PD CEN/TS 12200-2:2017

BSI Standards Publication

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

Part 2: Guidance for the assessment of conformity

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National foreword

This Published Document is the UK implementation of CEN/TS 12200-2:2017. It supersedes DD CEN/TS 12200-2:2003 which is withdrawn.

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Plastics rainwater piping systems for above ground external use - Unplasticized poly(vinyl chloride) (PVC-U) - Part 2: Guidance for the assessment of conformity

Systèmes de canalisations de descentes d'eaux pluviales en plastique à usage externe en aérien - Poly(chlorure de vinyle) non plastifié (PVC-U) - Partie 2 : Guide pour l'évaluation de la conformité

Kunststoff-Rohrleitungssysteme für außenliegende Regenfallleitungen - Weichmacherfreies Polyvinylchlorid (PVC-U) - Teil 2: Empfehlungen für die Beurteilung der Konformität

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The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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European foreword

This document (CEN/TS 12200-2:2017) has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 12200-2:2003.

Compared with CEN/TS 12200-2:2003, the following changes have been made:

a) use of the template drafted by CEN/TC 155/WG 21 for assessment of conformity documents (change of "Terms and definitions" and addition of 1 column "Sampling procedures" in Tables);

b) introduction of "Limits of addition of PVC reprocessed and recycled material" in a separate table (Table 2);

c) addition of an informative Annex A: Basic test matrix.

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: *Specifications for pipes, fittings and the system*;

— Part 2: *Guidance for the assessment of conformity;*

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Figures 1 and 2 are intended to provide general information on the concept of testing and organization of those tests used for the purpose of the assessment of conformity. For each type of test, i.e. type test (TT), batch release test (BRT), process verification test (PVT) and audit test (AT), this part of EN 12200 details the applicable characteristics to be assessed and the frequency and sampling of testing.

A typical scheme for the assessment of conformity of materials (formulations), pipes, fittings or assemblies by manufacturers is given in Figure 1.

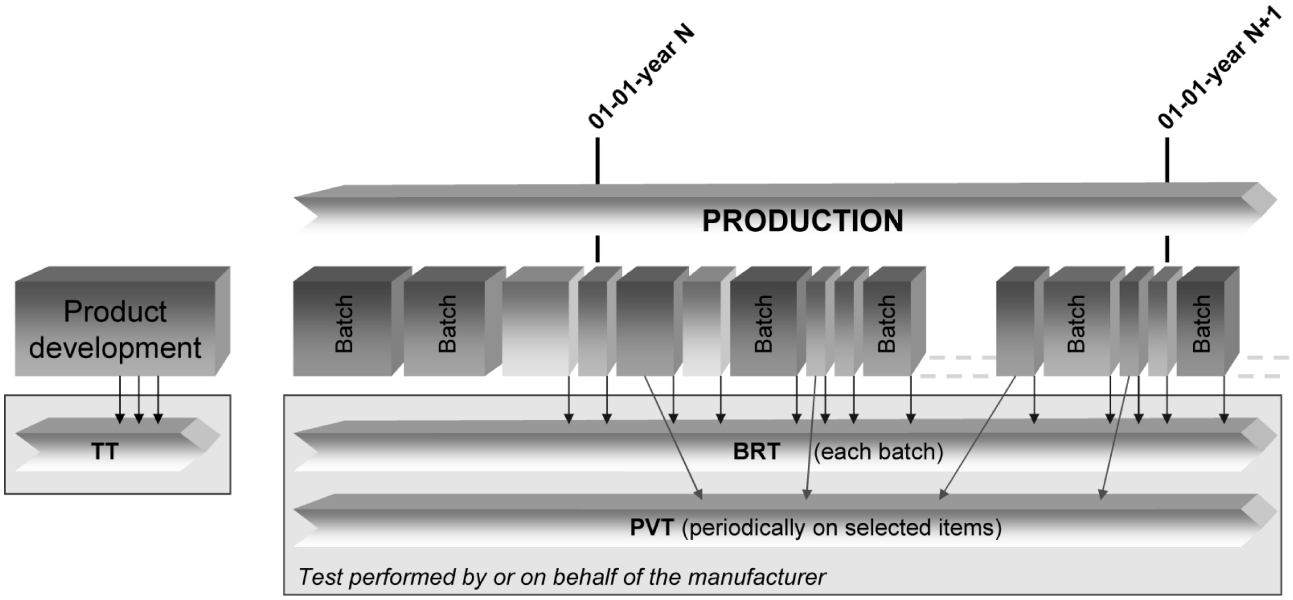

Figure 1 — Typical scheme for the assessment of conformity by a manufacturer

A typical scheme for the assessment of conformity of materials (formulations), pipes, fittings, valves or assemblies by manufacturers, including a third-party certification, is given in Figure 2.

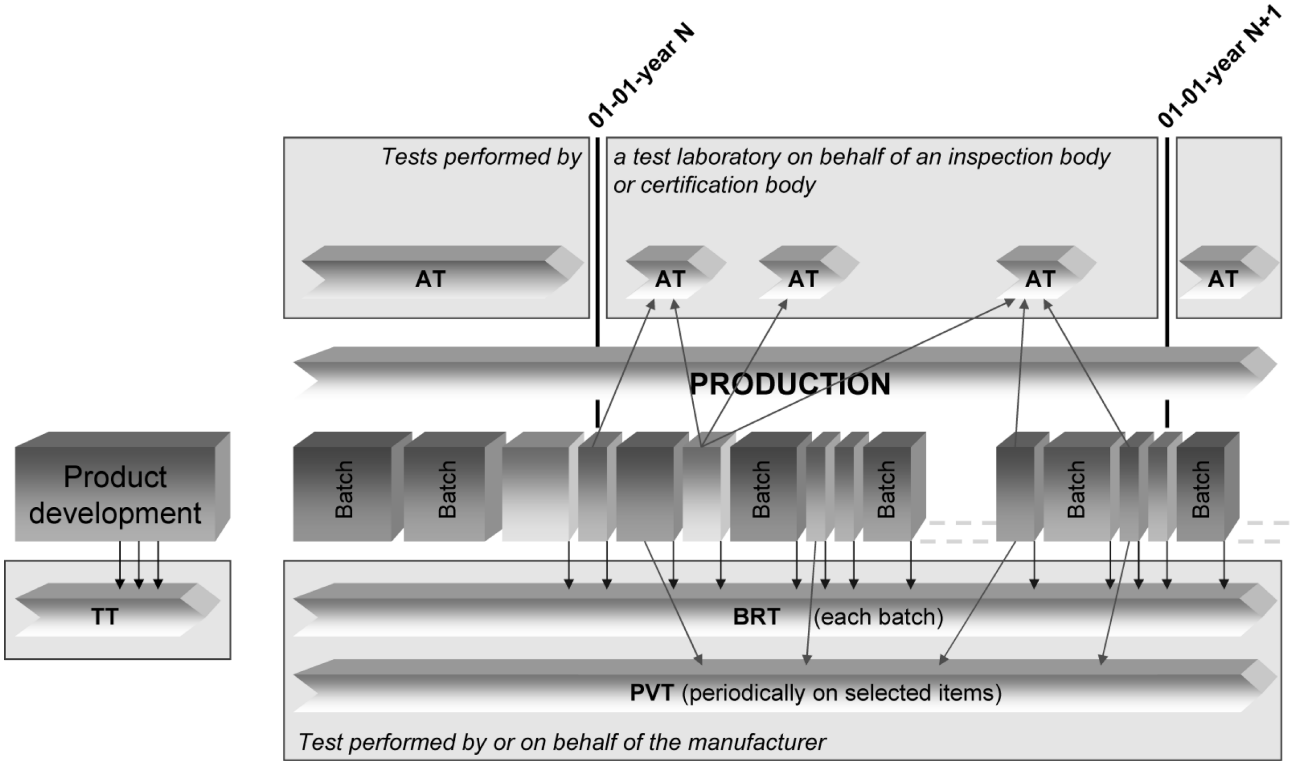

Figure 2 — Typical scheme for the assessment of conformity by a manufacturer, including certification

1 Scope

This part of EN 12200 gives guidance for the assessment of conformity of formulations, products, joints and assemblies in accordance with EN 12200-1:2016 intended to be included in the manufacturer's quality plan as part of the quality management system and for the establishment of third-party certification procedures.

NOTE In order to help the reader, a basic test matrix is given in Annex A.

In conjunction with EN 12200-1:2016, this document is applicable to piping systems made of unplasticized poly(vinyl chloride) (PVC-U) intended to be used for above ground external rainwater, and to fittings and brackets made of acrylic materials which may be used in combination with the pipes.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12200-1:2016, *Plastics rainwater piping systems for above ground external use - Unplasticized poly(vinyl chloride) (PVC-U) - Part 1: Specifications for pipes, fittings and the system*

3 Terms and definitions,

For the purposes of this document, the terms and definitions given in EN 12200-1:2016, and the following apply.

3.1
certification body
impartial body, governmental or non-governmental, possessing the necessary competence and responsibility to carry out certification of conformity according to given rules of procedure and management

Note 1 to entry: A certification body is preferably accredited to EN ISO/IEC 17021 [2].

3.2
inspection body
body, that performs inspection

[SOURCE: EN ISO/IEC 17020:2012 [3], 2.2]

Note 1 to entry: A body can be an organization, or part of an organization.

Note 2 to entry: A inspection body is preferably compliant with EN ISO/IEC 17020 [3].

3.3
testing laboratory
laboratory which measures, tests, calibrates or otherwise determines the characteristics of the performance of materials and products

Note 1 to entry: In the context of this part of EN 12202, the materials and products can be subjected to type testing, batch release testing, process verification testing, audit testing, and witness testing, as applicable.

Note 2 to entry: A testing laboratory is preferably compliant with EN ISO/IEC 17025 [4].

3.4
quality management system
management system to direct and control an organization with regard to quality

[SOURCE: EN ISO 9000:2015 [5], 3.2.3]

Note 1 to entry: Requirements for quality management systems are given in EN ISO 9001 [1].

3.5
quality plan
document setting out the specific quality practices, resources and sequence of activities relevant to a particular product or range of products

3.6
type testing
TT
testing performed to prove that the formulation, product, joint or assembly is capable of conforming to the requirements given in the relevant standard

Note 1 to entry: The type test results remain valid until there is a change in the material or product or assembly provided that the process verification tests are done regularly.

3.7
batch release test
BRT
test performed by or on behalf of the manufacturer on a batch of materials or products, which needs to be satisfactorily completed before the batch can be released

3.8
process verification test
PVT
test performed by, or on behalf of the manufacturer on materials, products or joints or assemblies at specific intervals to confirm that the process continues to be capable of producing products which conform to the requirements given in the relevant standard

Note 1 to entry: Such tests are not required to release batches of materials or products; rather they are carried out as a measure of process control.

3.9
audit test
AT
test performed by a test laboratory on behalf of an inspection body or certification body to confirm that the material, product, joint or assembly continues to conform to the requirements given in the relevant standard and to provide information to assess the effectiveness of the quality management system

3.10
indirect test
IT
test performed by or on behalf of the manufacturer, different from that specified test for that particular characteristic, having previously verified its correlation with the specified test

3.11
witness test
WT
test accepted by an inspection or a certification body for type testing and/or audit testing, which is carried out by or on behalf of the manufacturer and supervised by a representative of the inspection or certification body, qualified in testing

3.12
material
generic term for formulations grouped by families, expressed by generic names, e.g. poly(vinyl chloride) (PVC), stainless steel, brass or EPDM

Note 1 to entry: Definition from European Commission, Directorate-General for Enterprise and Industry, Sub-group on Product Testing Procedures (EC, DG ENT and IND, SG PTP).]

3.13
formulation
clearly defined homogenous mixture of base polymer with additives, i.e. anti-oxidants, pigments, stabilizers and others, at a dosage level necessary for the processing and the intended use of the final product

Note 1 to entry: The term “compound” is sometime used with similar meaning as “formulation”.

3.14
material batch
clearly identified quantity of a given homogeneous formulation manufactured under uniform conditions and defined and identified by the formulation manufacturer

3.15
product
pipe or fitting of a clearly identified type intended to be a part of a piping system which the manufacturer puts on the market

3.16
product batch
clearly identified collection of products, manufactured consecutively or continuously under the same conditions, using the same formulations and conforming to the same specification

Note 1 to entry: The production batch is defined and identified by the product manufacturer.

3.17
sample
one or more products drawn from the same production batch, selected at random without regard to their quality

Note 1 to entry: The number of products in the sample is the sample size.

3.18
group
collection of similar products from which samples are selected for testing purposes

3.19
component
product manufactured out of a specific formulation, brought to the market as part of another product or as a spare part

3.20
joint
connection between two products

3.21
assembly
product that can be dismantled into a set of components

EXAMPLE A test piece consisting of various products.

3.22
sampling plan
specification of the type of sampling to be used in combination with the operational specification of the entities or increments to be taken, the samples to be constituted and the measurements or tests to be made

EXAMPLE A specific plan which indicates the number of units of products or assemblies to be inspected.

3.23
product type
generic description of a product

EXAMPLE A pipe or its main parts, of the same design, from a particular formulation.

3.24
cavity
(moulding) space within a mould to be filled to form the moulded product

EXAMPLE That part of the injection mould which gives the form to the injection moulded product.

4 Abbreviated terms

To avoid misunderstanding, the abbreviations in this clause are defined as being the same in each language. For the same reason, the terms are given in the three languages, English, French and German.

	EN	FR	DE
AT	audit test	essai d'audit	Überwachungsprüfung
BRT	batch release test	essai de libération de campagne de fabrication	Freigabeprüfung einer Charge
IT	indirect test	essai indirect	indirekte Prüfung
PVT	process verification test	essai de vérification du procédé de fabrication	Prozessüberprüfung
TT	type test	essai de type	Typprüfung
WT	witness testing	essai témoin	Prüfung unter Aufsicht

5 General

5.1 Formulation, products, joints and assemblies shall conform to the requirements given in EN 12200-1.

5.2 Products and assemblies shall be produced by the manufacturer under a quality management system which includes a quality plan .

It is recommended that the quality management system conforms to, or is no less stringent than, the relevant requirements in EN ISO 9001 [1].

6 Testing and inspection

6.1 Material specification

6.1.1 PVC-U material

For the purposes of this Technical Specification the material specification consists of a formulation which defines PVC resin and additives and their dosage levels.

The dosage level of ingredients of a formulation shall not exceed the tolerance bands given in Table 1. If any level exceeds the dosage band or if a type (see Table 1) is changed, this variation constitutes a change in formulation.

The use of reprocessed and/or recycled material shall be considered as a change in formulation when the change in addition exceeds the tolerance bands given in Table 2.

The values of Parts *X* added to 100 parts by mass of PVC, shall be specified by the manufacturer in his quality plan.

Table 1 — Formulation specification

Ingredients	Type	Band
PVC resin	Nominal K value as specified by the manufacturer:	±3 units
Type of stabilizer or master batch	1) OBS (Organic Based Stabilizers) 2) Ca-Zn 3) Sn 4) Ca-Sn 5) Others	X_1 : ± 25 %
Lubricants	All	X_2 : ± 50 % for $X_2 \leq 0,2$ X_2 : ± 0,1 part for $X_2 > 0,2$
Fillers	1) $CaCO_3$ 2) Others	X_3 : ± 3 parts X_4 : ± 25 %
Impact modifiers	All	X_5 : ± 1 part
Flow agents	All	X_6 : ± 25 % for $X_6 \leq 2$ X_6 : ± 0,5 part for $X_6 > 2$
Pigments	No requirements	-
Others	To be separately specified by the manufacturer	$X_{7,n}$: ± 25 %

Table 2 — Limits of addition of PVC reprocessed and recycled material

Ingredients	Type	Band
External reprocessed and recycled material	With an agreed specification [a]	≤ X_8 [b]
External reprocessed and recycled material	Not covered by an agreed specification	≤ X_9 [b]
[a] The specifications shall be declared by the manufacturer to the certification body. [b] See specifications in EN 12200–1.		

6.1.2 Acrylic material

For the purposes of this Technical Specification, the material specification consists of a compound/formulation comprising an Acrylic compound/formulation with specific trade name and additives with known dosage level.

6.1.3 Other material

Metallic brackets may be used in conjunction with rainwater plastic piping systems in accordance with the requirements in EN 12200-1, material requirements should be referenced from EN 1462.

NOTE The material composition may affect the requirement for corrosion resistance as specified in EN 12200–1:2016, 4.5.

6.2 Grouping

6.2.1 General

For the purposes of this Technical Specification, the groups specified in 6.2.2 to 6.2.3 apply.

6.2.2 Size groups

The entire size range from 50 mm to 160 mm inclusive shall be considered as a single group.

6.2.3 Fitting groups

Two groups of fittings each having a similar design are defined, as given in Table 3.

For testing purposes, one individual fitting shall be selected from each group.

Table 3 — Fitting groups

Fitting group	Type of fitting
1	Brackets and couplers with fixing lugs
2	Other fittings

6.3 Type testing

Relevant TTs shall be carried out whenever there is a change in design, in formulation or production method, other than routine in-process adjustments, and/or whenever there is an extension of the product range.

Type tests, which are carried out whenever a change of the production site occurs, depend on the extent of the change. Therefore relevant type tests should be defined individually by the manufacturer.

Type tests shall demonstrate that the products conform to all requirements for the characteristics given in Table 4, Table 5 and Table 6, as applicable.

Table 4 — Characteristics of pipes that require type testing (TT)

Characteristic	Reference to part, clause or subclause of EN 12200–1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
Appearance	5	+	+	+	+	Once per size	Once per size group
Geometrical characteristics	6.2 and 6.4	+	+		+	Once per size	Once per size group
Impact resistance (round-the-clock method)	7.1	+	+	+	+	Once per size per formulation	Once per size group per formulation
Tensile Impact strength	7.1	+		+		Once per formulation	Once per formulation
Tensile strength	7.1	+		+		Once per formulation	Once per formulation
Elongation	7.1	+		+		Once per formulation	Once per formulation
Vicat Softening Temperature (VST)	8.1	+		+		Once per formulation	Once per formulation
Longitudinal reversion	8.1	+	+	+	+	Once per size	Once per size group

[a] N : new system;
D : change in design;
M : change of formulations
E : extension of the product range (except the products already covered by the scheme of sampling procedure);
+ : test to be carried out.

[b] Recommended sampling procedure for a testing laboratory working on behalf of a certification body.

Table 5 — Characteristics of fittings that require type testing (TT)

Characteristic	Reference to part, clause or subclause of EN 12200–1	Conditions requiring test [a]					Sampling procedure	
		N	D	M	P	E	Manufacturer	Certification body [b]
Appearance	5	+	+	+	+	+	Once per each fitting	Once per fitting group
Geometrical characteristics	6.3 – 6.4	+	+		+	+	Once per each fitting	Once per fitting group
Bracket strength	7.2	+	+	+	+	+	Once per each fitting/formulation	Once per fitting group/formulation
Vicat Softening Temperature (VST)	8.2	+		+			Once per formulation	Once per formulation
Effect of heating [c]	8.2	+	+		+	+	Once per each fitting	Once per fitting group

[a] N : new system;
D : change in design;
M : change of formulation;
P : change of production method;
E : extension of the product range (except the products already covered by the scheme of sampling procedure);
+ : test to be carried out.

[b] Recommended sampling procedure for a testing laboratory working on behalf of a certification body. Testing undertaken in a manufacturer laboratory shall be taken into account, provided prior acceptance by the certification body.

[c] Only for injection-moulded parts.

Table 6 — Characteristics of fitness for purpose of the system that require type testing (TT)

Characteristic	Reference to part, clause or subclause of EN 12200–1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
Watertightness [c]	9	+	+		+	Once per size per joint design [d]	One size per joint design [d]
Residual tensile impact strength	9	+		+		Once per formulation	Once per formulation
Artificial ageing (colour fastness)	9	+		+		Once per formulation	Once per formulation

[a] N : new system;
D : change in design;
M : change of formulation;
E : extension of the product range (except the products already covered by the scheme of sampling procedure);
+ : test to be carried out.

[b] Recommended sampling procedure for a testing laboratory working on behalf of a certification body.

[c] Not required for solvent cement joints and not applicable for unsealed systems.

[d] Joint design at least includes: seal design, groove geometry and seal hardness (±5 IHRD).

6.4 Batch release tests

Those characteristics specified in EN 12200-1 and listed in Tables 7 and 8 shall be batch release tested with the minimum sampling frequency as given in Table 7 or Table 8 as applicable.

Table 7 — Characteristics of pipes and minimum sampling frequencies for BRTs

Characteristic	Reference to part, clause or subclause of EN 12200–1	Minimum sampling frequency
Appearance/colour	5	Once at start up and then every 8 h
Outside diameter	6.2.1 and 6.2.2	Once at start up and then every 8 h
Length of pipe	6.2.3	Once at start up and then every 8 h
Wall thickness	6.2.4	Once at start up and then every 8 h
Socket dimensions [a]	6.4	Once at start up and then every 8 h
Impact resistance[b]	7.1	Once at start up and then

		every 24 h
Longitudinal reversion	8.1	Once at start up and then every 24 h
Marking	12.2	Once at start up and then every 8 h
a Only applies to dimensions likely to vary during the process. b This test can be the subject of indirect testing at ambient temperature, if correlation can be established.		

Table 8 — Characteristics of fittings and minimum sampling frequencies for BRTs

Characteristic	**Reference to part, clause or subclause of** EN 12200–1	**Minimum sampling frequency**
Appearance/colour	5	Once per cavity at start up and then every 8 h
Socket and spigot dimensions [a]	6.4	Once per cavity at start up and then every 8 h
Effect of heating [b]	8.2	Once per cavity at start up and then every 24 h
Marking	12.3	Once per cavity at start up
a Only for dimensions which are influenced by the process. b Only for injection-moulded parts.		

The manufacturer shall specify a batch in the quality plan.

A batch shall only be released for supply when all the relevant tests and inspections have been carried out at the specified frequencies and the requirements have been met.

If a product fails in respect of any characteristic given in Table either the batch shall be rejected or the retest procedures shall be performed for the characteristic on which the product failed.

The retest procedure shall be as follows:

Find the last product which conforms to the requirements as specified in EN 12200-1. Release all products produced before that point and reject the products produced after that point.

Procedures for dealing with rejected products shall be detailed in the manufacturer's quality plan.

6.5 Process verification tests

The characteristics specified in EN 12200-1 and listed in Table 9, Table 10 and Table 11 shall be process verification tested with the minimum sampling frequency given in Table 9, Table 10 and Table 11, as applicable, if not type tested or audit tested in the same period.

Table 9 — Characteristics of pipes and minimum sampling frequencies for PVTs

Characteristic	Reference to part, clause or subclause of EN 12200–1	Minimum sampling frequency
Vicat Softening Temperature (VST)	8.1	Once per year per formulation currently used
Tensile Strength	7.1	Once per year per formulation currently used
Elongation	7.1	Once per year per formulation currently used

Table 10 — Characteristics of fittings and minimum sampling frequencies for PVTs

Characteristic	Reference to part, clause or subclause of EN 12200–1	Minimum sampling frequency
Vicat Softening Temperature (VST)	8.2	Once per year per formulation currently used
Bracket strength	7.2	Once per 5 year per design/formulation

Table 11 — Characteristics for fitness for purpose and minimum sampling frequencies for PVTs

Characteristic	Reference to part, clause or subclause of EN 12200–1	Minimum sampling frequency
Watertightness [a]	9 – Table 12	Once per 3 years per size group per joint design [b]
Residual Tensile impact strength	9	Once per 10 year per formulation
Artificial ageing	9	Once per 10 year per formulation
a Not required for solvent cement joints and not applicable for unsealed systems b Joint design at least includes: seal design, groove geometry and seal hardness (±5 IHRD).		

If the product does not conform to the requirements in respect of any characteristics given in Table 9, Table 10 and Table 11, as applicable, the retest procedure detailed in the manufacturer's quality plan shall be performed.

If the retest procedure does not confirm conformity of the product to the requirements, then the process shall be investigated and corrected in accordance with the procedures given in the manufacturer's quality plan as well as to verify the characteristics given in Table 9, Table 10 and Table 11, as applicable.

Certification bodies may accept process verification tests (PVT) as audit tests (AT) if witnessed by them or by their agencies.

A test performed as an AT does not need to be repeated as a PVT.

6.6 Audit tests

ATs are performed only if a third-party certification is involved.

Those characteristics specified in EN 12200-1 and listed in Table 12 to Table 14 are intended to be audit tested with the minimum sampling frequency as given in Table 12 to Table 14, as applicable.

Table 12 — Characteristics of pipes and minimum sampling frequencies for AT

Characteristics	**References to paragraphs and tables of** EN 12200–1	**Minimum sampling Frequency**
Vicat	8.1	Once/year/formulation used[a]
Appearance	5	Once per year/size group
Geometric characteristics	6.2 and 6.4	Once per year/size group
Tensile strength	7.1	Once per year/size group
Elongation	7.1	Once per year/size group
Impact strength	7.1	Once per year/size group
Tensile impact strength	7.1	Once per year/size group
Longitudinal reversion	8.1	Once per year/size group
Marking	12.2	Once per year/size group
a A change of colour does not represent a change of formulation.		

Table 13 — Characteristics of fittings and minimum sampling frequencies for AT

Characteristics	References to paragraphs and tables of EN 12200–1:2016	**Minimum sampling Frequency**
Vicat	8.2	Once/year/formulation used[a]
Appearance	5	Once per year/size group
Geometric characteristics	6.3 and 6.4	Once per year/size group
Bracket strength	7.2	Once per 5 year/size group
Effects of heating	8.2	Once per year/size group
Marking	12.3 and 12.4	Once per year/size group
a A change of colour does not represent a change of formulation.		

Table 14 — Characteristics for fitness for purpose of the system and minimum sampling frequencies for AT

Characteristics	References to paragraphs and tables of EN 12200–1:2016	Minimum sampling Frequency
Residual tensile impact	9	Once per 10 year/ formulation/colour [a]
u/v degradation (colour fastness)	9	Once/10year/ formulation/colour [a]
Watertightness [b]	9	Once/5year/group
a A change of colour does not represent a change of formulation. b Not required for solvent cement joints and not applicable for unsealed systems		

The sizes, types and classes selected for tests should preferably be primarily those which have not previously been selected for audit testing. Samples should be preferably taken from the largest volume of production per group.

6.7 Indirect tests (IT)

Generally testing shall be performed according to the test methods referred to in EN 12200-1.

ITs may be used for BRT characteristics as given in Table 7 and Table 8. Indirect testing shall not be used for to TTs, PVTs or ATs.

The indirect test method used and the correlation or safe relationship of the indirect testing to the specified testing shall be documented in the manufacturer's quality plan. The continuing validity of the indirect testing shall be checked at regular intervals.

In cases of dispute the BRT as specified in Table 7 and Table 8 shall be used.

If third party certification is involved, the IT shall be acceptable to the certification body.

6.8 Test records

Unless otherwise specified all records should be maintained for a minimum of five years in accordance with the information given in the quality system.

Annex A
(informative)

Basic test matrix

Table A.1 — Basic test matrix

Characteristics	TT	BRT	PVT	AT
Pipes				
Vicat	+		+	+
Appearance	+	+		+
Geometric characteristics	+	+		+
Tensile strength	+		+	+
Elongation	+		+	+
Impact strength	+	+		+
Tensile impact strength	+			+
Longitudinal reversion	+	+		+
Marking		+		+
Fittings				
Vicat	+		+	+
Appearance	+	+		+
Geometric characteristics	+	+		+
Bracket strength	+		+	+
Effects of heating	+	+		+
Marking		+		+
Fitness for purpose				
Residual tensile impact	+		+	+
u/v degradation (colour fastness)	+		+	+
Watertightness	+		+	+

Bibliography

[1] EN ISO 9001, *Quality management systems - Requirements (ISO 9001)*

[2] EN ISO/IEC 17021, *Conformity assessment — Requirements for bodies providing audit and certification of management systems (ISO/IEC 17021)*

[3] EN ISO/IEC 17020, *Conformity assessment - Requirements for the operation of various types of bodies performing inspection (ISO/IEC 17020)*

[4] EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025)*

[5] EN ISO 9000:2015, *Quality management systems - Fundamentals and vocabulary (ISO 9000:2015)*

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