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BSI Standards Publication

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

Part 2: Guidance for the assessment of conformity

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National foreword

This Published Document is the UK implementation of CEN/TS 1566-2:2012. It supersedes DD ENV 1566-2:2001 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee PRI/88, Plastics piping systems, to Subcommittee PRI/88/1, Plastics piping for non-pressure applications.

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

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

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English Version

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Chlorinated poly(vinyl chloride) (PVC-C) - Part 2: Guidance for assessment of conformity

Systèmes de canalisations en plastique pour l'évacuation des eaux-vannes et des eaux usées (à basse et à haute température) à l'intérieur de la structure des bâtiments - Poly(chlorure de vinyle) chloré (PVC-C) - Partie 2 : Guide pour l'évaluation de la conformité

Kunststoff-Rohrleitungssysteme zum Ableiten von Abwasser (niedriger und hoher Temperatur) innerhalb der Gebäudestruktur - Chloriertes Polyvinylchlorid (PVC-C) - Teil 2: Empfehlungen für die Beurteilung der Konformität

This Technical Specification (CEN/TS) was approved by CEN on 9 January 2012 for provisional application.

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.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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Foreword

This document (CEN/TS 1566-2:2012) 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 [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes ENV 1566-2:2001.

Compared with ENV 1566-2:2001, 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) Addition of a table (Table 1) for Formulation specification;

c) Size groups have been redefined (Table 2);

d) Deletion of requirements for Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C as they are no longer required (Tables 4, 9 and 12);

e) Deletion of requirements for water absorption as they are no longer required (Tables 4 and 5);

f) Deletion of requirements for TPE seals as they are no longer required (Tables 6, 11 and 14);

g) Addition of an informative Annex A: Basic test matrix.

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

— Part 1: Specifications for pipes, fittings and the system

— Part 2: Guidance for the assessment of conformity (the present Technical Specification)

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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 organisation 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 document details the applicable characteristics to be assessed and the frequency and sampling of testing.

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

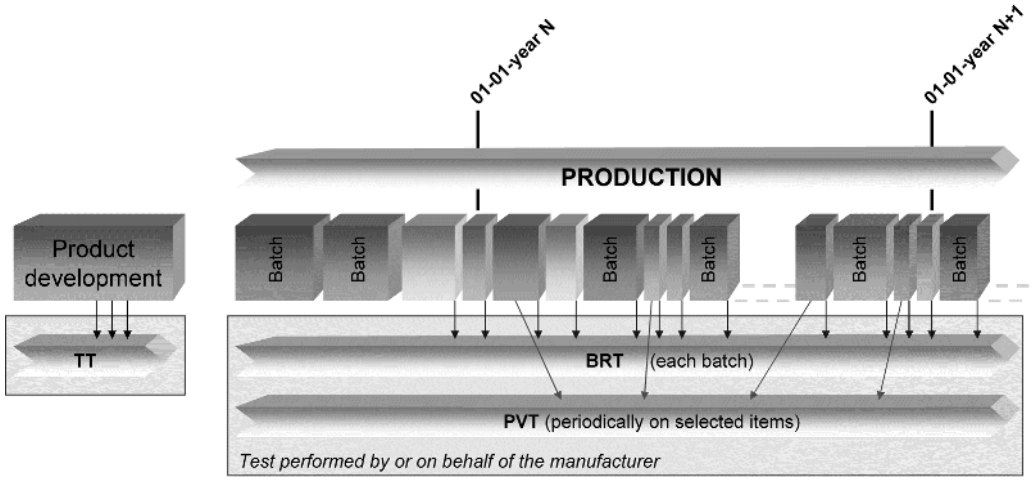

Figure 1 — Typical scheme for the assessment of conformity by a manufacturer

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

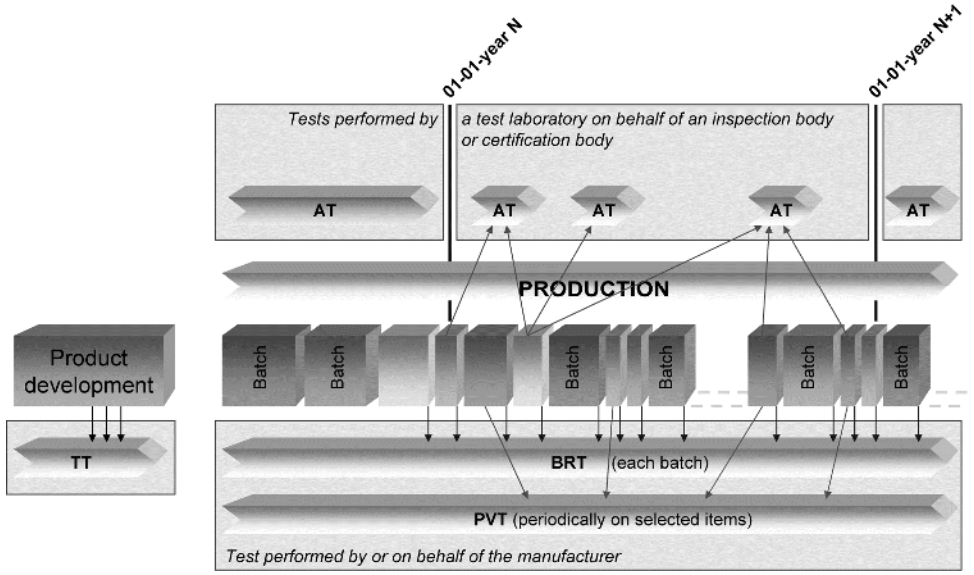

Figure 2 — Typical scheme for the assessment of conformity by a manufacturer, including a third-party certification

1 Scope

This Technical Specification gives guidance for the assessment of conformity of materials (compounds/formulations), products and assemblies in accordance with EN 1566-1 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 1 It is recommended that the quality management system conforms to or is no less stringent than the relevant requirements to EN ISO 9001 [1].

NOTE 2 If third-party certification is involved, it is recommended that the certification body is accredited to EN 45011 [2], EN 45012 [3] or EN ISO/IEC 17021 [4], as applicable.

NOTE 3 In order to help the reader, a basic test matrix is given in Annex A.

In conjunction with EN 1566-1, this document is applicable to solid-wall piping systems made of chlorinated poly(vinyl chloride) (PVC-C) intended to be used for the following purposes:

— for soil and waste discharge systems (low and high temperature) inside buildings (application area code "B");

— for soil and waste discharge systems (low and high temperature) for both inside buildings and buried in ground within the building structure (application area code "BD").

NOTE 4 This is reflected in the marking of products by "B" or "BD".

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 1566-1:1998, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Chlorinated poly(vinyl chloride) (PVC-C) — Part 1: Specifications for pipes, fittings and the system*

3 Terms and definitions

For the purposes of this Technical Specification, the terms and definitions given in EN 1566-1:1998 and the following apply.

3.1
certification body
impartial body, governmental or non-governmental, possessing the necessary competence and authority 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 45011 [2].

3.2
inspection body
impartial organisation or company approved by the certification body as possessing the necessary competence to verify and/or to carry out initial type testing, audit testing and inspection of the manufacturer's factory production control in accordance with the relevant standard

Note 1 to entry: An inspection body is preferably accredited to EN ISO/IEC 17020 [5].

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 1566, the materials and products can be subjected to type testing, batch release testing, process verification testing, audit testing and/or witness testing, as applicable.

Note 2 to entry: A testing laboratory is preferably accredited to EN ISO/IEC 17025 [6].

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

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 verify that the material, 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, 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 and 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 test specified

3.11
witness test
WT
testing 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 compounds/formulations grouped by families, expressed by generic names, e.g. polypropylene, stainless steel, brass or EPDM

[SOURCE: European Commission, Directorate-General for Enterprise and Industry, Sub-group on Product Testing Procedures (EC, DG ENT and IND, SG PTP)]

3.13
compound/ 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

3.14
material batch
clearly identified quantity of a given homogeneous compound/formulation manufactured under uniform conditions and defined and identified by the compound/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 materials and conforming to the same specification

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

3.17
lot
clearly identifiable sub-division of a batch for inspection purposes

3.18
sample
one or more products drawn from the same production batch or lot, selected at random without regard to their quality

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

3.19
group
collection of similar products from which samples are selected for testing purposes

3.20
component
product manufactured out of a specific compound/formulation, brought to the market as part of a product or as a spare part

3.21
joint
connection between two products

3.22
assembled product
assembled final product using two or more single parts

3.23
thermoplastics fabricated fitting
fitting produced from pipe and/or from injection-moulded fittings by thermoforming, solvent-cementing or welding

3.24
assembly
product that can be dismantled into a set of components

EXAMPLE A test piece consisting of various products.

3.25
sampling plan
specification of the type of sampling to be used combined 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.

3.26
product type
generic description of a product

EXAMPLE A pipe or fitting or their main parts, of the same design, from a particular compound.

3.27
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 Materials (compounds/formulations), products, joints and assemblies shall conform to the requirements given in EN 1566-1.

5.2 Products shall be produced by the manufacturer under a quality management system which includes a quality plan (including specifications on joints and assemblies).

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

6 Testing and inspection

6.1 Material specification

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

The dosage level of ingredients of a material 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 in formulation constitutes a change in material.

The values of the parts *X* added to 100 parts by mass of total PVC and PVC-C shall be specified by the manufacturer in the quality plan.

Table 1 — Formulation specification

Ingredients	Type	Band
PVC-C resin	Nominal Chlorine content as specified by the manufacturer	± 3 units
PVC resin	Nominal K value as specified by the manufacturer	± 3 units
Type of stabiliser or master batch	1) OBS (Organic Based Stabilisers) 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 %

6.2 Grouping

6.2.1 General

For the purposes of this Technical Specification, the following groups apply.

6.2.2 Size groups

Three size groups are defined for pipes and fittings, as given in Table 2.

For testing purposes, one individual nominal diameter, d_n, shall be selected from each group.

Table 2 — Size groups

Size group	Nominal diameter, d_n mm
1	$d_n < 75$
2	$75 \leq d_n < 200$
3	$200 \leq d_n \leq 315$

6.2.3 Fitting groups

Three 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	Bends
2	Branches
3	Other fittings

6.3 Type testing

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

NOTE Type tests, to be carried out when a change of the production site occurs, depending 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 to Table 6, as applicable.

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
PVC-C and PVC content [c]	4.1	+	-	+	-	One calculation per compound/formulation	One calculation per compound/formulation
Appearance	5.1	+	-	+	+	Once per size	Once per size group
Colour	5.2	+	-	+	+	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 – Table 13	+	-	-	+	Once per size per compound/formulation	Once per size group
		-	-	+	-	Once per compound/formulation	Once per compound/formulation
Impact resistance (staircase method) [d]	7.2 – Table 16	+	-	-	+	Once per size per compound/formulation	Once per size group
		-	-	+	-	Once per compound/formulation	Once per compound/formulation
Vicat Softening Temperature (VST)	8.1 – Table 17	+	-	+	-	Once per compound/formulation	Once per compound/formulation
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.1 – Table 17	+	-	+	-	Not required anymore	Not required anymore
Longitudinal reversion	8.1 – Table 17	+	-	-	+	Once per size	Once per size group
Water absorption	8.1 – Table 17	+	-	+	-	Not required anymore	Not required anymore
Resistance to internal pressure [e]	10.2 – Table 21	+	-	+	-	Once per compound/formulation with one optional dimension	Once per compound/formulation with one optional dimension
Ring stiffness [e]	10.3 – Table 22	+	-	+	+	Once per size per material	Once per size group

[a] N : new system;
D : change in design;
M : change of compound/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. Testing undertaken in a manufacturer laboratory shall be taken into account, provided prior acceptance by the certification body.

[c] Done by calculation using Table 1.

[d] Only for pipes intended to be installed at temperatures below -10 °C. If the test is required, then the round-the-clock method is not necessary.

[e] For application area BD only.

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Conditions requiring test [a]					Sampling procedure	
		N	D	M	P	E	Manufacturer	Certification body [b]
PVC-C and PVC content [c]	4.1	+	-	+	-	-	One calculation per compound/formulation	One calculation per compound/formulation
Appearance	5.1	+	-	-	+	+	Once per each fitting	Once per fitting group
Colour	5.2	+	-	-	+	+	Once per each fitting	Once per fitting group
Geometrical characteristics	6.3 and 6.4	+	+	-	+	+	Once per each fitting	Once per size group and per fitting group
Vicat Softening Temperature (VST)	8.2 – Table 18	+	-	+	-	-	Once per compound/formulation	Once per compound/formulation
Effects of heating [d]	8.2 – Table 18	+	+	-	+	+	Once per each fitting	Once per fitting group
		-	-	+	-	-	Once per size group and per fitting group	Once per compound/formulation
Water absorption	8.2 – Table 18	+	-	+	-	-	Not required anymore	Not required anymore
Watertightness [e]	8.2 – Table 19	+	+	-	-	+	Once per compound/formulation with one optional dimension	Once per compound/formulation with one optional dimension
Resistance to internal pressure [f] [g]	10.2 – Table 21	+	-	+	-	-	Once per compound/formulation with one optional dimension	Once per compound/formulation with one optional dimension

a N : new system;
D : change in design;
M : change of material;
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 Done by calculation using Table 1.

d Only for injection-moulded parts.

e Only for fabricated fittings made from more than one piece. A sealing ring retaining mean is not considered as a piece.

f For application area BD only.

g Not to be repeated for fittings material when the material is the same as for pipes and already tested for that purpose.

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
Watertightness [c]	9 – Table 20	+	+	-	+	Once per size per joint design [d]	One size per joint design [d]
Airtightness [c]	9 – Table 20	+	+	-	+	Once per size per joint design [d]	One size per joint design [d]
Elevated temperature cycling [e]	9 – Table 20	+	+	+	-	Once per compound/formulation per joint design on the smallest produced wall thickness [d]	Once per compound/formulation per joint design on the smallest produced wall thickness [d]
Tightness of elastomeric sealing ring joints [f]	9 – Table 20	+	+	-	+	Once per size per joint design [d]	One size per joint design [d]
Long term performance of TPE-seals	9 – Table 20					Not required anymore	Not required anymore

a N : new system;
D : change in design;
M : change of compound/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. Testing undertaken in a manufacturer laboratory shall be taken into account, provided prior acceptance by the certification body.

c Not required for solvent cemented joints.

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

e Testing conditions depending on application area B or BD (see EN1566-1).

f For application area BD only.

6.4 Batch release tests

Those characteristics specified in EN 1566-1 and listed in Table 7 and Table 8 shall be subject to BRTs with the minimum sampling frequency as given in Table 7 and Table 8, as applicable.

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Minimum sampling frequency
Appearance and colour	5.1 / 5.2	Once at start up and then every 8 h
Mean outside diameter	6.2.1	Once at start up and then every 8 h
Length of pipe	6.2.2	Once at start up and then every 8 h
Chamfer [a]	6.2.3	Once at start up
Wall thickness	6.2.4	Once at start up and then every 8 h
Socket dimensions [b]	6.4	Once at start up and then every 8 h
Impact resistance (round-the-clock method)	7.1 – Table 13	Once at start up and then every 24 h
Impact resistance (staircase method) [c]	7.2 – Table 16	Once at start up and then every 24 h
Longitudinal reversion	8.1 – Table 17	Once at start up and then every 24 h
Marking	13.2 – Table 23	Once at start up and then every 8 h

a If a chamfer is required.
b Only for dimensions which are influenced by the process.
c Only for pipes intended to be installed at temperatures below -10 °C. If the test is required, then the round-the-clock method is not necessary.

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Minimum sampling frequency
Appearance and colour	5.1 / 5.2	Once per cavity at start up and then every 8 h
Socket and spigot dimensions [a]	6.3.1 and 6.4	Once per cavity at start up and then every 8 h
Wall thickness	6.3.3	Once per cavity at start up
Effect of heating [b]	8.2 – Table 18	Once per cavity at start up and then every 24 h
Watertightness [c]	8.2 – Table 19	Once per fitting every 8 h
Marking	13.3 – Table 24	Once per cavity at start up

a Only for dimensions which are influenced by the process.
b Only for injection-moulded parts.
c Only for fabricated fittings made from more than one piece. A sealing ring retaining mean is not considered as a piece.

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 7 or Table 8, as applicable, 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 1566-1. 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

Those characteristics specified in EN 1566-1 and listed in Table 9 to Table 11 shall be process verification tested with the minimum sampling frequency given in Table 9 to 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 sub-clause of EN 1566-1	Minimum sampling frequency
Vicat Softening Temperature (VST)	8.1 – Table 17	Once per year per compound/formulation currently used
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.1 – Table 17	Not required anymore
Resistance to internal pressure [a]	10.2 – Table 21	Once per year per compound/formulation currently used
Ring stiffness [a]	10.3 – Table 22	Once per year per compound/formulation currently used and size group and pipe series
[a] For application area BD only.		

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Minimum sampling frequency
Vicat Softening Temperature (VST)	8.2 – Table 18	Once per year per compound/formulation currently used
Resistance to internal pressure [a]	10.2 – Table 21	Once per 2 years per compound/formulation currently used
[a] For application area BD only.		

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Minimum sampling frequency
Watertightness [a]	9 – Table 20	Once per 3 years per size group per joint design [b]
Airtightness [a]	9 – Table 20	Once per 3 years per size group per joint design [b]
Tightness of elastomeric sealing ring joints [c]	9 – Table 20	Once per 3 years per size group per joint design [b]
Elevated temperature cycling	9 – Table 20	Once per 3 years per joint design on the compound/formulation currently used [b]
Long term performance of TPE-seals	9 – Table 20	Not required anymore

[a] Not required for solvent cemented joints.
[b] Joint design at least includes: seal design, groove geometry and seal hardness (± 5 IHRD).
[c] For application area BD only.

If the product does not conform to the requirements in respect of any characteristic given in Table 9 to 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. In this way, the characteristics given in Table 9 to Table 11, as applicable, shall also be verified.

A test performed as an AT (including WT) does not need to be repeated as a PVT.

6.6 Audit tests

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

Those characteristics specified in EN 1566-1 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 ATs

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Minimum sampling frequency
PVC-C and PVC content [a]	4.1	Once per year per compound/formulation currently used
Appearance and colour	5.1 / 5.2	Once per year per size group
Geometrical characteristics	6.2 and 6.4	Once per year per size group
Impact resistance (round-the-clock method)	7.1 – Table 13	Once per year per size group
Impact resistance (staircase method) [b]	7.2 – Table 16	Once per year per size group
Vicat Softening Temperature (VST)	8.1 – Table 17	Once per year per compound/formulation currently used
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.1 – Table 17	Not required anymore
Longitudinal reversion	8.1 – Table 17	Once per year per size group
Resistance to internal pressure [c]	10.2 – Table 21	Once per 3 years per compound/formulation currently used
Ring stiffness [c]	10.3 – Table 22	Once per 3 years per compound/formulation currently used per size group and pipes series
Marking	13.2 – Table 23	Once per year per size group

[a] Done by calculation using Table 1.
[b] Only for pipes intended to be installed at temperatures below -10 °C.
[c] For application area BD only.

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Minimum sampling frequency
PVC-C and PVC content [a]	4.1	Once per year per compound/formulation currently used
Appearance and colour	5.1 / 5.2	Once per year per fitting group
Geometrical characteristics	6.3 and 6.4	Once per year per fitting group
Vicat Softening Temperature (VST)	8.2 – Table 18	Once per year per compound/formulation currently used
Effects of heating [b]	8.2 – Table 18	Once per year per fitting group
Resistance to internal pressure [c] [d]	10.2 – Table 21	Once per 3 years per compound/formulation currently used
Marking	13.3 – Table 24	Once per year per fitting group

[a] Done by calculation using Table 1.
[b] Only for injection-moulded parts.
[c] For application area BD only.
[d] Not to be repeated for fittings material when the material is the same as for pipes and already tested for that purpose.

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

Characteristic	Reference to part, clause or sub-clause of EN 1566-1	Minimum sampling frequency
Watertightness [a]	9 – Table 20	Once per year on one size
Airtightness [a]	9 – Table 20	Once per year on one size
Tightness of elastomeric sealing ring joints [a] [b]	9 – Table 20	Once per year on one size
Elevated temperature cycling	9 – Table 20	Once per 3 years per joint design [c]
Long term performance of TPE-seals	9 – Table 20	Not required anymore

[a] Not required for solvent cemented joints.
[b] For application area BD only.
[c] Joint design at least includes: seal design, groove geometry and seal hardness (± 5 IHRD).

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

Certification bodies may accept PVTs as ATs if witnessed by them or by their agencies.

6.7 Indirect tests

Generally, testing shall be performed using the test methods referred to in EN 1566-1.

Indirect testing may be used for BRT characteristics as given in Table 7 and Table 8. Indirect testing shall not be used for 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, as applicable, shall be used.

If third-party certification is involved, the IT shall be accepted by certification body.

6.8 Test records

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

Annex A
(informative)

Basic test matrix

Table A.1 — Basic test matrix

Characteristic	TT	BRT	PVT	AT
Pipes				
PVC-C and PVC content	+			+
Appearance and colour	+	+		+
Geometrical characteristics	+	+		+
Impact resistance (round-the-clock method)	+	+		+
Impact resistance (staircase method)	+	+		+
Vicat softening temperature (VST)	+		+	+
Vicat softening temperature (VST) after conditioning 16 h in water at 90 °C	Not required anymore			
Longitudinal reversion	+	+		+
Water absorption	Not required anymore			
Resistance to internal pressure	+		+	+
Ring stiffness	+		+	+
Marking		+		+
Fittings				
PVC-C content	+			+
Appearance and colour	+	+		+
Geometrical characteristics	+	+		+
Vicat softening temperature (VST)	+		+	+
Effects of heating	+	+		+
Water absorption	Not required anymore			
Watertightness	+	+		
Resistance to internal pressure	+		+	+
Marking		+		+
Fitness for purpose				
Watertightness	+		+	+
Airtightness	+		+	+
Tightness of elastomeric sealing ring joints	+		+	+
Elevated temperature cycling	+		+	+
Long-term performance of TPE-seals	Not required anymore			

Bibliography

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

[2] EN 45011, *General requirements for bodies operating product certification systems (ISO/IEC Guide 65)*

[3] EN 45012, *General requirements for bodies operating assessment and certification/registration of quality systems (ISO/IEC Guide 62)*

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

[5] EN ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection (ISO/IEC 17020)*

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

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