



EAST AFRICAN STANDARD

**Plastics rainwater piping systems for above ground external use —
Unplasticized poly (vinyl chloride) (PVC-U) — Specifications for
pipes, fittings and the system**

EAST AFRICAN COMMUNITY

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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Introduction

In the preparation of this East African Standard, the following source was consulted extensively:

BS EN 12200-1:2000, *Plastics rainwater piping systems for above ground external use — Unplasticized poly (vinyl chloride) (PVC-U) — Specifications for pipes, fittings and the system*

Assistance derived from this source and others inadvertently not mentioned is hereby acknowledged.

Draft for comments only — Not to be cited as East African Standard

BRITISH STANDARD

**BS EN
12200-1:2000**

Plastics rainwater piping systems for above ground external use — Unplasticized poly(vinyl chloride) (PVC-U) —

Part 1: Specifications for pipes, fittings and the system

The European Standard EN 12200-1:2000 has the status of a
British Standard

ICS 23.040.01; 91.060.20

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National foreword

This British Standard is the official English language version of EN 12200-1:2000. It is one of a group of EN standards which each partially supersedes BS 4576-1:1989, the others being BS EN 607:1996 and BS EN 1462:1997. BS 4576-1:1989 will be withdrawn on 2002-09-31.

The UK participation in its preparation was entrusted by Technical Committee PRI/88, Plastics piping systems and components (previously PRI/61), to Subcommittee PRI/88/1, Thermoplastics piping systems for non-pressure applications (previously PRI/61/1), 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.

The responsible UK committee gives the following advice concerning the scope and contents of EN 12200-1.

- a) EN 12200-1:2000 covers non-circular section downpipes and fittings, in addition to the circular-section pipes and fittings specified in BS 4576-1:1989.
- b) EN 12200-1:2000 is specific to rainwater downpipe systems installed outdoors. For indoor rainwater downpipe reference should be made to standards for soil and waste discharge within the building structure, e.g. BS EN 1329-1:2000.

NOTE In the UK, plastics rainwater downpipe systems installed outdoors normally have “unsealed” joints (see Table 2).

c) In the foreword of EN 12200-1, reference is made to EN 12056-3 for the purposes of roof drainage layout and calculations. That standard is expected to replace BS 6367, to which reference was made in BS 4576-1:1989 for such purposes.

d) Since in Table 12 reference is made to “stage 3” of the grey scale according to EN 20105-A02, the reference here and to this standard in clause 2 should be considered to relate to the current published edition (1994) of that standard.

This British Standard, having been prepared under the direction of the Sector Committee for Materials and Chemicals, was published under the authority of the Standards Committee and comes into effect on 15 November 2000

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Amendments issued since publication

Amd. No.	Date	Comments

The responsible UK committee gives the following advice concerning the definition given in 3.1.9 for the mean wall thickness (e_m). This requires “a number of measurements .. regularly spaced around ... the same cross-section ... including the measured minimum and the measured maximum values of the wall thickness in that cross-section”. In practice, the actual minimum and maximum wall thicknesses may not be diametrically opposed, in which case use of the two corresponding diameters as part of a set required to be regularly spaced may force use of an excessive number of measurements. Pending issue of any related corrigendum or amendment, the UK cannot modify the text of EN 12200-1 as ratified, but recommends that the definition given in 3.1.9 is not necessarily taken as a model for use elsewhere. Later drafts for other purposes should consider termination of the definition after “of a component”, or should consider measurement of mean wall thickness by reference to EN ISO 3126 when available.

NOTE None of the specific requirements of EN 12200-1 are actually dependent on the definition of e_m but relate to e (see 3.1.8 and e.g. Table 2).

The responsible UK committee gives the following advice concerning the marking requirements given in clause 12 which relate to the durability of the marking. In the absence of any objective criteria for durability under conditions beyond the control of the manufacturer, it is recommended that users of this standard should agree on the acceptable conditions of storage, weathering, handling and installation, e.g. by reference to the manufacturer's recommendations and/or any relevant guidance document, e.g. ENV 12200-3 or EN 12056-3 when available [see item c) of this foreword].

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.

WARNING This British Standard, which is identical with EN 12200-1:2000, does not necessarily detail all the precautions necessary to meet the requirements of the Health and Safety at Work etc. Act 1974 and subsequent legislation. Attention should be paid to any appropriate safety precautions and the test methods referred to in EN 12200-1 should be operated only by trained personnel.

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 and ii, the EN title page, pages 2 to and 27 and a back cover.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12200-1

September 2000

ICS 23.040.01

English version

**Plastics rainwater piping systems for above ground external use
– Unplasticized poly(vinyl chloride) (PVC-U) – Part 1:
Specifications for pipes, fittings and the system**

Systèmes de canalisations de descentes d'eaux pluviales en plastique à usage externe en aérien – Poly(chlorure de vinyle) non plastifié (PVC-U) – Partie 1: Spécifications pour tubes, raccords et le système

Kunststoff-Rohrleitungssysteme für außenliegende Regenfalleitungen – Weichmacherfreies Polyvinylchlorid (PVC-U) – Teil 1: Anforderungen an Rohre, Formstücke und das Rohrleitungssystem

This European Standard was approved by CEN on 14 June 2000.

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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 155, Plastics piping systems and ducting systems, the Secretariat of which is held by NNI.

It has been prepared in liaison with CEN/TC 128, Roofing and cladding products for discontinuous laying, taking into account EN 607 and EN 1462 and CEN/TC 165, Waste water engineering, taking into account EN 12056-3.

This standard is a part of a System Standard for plastics piping systems of a particular material for a specified application. There are a number of such System Standards.

System Standards are based on the results of the work undertaken in ISO/TC 138, Plastics pipes, fittings and valves for the transport of fluids, which is a Technical Committee of the International Organization for Standardization (ISO).

They are supported by separate standards on test methods to which references are made throughout the System Standard.

The System Standards are consistent with general standards on functional requirements and on recommended practice for installation.

EN 12200 consists of the following parts, under the general title "*Plastics rainwater piping systems for above ground external use — Unplasticized poly(vinyl chloride) (PVC-U)*":

- Part 1: Requirements for pipes fittings and the system (the present standard).
- Part 2: Guide for the assessment of conformity.
- Part 3: Guidance for installation (ENV).

This part of EN 12200 includes the following:

- Annex A (normative): Utilization of non-virgin material.
- Bibliography.

At the date of publication of this standard, System Standards for piping systems of PVC-U and other plastics materials have been used for the same application. These standards are the following:

EN 1329, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Unplasticized poly(vinyl chloride) (PVC-U)*

EN 1451, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Polypropylene (PP)*

EN 1455, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Acrylonitrile-butadiene-styrene (ABS)*

EN 1519, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Polyethylene (PE)*

EN 1565, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Styrene copolymer blends (SAN+PVC)*

EN 1566, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Chlorinated poly(vinyl chloride) (PVC-C)*

For pipes and fittings which have conformed to the relevant national standard before the date of availability [2000-09-20], as shown by the manufacturer or by a certification body, the national standard may continue to be applied until 2002-09-31.

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 2001-03-31. Conflicting national standards shall be withdrawn at the latest by 2002-09-31.

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.

1 Scope

This standard specifies the requirements for pipes, fittings and the system of unplasticized poly(vinyl chloride) (PVC-U) intended for use as above-ground external rainwater downpipes.

It also specifies the test parameters for the test methods referred to in this standard.

These products are usually used in conjunction with gutters conforming to EN 607. They are not intended for use with products conforming to EN 612.

It is applicable to PVC-U rainwater systems of circular, square, rectangular or any other shape with sealed (rubber ring or solvent cement) or unsealed joints.

This standard covers a range of pipes and fittings sizes.

It also specifies requirements for brackets.

NOTE It is the responsibility of the purchaser or specifier to make the appropriate selections from the size range to take into account their particular requirements and any relevant national regulations and installation practices or codes.

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 this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

- | | |
|----------------|---|
| EN 513:1999, | <i>Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors — Determination of the resistance to artificial weathering</i> |
| EN 638, | <i>Plastics piping and ducting systems — Thermoplastics pipes — Determination of short-term tensile properties</i> |
| EN 681-1, | <i>Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber</i> |
| EN 681-2, | <i>Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers</i> |
| EN 727, | <i>Plastics piping and ducting systems — Thermoplastics pipes and fittings — Determination of Vicat softening temperature (VST)</i> |
| EN 743:1994, | <i>Plastics piping and ducting systems — Thermoplastics pipes — Determination of the longitudinal reversion</i> |
| EN 744:1995, | <i>Plastics piping and ducting systems — Thermoplastics pipes — Test method for resistance to external blows by the round-the-clock method</i> |
| EN 763:1994, | <i>Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Test method for visually assessing effects of heating</i> |
| EN 922, | <i>Plastics piping and ducting systems — Pipes and fittings of unplasticized poly(vinyl chloride) (PVC-U) — Specimen preparation for determination of the viscosity number and calculation of the K value</i> |
| EN 1053, | <i>Plastics piping systems — Thermoplastics piping systems for non-pressure applications — Test method for watertightness.</i> |
| EN 1462, | <i>Specification for eaves gutter brackets</i> |
| EN 1905, | <i>Plastics piping systems — Unplasticized poly(vinyl chloride) (PVC-U) pipes, fittings and material — Method for assessment of the PVC content based on total chlorine content.</i> |
| EN 10204:1991, | <i>Metallic products — Types of inspection documents</i> |
| EN 12095, | <i>Plastics piping systems — Test method for bracket strength.</i> |
| EN 20105-AO2, | <i>Grey scale for assessing change in colour</i> |

EN ISO 527-3:1995,	<i>Plastics — Determination of tensile properties — Part 3: Test conditions for film and sheets.</i>
prEN ISO 3126:1999,	<i>Plastics piping systems - Plastics components - Measurement and determination of dimensions (revision of prEN 496:1991 and ISO 3126:1974) (ISO/DIS 3126:1999)</i>
EN ISO 8256:1996,	<i>Plastics — Determination of tensile impact strength (ISO 8256:1990, including Technical Corrigendum 1:1991)</i>
ISO 472:1988,	<i>Plastics vocabulary</i>
ISO 1043-1:1997,	<i>Plastics — Symbols — Part 1: Basic polymers and their special characteristics</i>
ISO 1183:1987,	<i>Plastics — Methods for determining the density and relative density of non-cellular plastics</i>
ISO 4892-2:1994,	<i>Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon arc sources</i>
ISO 4892-3:1994,	<i>Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps</i>

3 Definitions, symbols and abbreviations

For the purposes of this standard, the following definitions, symbols and abbreviations apply.

3.1 Definitions

In addition to the definitions given below, the definitions given in ISO 472:1988 and ISO 1043-1:1997 apply.

3.1.1

nominal size DN

numerical designation of the size of a component, other than a component designated by thread size, which is approximately equal to the manufacturing dimension, in millimetres (mm)

3.1.2

nominal size DN/OD

nominal size, related to the outside diameter

3.1.3

nominal outside diameter (d_n)

specified outside diameter, in millimetres, assigned to a nominal size DN/OD

3.1.4

nominal outside diameter (d_g)

value of the measurement of the outside diameter through its cross-section at any point of a pipe or spigot of a fitting, rounded to the next greater 0,1 mm

3.1.5

mean outside diameter (d_{em})

value of the measurement of the outer circumference of a pipe or spigot of a fitting in any cross-section, divided by π ($\approx 3,142$), rounded to the next greater 0,1 mm

3.1.6

mean inside diameter of a pipe (d_{im})

arithmetical mean of a number of measurements of the inside diameter of a pipe in the same cross-section

3.1.7

mean inside diameter of a socket (d_{sm})

arithmetical mean of a number of measurements of the inside diameter of a socket in the same cross-section

3.1.8

wall thickness (e)

value of the measurement of the wall thickness at any point around the circumference of a component rounded to the next greater 0,1 mm

3.1.9 mean wall thickness (e_m)

arithmetical mean of a number of measurements of the wall thickness, regularly spaced around the circumference and in the same cross-section of a component, including the measured minimum and the measured maximum values of the wall thickness in that cross-section

3.2 Definitions for brackets

3.2.1 anchor bracket

bracket designed to be fixed to a wall or other support and attached to a socket of a pipe or fitting to prevent the socket from moving under the effect of thermal expansion

NOTE Some anchor brackets can be adapted to act as a guide bracket. (See 3.2.2)

3.2.2 guide bracket

bracket designed to be fixed to a wall or other support and to fit a pipe sufficiently loosely to allow longitudinal thermal movement whilst preventing the pipe from bowing between anchor brackets

NOTE By fixing an guide bracket tightly below a fitting on vertical pipework, it can be made to act as an anchor bracket. (See 3.2.1)

3.3 Symbols

- A : length of engagement
- C : depth of sealing zone
- d_e : outside diameter
- d_{em} : mean outside diameter
- d_{im} : mean inside diameter of pipe or spigot
- d_n : nominal outside diameter
- d_s : inside diameter of a socket
- d_{sm} : mean inside diameter of a socket
- e : wall thickness (at any point)
- e_m : mean wall thickness
- e_2 : wall thickness of a socket
- e_3 : wall thickness at the groove
- L_1 : length of spigot
- L_2 : length of socket
- l : effective length of a pipe
- Z_d : design length (Z_d length) of a fitting
- α : nominal angle of a fitting

3.4 Abbreviations

- DN : nominal size
- DN/OD : nominal size, outside diameter related
- PVC-U : unplasticized poly(vinyl chloride)
- TIR : true impact rate

4 Material

4.1 Raw material

The raw material shall be PVC-U to which are added those additives that are needed to facilitate the manufacture of components conforming to the requirements of this standard.

4.2 Utilization of non-virgin material

Utilization of non-virgin material shall conform to Annex A (normative).

4.3 Sealing ring retaining means

Sealing rings may be retained using means made from polymers other than PVC-U, provided the joints conform to the requirements given in Table 12.

4.4 Brackets not of PVC-U

All such components shall fulfil the material and corrosion resistance requirements of EN 1462.

5 General characteristics - appearance

When viewed without magnification, the internal and external surfaces of pipes and fittings shall be smooth, clean and free from grooving, blistering, impurities, pores or other surface irregularity likely to prevent conformity of pipes and fittings to this standard. Each end of a pipe or a fitting shall be cleanly cut, if applicable, and shall be square to its axis.

6 Geometrical characteristics

6.1 General

Dimensions shall be measured in accordance with prEN ISO 3126:1999.

In case of dispute the reference temperature is (23 ± 2) °C.

NOTE Figures 1 to 11 are schematic sketches only, to indicate the relevant dimensions. They do not necessarily represent manufactured components.

6.2 Dimensions of pipes

6.2.1 Diameters of circular pipes

The mean diameters of circular pipes shall conform to Table 1.

Table 1 — Preferred pipe diameters

Dimensions in millimetres

Nominal size DN/OD ¹⁾	Nominal outside diameter d_n	Mean outside diameter		Mean inside diameter $d_{im,min}$	Internal cross-sectional area ²⁾ (mm ²)
		$d_{em,min}$	$d_{em,max}$		
50	50	50,0	50,3	46,3	1 684
53 ³⁾	53	53,0	53,3	49,3	1 909
63	63	63,0	63,3	59,3	2 762
68 ³⁾	68	68,3	68,7	64,6	3 278
75	75	75,0	75,4	71,3	3 993
80	80	80,0	80,4	76,0	4 546
82	82	82,0	82,4	78,0	4 788
90	90	90,0	90,4	85,6	5 760
100	100	100,0	100,4	95,4	7 151
105 ³⁾	105	105,5	105,9	100,7	7 964
110	110	110,0	110,4	104,7	8 619
125	125	125,0	125,4	119,1	11 141
140	140	140,0	140,5	133,6	14 031
160	160	160,0	160,5	152,5	18 280

¹⁾ Nominal sizes $50 < DN/OD < 160$ mm other than those in the table are permitted. They should be selected from the Renard R40 series or traditional nominal sizes. In such cases the pipe outside diameter tolerance, mean inside diameter and internal cross-sectional area shall be interpolated from the nearest adjacent values above and below in the table.
²⁾ For the determination of the wall thickness of non-circular pipes and their sockets, see 6.2.4.2.
³⁾ These sizes are based on the inside diameter series in EN 476:1997, they are not interchangeable with other pipes conforming to the standards listed in the foreword.

6.2.2 Outside dimensions and tolerances of non-circular pipes

The pipe cross-section may be square, rectangular or any other shape. The external sizes shall be given by the manufacturer. The tolerances on the external sizes shall conform to Table 1 using the largest dimension as the nominal size and rounding down to the nearest outside diameter as given in the table. See Figure 1.

EXAMPLE For a rectangular pipe of 80 × 65 the applicable tolerances would be as DN 80.

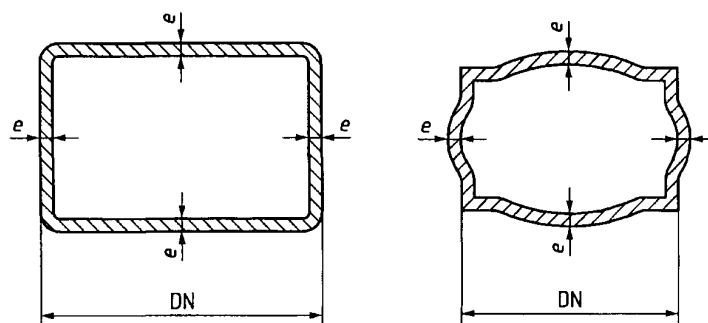


Figure 1 — Dimensions of non-circular pipes

6.2.3 Effective length of pipes

The effective length (useful length) of a pipe, l , shall be not less than that specified by the manufacturer when measured as shown in Figure 2.

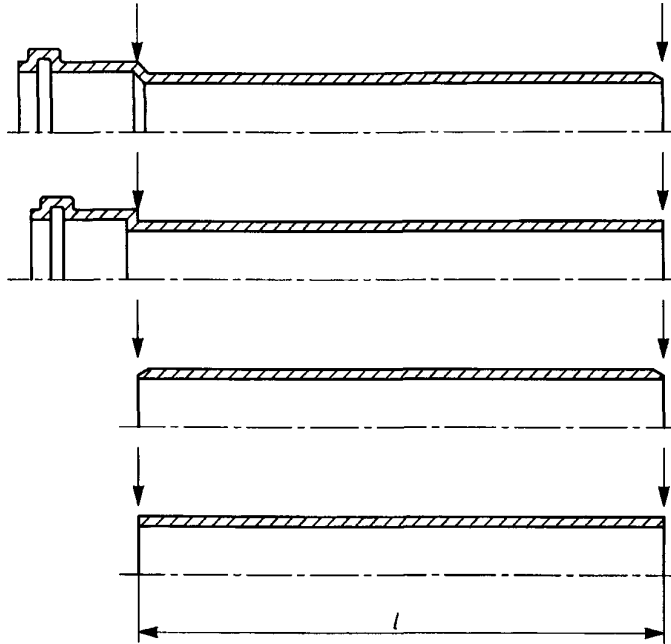


Figure 2 — Effective length of pipe

6.2.4 Wall thicknesses of pipes and sockets

6.2.4.1 Wall thickness of circular pipes and their sockets

The wall thickness of circular pipes and their sockets shall conform to Table 2 when measured at the location points as shown in Figure 3.

Table 2 — Wall thicknesses of pipes and pipe sockets

Dimensions in millimetres

Nominal size DN/OD ¹⁾	Nominal outside diameter d_n	Wall thickness of pipes and fittings				
		sealed system			unsealed system	
		e_{min}	$e_{2,min}$	$e_{3,min}$	e_{min}	$e_{2,min}$
50	50	1,5	1,4	1,0	1,2	1,0
53 ²⁾	53	1,5	1,4	1,0	1,3	1,2
63	63	1,5	1,4	1,0	1,3	1,2
68 ²⁾	68	1,5	1,4	1,0	1,5	1,4
75	75	1,5	1,4	1,0	1,5	1,4
80	80	1,6	1,4	1,0	1,5	1,4
82	82	1,6	1,4	1,0	1,5	1,4
90	90	1,8	1,6	1,0	1,8	1,6
100	100	1,9	1,7	1,0	1,8	1,7
105 ²⁾	105	2,0	1,7	1,1	1,8	1,7
110	110	2,2	2,0	1,2	2,0	1,8
125	125	2,5	2,2	1,4	-	-
140	140	2,7	2,4	1,5	-	-
160	160	3,2	2,9	1,8	-	-

¹⁾ Where non-preferred sizes not listed in the table are manufactured (see footnote 1 in Table 1) the values of e_{min} , $e_{2,min}$, and $e_{3,min}$ shall be interpolated from the nearest adjacent values both above and below in this table.
²⁾ These sizes are based on the inside diameter series in EN 476:1997, they are not interchangeable with other pipes conforming to the standards listed in the foreword.

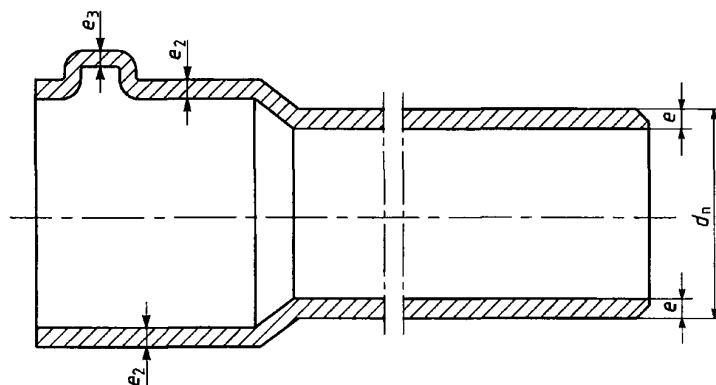


Figure 3 — Wall thickness location points

6.2.4.2 Wall thickness of non-circular pipes and their sockets

The wall thickness of non-circular pipes and their sockets when measured at the location points as shown in Figure 3 shall be determined as follows:

- a) determine the internal cross-sectional area;
- b) round down to the next lower value in Table 1 and identify the corresponding circular nominal size;
- c) use the wall thickness values for pipes and sockets as defined in Table 2 for that nominal size, which apply only to the middle of the faces of the non-circular pipe and socket (see Figure 1).

6.2.5 Dimensions of sockets

The dimensions of pipe sockets (see Figures 4 and 5) shall be the same as for fittings (see 6.4).

6.3 Dimensions of fittings

6.3.1 Nominal size(s)

The nominal size of a fitting shall correspond to and be designated by the nominal size of the pipe which it is intended to fit. Non-circular fittings are sized in the same manner in accordance with 6.2.2

6.3.2 Wall thicknesses of fittings

The wall thickness of the body of fittings, e_{\min} , sockets, $e_{2,\min}$, and ring seal grooves of sealed systems, $e_{3,\min}$, shall conform to Table 2 and Figure 3.

6.3.3 Angles

For bends the nominal angles, α , shall be 87,5/90°, 75°, 67,5°, 60° and 45°.

For branches and double branches, the nominal angles, α , shall be 87,5/90°, 67,5°, 60° and 45°.

If other angles are required, they shall be agreed between manufacturer and purchaser and be identified accordingly.

6.3.4 Design lengths (Z_d)

The Z_d -length(s) of fittings shall be given by the manufacturer.

NOTE The Z_d -lengths are intended to assist in the design of moulds and are not intended to be used for quality control purposes. ISO 265-1:1988 can be used as a guideline.

6.4 Diameters and lengths of sockets and spigots

6.4.1 Ring seal sockets and spigots

The diameters and lengths of ring seal sockets and spigots (see Figure 4) shall conform to Table 3.

Where sealing rings are firmly fixed and have multiple sealing zones, the dimensions A_{\min} and C_{\max} shall be measured to the effective sealing point as specified by the manufacturer.

Table 3 — Diameters and lengths of ring seal sockets and related spigots

Dimensions in millimetres

Nominal size DN/OD ¹⁾	Nominal outside diameter d_n	Mean inside diameter ²⁾ $d_{sm,min}$	Lengths of sockets and spigots		
			A_{\min}	C_{\max}	$L_{1,min}$
50	50	50,4	20	18	37
53 ³⁾	53	53,4	21	18	37
63	63	63,4	22	18	37
68 ³⁾	68	68,8	24	19	43
75	75	75,5	25	20	43
80	80	80,5	26	21	44
82	82	82,5	26	21	44
90	90	90,5	28	23	46
100	100	100,5	30	24	46
105 ³⁾	105	106,0	31	25	52
110	110	110,5	32	26	54
125	125	125,5	35	28	60
140	140	140,6	39	30	60
160	160	160,6	42	32	60

¹⁾ Where non-preferred sizes not listed in the table are manufactured (see footnote 1 in Table 1) the values of $d_{sm,min}$, A_{\min} , C_{\max} , and $L_{1,min}$ shall be interpolated from the nearest adjacent values both above and below in this table.
²⁾ Calculated as follows: $d_{sm,min} = (d_{em,max} + 0,1)$ mm.
³⁾ These sizes are based on the inside diameter series in EN 476:1997, they are not interchangeable with other pipes conforming to the standards listed in the foreword.

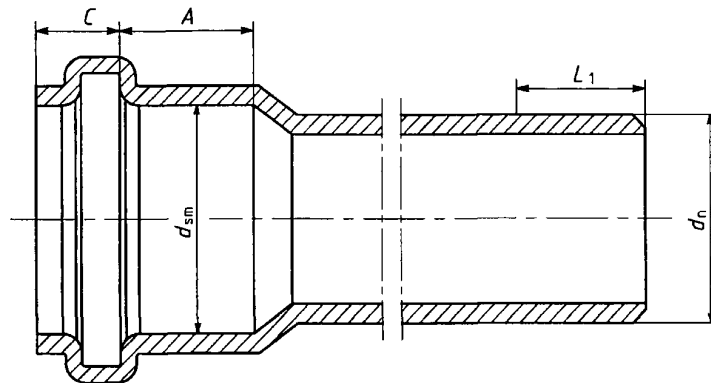


Figure 4 — Location of points of measurement for ring seal sockets and spigots

6.4.2 Solvent cement and unsealed sockets and spigots

The diameters and lengths of solvent cement and unsealed sockets and spigots (see Figure 5) shall conform to Table 4.

The manufacturer shall declare whether the sockets are tapered or parallel. If parallel the d_{sm} dimensions shall apply over the entire socket. If tapered the d_{sm} dimension shall apply at the mid mean point with a maximum taper angle of 20' per side.

Table 4 — Diameters and lengths of solvent cement sockets and sockets for unsealed systems and their related spigots

Dimensions in millimetres

Nominal size DN/OD ¹⁾	Nominal outside diameter d_n	Mean inside diameter		Lengths of sockets and spigots $L_{1,min}$ and $L_{2,min}$ ³⁾
		$d_{sm,min}$	$d_{sm,max}$ ²⁾	
50	50	50,1	50,4	30
53 ⁴⁾	53	53,1	53,5	31
63 ⁴⁾	63	63,1	63,5	36
68 ⁴⁾	68	68,5	68,9	37
75	75	75,2	75,6	40
80	80	80,2	80,6	42
82	82	82,2	82,6	42
90	90	90,2	90,6	46
100	100	100,2	100,6	46
105 ⁴⁾	105	105,7	106,1	47
110	110	110,2	110,6	48
125	125	125,2	125,7	51
140	140	140,3	140,8	55
160	160	160,3	160,8	58

¹⁾ Where non-preferred sizes not listed in the table are manufactured (see footnote 1 in Table 1) the values of $d_{sm,min}$, $d_{sm,max}$, $L_{1,min}$ and $L_{2,min}$ shall be interpolated from the nearest adjacent values both above and below in this table.
²⁾ $d_{sm,max}$ -values do not apply to unsealed systems.
³⁾ For unsealed systems the $L_{1,min}$ and $L_{2,min}$ values may be reduced to $0,75L_{1,min}$.
⁴⁾ These sizes are based on the inside diameter series in EN 476:1997, they are not interchangeable with other pipes conforming to the standards listed in the foreword.

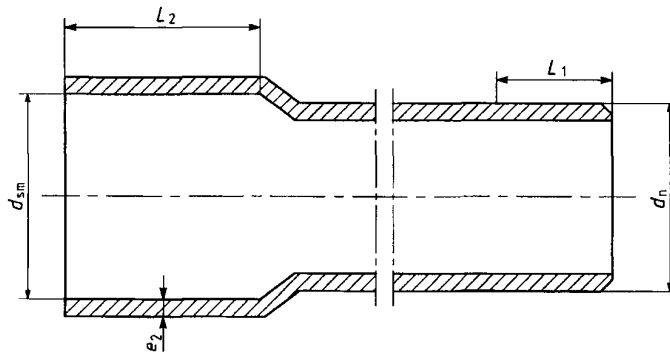


Figure 5 — Location of points of measurement of solvent cement sockets, unsealed sockets and spigots

6.4.3 Non-circular sockets and spigots

Non-circular sockets shall be sized as detailed in 6.2.2 using the maximum dimension of the pipe. The tolerances and dimensions given in Tables 3 or 4 shall then be applied accordingly.

6.4.4 Spigot sleeves

Spigot sleeves intended for jointing unsealed systems to the inside diameter of pipes shall not be subject to Table 1 requirements but shall conform to Table 5 and Figure 6.

Table 5 — Minimum inside diameter of spigot sleeves

Dimensions in millimetres		
Nominal size DN/OD ¹⁾	Nominal outside diameter d_n	Minimum inside diameter $d_{im,min}$
50	50	40
53 ²⁾	53	43
63	63	53
68 ²⁾	68	58
75	75	65
80	80	70
82	82	72
90	90	80
100	100	90
105 ²⁾	105	95
110	110	95

¹⁾ Where non-preferred sizes not listed in the table are manufactured (see footnote 1 in Table 1) the value of $d_{im,min}$ shall be interpolated from the nearest adjacent values both above and below in this table.
²⁾ These sizes are based on the inside diameter series in EN 476:1997, they are not interchangeable with other pipes conforming to the standards listed in the foreword.

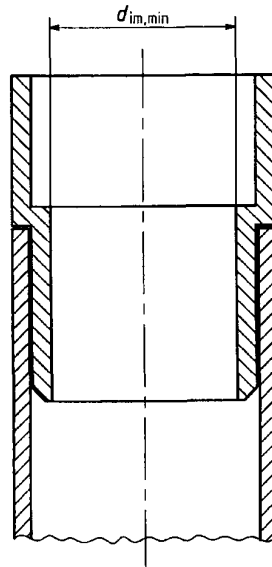


Figure 6 — Fitting spigot sleeve fitted to internal pipe bore

6.5 Types of fittings

This standard includes branches, bends, pipe couplers, pipe couplers with fixing lugs, outlet shoes and transition fittings. (See Figures 7 to 11).

Transition fittings include round to square adaptors, reducers, rainwater heads, adaptors to other materials and adaptors to drainage systems including gullies.

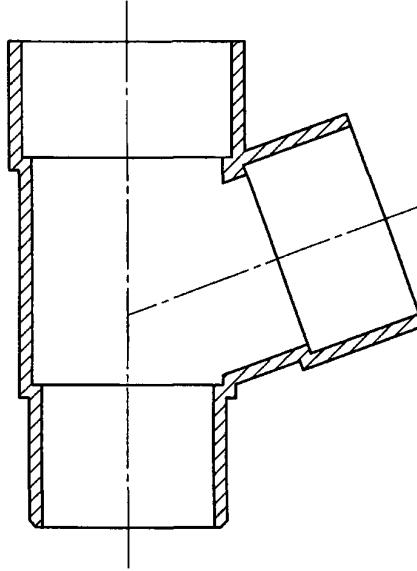


Figure 7 — Typical branch with outlet spigot sleeve

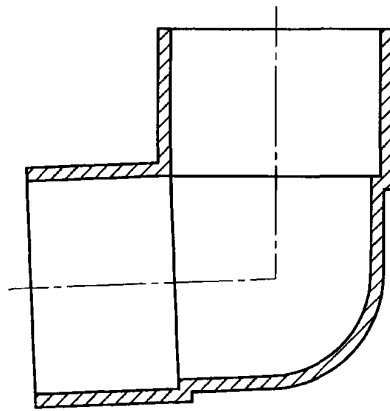


Figure 8 — Typical bend double socket

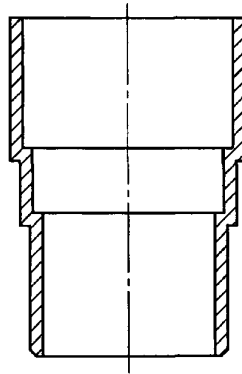


Figure 9 — Typical pipe coupler with spigot sleeve

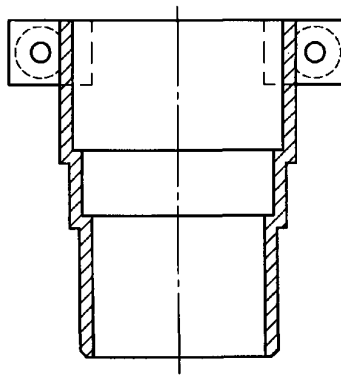


Figure 10 — Typical pipe coupler with fixing lugs and outlet spigot sleeve

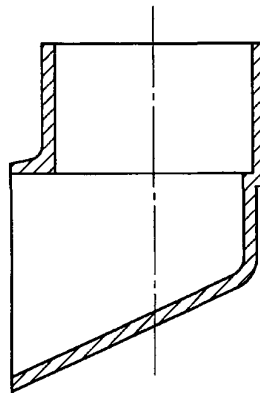


Figure 11 — Typical outlet shoe

6.6 Brackets

Brackets made from PVC-U shall conform to the requirements of 4.1, 4.2 and 7.2.

If brackets made from other materials are used with pipes and fittings conforming to this standard, they shall conform to the requirements of 4.4 and 7.2.

The nominal size of the bracket shall correspond to and be designated by the nominal size of pipe or socket which it is intended to fit. Non-circular brackets shall be sized in accordance with 6.2.2

7 Mechanical characteristics

7.1 Pipes

When tested in accordance with the test methods as specified in Table 6 using the indicated parameters, the pipe shall have mechanical characteristics conforming to the requirements given in Table 6.

Non-circular sections sized as described in 6.2.2 shall be tested in accordance with the corresponding size values for circular pipe. When impact testing non-circular pipes they shall be struck centrally on the widest flat face or flattest side. The V-block described in EN 744:1995 shall also be modified to fit the non-circular pipe profile. Non-circular pipes shall be struck only once per specimen.

Table 6 — Mechanical characteristics of pipes

Characteristics	Requirements	Test parameters		Test method
Impact resistance (round-the-clock method)	TIR ≤ 10 %	Type of striker for $d_n < 110$ mm: $d_n ≥ 110$ mm: Mass of striker Fall of striker Conditioning medium Condition and test temperature	d 25 d 90 Shall conform to Table 7 Shall conform to Table 7 Water 0 °C	EN 744:1995
Tensile impact strength ¹⁾	≥ 500 kJ/m ²	Machined specimen Test temperature	Type 2, 3 or 5 ²⁾ in accordance with EN ISO 8256:1996 (23 ± 2) °C	Method A of EN ISO 8256:1996
Tensile strength	≥ 42 N/mm ²	Strain speed Test piece	5 mm/min Type 5 conforming to EN ISO 527-3:1995	EN 638
Elongation at break	≥ 100 %	Strain speed Test piece	5 mm/min Type 5 conforming to EN ISO 527-3:1995	EN 638
¹⁾ This type test also relates to the ageing of pipes (see Table 12). ²⁾ In case of dispute test piece of type 5 shall be used.				

Table 7 — Falling weight impact energy

Nominal size DN/OD ¹⁾	Nominal outside diameter d_n	Mass of striker	Fall height
	mm	kg	m
50	50	0,5	1,0
53 ²⁾	53	0,5	1,0
63	63	0,8	1,0
68 ²⁾	68	0,8	1,0
75	75	0,8	1,0
80	80	1,25	1,0
82	82	1,25	1,0
90	90	0,8	2,0
100	100	1,25	2,0
105 ²⁾	105	1,6	2,0
110	110	1,6	2,0
125	125	2,0	2,0
140	140	2,5	2,0
160	160	3,2	2,0

¹⁾ Where non-preferred sizes not listed in the table are manufactured (see footnote 1 in Table 1) the values of the mass and fall height of the striker shall be interpolated from the nearest adjacent values both above and below in this table.
²⁾ These sizes are based on the inside diameter series in EN 476:1997, they are not interchangeable with other pipes conforming to the standards listed in the foreword.

7.2 Mechanical characteristics of anchor brackets

When tested in accordance with the test method as specified in Table 8 using the indicated parameters, brackets shall have mechanical characteristics conforming to the requirements given in Table 8.

Table 8 — Mechanical characteristics of brackets

Characteristic	Requirement	Test parameters	Test method
Bracket strength	Permanent distortion ≤ 3 mm	Shall conform to Table 9	EN 12095

Table 9 — Vertical test loads on brackets

Nominal size DN/OD ¹⁾	Nominal outside diameter d_n mm	Vertical test load on bracket ²⁾ kg
50	50	9,1
53 ³⁾	53	12,0
63	63	15,1
68 ³⁾	68	17,9
75	75	21,8
80	80	25,0
82	82	25,9
90	90	31,8
100	100	39,7
105 ³⁾	105	44,1
110	110	47,8
125	125	61,7
140	140	77,2
160	160	101,3

¹⁾ Where non-preferred sizes not listed in the table are manufactured (see footnote 1 in Table 1) the value of the test load shall be interpolated from the nearest adjacent values both above and below in this table.
²⁾ Calculation based on weight of 5,5 m column of water.
³⁾ These sizes are based on the inside diameter series in EN 476:1997, they are not interchangeable with other pipes conforming to the standards listed in the foreword.

8 Physical characteristics

8.1 Physical characteristics of pipes

When tested in accordance with the test methods as specified in Table 10 using the indicated parameters, the pipe shall have physical characteristics conforming to the requirements given in Table 10.

Table 10 — Physical characteristics of pipes

Characteristic	Requirement	Test parameters		Test method
Vicat softening temperature	≥ 75 °C	Shall conform to EN 727		EN 727
Longitudinal reversion	≤ 3 % The pipe shall exhibit no bubbles or cracks	Test temperature	(100 ± 2) °C	Method A of EN 743:1994: Liquid ¹⁾
		Immersion time	(15 ± 2) min	
		or ¹⁾		
		Test-temperature	(100 ± 2) °C	Method B of EN 743:1994: Air
		Immersion time	(30 ± 2) min	

¹⁾ Method B shall be used in cases of dispute.

8.2 Physical characteristics of fittings

When tested in accordance with the test method as specified in Table 11 using the indicated parameters, the fitting, except for any seal retaining means, shall have physical characteristics conforming to the requirements given in Table 11.

Table 11 — Physical characteristics of fittings

Characteristic	Requirement	Test parameters		Test method
Effects of heating	¹⁾ and ²⁾	Test temperature Heating time	(150 ± 2) °C (15 ± 2) min	Method A of EN 763:1994: Air oven
Vicat softening temperature	≥ 75 °C	Shall conform to EN 727		EN 727
¹⁾ a) Within a radius of 15 times the wall thickness around the injection point, the depth of cracks, delamination or blisters shall not exceed 50 % of the wall thickness at that point. b) Within a distance of 10 times the wall thickness from the diaphragm zone, the depth of cracks, delamination or blisters shall not exceed 50 % of the wall thickness at that point. c) Within a distance of 10 times the wall thickness from the ring gate, the length of cracks, shall not exceed 50 % of the wall thickness at that point. d) The weld line shall not have opened more than 50 % of the wall thickness at the line. e) In all other parts of the surface the depths of cracks and delaminations shall not exceed 30 % of the wall thickness at that point. Blisters shall not exceed a length of 10 times the wall thickness. ²⁾ After cutting through the fitting, the cut surfaces shall show no foreign particles, when viewed without magnification.				

9 Fitness for purpose of joint and system

When tested in accordance with the test methods specified in Table 12 pipes, fittings and their assemblies shall conform to the requirements given in Table 12.

Table 12 — Fitness for purpose characteristics of joint or system

Characteristic	Requirement	Test parameters		Test method
Watertightness ¹⁾	No leakage	Shall conform to EN 1053		EN 1053
Artificial ageing ²⁾ (colour fastness)	The change of colour shall not exceed stage 3 of the grey scale according to EN 20105-A02	Radiation energy Cycling and temperature regime	2,6 GJ/m ² Method 1 of EN 513:1999	Method A of ISO 4892-2:1994 (Xenon test): artificial weathering ³⁾
		or ³⁾		
		Exposure time Cycle: - irradiation - condensation	1 600 h (UVA 351 lamp) 6h at (50 ± 5) °C 2h at (50 ± 5) °C	ISO 4892-3:1994 (QUV test)
Tensile impact strength after ageing (pipe only)	≥ 50 % of the value before ageing	Test temperature Test piece	(23 ± 2) °C Shall conform to Table 6	Method A of EN ISO 8256:1996
¹⁾ Watertightness requirements do not apply to unsealed systems. ²⁾ This is intended as a type test for each formulation and colour and may be carried out on other profiles, e.g. those manufactured to EN 607. ³⁾ Where in case of dispute, the method of ISO 4892-2:1994 (Xenon test) shall be used.				

10 Sealing rings

10.1 The sealing ring shall have no detrimental effect on the properties of the pipe and of the fittings and shall not cause the test assembly to fail to conform to Table 12.

10.2 Materials for sealing rings shall conform to EN 681-1 or EN 681-2, as applicable.

11 Adhesives

The adhesive shall be solvent cement and shall be as specified by the manufacturer of pipes and/or fittings.

The adhesive shall have no detrimental effects on the properties of the pipe and of the fittings and shall not cause the test assembly to fail to conform to Table 12.

12 Marking

12.1 General

12.1.1 Marking elements shall be labelled or printed or formed directly on the pipe or the fitting, in such a way that after storage, weathering and handling, and installation, legibility is maintained in accordance with one of the following levels.

One of the following three levels of legibility of the marking is specified for the individual marking aspect in the column "Minimum durability of legibility of marking" in Tables 13 and 14.

The symbols for the legibility mean the following:

- a: durable in use;
- b: legible until the system is installed;
- c: marking on the packaging, legible until the component is installed.

NOTE The manufacturer is not responsible for marking being illegible, due to actions caused during installation and use such as painting, scratching, covering of the components or use of e.g. detergents on the components unless agreed or specified by the manufacturer.

12.1.2 Marking shall not initiate cracks or other types of defects which adversely influence the performance of the pipe or the fitting.

Marking by indentation reducing the wall thickness not more than 0,25 mm shall be deemed to conform to this clause without infringing the requirements for the wall thickness given in 6.2.4.

12.1.3 If printing is used, the colouring of the printed information shall differ from the basic colouring of the pipe or the fitting.

12.1.4 The size of the marking shall be such that it is legible without magnification.

12.2 Minimum required marking of pipes

Pipes shall be marked at least once per pipe.

The marking shall conform to Table 13.

Table 13 — Minimum required marking of pipe

Aspects	Marking or symbol	Durability of legibility of marking
Material	PVC or PVC-U	a
Manufacturer	Name or trade mark	a
Number of this standard	EN 12200	a
Pipe size ¹⁾	e.g. 80 or 65 × 65	a
Wall thickness (e)	e.g. 1,6	a
Rainwater	R	c
Manufacturing information	²⁾	c
¹⁾ Non-circular pipes shall be designated as 6.2.2. ²⁾ For providing traceability the following details shall be given: a) the production period, year and month, in figures or in code; b) a name or code for the production site if the manufacturer is producing at different sites, nationally and/or internationally.		

12.3 Fittings

The marking of fittings shall be in accordance with Table 14.

Table 14 — Minimum required marking of fittings

Aspects	Marking or symbol	Durability of legibility of marking
Material	PVC or PVC-U	a
Manufacturer	Name or trade mark	a
Number of this standard	EN 12200	a
Nominal size ¹⁾	e.g. 80 or 65 × 65	a
Nominal angle α	e.g. 45°	a
Rainwater	R	c
Manufacturing information	²⁾	c
¹⁾ Fittings for non-circular pipes shall be designated as 6.2.2. ²⁾ For providing traceability the following details shall be given: a) the production period, year, in figures or in code; b) a name or code for the production site if the manufacturer is producing at different sites, nationally and/or internationally.		

12.4 Brackets

Brackets of PVC-U shall be marked in accordance with Table 14.

If marking details are formed directly on the brackets it shall be done in such a way that the marking does not initiate cracks or other types of failure.

Brackets made of materials other than PVC-U shall not be marked directly but shall carry the following information on the packaging or on a label.

- designed for use with systems conforming to EN 12200
- nominal size
- manufacturer's name or trade mark
- corrosion class as specified in EN 1462

12.5 Certified components

Pipes and fittings conforming to this standard which are third party certified, may be marked accordingly.

ANNEX A (normative)

Utilization of non-virgin material

A.1 Material terms and definitions

A.1.1

virgin material

material in a form such as granules or powder that has not been subjected to use or processing other than that required for its manufacture and to which no reprocessable or recyclable material has been added

A.1.2

own reprocessable material

material prepared from rejected unused pipes or fittings, including trimmings from the production of pipes or fittings, that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer by a process such as moulding or extrusion, and for which the complete formulation is known

A.1.3

external reprocessable material

material comprising either one of the following forms:

- a) material from rejected unused pipes or fittings or trimmings there from, that will be reprocessed and that were originally processed by another manufacturer;
- b) material from the production of unused PVC-U products other than pipes and fittings, regardless of where they are manufactured

A.1.4

recyclable material

material comprising either of the following forms:

- a) material from used pipes or fittings which have been cleaned and crushed or ground;
- b) material from used PVC-U products other than pipes or fittings which have been cleaned and crushed or ground

A.2 Reprocessable and recyclable material

NOTE For the purposes of this clause the term pipes means extruded pipes, gutters and any parts of a fabricated fitting which is made from an extrusion. The term fitting means injection-moulded fittings and injection-moulded parts of a fabricated fitting.

A.2.1 Own reprocessable material

The use of clean own reprocessable material with agreed specification for the production of pipes and fittings is permitted without limitations.

If fitting material is used for the production of pipes it shall be considered as recyclable material.

A.2.2 External reprocessable and recyclable materials with agreed specification

A.2.2.1 Material from PVC-U pipes, gutters and fittings

External reprocessable and recyclable material with an agreed specification from PVC-U pipes, gutters and fittings that are available in relevant quantities and intervals of time is permitted to be added to virgin or own reprocessable material or a mixture of those two materials for the production of pipes and fittings provided that all of the following conditions are met:

- a) a specification for each material shall be agreed between the supplier of external reprocessable or recyclable material and the pipe manufacturer. It shall at least cover the characteristics given in Table A.1. When determined in accordance with the test method given in Table A.1, the actual values for these characteristics shall conform to the agreed value, and the permitted deviations shall conform to those given in Table A.1.

NOTE The quality plan of the supplier of external reprocessable or recyclable material should conform to EN ISO 9002:1994. For the purposes of this subclause, the manufacturer is responsible for claiming and ensuring that the quality plan conforms to or is no less stringent than the relevant requirements of EN ISO 9002:1994: it is not essential for the manufacturer to be approved and registered for operation in accordance with EN ISO 9002:1994.

Table A.1 — Specification of characteristics to be covered by an agreement and the maximum permitted deviations for these characteristics

Characteristic	Permitted deviations	Test method
PVC-content ¹⁾	± 4 % absolute by mass	EN 1905
K-value ¹⁾	± 3 units	EN 922
Density ¹⁾	± 20 kg/m ³	ISO 1183:1987
Vicat softening temperature (VST) ¹⁾	± 2 °C	EN 727
Particle size ²⁾	Requirements and test method shall be agreed and stated in the specification.	
Type of stabilizer ¹⁾²⁾	Requirements and test method shall be agreed and stated in the specification.	
Impurities ²⁾	Based on the source of material and the recycling process a relevant test method and requirements shall be agreed and stated in the specification. Both the test method and the requirements shall be published.	
¹⁾ If the source of the material is pipes and fittings produced under a European nationally recognized quality mark or a European quality mark, it is not required to test this material characteristics if the requirement covered by the quality mark conforms to the requirement given in this table. ²⁾ The relevant requirements and test method are depending on the recycling process and on the end product.		

- b) each delivery shall be covered by a certificate according to 3.1.B of EN 10204:1991, showing conformity to the agreed specification;
- c) the maximum quantity of external reprocessable and recyclable material that is intended to be added shall be specified by the pipe or fitting manufacturer;
- d) the quantity of external reprocessable and recyclable material that is actually added in each production series shall be recorded by the pipe or fitting manufacturer;
- e) type testing shall be carried out on the end product with the maximum specified amount of and with each form of external reprocessable or recyclable material with an agreed specification. Approved results shall be taken as proving conformity also of components containing lower levels of additions of external reprocessable or recyclable material.

A.2.2.2 Material from other PVC-U products than pipes gutters and fittings

External reprocessable and recyclable material with an agreed specification from PVC-U bottles or window frames that are available in relevant quantities and intervals of time is permitted to be added to virgin or own reprocessable material or a mixture of those two materials for the production of pipes and fittings provided that all of the following conditions are met:

- a) the material shall conform to all of the conditions given in a) to e) of A.2.2.1, inclusive, and to all of the additional characteristics and requirements given in Table A.2.

Table A.2 — Requirements for external reprocessable and recyclable material from PVC-U products other than pipes gutters and fittings

Characteristic	Requirements	Test method
PVC-content	≥ 80 % by mass	EN 1905
K-value	56 ≤ K-value ≤ 70	EN 922
Density	1 390 kg/m ³ ≤ density ≤ 1 500 kg/m ³	ISO 1183:1987
Vicat softening temperature (VST)	≥ 62 °C	EN 727
Impurities	≤ 1 500 ppm for particle size ≤ 1 000 μm ≤ 1 500 ppm for 1000 μm < particle size < 1400 μm	¹⁾
Particle size	> 1 000 μm: max 15 % < 1 400 μm: 100 %	
Application source of the material	one source: bottles or window frames	
If the source of the material is unused products for which the complete formulation is known and is such that all the requirements given in this table are fulfilled the material does not have to be tested and does not have to meet the requirements for particle size.		
¹⁾ Based on the source of material and the recycling process a relevant test method and requirements shall be agreed and stated in the specification. Both the test method and the requirements shall be published.		

- b) the material shall be clean and dry;
- c) the maximum allowed amount of reprocessable and recyclable materials shall depend on the difference in K-value of the virgin material and the reprocessable and recyclable material as follows:
 - 1) if the difference in K-value, when determined in accordance with EN 922, is ≤ 4 units, then up to 20 % by mass may be added;
 - 2) if the difference in K-value is > 4 units, or not determined, then up to 5 % by mass may be added;
- d) the quantity of external reprocessable and recyclable materials that is actually added in each production series shall be recorded by the pipe and fitting manufacturer.

NOTE The attention is drawn to possible national regulations regarding heavy metals, e.g. cadmium.

A.2.3 External reprocessable and recyclable material not covered by an agreed specification

A.2.3.1 Material from PVC-U pipes and fittings

External reprocessable and recyclable material not covered by an agreed specification from PVC-U pipes and fittings that are available in random quantities and intervals of time is permitted to be added to virgin or own reprocessable material or a mixture of those two materials for the production of pipes provided that all of the following conditions are met:

- a) when this material is used the production shall be considered as at least one batch and shall be tested accordingly;
- b) the material shall be clean and dry;
- c) the maximum allowed amount of external reprocessable and recyclable materials that may be added shall depend on the difference in K-value of the virgin material and the external reprocessable and recyclable material as follows:
 - 1) if the difference in K-value, when determined in accordance with EN 922, is ≤ 4 units, then up to 10 % by mass may be added;
 - 2) if the difference in K-value is > 4 units, or not determined, then up to 5 % by mass may be added.
- d) the quantity of external reprocessable and recyclable materials that is actually added in each production series shall be recorded by the pipe manufacturer.

A.2.3.2 Material from other PVC-U products than pipes and fittings

External reprocessable and recyclable material not covered by an agreed specification from other PVC-U products than pipes and fittings shall not be used for the production of pipes and fittings conforming to this standard.

Bibliography

- EN 476:1997, *General requirements for components used in discharge pipes, drains and sewers for gravity systems*
- EN 607, *Eaves gutters and fittings made of PVC-U — Definitions, requirements and testing*
- EN 612, *Eaves gutters and rainwater down-pipes of metal sheet — Definitions, classifications and requirements*
- prEN 12200-2, *Plastics rainwater piping systems for above ground external use — Unplasticized poly(vinyl chloride) (PVC-U) — Part 2: Guidance for the assessment of conformity*
- prEN 12200-3, *Plastics rainwater piping systems for above ground external use — Unplasticized poly(vinyl chloride) (PVC-U) — Part 3: Guidance for installation*
- EN 12056-3, *Gravity drainage systems inside buildings — Part 3: Roof drainage layout and calculations*
- EN ISO 9002:1994, *Quality systems — Model for quality assurance in production, installation and servicing (ISO 9002:1994)*
- ISO 265-1:1988, *Pipes and fittings of plastics materials — Fittings for domestic and industrial waste pipes — Basic dimensions: Metric series — Part 1: Unplasticized poly(vinyl chloride) (PVC-U)*

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Unplasticized poly (vinyl chloride) (PVC-U) — Specifications for
pipes, fittings and the system**

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