BRITISH STANDARD

BS 8000-13: 1989

Workmanship on building sites —

Part 13: Code of practice for above ground drainage and sanitary appliances

CAWS R10, R11

UDC 69.002.72 + 696.12.002.72 + 696.1

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Council for Building and Civil Engineering (B/-) to Technical Committee B/146, upon which the following bodies were represented:

Building Employers' Confederation
Chartered Institute of Building
Consumer Policy Committee of BSI
Department of the Environment (Building Research Establishment)
Department of the Environment (Property Services Agency)
Federation of Associations of Specialists and Sub-Contractors
Institute of Clerks of Works of Great Britain Inc
Institution of Civil Engineers
Institution of Structural Engineers
National Building Specification Ltd.
National Council of Building Materials Producers
National House Building Council
Royal Institute of British Architects
Royal Institution of Chartered Surveyors
Society of Chief Architects of Local Authorities

This British Standard, having been prepared under the direction of the Council for Building and Civil Engineering, was published under the authority of the Board of BSI and comes into effect on 31 October 1989

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Contents

Foreword

This Part of BS 8000 has been prepared under the direction of the Council for Building and Civil Engineering. It makes recommendations and gives guidance on basic workmanship for conventional types of building work.

The recommendations given are not necessarily comprehensive; particular project documents, e.g. project specifications, may need to cover particular recommendations not dealt with by this code of practice.

This code of practice is unique in that unlike other British Standards, it draws together recommendations given in other codes of practice.

The purpose of this code of practice is to encourage good workmanship by providing the following:

a) the most frequently required recommendations on workmanship for building work in a readily available and convenient form to those working on site;

b) assistance in the efficient preparation and administration of contracts;

c) recommendations on how designers' requirements for workmanship may be satisfactorily realized;

d) definitions of good practice on building sites for supervision and for training purposes; this guidance is not intended to supplant the normal training in craft skills;

e) a reference for quality of workmanship on building sites.

It is recognized that design, procurement and project information should be conducive to good workmanship on site.

During the preparation of this code of practice the Building Industry's Co-ordinating Committee for Project Information (CCPI), produced a Common Arrangement of Work Sections (CAWS) for building work. This code of practice has generally been arranged in accordance with the Common Arrangement so that it can be used easily with project specifications and bills of quantities using this arrangement. Other major documents are being restructured in accordance with the Common Arrangement.

NOTE The CCPI was sponsored by the Association of Consulting Engineers, the Building Employers' Confederation, the Royal Institution of Chartered Surveyors and the Royal Institute of British Architects.

When complete BS8000 will comprise the following Parts.

— *Part 1: Code of practice for excavation and filling;*

— *Part 2: Code of practice for concrete work;*

— *Part 3: Code of practice for masonry;*

— *Part 4: Code of practice for waterproofing;*

— *Part 5: Code of practice for carpentry, joinery and general fixings;*

— *Part 6: Code of practice for roof, slate, tile covering and cladding;*

— *Part 7: Code of practice for glazing;*

— *Part 8: Code of practice for plasterboard partitions and dry linings;*

— *Part 9: Code of practice for cement/sand floor screeds and concrete floor toppings;*

— *Part 10: Code of practice for plastering and rendering;*

— *Part 11: Code of practice for wall and floor tiling;*

— *Part 12: Code of practice for decorative wallcoverings and painting;*

— *Part 13: Code of practice for above ground drainage and sanitary appliances;*

— *Part 14: Code of practice for below ground drainage;*

— *Part15: Code of practice for hot and cold water services (domestic scale).*

Technical Committees SEB/14, Drainage of roofs and paved areas, and SEB/18, Sanitary pipework and appliances, have also participated in the preparation of this Part of BS 8000 and the content is based on and consistent with that of BS 5572, BS 6367 and BS 6465-1. However, BS 5572, BS 6367 and BS 6465-1 cover the subject matter more comprehensively and include design, materials and other related aspects in addition to workmanship on site.

The text of this Part of BS 8000 includes commentaries. These commentaries are separately identified and are intended to be for guidance only and do not form part of the recommendations. They refer, unless otherwise stated, to the clause which immediately precedes each commentary.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Section 1. General

1.1 Scope

This Part of BS 8000 gives recommendations on basic workmanship and covers those tasks which are frequently carried out in relation to above ground drainage and sanitary appliance installation.

For design aspects of above ground drainage and sanitary appliance installation reference should be made to BS 5572, BS 6367 and BS 6465-1.

NOTE This code of practice includes supplementary elements in the form of commentaries to assist in its use and understanding. Compliance with the commentaries is not necessary in order to be able to claim conformity with the standard.

1.2 References

1.2.1 Normative references

This Part of BS 8000 incorporates, by reference, provisions from specific editions of other publications.

These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this Part of BS 8000 only when incorporated in it by amendment or revision.

1.2.2 Informative references

This Part of BS 8000 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

1.3 Definitions

For the purposes of this Part of BS 8000, the definitions given in BS 4118:1981 apply.

Section 2. Materials handling and preparation

2.1 Checking, handling and site storage of materials and components

2.1.1 Checking

Check delivery tickets and certificates against the specification; examine marks and labels and condition of materials and components. If necessary refer to supplier immediately.

In particular check that sanitary apliances are not chipped or otherwise damaged in any way.

2.1.2 Handling and site storage

2.1.2.1 *Pipes, gutters and associated components.* Handle with care to minimize damage and soiling. Do not throw or push items from the transport onto the ground.

Prepare storage areas in advance of deliveries and store products as follows.

a) *Fittings and accessories:* store under cover in a secure hut or compound as appropriate.

b) *Plastics pipes gutters and fittings:* leave pipes in wrappings where practicable and stack on flat level ground or clear of the ground on bearers or boards to avoid soiling and damage from sharp objects. Stack pipes in racks or in stacks not higher than 1.5 m and secured from collapse. Take extra care with UPVC (unplasticized polyvinyl chloride) pipes in cold weather when their impact strength is less and pipes are therefore more vulnerable to damage.

COMMENTARY. *It is not advisable that plastics pipes and fittings be stored for long periods in the open or in unventilated conditions. Exposure to the sun or other heat sources can be detrimental to surface finishes and can cause distortion.*

c) *Cast iron pipes and fittings, and galvanized pipes and assemblies:* store clear of the ground on a level surface to a height convenient for handling, and secure against collapse. Ensure that pipes and coatings are not damaged in the stack. Stack fittings and assemblies so that they are not soiled or damaged.

d) *Copper pipes and fittings:* store clear of the ground on a platform, on bearers or in racking in a secure hut or compound under cover.

e) *Jointing materials:* store securely under cover in containers as delivered until required. Follow manufacturers' sitework instructions, particularly with regard to safety provisions.

2.1.2.2 *Sanitary appliances and associated components.* Handle very carefully to avoid causing damage in any way. Leave wrappings and protection in place for as long as possible (see **3.3.5**). Store under cover, protected from weather, dirt, damage, distortion and pilfering, and so that there is a convenient sequence of removal from the store to the work positions minimizing the risk of damage through double handling.

2.2 Preparation of work, materials and components

Ensure that any builders' work necessary is or will be sufficiently complete and will not delay continuity of the drainage and installation work. Agree the sequencing of installation. Liaise with any other site contractors.

Verify the positions of constructed work, e.g. walls, floor levels and openings, against the layouts of the sanitary installations. Check that there is adequate clearance around all holes in the structure intended for pipes and fittings.

Inspect all materials and components immediately before use. Discard any that are faulty.

Section 3. Installation

3.1 Pipework and gutters

3.1.1 General

3.1.1.1 *Positioning pipes.* Erect stacks plumb. Fix branch pipes with uniform and adequate gradients according to design so that they will drain efficiently.

Ensure that there is a sufficient clearance between pipework and other services and parts of the building fabric for maintenance, e.g. cleaning at access points and painting.

For rainwater pipes, immediately before assembling and connecting pipework to receive rainwater, ensure that:

a) below ground drainage has been installed to receive discharge from those pipes; or

b) a temporary arrangement is made for the disposal of rainwater discharge.

COMMENTARY. *Where pipes which need to be painted for maintenance purposes are located in chases or internal angles of the building structure, adequate clearance may be required for this purpose.*

3.1.1.2 *Cutting pipes.* Cut pipe ends square. Remove any burrs and swarf and ensure pipe bores are clean before jointing. Chamfer leading cut ends if the jointing is of the push fit type.

3.1.1.3 ***Bending pipes***

a) Do not bend plastics or galvanized pipes.

b) Bend copper pipes on a bending machine, avoiding ripples and throating to maintain the diameter of pipe bore at the bend.

3.1.1.4 ***Fabricating fittings***

a) Do not fabricate plastics fittings on site but use only the recognized and proper fittings made for the purpose.

b) Where copper pipe junctions are fabricated on site with bronze or other proprietary material welding or silver soldering, allow only suitably qualified operatives to carry out the work.

3.1.1.5 *Pipe fixings.* Use only fixings that are compatible with the materials and system of pipe work. Do not exceed the maximum spacing between fixings for sanitary pipes given in Table 1.

Fix pipes according to the relevant allowances for movement, providing either sliding supports for location or rigid fixings for clamping pipe runs at intervals to the building fabric (see **3.1.1.7**).

Table 1 — Maximum distance between sanitary pipe supports

Pipe material	Nominal pipe size	Vertical pipes	Low gradient pipes
	mm	m	m
Plastics of any type	32 to 40	1.2	0.5
	50	1.2	0.6
	75 to 100	1.8	0.9
	150	1.8	1.2
Cast iron	all sizes	3.0	3.0
Copper	25	2.4	1.8
	32 to 40	3.0	2.4
	50	3.0	2.7
	65 to 100	3.7	3.0
Galvanized steel	25	3.0	2.4
	32	3.0	2.7
	40 to 50	3.7	3.0
	65 to 75	4.6	3.7
	100	4.6	4.0

COMMENTARY. *Rainwater pipes may be fixed by ears cast, bolted or welded to the pipe sockets or by loose holderbats, screwed or built in, one to each length of pipe. Where pipes exceed* 2 m *in length, an intermediate holderbat may be fitted.*

3.1.1.6 *Fixing fascia gutters.* Fix to even falls to outlets. Support with screwed brackets fixed at their centres and with allowances for expansion at intervals no greater than those in the manufacturer's sitework instructions.

COMMENTARY. *A recommended maximum rate of fall for domestic gutters is 1 in 350.*

Eaves gutters are usually supported by means of fascia or rafter brackets fastened with corrosion-resistant screws of minimum size 25 mm *long* × 5 mm *and fitted not more than* 1 m *apart. Special restraining brackets may be required to prevent the gutter being dislodged by ladders or strong winds. Additional brackets may be fitted to or near angles and outlets to prevent sagging.*

3.1.1.7 *Movement allowance for plastics pipework.* Allow for movement of plastics pipelines by providing expansion joints at specified intervals. Do not position expansion joints at greater centres than those given in the manufacturer's sitework instructions.

In systems having joints sealed with rubber rings and in unsealed rainwater pipes, form expansion joints by leaving a clearance between the spigot and the socket shoulder. In systems sealed principally by solvent welded joints, include ring-seal joints where necessary to form expansion joints.

Securely fix roof or balcony outlets before connecting the pipes. Arrange expansion joints in the pipe to prevent the outlet being lifted or tilted by thermal movement in the pipe or by deflection of the roof covering where this is flexible.

Rigidly clamp the socket of each expansion joint to the building fabric; between expansion joints use fixings which allow a sliding movement of the pipe.

COMMENTARY. *It is generally convenient and practical to locate expansion joints in discharge stacks at the highest branch connection in each storey height. In the top storey if the dry part of the stack is not offset and is free to expand upwards, an expansion joint is not normally necessary. Branches are generally provided with an expansion joint at their junction with the stack. Branches up to*1.0 m *long from single WCs do not require expansion joints as the rubber seal of the WC connector can accommodate the thermal movement in a short length of pipe.*

Expansion of plastics is several times that of iron or copper; if joints allowing movement are not included or are ineffective, the expansion and contraction due to temperature changes of the pipe run may break pipe joints, distort the pipe or disturb fixings and connections to appliances.

Particular care may be required to allow for movement at flat-roof outlets. Expansion joints have to provide for both expansion of the pipework and deflection of the roof. Where there is an offset below the roof outlet it is essential to clamp the head of the stack otherwise the offset will act as a lever to tilt the outlet.

3.1.1.8 *Sleeving.* Provide and fix sleeving and packing around pipes which pass through walls, floors and roofs in accordance with the project specification.

COMMENTARY. *The passage of building services through the building fabric inevitably adversely affects the potential performance of the fabric, particularly resistance to the transmission of sound, fire, smoke and moisture. It is important therefore that design and workmanship applied at these junctions are executed with care to minimize potential deficiencies in performance. It is essential that where sleeves are provided, they pass through the whole thickness of the wall, floor or roof fabric, and any sealing between pipes and fabric is effective and durable.*

3.1.1.9 *Access points.* Unless otherwise specified provide clearing access openings positioned so that the pipework can be cleared along the direction of the flow at the following points:

a) at connections to below ground drains;

b) at changes in direction of stacks;

c) at changes in direction of horizontal runs;

d) at ends of branches receiving multiple appliances (the access end should be taken up to above the spill-over level of the lowest appliance on that branch);

e) at other points required for testing.

3.1.2 Jointing

3.1.2.1 *Materials.* Do not use jointing materials in excess quantities and keep them clear of the pipe bore. Clean the joint after making.

COMMENTARY. *Excess flux in contact with copper may corrode the copper. Excess solvent cement may reduce and damage the bore of plastics pipes.*

3.1.2.2 *Use of solvent cement for plastics*

a) Take note of warning instructions on the containers of solvent cements and cleaning fluids, e.g. do not inhale, keep away from naked flame, provide free ventilation.

b) Use only materials which are compatible with the material being jointed.

c) Do not use solvent cement later than the expiry date shown on the container.

3.1.2.3 *Elastomeric ring seals.* Use only the ring seals supplied for the pipe system and the lubricant recommended for the purpose.

COMMENTARY. *Ring seals from different manufacturers are generally not interchangeable. Use of incorrect lubricants can cause deterioration of the seal.*

3.1.2.4 *Assembling pipes*

a) Immediately before assembly clean jointing surfaces as appropriate to the material and type of joint being made.

b) Unless otherwise specified ensure that pipe ends are pushed fully home before tightening or sealing joints.

c) For plastics pipes with push fit ring or seals of similar type withdraw the pipe approximately 10 mm after pushing home assembly.

3.1.2.5 *Cast iron pipes.* Joint cast iron pipes with the type of joint specified and in accordance with manufacturers' sitework instructions where proprietary joints are used.

COMMENTARY. *One of three types of joint might be specified:*

a) *a proprietary gasketted joint complying with BS 6087; or*

b) *a lead caulked joint; or*

c) *a proprietary cold caulking compound joint.*

3.1.2.6 *Copper pipes.* Use the type of joint and fittings specified.

COMMENTARY. *Copper pipes are normally jointed with either soldered capillary joints and fittings or non-manipulative compression fittings.*

3.1.2.7 *Galvanized steel pipes.* Joint as specified. Do not weld tubes which are already galvanized.

COMMENTARY. *Galvanized steel pipes might be joined on site either with a proprietary cold jointing compound or with bolted flanges and gaskets.*

3.1.2.8 *Plastics pipes.* Joint plastics pipes as specified and in accordance with manufacturers' sitework instructions. Use methods of jointing appropriate to the material of the pipe, as follows:

a) Pipes of the following materials are jointable with solvent cement, compression fittings and with ring seals (or similar push fit friction seals):

ABS (acrylonitrile butadiene styrene);

MUPVC (modified unplasticized polyvinyl chloride);

UPVC (unplasticized polyvinyl chloride).

b) Pipes of the following materials are jointable with compression fittings, fusion welding and ring seals (or similar push fit friction seals):

PE (polyethylene);

PP (polypropylene).

3.1.2.9 *Pipes of other materials.* When jointing pipes of materials, other than those given in **3.1.2.8** a) and **3.1.2.8** b), use only jointing materials, fittings and techniques which will make effective and durable connections.

COMMENTARY. *The method of jointing depends on the materials and sizes of the pipes, and on whether spigot or socket ends are to be connected.*

BS 5572 gives information for general guidance on joints between small size branch pipes to vertical stacks and on joints between pipes of the same size.

3.1.2.10 *Rainwater pipes.* Unless otherwise specified do not seal pipe joints to vertical runs of external pipe if less than 75 mm diameter, except for the joint between the gutter outlet and rainwater pipe. If pipes are metal and unsealed, wedge the spigots centrally in the sockets neatly with a durable preformed compressible material to prevent rattling.

Seal joints of all pipes of over 75 mm diameter and all joints in near-horizontal runs.

Seal all internal rainwater pipe joints as for discharge pipes. Refer to and apply all other relevant provisions in **3.1.2**.

3.1.2.11 *Rainwater gutters.* Follow the manufacturer's sitework instructions when using proprietary gutter systems. Generally, carry out the following.

a) Ensure mastic sealant, where used, is evenly spread over the whole surface of the jointing socket so that the tightening of the joints squeezes some mastic out of the joint. Clean off excess mastic.

b) For gutters with bolted joints, tighten the bolt or bolts in the gutter sole before tightening the remaining bolts.

c) Use fixings which are resistant to corrosion. Use washers for any steel bolts on all except small domestic scale gutters.

d) Prime and paint spigots, sockets and cut ends of all cast-iron and steel gutters before assembly to protect against corrosion.

e) Ensure that plastics gutters are provided with adequate and proper expansion gaps at locations and intervals in accordance with the manufacturer's sitework instructions.

3.2 Sanitary appliances

3.2.1 Pipes to appliances

Install discharge pipes and water supply pipes before fixing the appliances. Make any union or detachable type joints between appliances, traps and pipes.

3.2.2 Fixing appliances

Securely fix all appliances, following the manufacturer's sitework instructions and the following.

a) Where they are subjected to frequent wet conditions use copper alloy or stainless steel fixings and fastenings, unless the appliance manufacturer has supplied fixings and fastenings or has provided instructions about which fixings and fastenings are satisfactory.

b) Do not embed any appliance in the wall surface finish except where specified.

c) Do not use supply or discharge pipework to support or fix appliances.

d) Where the appliance is seated with its weight carried directly on the floor, ensure that the seating is level and even; if necessary on hard floors, where it is intended that an appliance makes continuous contact with the floor, use mortar (cement : sand 1 : 6) no thicker than 20 mm as laid on hard setting mastic to point around and under the appliance.

e) Ensure that appliances are fixed at the required position and height and are fixed plumb and level so that surfaces designed with falls will drain as intended.

3.2.3 Sealants

Seal between all appliances except, normally, cisterns, and the building structure as follows:

a) ensure that the correct specified type of sealant is used;

b) ensure that the finishes to backgrounds are complete and the surfaces to receive the sealant are clean and dry;

c) remove the minimum necessary of any protective covering to give access for the application of the sealant;

d) apply sealant in accordance with the manufacturer's sitework instructions and leave a neat smooth surface and watertight joint.

3.3 Protection

3.3.1 Fire precautions

When using heat producing apparatus, e.g. blow torches, ensure that adjacent building fabric is protected from scorch damage and risk of fire. Take particular care when working in roof spaces and other confined areas. Do not leave heat producing apparatus unattended or directed on to flammable materials.

3.3.2 Painting. If paint of any sort is used, ensure that it is compatible with the main paint specification. Provide all ferrous metal components with protection against corrosion and, if not supplied with an adequate protective coating, paint with a suitable material (see BS 6150 and BS 5493).

COMMENTARY. *Some plastics materials without inherent protection against ultraviolet (UV) radiation require painting if used externally.*

3.3.3 Pipework

Do not damage pipework either before or after fixing. Cover all exposed pipe ends, branches and access points with a purpose-made fitting or with a protective cover or cap to guard against entry of tools or building material.

3.3.4 Gutters

Take care not to damage gutters. Do not support ladders or scaffold boards on semi-rigid gutters which can distort or break under load.

3.3.5 Sanitary appliances

a) Keep protective coverings in place as long as practically possible up to hand-over.

b) Replace any appliances which are chipped, cracked, scratched, distorted or otherwise damaged.

c) Do not stand in or on any appliance.

d) Do not use appliances.

Section 4. Inspection and testing

4.1 Inspection and testing

4.1.1 Pipework

Inspect completed sections during the course of installation and correct any defects. When warranted by the size of the installation or when any section will be rendered inaccessible at a later stage, test completed work in sections.

Carry out final testing, making good and recording results in accordance with the project specification and any statutory requirements, including the period of notice for inspection.

COMMENTARY. *Testing the soundness of above ground drainage lines is normally carried out by using air pressure.*

Detection of the location of leaks can be carried out by smoke but care is needed not to damage the pipework by heat or products of combustion; the pipework manufacturer's advice should be sought. Leakage can also be revealed by the use of a soap solution applied to suspect areas.

Water testing is not normally justified but may be applied at the lowest level of the pipework up to the spill-over level of the lowest sanitary appliance provided the static head does not exceed 6 m.

4.1.2 Rainwater gutters

Test all gutters for leakage over walls and internal areas as follows:

a) plug the gutter outlet(s);

b) fill the gutter with water to the overflow level or to the lower level of the freeboard;

c) check visually for leaks after 5 min;

d) if leaks are found, reseal and repeat test.

4.1.3 Sanitary appliances

Examine sanitary appliances for damage and satisfactory operation of appliances and fittings prior to inspection for handover. Remedy any faults observed.

4.1.4 Installation performance

Check generally that all appliances drain speedily, quietly and completely through the installation.

Test as required to ensure a minimum water seal of 25 mm will be retained in every trap during peak working conditions.

COMMENTARY. *Performance test procedures for siphonage and back pressure in pipework are given in BS 5572.*

4.1.5 Instructions provided for user

Ensure that any operation, cleaning and/or maintenance instructions provided for the user are intact and, where applicable, attached to the installation.

Index

List of references (see 1.2)

Normative reference

BSI standards publications
BRITISH STANDARDS INSTITUTION, London

BS 4118:1981, *Glossary of sanitation terms.*

Informative references

BSI standards publications
BRITISH STANDARDS INSTITUTION, London

BS 5493:1977, *Code of practice for protective coating of iron and steel structures against corrosion.*
BS 5572:1978, *Code of practice for sanitary pipework.*
BS 6087:1981, *Specification for flexible joints for cast iron drainpipes and fittings (BS 437) and for cast iron soil, waste and ventilating pipes and fittings (BS 416).*
BS 6150:1982, *Code of practice for painting of buildings.*
BS 6367:1983, *Code of practice for drainage of roofs and paved areas.*
BS 6465, *Sanitary installations.*
BS 6465-1:1984, *Code of practice for scale of provision, selection and installation of sanitary appliances.*
BS 8000, *Workmanship on building sites.*
BS 8000-1:1989, *Code of practice for excavation and filling.*
BS 8000-2, *Code of practice for concrete work*[1)].
BS 8000-3:1989, *Code of practice for masonry.*
BS 8000-4:1989, *Code of practice for waterproofing.*
BS 8000-5, *Code of practice for carpentry, joinery and general fixings*[1)].
BS 8000-6, *Code of practice for roof, slate, tile covering and cladding*[1)].
BS 8000-7, *Code of practice for glazing*[1)].
BS 8000-8:1989, *Code of practice for plasterboard partitions and dry linings.*
BS 8000-9:1989, *Code of practice for cement/sand floor screeds and concrete floor toppings.*
BS 8000-10:1989, *Code of practice for plastering and rendering.*
BS 8000-11, *Code of practice for wall and floor tiling.*
BS 8000-11.1:1989, *Ceramic tiles, terrazzo tiles and mosaics.*
BS 8000-11.2, *Natural stone*[1)].
BS 8000-12:1989, *Code of practice for decorative wallcoverings and painting.*
BS 8000-14:1989, *Code of practice for below ground drainage.*
BS 8000-15, *Code of practice for hot and cold water services (domestic scale)*[1)].

[1)] In preparation

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