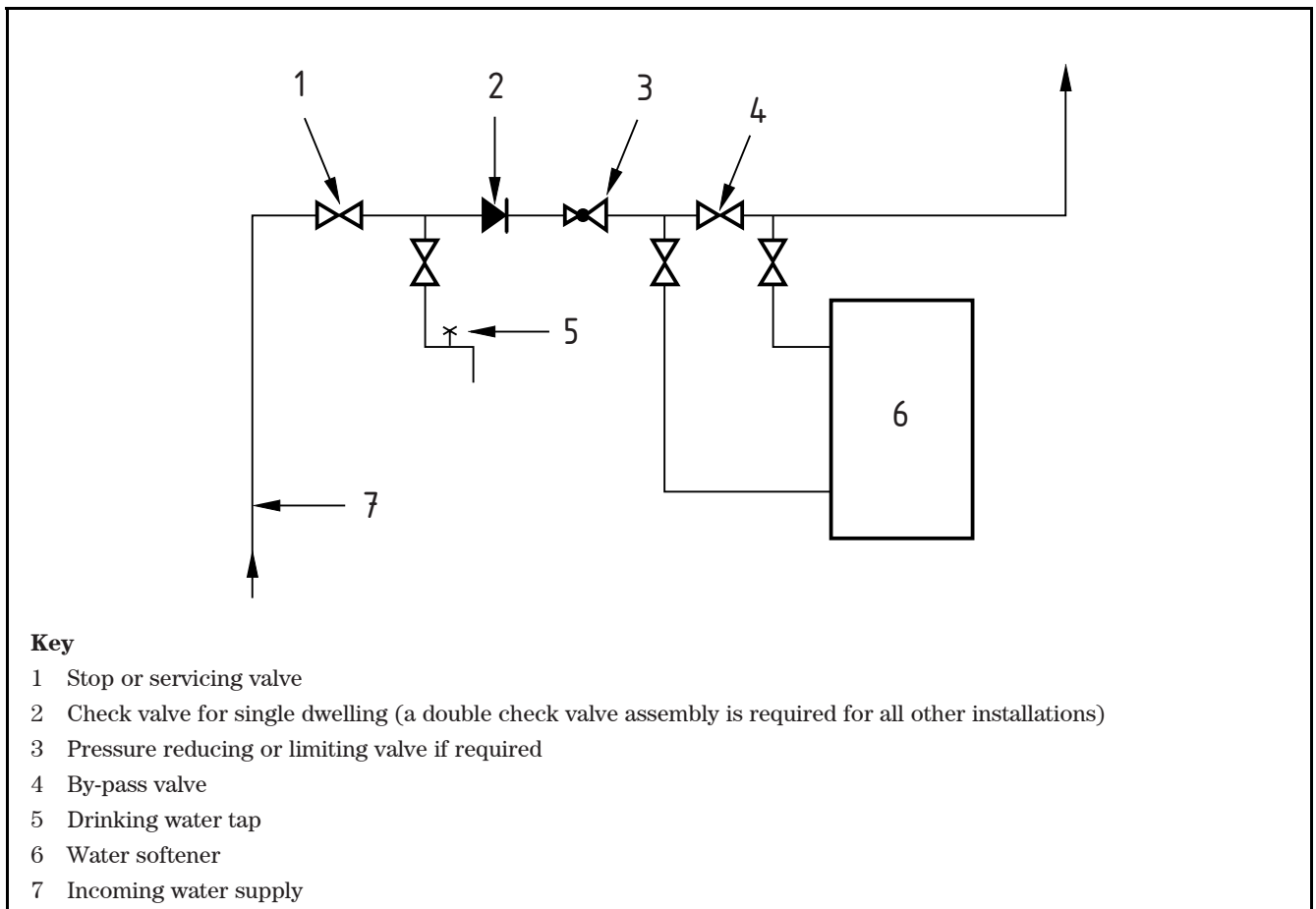
A separate un-softened mains fed drinking water tap, such as is also illustrated in Figure 1, is recommended and will ensure that drinking water is always available and serves two purposes. Firstly, it enables samples to be taken to verify the quality of the incoming supply either by the occupier or the water supplier who has an obligation to carry out compliance samples at mains water taps within consumers premises for compliance with water quality regulations. Secondly, the Department of Health recommends that un-softened water should be available for infant feed preparation to help prevent hypernatraemia, and also to assist recommendations to reduce sodium intake in the general population.

The WFRs [1] require that "All premises supplied with water for domestic purposes shall have at least one conveniently situated tap for the drawing of drinking water".

It should be noted that the parametric value for sodium of 200 mg/l stipulated in the Water Supply (Water Quality) Regulations 2000 [13], will only be exceeded when it is softened in areas where the water supply is extremely hard, viz. greater than 435 mg/l as CaCO₃ (assuming zero sodium in the mains supply).

A water softener should not be installed upstream of lead pipework.

Figure 1 Example of pipework for installation of water softener



5.2.2 Type of system

5.2.2.1 When designing a distribution system, attention is drawn to the requirements of the WFRs [1] and the Health and Safety Executive's Approved Code of Practice L8(rev) [5].

COMMENTARY AND RECOMMENDATIONS ON 5.2.2.1

Direct supply from a water main is preferable to supply via a storage system from which droplets or aerosols might be inhaled (see 5.6.3 on legionella). In any case, considerations of pressure and reliability of supply, particularly where dwellings are located at the extremity of mains distribution system, should be studied.

Characteristics of supply directly from a water main:

- a) *water quality is assured by not being kept in storage;*
- b) *smaller pipes may be used in most cases except for the service pipe which might need to be larger than the supply pipe to a storage cistern;*
- c) *the higher pressure that is usually available is more suitable for instantaneous type shower heaters, hose taps and for mixer fittings used in conjunction with a high pressure (unvented) hot water supply;*
- d) *where single outlet mixer fittings are used measures to prevent backflow will be necessary when used in conjunction with a low pressure (vented) hot water supply.*
- e) *A pumped supply pipe might be necessary due to lack of pressure.*

Characteristics of supply via a storage cistern:

- 1) *availability of a reserve of water for use in case of interruption of the mains supply;*
- 2) *additional protection of the mains from contamination;*
- 3) *reduced risk of water-hammer and reduced noise from outlets, but additional noise generated by the float-operated valve controlling the water supply to the cistern;*
- 4) *a constant low pressure with reduced risk of leakage and which is suitable for mixer fittings in conjunction with low pressure (vented) hot water supply, but the pressure available is usually insufficient for some types of taps and might not be sufficient for satisfactory showering in the absence of a booster pump;*
- 5) *risk of frost damage;*
- 6) *space occupied and cost of storage cistern, structural support and additional pipework;*
- 7) *need to ensure that the cistern is continuously protected against the ingress of any contaminant.*

In some cases a combination of the two methods or supply might be the best arrangement. In a dwelling, for example, the ground floor cold outlets and any outside tap could be supplied under mains pressure while all other cold water outlets could be fed from a storage cistern. In these cases, precautions are necessary to prevent cross-connections and backflow.

5.2.2.2 Systems in buildings other than dwellings

For buildings other than dwellings, the method of supply shall be related to the size and usage of the building and the number of appliances to be served.

COMMENTARY AND RECOMMENDATIONS ON 5.2.2.2

In the case of small buildings where the water consumption is likely to be comparable to that of a dwelling house, the options stated in 5.2.2.1 should be considered. For larger buildings, drinking water should be taken directly from the water undertaker's main wherever practicable (using a pump system where necessary; see 5.2.2.3) or, when circumstances dictate otherwise, from a cistern protected in accordance with 5.2.3.2.

5.2.2.3 Pumped systems

Where insufficient water pressure is available in the supply pipe and the demand is less than 0.2 l/s, or if the demand is greater and the water undertaker agrees, drinking water may be pumped directly or indirectly off the supply pipe. (See also 5.2.1.1.)

The prior written consent of the water undertaker shall be obtained before a pump is connected in or to a supply pipe.

COMMENTARY AND RECOMMENDATIONS ON 5.2.2.3

Where the available pressure is insufficient to supply the whole of a building, consideration should be given to installing a pumped system.

When deciding on the method of pumping and on the siting of break tanks and pumps, consideration should be given to the use of such pressure as might be available in the mains supply. In all systems, precautions have to be taken to ensure that backflow does not occur from the distribution pipework and pumping plant (see 5.6.1.3 and 5.6.3).

5.2.3 Storage cisterns

5.2.3.1 General

5.2.3.1.1 Water suppliers cannot guarantee an uninterrupted supply of water, therefore if water is critical to your operations consideration shall be given to onsite storage.

NOTE Storage cisterns are not recommended for drinking water where direct supply is possible since water quality cannot be completely assured.

5.2.3.1.2 Drinking water storage cisterns and covers shall not impart taste, colour, odour or toxicity to the water, nor promote or foster microbial growth (see 5.6). Any cistern from which water is drawn shall be watertight and for domestic purposes shall be:

- a) fitted with a rigid, close fitting and securely fixed cover which is not airtight but excludes light and insects from the cistern, fits closely around any vent pipe, made of materials which will not shatter or fragment when broken and will not contaminate any water which condenses on its underside;
- b) fitted with a screened air inlet
- c) where necessary, lined or coated with a material suitable for use in contact with drinking water;
- d) insulated against heat and frost;
- e) supplied from a supply pipe from the water supplier's mains or from a pump drawing water from a cistern which is also a watertight closed vessel similarly equipped and supplied as above;
- f) when of capacity greater than 1 000 l, so constructed that the interior can be readily inspected and cleaned, and the inlet control valve adjusted and maintained without having to remove the cover or the whole of any cover which is in two or more parts; and
- g) provided with warning and overflow pipes, as appropriate (see 5.2.4), which are constructed and arranged to exclude insects.

COMMENTARY AND RECOMMENDATIONS ON 5.2.3.1.2

Table 1 gives recommendations for storage capacities related to various types of use but these are to be regarded as a guide only. The water supplier should be consulted regarding any particular requirements it might have in this matter.

In determining the total capacity of cold water storage in the premises concerned, account should be taken of:

- a) *the need to prevent stagnation by ensuring that water is held in storage for as short a time as possible; and*
- b) *the requirements of any associated water-using fittings and appliances, particularly where supply interruptions could cause damage to property or inconvenience to the consumer.*

The probable pattern of water use (draw-off rates and their durations) should be determined and account taken of any local conditions of low or reduced mains pressures likely to affect cistern refilling at times of peak demand.

Where storage is a requirement under the Water Industry Act 1991 (Section 66), a maximum capacity of 80 l per person normally resident will probably prove satisfactory. A larger capacity based on 130 l per person would be appropriate where cistern refilling normally takes place only during the night hours.

The water supplier should be consulted before finalizing cistern capacity to non-domestic premises.

Separation of capacity among two or more cisterns should facilitate water circulation, and inlets and outlets should be located to prevent stratification and stagnation within the cisterns.

Table 1 **Recommended minimum storage of cold water for domestic purposes (hot and cold outlets)**

Type of building or occupation	Minimum storage litres
Hostel	90 per bed space
Hotel	200 per bed space
Office premises:	
with canteen facilities	45 per employee
without canteen facilities	40 per employee
Restaurant	7 per meal
Day school:	
nursery	} 15 per pupil
primary	
secondary	} 20 per pupil
technical	
Boarding school	90 per pupil
Children's home or residential nursery	135 per bed space
Nurses' home	120 per bed space
Nursing or convalescent home	135 per bed space
<i>NOTE Direct supply is preferred for the supply of drinking water.</i>	

5.2.3.1.3 The material of a cistern shall be corrosion resistant or shall be coated internally with an approved non-toxic corrosion resistant material conforming to BS 6920-1, 2 and 3.

5.2.3.1.4 The cistern shall be supported on a firm level base which is capable of withstanding the weight of the cistern when filled with water to the spill-over level (nominal capacity). Every plastic cistern shall be supported on a flat rigid platform fully supporting the bottom of the cistern over the whole of its area. Access shall be provided as described in 5.8.5. Space shall be provided under and around the cistern for maintenance.

5.2.3.1.5 For cisterns at or above ground level, the outlet of any overflow pipe shall be more than 150 mm above the finished surface (see **5.2.4**).

5.2.3.1.6 For cisterns below ground level, the outlet of any warning or combined warning and overflow pipe shall be configured to warn of discharge (see **5.2.4**).

5.2.3.1.7 Cisterns sunk in the ground shall have special measures to detect leakage.

5.2.3.1.8 Except for interconnected cisterns arranged to store water at the same water level, every pipe supplying water to a cistern shall be fitted with a float-operated valve or some no less effective device to control the inflow of water and maintain it at the required level. The inlet control device shall be suitable for the particular application.

When a float-operated valve is used it shall either:

- a) conform to BS 1212, parts 1, 2, 3 or 4 and be used with a float conforming to BS 1968 or BS 2456 of the correct size corresponding to the length of the lever arm and the water supply pressure; or
- b) where any other float-operated valve or other level control device is used, conform to the minimum performance requirements of BS 1212-1, 2, 3 or 4 where applicable to the circumstances of its use and shall be clearly marked with the water pressure, temperature and other characteristics for which it is intended to be used.

Every inlet control device shall be securely fixed, and when fixed to the cistern, shall be braced so as not to distort the cistern, and so affect the water level at which it closes. (For more details on warning and overflow, see **5.2.4**.)

5.2.3.1.9 All cold water distributing pipes from cisterns shall be connected at the lowest practicable point on the cistern, and arranged to promote the movement of water within the cistern. Connections to pipes feeding hot water apparatus shall be set at a level at least 25 mm above connections to cold water distributing pipes and shall be for the supply of hot water apparatus only.

COMMENTARY AND RECOMMENDATIONS ON 5.2.3.1.9

The water supply to the cistern should be fitted on the opposite side to the distribution pipes to promote movement of water.

The 25 mm requirement will minimize the risk of scalding from outlets such as showers, should the water supply fail.

5.2.3.2 Large storage system cisterns

Cisterns over 1 000 l capacity shall additionally conform to the following requirements:

- a) Where required, to avoid interruption of the water supply, storage shall be provided by a system of split compartments or multiple cisterns to facilitate repairs or maintenance.
- b) A washout pipe with the valve incorporated as close as practicable to the cistern shall not be connected to a drain but may be arranged to discharge into open air at least 150 mm above a drain if required. Where the washout pipe runs direct to drain, a type AA airgap shall be incorporated.

COMMENTARY AND RECOMMENDATIONS ON 5.2.3.2

A washout pipe should be provided flush with the bottom of the cistern at its lowest point. Where practicable, the floor of the cistern should be laid to a slight fall to the washout pipe for cleaning purposes. The washout pipe outlet should be controlled by a suitable fullway valve and blanked off with a plug or flange when not in use.

In order to facilitate the requirements of 5.2.3.2a), consideration should be given to the use of delayed-action ball-valves.

Sometimes, particularly in the case of a complex of buildings, because of the larger volume of storage required or to provide the necessary head, it might be necessary to support the cistern in an independent structure outside the building(s). Although such a storage facility is often referred to as a tank or water tower, it is, by definition, a cistern.

Cisterns mounted outside buildings, whether fixed to the building itself or supported on an independent structure, should be enclosed in a well ventilated, but draughtproof, housing constructed to prevent ingress of birds, animals, and insects, but providing access to the interior of the cistern by authorized persons for inspection and maintenance.

Water systems incorporating a cistern for domestic use, installed below ground level, are notifiable to the water supplier and consultation is required before installation.

5.2.4 Warning and overflow pipes

Every cistern of capacity (if filled to the level at which water just starts to flow through any overflow pipe) up to 1 000 l shall be fitted with a combined warning and overflow pipe.

Cisterns of capacity exceeding 1 000 l shall be fitted with one or more overflow pipes.

- a) For capacities up to 5 000 l the lowest overflow pipe shall be a warning pipe.
- b) For capacities over 5 000 l, either the lowest overflow pipe shall be a warning pipe, or a device shall be fitted that indicates when the water in the cistern reaches a level that is at least 25 mm below the lowest point of the lowest overflow pipe connection, or an independent control is fitted to shut off the inflow when the water in the cistern reaches the lower of the warning and overflow pipes.

Ventilation openings shall be screened by a corrosion-resistant mesh with a maximum aperture size of 0.65 mm.

Overflow and warning pipes shall be made of rigid, corrosion resistant material; no flexible hose shall be connected to or form part of any overflow or warning pipe. When a single overflow pipe is fitted its bore shall be greater than that of the inlet pipe to the cistern and in no case shall any warning pipe be less than 19 mm internal diameter.

No warning or overflow pipe shall rise in level outside the cistern.

Every warning pipe shall discharge water immediately the water in the cistern reaches the overflowing level and shall discharge in a conspicuous position, preferably outside the building where this is appropriate.

The overflow pipe or pipes shall be of a suitable size and lead to a continuous fall, in order to be able to carry away all the water which is discharged into the cistern in the event of the inlet control device becoming defective, without the water level reaching the spill-over level of the cistern or submerging the discharge opening of the inlet pipe or valve.

COMMENTARY AND RECOMMENDATIONS ON 5.2.4

Where overflow and warning pipes discharge through the external wall of a building they should be arranged so as to prevent the inward flow of cold air by turning down the warning pipe into the cistern and below the water line except where this could interfere with the operation of the flushing mechanism or float-operated valve in a WC flushing cistern.

5.2.5 Stopvalves

5.2.5.1 Stopvalves fitted to supply pipes shall conform to the relevant standard in Table 2.

Table 2 **British Standards for stopvalves**

Nominal size of pipe	British Standard	
	Above ground	Below ground
50 mm or smaller	BS 1010-2 (BS EN 1213)	BS 2580
	BS 2580	BS 5433
	BS 5433	
50 mm or larger	BS 5163-2	BS 5163-2

The stopvalve components of composite fittings shall conform to the requirements for stopvalves.

When a stopvalve is installed below ground, it shall be enclosed in a suitable accessible chamber.

5.2.5.2 In every building or part of a building to which a separately chargeable supply of water is provided and in any premises occupied as a dwelling, whether or not separately charged for a supply of water, a stopvalve shall be provided that controls the whole of the supply to those premises without shutting off the supply to any other premises. This stopvalve shall, so far as is practicable, be installed within the building or premises concerned in an accessible position above floor level and close to the point of entry of the pipe supplying water to that premises, whether this be a supply pipe or a distributing pipe. Stop valves should not be installed in one separately occupied part of a building that will shut off water to another separately occupied part of a building where they do not have access.

In addition, where a common supply or distributing pipe provides water to two or more premises, it shall be fitted with a stopvalve that controls the water supply to all of the premises supplied by that pipe. This stopvalve shall be installed either inside or outside the building in a position to which every occupier of the premises supplied has access.

A stopvalve shall be installed in every pipe supplying water to any structure erected within the curtilage of a building but having no access from the main building. This stopvalve shall be located in the main building as near as practicable to the exit point of the supply pipe to the other structure or if this is not practicable in the other structure itself as near as possible to the entry point of the supply.

Where a building is divided into separately occupied parts, the supply to each part shall be capable of being shut off by a second stopvalve installed outside that part, without shutting off the supply to other parts of the building, as shown in Figure 2 and Figure 3.

Figure 2 **Locations of stopvalves in blocks of flats with separate supply pipes to each flat**

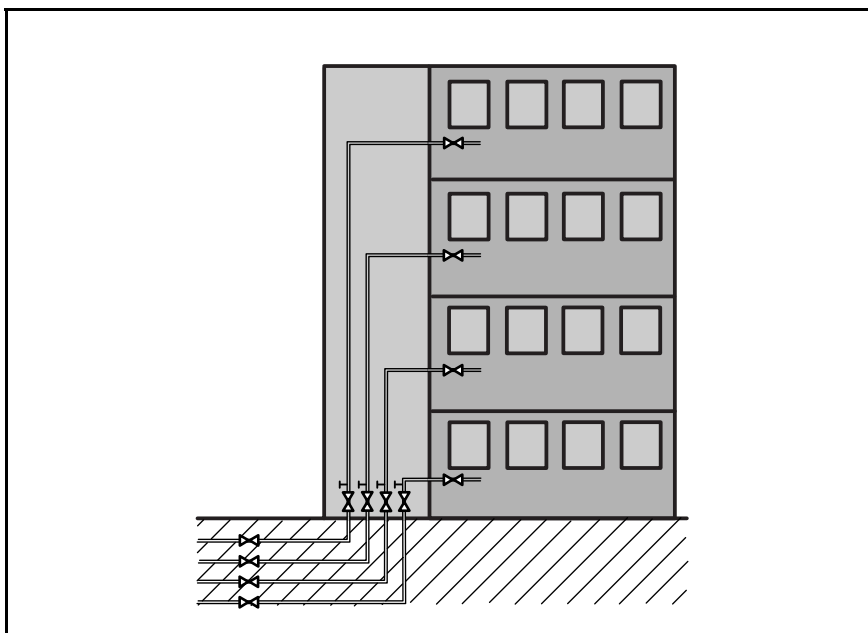
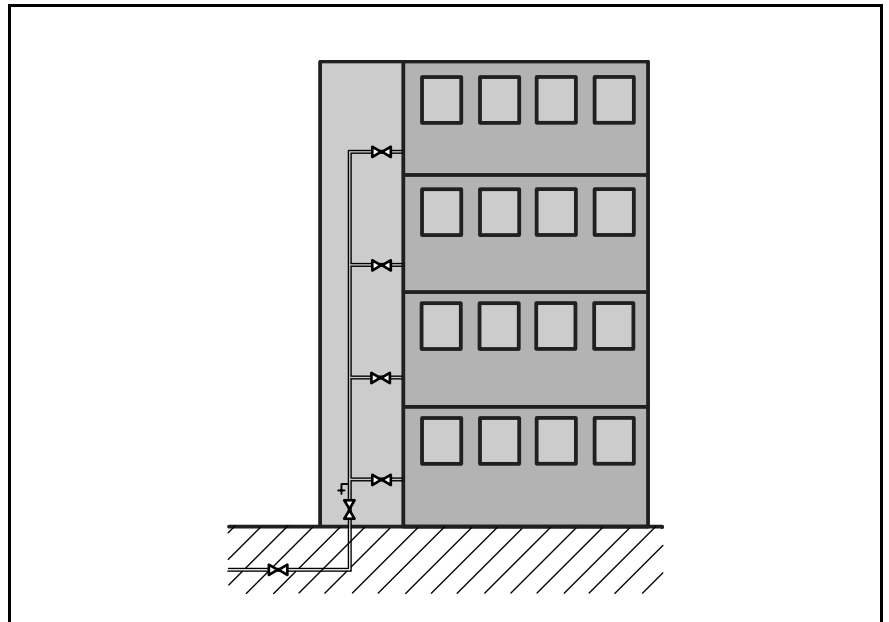


Figure 3 Locations of stopvalves in blocks of flats supplied from a common supply pipe



COMMENTARY AND RECOMMENDATIONS ON 5.2.5.2

The principle on which these requirements and recommendations are based is to provide a ready means of isolating any private or common supply causing damage or nuisance or for the purpose of effecting repairs, replacements or alterations. Any occupier should be able to drain down the supply to avoid frost damage and to shut off their own supply or a supply in unoccupied premises which is causing damage or nuisance by means of a stopvalve to which each occupier has ready access.

5.2.6 Servicing valves

5.2.6.1 An adequate number of servicing valves shall be provided and located in accessible positions so as to enable the flow of water to individual or groups of appliances to be controlled and to limit the inconvenience caused by interruption of supply during repairs.

COMMENTARY AND RECOMMENDATIONS ON 5.2.6.1

Where appropriate a servicing valve should be protected against unauthorized use.

5.2.6.2 A servicing valve shall be fitted upstream of, and as close as practicable to, every float-operated valve or other device used to control the inflow and level of water in cisterns.

Every pipe drawing water from a cistern other than those supplying water to a primary or heating system, shall be fitted with a servicing valve as near as is practicably possible to the cistern.

Pipes connecting feed cisterns to primary circuits shall not be fitted with servicing valves on the outlet pipe from the cistern.

Servicing valves shall be accessible.

COMMENTARY AND RECOMMENDATIONS ON 5.2.6.2

Having regard to the hydraulic resistance of screwdown type valves, it is permissible for copper alloy gatevalves conforming to BS 5154 to be used for this purpose. Alternatively, spherical valves are available and are well suited for fitting near to single outlet fittings and appliances as servicing valves.

5.2.7 Draining taps

Every pipe which supplies water to premises shall be fitted with a draining tap conforming to BS 2879 and arranged so that when the stopvalve installed according to 5.2.5.2 is closed and the draining tap is open, the supply pipe downstream of the stopvalve can be drained (see 5.7.5).

Draining taps shall have provision for discharging the water to the nearest convenient point for disposal. The draining taps on any supply or distributing pipe shall not be buried in the ground or so placed that their outlet is in danger of being flooded.

Sufficient draining taps conforming to BS 2879 shall be provided to facilitate the draining of all supply and distributing pipes within the building, in a way that minimizes the discharge of water when water fittings are being maintained or replaced.

COMMENTARY AND RECOMMENDATIONS ON 5.2.7

Combined stopvalves and draining taps are a convenient way of providing facilities for draining.

The pipe runs on the downstream of every stopvalve should be arranged so as to drain continuously towards draining taps or draw-off taps at the low points. All cisterns, tanks, cylinders and boilers should be fitted with draining taps unless they can be drained through pipes leading to draining taps or draw-off taps elsewhere; provision should be made for draining both the primary and secondary parts of an indirect hot water cylinder or calorifier. Provision should be made for draining low level pipes such as those laid in ducts under a ground floor.

All draining taps should be capable of being fitted with removable hosepipes unless installed over a drain or discharging into a permanent draining pipe. Where a draining tap is necessarily at such a level or in such a position that complete drainage cannot be obtained, even by the aid of a hosepipe and syphonic action, then a sump that can be emptied by bailing or pumping should be provided to receive the water drained from the tap.

Adequate facilities should be provided to permit entry of air into the system when draining down. Where the taps and float-operated valves in the system are not suitably located for this purpose, special air inlet valves should be fitted in appropriate locations.

When a sump is used it should be arranged so that the water level in it will at all times be kept below the outlet of the drain tap to preserve an air gap and prevent backflow. Similarly, outlets of hoses connected to draining taps should be arranged to discharge freely into the air, at no time should such hose outlets be allowed to become submerged.

For effective draining, it is essential that air enters the pipework freely and draw-off taps, float-operated valves and air inlet valves should be open for this purpose when draining is being carried out. Hot water cylinders are liable to collapse if air cannot enter the system.

Draining taps should be used for draining purposes only. Where a draw-off tap is used for draining the installation, it should not be fitted with a hose unless it has backflow protection and in accordance with the WFRs [1] (see A.2).

Attention is drawn to the situation where the provision of check valves and double check valve assemblies for backflow prevention at draw off taps, particularly those with flexible hoses, and other equipment may also prevent air entering the system during a draining operation.

5.2.8 Revenue meter installations

5.2.8.1 General

The water supplier shall consult with the consumer regarding the installation of a revenue meter, with regard to any requirements concerning the installation additional to those specified in **5.2.8.2** to **5.2.8.5** before work is begun.

COMMENTARY AND RECOMMENDATIONS ON 5.2.8.1

Meters on the incoming supply to premises, for revenue charging purposes, are usually supplied and installed by the water supplier and sited by agreement between the consumer and the water supplier.

Wherever possible meters should be installed at or near the street boundary of the premises supplied, which is the limit of the responsibility of the water supplier for maintenance of the service pipe.

The meter should be protected from the risk of damage by shock, vibration or frost induced by the surroundings at the place of installation.

5.2.8.2 Meters

Meters shall conform to BS EN 14154-1, with suitable connectors to facilitate future meter changes without the use of heat or major disturbance of the pipework.

5.2.8.3 Bonding

A copper bonding conductor of at least 10 mm² shall be installed for bonding between inlet and outlet pipework connections to water meters, water suppliers' stopvalves or other water conveying components in a metal water supply pipe to ensure electrical continuity to any pipework temporarily disconnected for the purpose of removing such components for replacement or maintenance (see **6.1.8** and **7.2.5**).

The copper bond shall be connected prior to attaching the pipework and shall remain in place following installation.

COMMENTARY AND RECOMMENDATIONS ON 5.2.8.3

These requirements are necessary on both internal and external installations for protection of the installer against electrical fault and for maintenance of the earth connection.

5.2.8.4 External installations

5.2.8.4.1 In external meter installations, the meter shall be installed below ground in a position accessible for meter reading and changing, with the dial uppermost.

The chamber shall be fitted with a cover marked “water meter”, of sufficient strength to carry the loads to which it might be subjected and fitted with slots or lifting eyes.

Pipes or drains other than the meter pipework shall not pass through the meter chamber.

The chamber shall be sized so that there is ample space available for removing the meter using the necessary hand tools.

Space shall be left for the extraction of bolts from flanges for ready dismantling of joints and no part of the meter assembly shall be built into the walls of the chamber or concreted into the chamber.

The pipe on both sides of the meter assembly shall have a clearance space around it through the wall of the chamber to facilitate exchange of the meter. Where the chamber needs to be watertight, the clearance shall be fitted with a sealing material approved by the water supplier and sufficient length of pipe left inside the pit to facilitate meter exchange.

Pipework on both sides of the meter assembly shall be firmly fixed to prevent movement of any flexible joints within the meter assembly. Nevertheless, such anchorage shall leave sufficient room for connecting and disconnecting the meter making use of the adaptors provided. The meter shall also be supported on the underside so as not to create differential loads between the meter and its connecting pipework.

There shall be a valve which isolates the meter on both the inlet and the outlet.

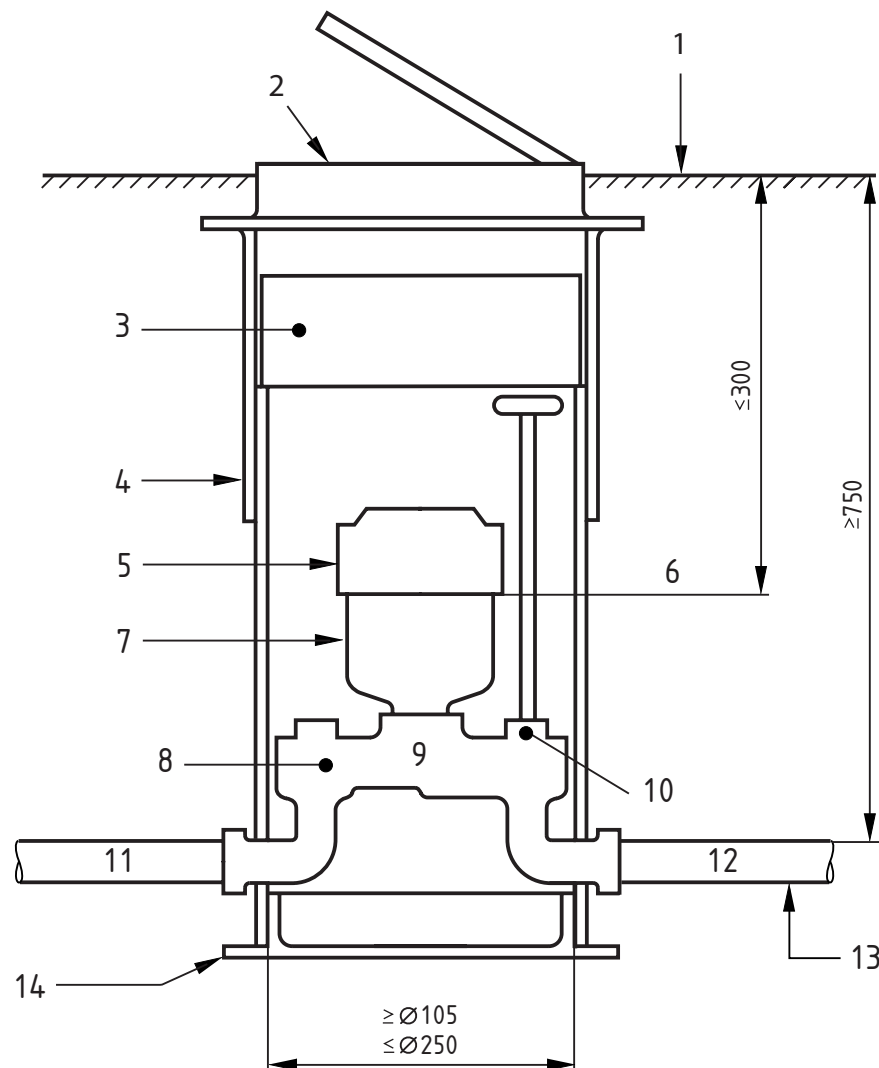
COMMENTARY AND RECOMMENDATIONS ON 5.2.8.4.1

For housing and other installations where the maximum water requirement does not exceed 3500 l/h, the chamber may be constructed of glass reinforced plastics or PVC (see Figure 4).

For meters where the water flow exceeds 3500 l/h, the chamber should be constructed of brick or concrete. The clear opening of the surface box should be the same as the internal dimensions of the chamber.

Steel framed, concrete filled covers to chambers are not recommended on account of their weight and their liability to flex causing the concrete to crack and the cover to jam.

Figure 4 Example of an external meter installation

**Key**

- | | |
|---|----------------------------------|
| 1 Ground level | 8 Outlet reverse flow restrictor |
| 2 Frame and cover | 9 Manifold |
| 3 Thermal insulation | 10 Inlet stopvalve |
| 4 Meter chamber with adjustable top section | 11 Outlet |
| 5 Register | 12 Inlet |
| 6 Highest meter capsule point | 13 Service pipe |
| 7 Meter capsule | 14 Base |

5.2.8.4.2 Any stopvalve in a meter chamber shall conform to Table 2.

5.2.8.5 Internal meters

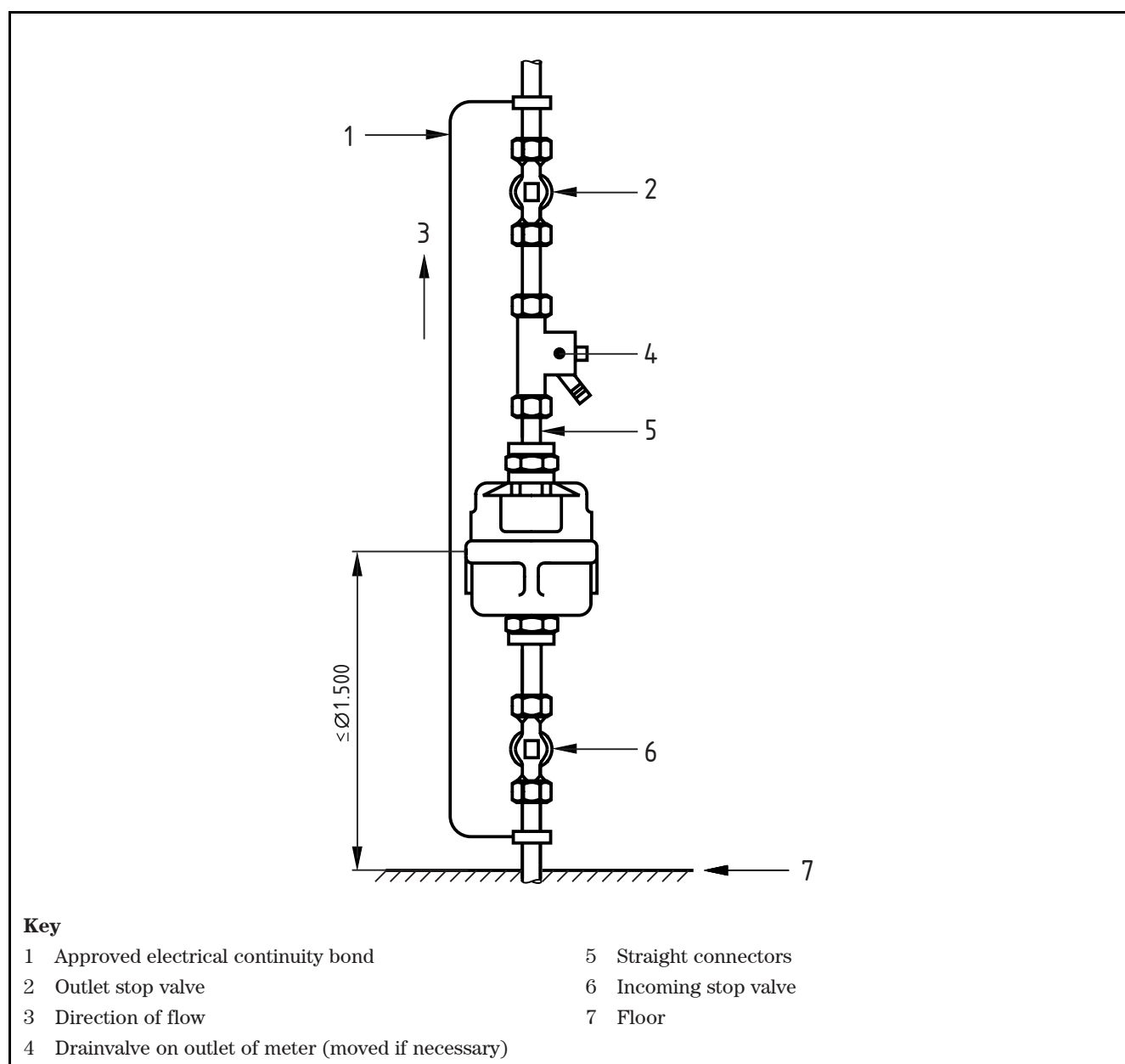
5.2.8.5.1 Internal meters shall be fixed horizontally or vertically and with the dial not more than 1.5 m above floor level and readily visible for reading.

Where the existing pipework is, or can be, re-positioned so as to be parallel to the wall and is not less than 50 mm away from it, installations shall be as indicated in Figure 5.

COMMENTARY AND RECOMMENDATIONS ON 5.2.8.5.1

Where a consumer wishes to limit access to the meter for reading purposes, a remote readout device may be installed if the water supplier agrees.

Figure 5 Recommended meter installation inside building



5.2.8.5.2 Pipework shall be adequately supported, leaving sufficient room for changing the meter with the connections provided.

5.2.8.5.3 The meter shall be installed downstream of the internal stopvalve and as close to it as possible.

Where a drain valve is required, in accordance with the WFRs [1], it shall be installed immediately downstream of the meter.

COMMENTARY AND RECOMMENDATIONS ON 5.2.8.5.3

The length of pipe between the stopvalve and the meter cannot easily be drained and will thus require effective protection against damage from frost in accordance with 5.7.

5.2.8.5.4 A second stopvalve or servicing valve shall be installed downstream of the meter.

5.2.8.5.5 Where the installation of meters in exposed locations, e.g. garages subject to frost, is unavoidable and agreed by the water supplier, adequate insulation in accordance with **5.7.3** shall be provided but not so as to seriously impede reading or changing the meter.

5.2.9 Non-revenue meters

The installation of non-revenue meters shall conform to **5.2.8** except that the water supplier need not be consulted.

5.3 Hot water services

5.3.1 General principles

The hot water service shall be designed to provide hot water at the point of use, in the quantities and at the temperatures required by the user.

COMMENTARY AND RECOMMENDATIONS ON 5.3.1

Hot water storage and distribution should be as recommended in Approved Code of Practice L8 (rev) [5] (see also 5.6.3). However, these water temperatures and delivery times might not be achievable where hot water is provided by instantaneous water heaters or combination boilers.

The Health and Safety Executive guidance note HS(G) 104, "Safe" hot water temperatures (currently under review) refers to scalding protection [14].

5.3.2 Choice of system

Where the user requirements are not specified, and in particular where the user is not known, e.g. in speculative housing developments, an assessment of user needs shall be made on the basis of the size and type of building, experience and convention.

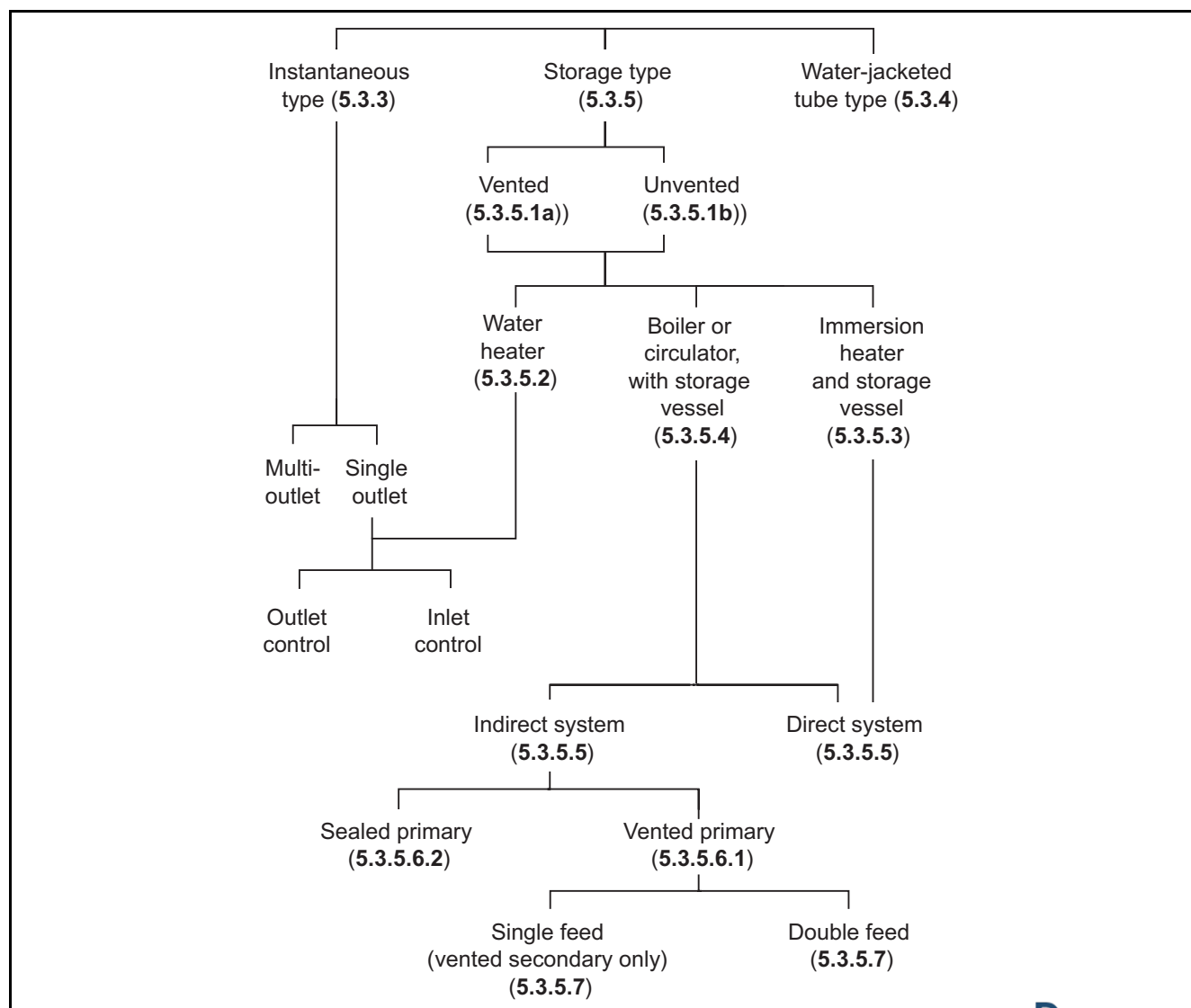
Where a dwelling has only one bathroom it shall be assumed that immediately after filling a bath, some hot water will be required for kitchen use, but a second bath will not be required within 20 min to 30 min. Where a dwelling has two or more bathrooms, it shall be assumed that all the installed baths will be filled in succession and that hot water will immediately be required for kitchen use (see Figure 6).

COMMENTARY AND RECOMMENDATIONS ON 5.3.2

Data on which this assessment is made should include the following:

Hot water (60 °C) used in dwellings:	35 l to 45 l per person per day
Average bath:	60 l at 60 °C plus 40 l at 10 °C or 100 l at 40 °C
Shower:	0.05 l/s to 0.10 l/s at 40 °C
Power shower:	Up to 0.2 l/s at 40 °C
Wash basin hot tap:	0.10 l/s to 0.15 l/s at 40 °C to 60
Kitchen sink	0.10 l/s to 0.20 l/s at 60 °C
NOTE Although temperatures of 40 °C are quoted, these should be achieved by mixing cold and hot water.	

Figure 6 Choice of hot water system



5.3.3 Gas-fired water heaters in rooms containing a bath or shower

Gas-fired water heaters installed in a room used or intended to be used as a bathroom or shower room shall be of the room-sealed type. The appliance shall be installed in accordance with BS 5546.

5.3.4 Water-jacketed tube heaters

Water-jacketed tube heater installations supplied directly from a supply pipe shall accommodate expansion of water so that there is no discharge from the system except in emergency situations.

COMMENTARY AND RECOMMENDATIONS ON 5.3.4

The cold water feed might be from a supply pipe or from a storage cistern. The water drawn for use passes through a heat exchanger in a reservoir of primary water heated by an integral or separate boiler. The size of this reservoir, which in some designs can include the space-heating circuit, the rate of heat input to it and the heat exchanger characteristics determine the amount and rate of flow of hot water that can be provided without unacceptable temperature drop. The primary circuit can be vented or sealed.

The performance characteristics of individual appliances should be ascertained from the manufacturers.

5.3.5 Storage-type hot water systems

5.3.5.1 Choice of vented or unvented system

The choice between the vented and the unvented type of installation shall be made in conjunction with the choice of method of cold water supply (see 5.2.2).

Whichever system is installed, it shall conform to the relevant requirements of 5.4.

COMMENTARY AND RECOMMENDATIONS ON 5.3.5.1

Except for supplies to dual stream fittings, mixing fittings should be supplied with comparable hot and cold water supply pressures.

A summary of the main differences between vented and unvented systems is as follows.

- a) *Vented systems: vented domestic hot water service systems are fed with cold water from a storage cistern which is situated above the highest outlet to provide the necessary pressure in the system and which accommodates expansion of the water when it is heated. An open vent pipe runs from the top of the hot water storage vessel to a point above the water storage cistern, into which it is arranged to vent. Explosion protection involving no mechanical devices is provided by the open vent and the cistern.*
- b) *Unvented systems: unvented systems can be supplied from a storage cistern, either directly or through a booster pump, but usually from the supply pipe, either directly or via a pressure reducing valve. The main characteristics of unvented systems are as follows.*
 - 1) *Explosion protection is provided by safety devices.*
 - 2) *Systems depend upon pressure continuity and the hot water flow cannot be guaranteed if pressures fall.*
 - 3) *In unvented systems supplied from a supply pipe the absence of a storage cistern can reduce the risk of frost damage to property and removes the source of refill, or float-operated valve noise.*

- 4) *The safety aspects of unvented, storage-type hot water systems are subject to the requirements of the Building Regulations [4] (see A.1). In accordance with the Building Regulations, the installation of an unvented hot water storage system have to be notified before and after installation to the local authority building control. A person registered with an approved Competent Persons Scheme in accordance with the Building Regulations [4] does not need to notify their local authority building control, but they may notify their scheme provider after the installation of the unvented system (see A.1).*

5.3.5.2 Storage water heaters

5.3.5.2.1 Non-pressure or inlet controlled type

No hose or other connection shall be made to the outlet of a non-pressure or inlet-controlled storage-type water heater and the outlet shall not be controlled by a valve or tap.

COMMENTARY AND RECOMMENDATIONS ON 5.3.5.2.1

Special taps and mixer taps in which the tap mechanism controls the cold water inlet to the heater while the hot water from the heater is discharged through the tap outlet can be used when specified by the heater manufacturer, provided the tap outlet remains unobstructed.

5.3.5.2.2 Pressure or outlet controlled type

The heater shall be suitable for the supply pressure and there shall be appropriate arrangements to accommodate expansion of the heated water.

COMMENTARY AND RECOMMENDATIONS ON 5.3.5.2.2

Many pressure-type water heaters are designed to be supplied from a storage cistern only and will not withstand mains water pressures.

For installations in small dwellings a capacity of 100 l to 150 l is sufficient to provide a hot water supply including a supply to a bath. Heaters designed to take advantage of off-peak electricity tariffs may have a capacity of 200 l or more.

5.3.5.3 Storage vessel with electric immersion heater

The storage vessel shall conform to the relevant requirements of 5.6 and shall be corrosion resistant.

The immersion heater or heaters shall conform to BS EN 60335-2-21; all electrical controls shall conform to the relevant sections of BS EN 60730-2.

The immersion heater shall be provided with a non-self-resetting thermal energy cut-out device in addition to the normal automatic thermostat.

Immersion heaters and controls shall be so located that insertion, removal and adjustment can easily be performed.

5.3.5.4 Boiler heated hot water systems

Boiler heated hot water systems specified in this standard comprise a hot water storage vessel and an independent heating appliance, a back-boiler associated with an open fire or room heater, a boiler incorporated in a cooker, or a gas-fired circulator.