

Water supply — Requirements for systems and components outside buildings

The European Standard EN 805:2000 has the status of a
British Standard

ICS 23.040.01; 91.140.60

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National foreword

This British Standard is the official English language version of EN 805:2000.

The UK participation in its preparation was entrusted by Technical Committee B/504, Water supply, to Subcommittee B/504/1, Systems and components outside buildings, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Presumption of conformity to European legislative requirements

When the reference to this European Standard has been published in the Official Journal of the European Union (OJ), under the terms of the Public Procurement and Works Directives, which are transposed into UK law by the Utilities Contracts Regulations 1996, the Public Supply Contracts Regulations 1991 and the Public Works Contracts Regulations 1991 and:

“subject to ..., the technical specifications which the work or works to be carried out under a public works contract shall be defined by reference to any European specifications which are relevant”,

this standard should be called up in specifying all qualifying contracts.

Outside the scope of the Public Procurement Directive (PPD), and the UK Regulations transposing the PPD, this standard has no mandatory application, unless called up within a contract, other than as representing currently accepted good practice.

Representation of good practice

International co-operation in the development of European Standards inevitably requires compromise in the course of reaching agreement. The UK was prominent in the development of EN 805:2000 and, despite some reservations, voted in favour of its acceptance at CEN formal vote. Any future development of the standard will build upon the shared agreement of its current contents.

However, the current contents should not be taken to represent the full body of good practice guidance that exists on installation methods. Reference may also be made to documentation developed by UK Water Companies, which in turn may reference accepted sector and professional publications.

This British Standard, having been prepared under the direction of the Sector Committee for Building and Civil Engineering, was published under the authority of the Standards Committee and comes into effect on 15 September 2000

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ISBN 0 580 36369 4

Amendments issued since publication

Amd. No.	Date	Comments

Interpretation

The UK Technical Committee offers the following advice in respect of the contents of this standard.

1. Water for fire-fighting

Subclause 5.3.2 of this document specifies that water for fire-fighting purposes should be determined in accordance with national legislation or local regulations.

There is currently no national legislation or local regulations in the UK determining the quantity of water to be provided for fire-fighting but attention is drawn to the national guidance document on the provision of water for fire-fighting published jointly by the Local Government Association and Water UK in December 1998 and available for download from the Water UK internet site at <http://www.water.org.uk/forum/ftp/>.

2. Service objectives

Clause 6 of this document requires the water supplier to define the levels of service to be achieved at the point of connection to the consumer's installation.

For water suppliers in England and Wales minimum levels of service are set by legislation in the Water Supply and Sewerage Services (Customer Services Standards) Regulations 1989.

3. Rehabilitation

Due to the rapid development of rehabilitation techniques the document gives no detailed requirements for the renovation of mains. It is important to note the use of the word "relevant" in clause 7.

4. General dimensions for product standards — Dimensions

Subclause 9.3.1 of this document specifies two series of nominal sizes (DN) for components in the range 20 mm to 4 000 mm for internal (DN/ID) and external diameter (DN/OD).

The subclause refers specifically to requirements to be observed in the drafting of product standards and therefore does not preclude the acceptance of any sizes which may appear in such product standards.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 64, an inside back cover and a back cover.

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English version

Water supply - Requirements for systems and components outside buildings

Alimentation en eau - Exigences pour les réseaux
extérieurs aux bâtiments et leurs composants

Wasserversorgung - Anforderungen an
Wasserversorgungssysteme und deren Bauteile außerhalb
von Gebäuden

This European Standard was approved by CEN on 7 June 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword	4
Introduction	5
1 Scope.....	6
2 Normative references	7
3 Definitions.....	7
3.1 Pressures	7
3.2 System.....	9
3.3 Components	12
3.4 Diameters	13
3.5 Installation	13
3.6 Hydraulic design	15
3.7 Structural design.....	15
4 Application of standards and regulations	16
5 Requirements for water supply systems	16
5.1 Water quality	16
5.2 Design life	17
5.3 Demand for water.....	17
5.4 System security	17
6 Service objectives	17
7 Rehabilitation	17
8 Design	18
8.1 Design objectives.....	18
8.2 Peak flow factors.....	18
8.3 Hydraulic design	18
8.4 Structural design.....	20
8.5 System layout.....	22
8.6 Protection against aggressive environment	24
8.7 Reservoirs.....	24
8.8 Pumping stations	24
8.9 Documentation	24
9 General requirements for product standards	24
9.1 General.....	24
9.2 Materials.....	25
9.3 Dimensions	25
9.4 Structural design.....	26
9.5 Mechanical requirements	27
9.6 Water tightness	27
9.7 Joints	27
9.8 Protective measures	29
9.9 Durability	29
9.10 Test methods	29
9.11 Interconnection of products	31
9.12 Quality control	31
9.13 Marking.....	31

10	Installation	32
10.1	General requirements	32
10.2	Pipe trenches	33
10.3	Installation of pipeline components	34
10.4	Pipe joints	35
10.5	Protection against corrosion and contamination	35
10.6	Embedment and main backfill	36
10.7	Records of tests during installation	37
11	Testing of pipelines	37
11.1	General requirements	37
11.2	Safety	37
11.3	Pressure test	39
12	Disinfection	42
12.1	General	42
12.2	Preparation for disinfection	42
12.3	Selection of disinfectant	43
12.4	Disinfection procedures	43
12.5	Microbiological clearance and reporting	44
13	Additional requirements	44
14	Operation	44
14.1	Inspection and monitoring	44
14.2	Maintenance	45
15	Updating of documentation	45
Annex A (informative)	Guidance to EN 805	46
Annex B (informative)	A-deviations	63
Annex C (informative)	Bibliography	64

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 164 "Water supply", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

In specifying the requirements of this standard due regard has been taken of the importance of a reliable and safe supply of water for human consumption as well as for the purpose of trade, industry, agriculture and fire-fighting.

The widely varying water supply legislative requirements, populations, social and climatic conditions across Europe have also been taken into account.

This standard does not make any implication with regard to ownership of or responsibility for pipes or other apparatus in the supply system.

1 Scope

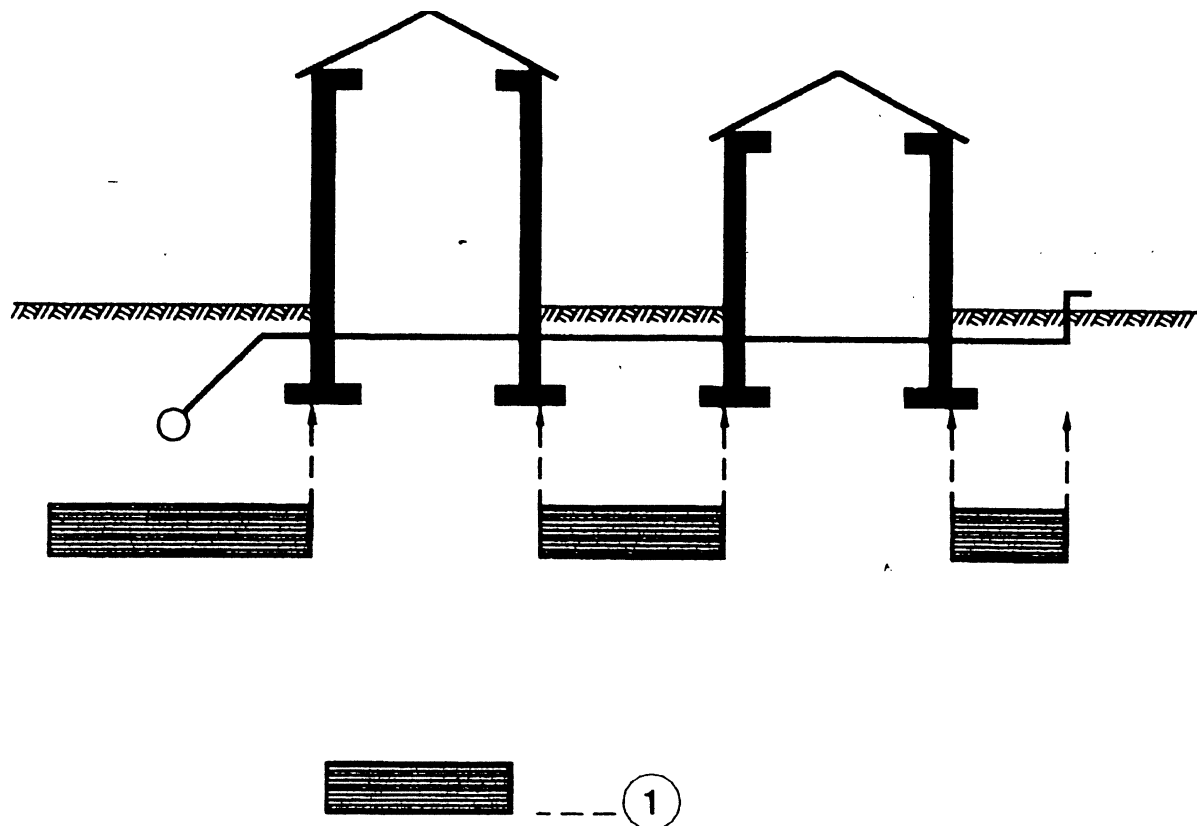
This standard specifies:

- general requirements for water supply systems outside buildings (see Figure 1), including potable water mains and service pipes, service reservoirs, other facilities and raw water mains but excluding treatment works and water resources development;
- general requirements for components;
- general requirements for inclusion in product standards which may include specifications which are more stringent;
- requirements for installation, site testing and commissioning.

The requirements of this standard apply to:

- the design and construction of new water supply systems;
- the extension of significant areas forming a coherent part of an existing water supply system;
- significant modification and/or rehabilitation of existing water supply systems.

NOTE It is not intended that existing water supply systems are to be altered to comply with this standard, provided that there are no significant detrimental effects on water quantity, security, reliability and adequacy of the supply.



Key

- 1 Field of application of this standard

Figure 1 - Field of application of this standard

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to the European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1295-1, *Structural design of buried pipelines under various conditions of loading - Part 1: General requirements*.

EN 1508, *Water supply - Requirements for systems and components for the storage of water*.

EN 45011, *General criteria for certification bodies operating product certification*.

EN 45012, *General criteria for certification bodies operating quality system certification*.

ISO 48, *Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)*.

EN ISO 9001, *Quality systems - Model for quality assurance in design/development, production, installation and servicing*.

EN ISO 9002, *Quality systems - Model for quality assurance in production, installation and servicing*.

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1 Pressures

For the designation of pressures in English, French and German see table 1 and annex A.2.

Table 1 - Designation of pressures in English, French and German

Abbreviation ^a	English	French	German	
DP	design pressure	pression de calcul en régime permanent	Systembetriebsdruck	System related
MDP	maximum design pressure	pression maximale de calcul	höchster Systembetriebsdruck	
STP	system test pressure	pression d'épreuve du réseau	Systemprüfdruck	
PFA	allowable operating pressure	pression de fonctionnement admissible	zulässiger Bauteilbetriebsdruck	Component related
PMA	allowable maximum operating pressure	pression maximale admissible	höchster zulässiger Bauteilbetriebsdruck	
PEA	allowable site test pressure	pression d'épreuve admissible sur chantier	zulässiger Bauteilprüfdruck auf der Baustelle	
OP	operating pressure	pression de fonctionnement	Betriebsdruck	System
SP	service pressure	pression de service	Versorgungsdruck	related
^a Valid for all language versions.				

3.1.1

allowable maximum operating pressure (PMA)

maximum pressure occurring from time to time, including surge, that a component is capable of withstanding in service

3.1.2

allowable operating pressure (PFA)

maximum hydrostatic pressure that a component is capable of withstanding continuously in service

3.1.3

allowable site test pressure (PEA)

maximum hydrostatic pressure that a newly installed component is capable of withstanding for a relatively short duration, in order to ensure the integrity and tightness of the pipeline

3.1.4

design pressure (DP)

maximum operating pressure of the system or of the pressure zone fixed by the designer considering future developments but excluding surge

3.1.5

maximum design pressure (MDP)

maximum operating pressure of the system or of the pressure zone fixed by the designer considering future developments and including surge, where:

- MDP is designated MDPa, when there is a fixed allowance for surge;
- MDP is designated MDPC, when the surge is calculated

3.1.6

operating pressure (OP)

internal pressure which occurs at a particular time and at a particular point in the water supply system

3.1.7

pressure zones

areas of pressure ranges within a water supply system

3.1.8

service pressure (SP)

internal pressure delivered at the point of connection to the consumer's installation at zero flow in the service pipe

3.1.9

surge

rapid fluctuations of pressure caused by flow alterations over short periods of time

3.1.10

system test pressure (STP)

hydrostatic pressure applied to a newly laid pipeline in order to ensure its integrity and tightness

3.2 System

3.2.1

gravity system

system where flow and/or pressure are caused by the force of gravity. There are two kinds of such systems:

- pressurized gravity system, where the pipeline operates full;
- non-pressurized gravity system, where the pipeline operates partially full.

3.2.2

local main

water main which connects principal main(s) with service pipes

3.2.3

potable water

water intended for human consumption as defined by the relevant national authorities

3.2.4

principal main

water main serving as a principal distributor within the supply area, normally without direct consumer connections

3.2.5

pumped and gravity system

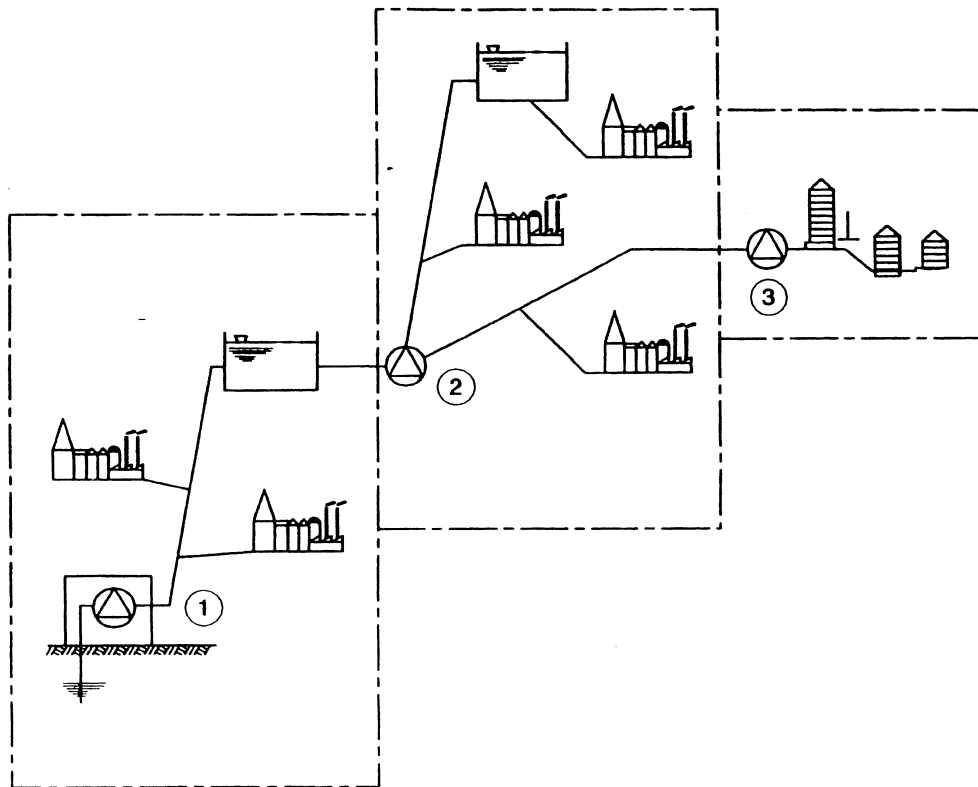
system where the gravity system and the pumped system are used, either separately or in combination, to provide the flow and/or pressure

3.2.6

pumping station

pumping installation designed to provide adequate pressure and flow within the distribution system. Three types can be distinguished (see Figure 2):

- main lift, normally at the outlet of the treatment works, or source if there is no treatment, to provide flow to the service reservoir;
- intermediate to deliver flow on the way to a service reservoir or supply area;
- booster to pump directly from and to the area without storage.



Key

- 1 Main lift
- 2 Intermediate
- 3 Booster

Figure 2 - Example of different types of pumping stations

3.2.7

pumped system

system where flow and/or pressure are provided by means of one or more pumps and where the pipeline operates full

3.2.8

reservoir

storage facility for water

3.2.9

service pipe

water pipe which supplies water from the local main to the consumer

3.2.10

service reservoir

covered reservoir for potable water which includes water compartment(s), control building, operation equipment and access arrangement providing reserve supplies, pressure stability and balancing demand fluctuations

3.2.11

standby plant

plant or system, such as additional pumps or duplicate mains, installed to provide secondary means for the supply of services in the event of failure or malfunction of the normal operating unit

3.2.12

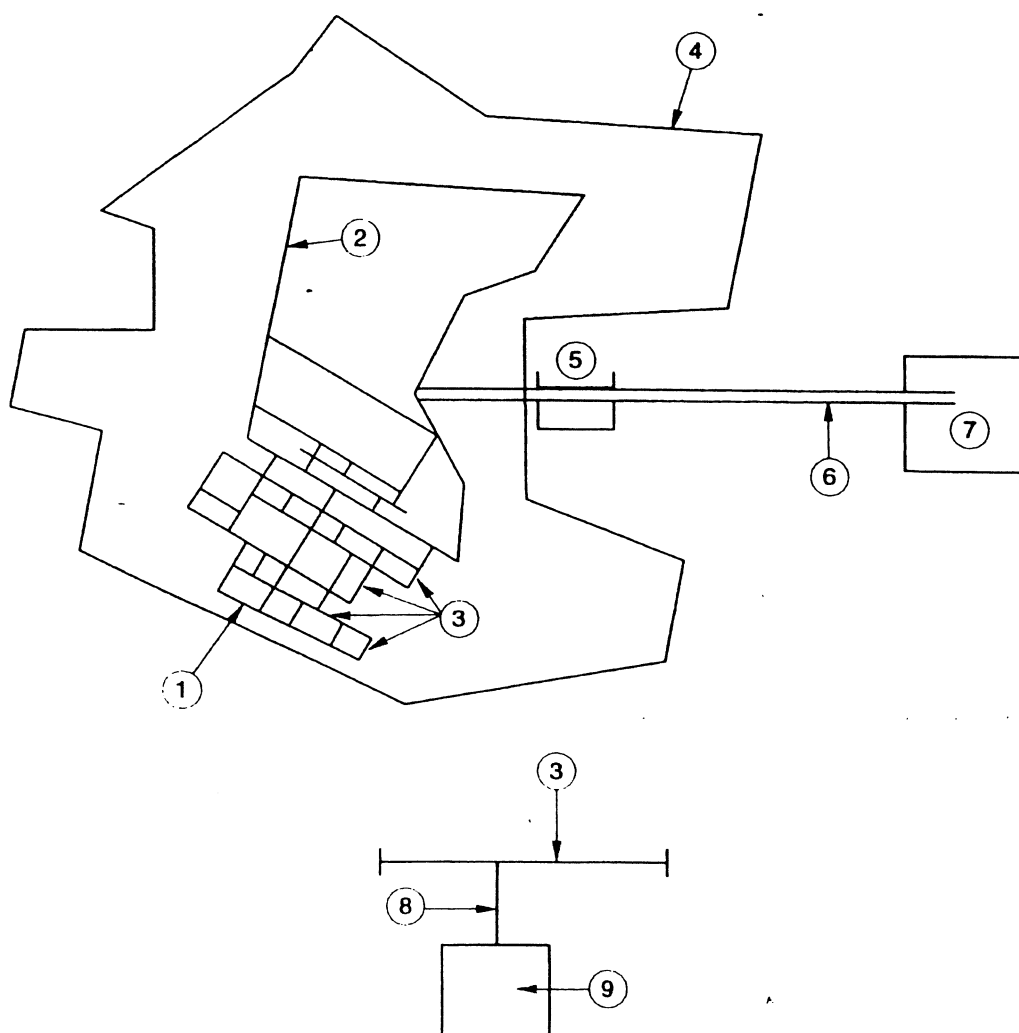
trunk main

water main which interconnects source(s), treatment works, reservoir(s) and/or supply areas, normally without direct consumer connection(s)

3.2.13

water distribution system

part of the water supply system comprising pipelines, service reservoirs, pumping stations and other assets by which water is distributed to the consumers. It begins at the outlet from the water treatment works (or source, if there is no treatment) and ends at the point of connection to the consumer's installation (see Figure 3).



key

- 1 Network
- 2 Principal main
- 3 Local main
- 4 Supply area
- 5 Service reservoir (may be present)
- 6 Trunk main
- 7 Source or treatment works
- 8 Service pipe
- 9 Consumer

Figure 3 - Example of a water distribution system

3.3 Components

3.3.1

accessories

components, other than pipes, fittings or valves, which are used in a pipeline, e.g. glands, bolts, locking rings for joints, ferrules

3.3.2

adjustable joint

joint which permits significant angular deflection at the time of installation but not thereafter

3.3.3

coating

additional material applied to the external surface of a component to protect it from corrosion, mechanical damage or chemical attack

3.3.4

ferrule

component used to connect a service pipe to a main, usually capable of shutting off the flow of water to the service pipe

3.3.5

fitting

component, other than a pipe, which allows pipeline deviation, change of direction or bore. In addition, flanged-socket pieces, flanged-spigot pieces and collars/couplings are defined as fittings

3.3.6

flexible joint

joint which permits significant angular deflection, both during and after installation and which can accept a slight offset of the centre line

3.3.7

flexible pipe

pipe whose load carrying capacity is limited by deformation (diametral deflection and/or strain) under load to the ultimate design criteria without breaking or overstressing (flexible behaviour)

3.3.8

joint

connection between the ends of two components including the means of sealing

3.3.9

lining

additional material applied to the internal surface of a component to protect it from corrosion, mechanical damage or chemical attack

3.3.10

pipe

component of uniform bore, normally straight in axis, having e.g. socket, spigot or flanged ends

3.3.11

pipe barrel

cylindrical part of the pipe with a uniform cross-section excluding socket and spigot where appropriate

3.3.12

rigid joint

joint that does not permit significant angular deflection, either during or after installation

3.3.13

rigid pipe

pipe whose load carrying capacity is limited by breaking without significant deformation of its cross-section (rigid behaviour)

3.3.14

semi-rigid pipe

pipe whose load carrying capacity is limited either by deformation/overstressing (flexible behaviour) or by breaking (rigid behaviour) depending on its ring stiffness and/or the conditions of installation

3.3.15

valve

component isolating or controlling flow and pressure, e.g. isolating valve, control valve, pressure reducing valve, air valve, non-return valve, hydrant

3.4 Diameters

3.4.1

external diameter (OD)

mean external diameter of the pipe barrel at any cross-section. For pipes with externally profiled barrels, the external diameter is taken as the maximum diameter when viewed in cross-section.

3.4.2

internal diameter (ID)

mean internal diameter of the pipe barrel at any cross-section

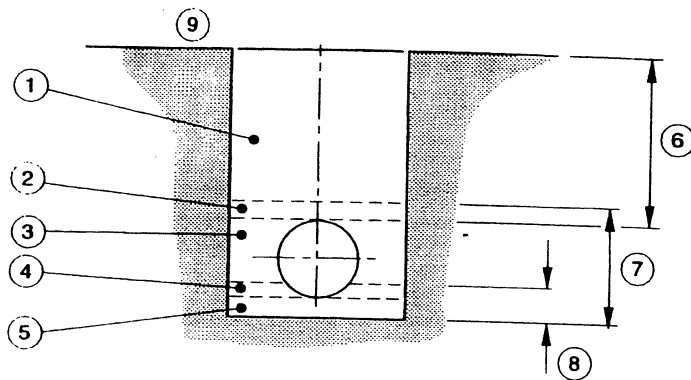
3.4.3

nominal size (DN/ID or DN/OD)

numerical designation of the size of a component, which is a whole number approximately equal to the actual dimension in millimetres. This applies to either the internal diameter (DN/ID) or the external diameter (DN/OD).

3.5 Installation

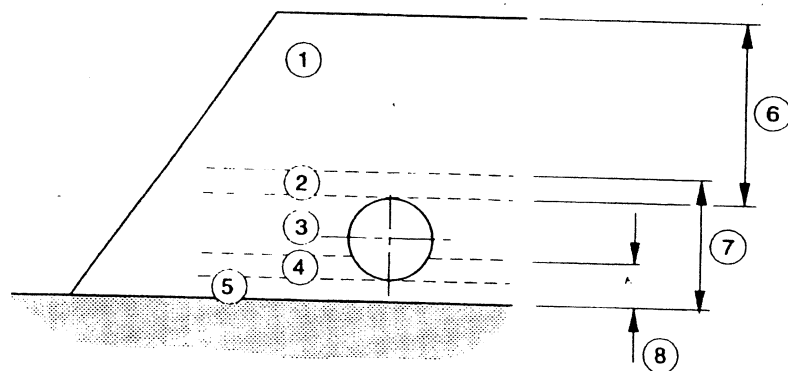
Installation terms are shown in Figure 4.



Key

- 1 Main backfill including road construction, if any
- 2 Initial backfill
- 3 Side fill
- 4 Upper bedding
- 5 Lower bedding
- 6 Depth of cover
- 7 Embedment
- 8 Bedding
- 9 Ground surface

a) Example of pipe laying in trenches



Key

- 1 Main backfill including road construction, if any
- 2 Initial backfill
- 3 Side fill
- 4 Upper bedding
- 5 Lower bedding
- 6 Depth of cover
- 7 Embedment
- 8 Bedding

b) Example of pipe laying in embankments

Figure 4 - Illustration of terms used in pipe installation

3.5.1

aggressive soil

soil which could have a corrosive or other adverse effect on a component and which requires special consideration with respect to protective measures

3.5.2

cathodic protection

method of protecting metal components against corrosion in which the metal to be protected is maintained in a cathodic state relative to its surroundings

3.5.3

contaminated soil

soil which has been affected by previous land use or by direct or indirect infiltration of chemicals or other substances, such that it requires special consideration

3.5.4

depth of cover

distance from the crown of the pipe barrel or fitting to the existing or future surface of the terrain

3.6 Hydraulic design

3.6.1

back flow

flow of water from outside the system in a direction contrary to the intended one

3.6.2

equivalent length

addition to the real length of a pipeline to simplify the allowance for local head losses at fittings, valves, etc., used for calculating the total head loss of a pipeline

3.6.3

peak flow factor

ratio between peak flow and average flow in the same period of time

3.6.4

water demand

estimated quantity of water required per unit of time

3.7 Structural design

3.7.1

bedding reaction angle

angle used for calculation purposes, corresponding to the arc of soil bearing reaction applied at the underside of the component

3.7.2

ring stiffness

resistance of a pipe to diametral deflection in response to external loading applied along one longitudinal diametric plane. The ring stiffness is defined by the following formula:

$$S = \frac{E \cdot I}{D_m^3} \quad (1)$$

where

S is the ring stiffness of the pipe in pascals (1 Pa = 1 N/m²);

E is the modulus of elasticity in flexure in the circumferential direction in pascals (1 Pa = 1 N/m²);

I is the second moment of area of the pipe wall in the longitudinal direction, per unit length in metres to the fourth power per metre;

D_m is the mean diameter of the neutral axis of the pipe wall in metres.

NOTE This definition applies to both short and long term values.

3.7.2

ultimate load

load which causes failure as defined in the product standards

4 Application of standards and regulations

In all aspects, including health and safety, the national standards, transposing ENs as available, shall apply as well as the regulations valid at the place where the system is being constructed and/or operated.

5 Requirements for water supply systems

5.1 Water quality

5.1.1 General

The water quality in the potable water supply system shall satisfy the requirements of national legislation, incorporating EU Directives and EFTA Regulations where applicable.

5.1.2 Materials

All parts of water supply systems in contact with potable water shall be designed and constructed using components and materials which meet the appropriate requirements such that there is no unacceptable deterioration of water quality.

5.1.3 Prevention of back flow

Potable water supply systems shall be designed, equipped and installed to ensure the prevention of back flow. The location and operation of air valves and washouts shall avoid water entering the system (see A.3). Any equipment installed for this purpose shall meet the requirements of applicable standards.

5.1.4 Stagnation

Potable water supply systems shall be designed, installed and operated to minimize water stagnation which would lead to unacceptable deterioration of water quality.

The following arrangements leading to stagnation shall be carefully considered:

- mains with dead ends;
- spurs serving hydrants;
- unisolated pipes laid in advance of development;
- sections with permanently low flow rates;
- enhanced pipe diameters required for fire-fighting or other non-permanent purposes.

Where necessary, facilities shall be provided for mains flushing.

5.1.5 Cross-connections with other systems

The interconnection of potable water supply systems shall only be permitted if the chemical and physical properties are compatible for blending and there is no unacceptable deterioration of water quality.

Except when water is intended for blending in the distribution system to produce a potable supply, there shall be no direct connection between potable water supply systems and systems containing non-potable water, any other liquid or gas, except where suitable arrangements are made to incorporate a physical air gap or an appropriate anti-pollution device conforming to national standards, transposing ENs as available. Closed valves or non-return valves, except for air valves, washouts and hydrants, do not constitute an effective means of separation for the purpose of this clause.

5.2 Design life

Systems shall be designed for a life of at least 50 years. Some components such as pumps and certain metering and control equipment may require earlier renovation or replacement.

NOTE This does not necessarily apply to temporary parts of a system.

5.3 Demand for water

5.3.1 Water demand estimates

Estimates of present and future demands shall be made (see A.4).

5.3.2 Water for fire-fighting

The requirements for water for fire-fighting purposes shall be determined in accordance with national legislation or local regulations (see A.5).

5.4 System security

Due regard shall be paid to security of water supply systems with respect to acts of terrorism, vandalism and other unlawful activity.

In general, the underground system will be secure but particular attention shall be given to above-ground pipework.

Pumping stations, service reservoirs and other above-ground structures are vulnerable and shall be designed to deter unauthorized entry or interference with the operation of the system. In particular, the possibility of contamination of the water shall be minimized.

Where risks are high the provision of security fencing and monitoring systems shall be considered.

6 Service objectives

The water supplier shall define the levels of service to be achieved at the point of connection to the consumer's installation. The definitions shall include service pressures, flow rates and continuity of supply (see A.6).

7 Rehabilitation

For works of repair, renovation or replacement, the relevant requirements of this standard shall be followed. In case of repair or renovation the design life extension may be less than 50 years.