PD CEN/TS 1329-2:2012

BSI Standards Publication

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

Part 2: Guidance for the assessment of conformity

bsi.

...making excellence a habit.™

National foreword

This Published Document is the UK implementation of CEN/TS 1329-2:2012. It supersedes DD ENV 1329-2:2001 which is withdrawn.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.

Published by BSI Standards Limited 2012

ISBN 978 0 580 75811 9

ICS 23.040.01; 83.140.30; 91.140.80

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 August 2012.

Amendments issued since publication

Amd. No.	Date	Text affected

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CEN/TS 1329-2

May 2012

ICS 23.040.01; 91.140.80

Supersedes ENV 1329-2:2001

English Version

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 2: Guidance for the 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) non plastifié (PVC-U) - Partie 2: Guide pour l'évaluation de la conformité

Kunststoff-Rohrleitungssysteme zum Ableiten von Abwasser (niedriger und hoher Temperatur) innerhalb der Gebäudestruktur - Weichmacherfreies Polyvinylchlorid (PVC-U) - 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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, 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 United Kingdom.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. CEN/TS 1329-2:2012: E

Contents

Page

Foreword

This document (CEN/TS 1329-2:2012) 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 1329-2:2001.

Compared with ENV 1329-2:2001, 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) Introduction of "Limits of addition of PVC reprocessed and recycled material" in a separate table (Table 2);

c) Deletion of all requirements for TPE seals as they are no longer required;

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

EN 1329, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Unplasticized poly(vinyl chloride) (PVC-U)*, 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, Croatia, 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, valves or assemblies by manufacturers is given in Figure 1.

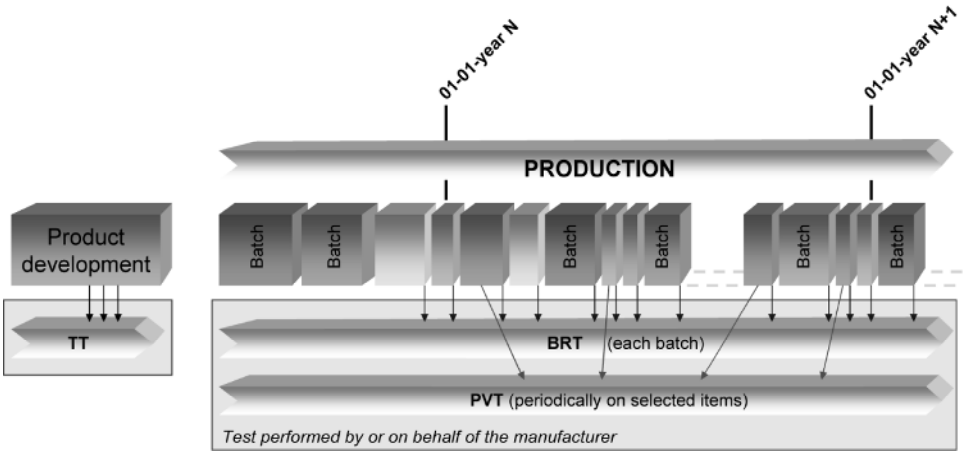

Figure 1 — Typical scheme for the assessment of conformity by a manufacturer

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

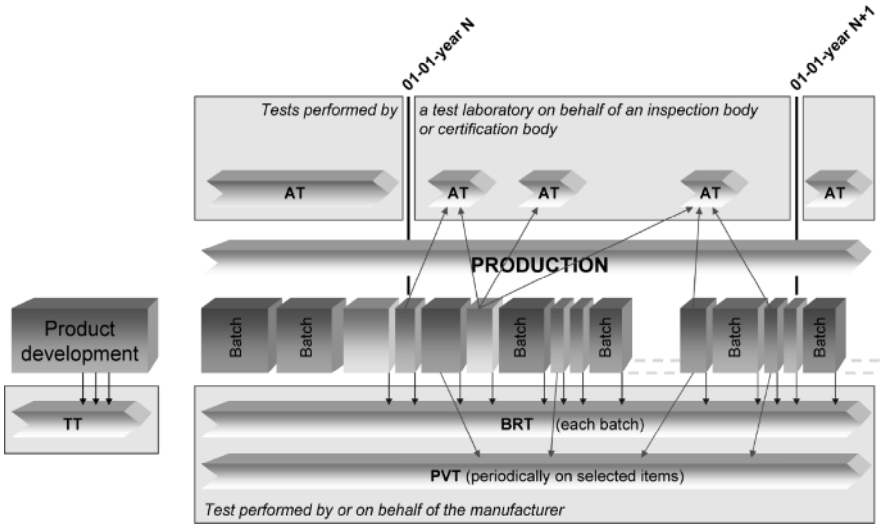

Figure 2 — Typical scheme for the assessment of conformity by a manufacturer, including a third-party certification

1 Scope

This Technical Specification gives guidance for the assessment of conformity of materials (compounds/formulations), products and assemblies in accordance with EN 1329-1 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 1329-1, this document is applicable to piping systems made of unplasticized poly(vinyl chloride) (PVC-U) 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 1329-1:1999, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Unplasticized poly(vinyl chloride) (PVC-U) — 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 1329-1:1999 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 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 1329, 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 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 prove 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 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 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 set apart 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 another 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 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.

3.26
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 1329-1.

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 in 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 resin 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 use of reprocessed and/or recycled material (which is referred to as "reprocessable and recyclable material" in EN 1329-1 until further revision) shall be considered as a change in formulation when the change in addition exceeds the tolerance bands given in Table 2.

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

Table 1 — Formulation specification

Ingredients	Type	Band
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 %

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

Ingredients	Type	Band
External reprocessed and recycled material [a]	With an agreed specification [b]	$\leq X_8$ [c]
External reprocessed and recycled material [a]	Not covered by an agreed specification	$\leq X_9$ [c]

a This is referred to as "reprocessable and recyclable material" in EN 1329-1.
b The specifications shall be declared by the manufacturer to the certification body.
c See specifications in EN 1329-1.

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 3.

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

Table 3 — 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 4.

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

Table 4 — 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, 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 5 to Table 7, as applicable.

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

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
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 – Tables 1 to 4, 9 and 13	+	+	-	+	Once per size	Once per size group
Impact resistance (round-the-clock method)	7.1.1 – Table 16	+	-	-	+	Once per size per compound/formulation	Once per size group
		-	-	+	-	Once per compound/formulation	Once per compound/formulation
Impact resistance (staircase method) [d]	7.1.1 – 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 19	+	-	+	-	Once per compound/formulation	Once per compound/formulation
Longitudinal reversion	8.1 – Table 19	+	-	-	+	Once per size	Once per size group
Degree of gelation [e]	8.1 – Table 19	+	-	-	+	Once per size per compound/formulation	Once per size group
		-	-	+	-	Once per compound/formulation	Once per compound/formulation
Resistance to internal pressure [f]	10 – Table 22	+	-	+	-	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 materials (compounds/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. 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 also to be installed at temperatures below -10 °C. If the test is required, the round-the-clock method is not necessary.

e Until the revision of EN 1329-1:1999, the interpretation shall be realized in accordance with Note a from Table 12, Clause 8.1 of EN 1401-1:2009.

f For application area BD only.

Table 6 — Characteristics of fittings that require type testing (TT)

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Conditions requiring test [a]					Sampling procedure	
		N	D	M	P	E	Manufacturer	Certification body [b]
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 – 6.4 – 6.5 Tables 1 to 15	+	+	-	+	+	Once per each fitting	Once per size group and per fitting group
Mechanical characteristics	7.2 [e]							
- mechanical strength [d]		+	+	-	+	+	Once per each fitting	Once per fitting group
- drop test		+	+	+	+	-	Once per size group per fitting group	Once per fitting group
Vicat Softening Temperature (VST)	8.2 – Table 20	+	-	+	-	-	Once per compound/formulation	Once per compound/formulation
Effect of heating [f]	8.2 – Table 20	+	+	-	+	+	Once per each fitting	Once per fitting group
		-	-	+	-	-	Once per size group and per fitting group	Once per compound/formulation
Resistance to internal pressure [g]	10 – Table 23	+	-	+	-	-	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 compound/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] Done by calculation using Table 1.

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

[e] There is a misprint in EN 1329-1:1999 where 7.2 is wrongly numbered 7.1.3 in the English version.

[f] Only for injection-moulded parts.

[g] For application area BD only.

Table 7 — Characteristics of fitness for purpose of the system that require type testing (TT)

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
Watertightness [c]	9 - Table 21	+	+	-	+	Once per size per joint design [d]	One size per joint design [d]
Airtightness [c]	9 - Table 21	+	+	-	+	Once per size per joint design [d]	One size per joint design [d]
Elevated temperature cycling [e]	9 - Table 21	+	+	+	-	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] [g]	9 - Table 21	+	+	-	+	Once per size per joint design [d]	One size per joint design [d]
Long-term performance of TPE seals	9 - Table 21	-	-	-	-	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 cement 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 EN 1329-1).

f For application area BD only.

g Until further revision, this requirement is contained in EN 1329-1:1999 as "Combined tightness for application area BD".

6.4 Batch release tests

Those characteristics specified in EN 1329-1 and listed in Table 8 and Table 9 shall be batch release tested with the minimum sampling frequency as given in Table 8 and Table 9, as applicable.

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

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Minimum sampling frequency
Appearance/colour	5.1 / 5.2	Once at start up and then every 8 h
Mean outside diameter	6.2.1 – Tables 1 and 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
Chamfer [a]	6.2.4	Once at start up
Wall thickness	6.2.5 – Tables 3 and 4	Once at start up and then every 8 h
Socket dimensions [b]	6.4 – Tables 9 to 13	Once at start up and then every 8 h
Impact resistance (round-the-clock method)	7.1.1 – Table 16	Once at start up and then every 24 h [c]
Impact resistance (staircase method) [d]	7.1.2 – Table 16	Once at start up and then every 24 h [c]
Longitudinal reversion	8.1 – Table 19	Once at start up and then every 24 h
Degree of gelation	8.1 – Table 19	Once at start up and then every 24 h
Marking	13.2 – Table 24	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] Once every 8 h when external reprocessable or recyclable material not covered by an agreed specification (see A.2.3.1 of EN 1329-1:1999) is used.
[d] If this test is carried out, the round-the-clock method is not necessary.

Table 9 — Characteristics of fittings and minimum sampling frequencies for BRTs

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Minimum sampling frequency
Appearance/colour	5.1 / 5.2	Once per cavity at start up and then every 8 h
Wall thickness	6.3.3 – Tables 5 to 8	Once per cavity at start up
Socket and spigot dimensions [a]	6.4 – Tables 9 to 15	Once per cavity at start up and then every 8 h
Effect of heating [b]	8.2 – Table 20	Once per cavity at start up and then every 24 h
Marking	13.3 – Table 25	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 8 and Table 9, as applicable, 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 1329-1. 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 1329-1 and listed in Table 10 to Table 12 shall be process verification tested with the minimum sampling frequency given in Table 10 to Table 12, as applicable, if not type tested or audit tested in the same period.

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

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Minimum sampling frequency
Vicat Softening Temperature (VST)	8.1 – Table 19	Once per year per compound/formulation currently used
Resistance to internal pressure [a]	10 – Table 22	Once per year per compound/formulation currently used
[a] For application area BD only.		

Table 11 — Characteristics of fittings and minimum sampling frequencies for PVTs

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Minimum sampling frequency
Mechanical characteristics - mechanical strength [a] - drop test	7.2 [b]	 Once per year per fitting group Once per year per size group per fitting group
Vicat Softening Temperature (VST)	8.2 – Table 20	Once per year per compound/formulation currently used
Resistance to internal pressure [c]	10 – Table 23	Once per 2 years per compound/formulation currently used
[a] Only for fabricated fittings made from more than one piece. A sealing ring retaining mean is not considered as a piece. [b] There is a misprint in EN 1329-1:1999 where 7.2 is wrongly numbered 7.1.3 in the English version. [c] For application area BD only.		

Table 12 — Characteristics for fitness for purpose and minimum sampling frequencies for PVTs

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Minimum sampling frequency
Watertightness [a]	9 – Table 21	Once per 3 years per size group per joint design [b]
Airtightness [a]	9 – Table 21	Once per 3 years per size group per joint design [b]
Tightness of elastomeric sealing ring joints [a c d]	9 – Table 21	Once per 3 years per size group per joint design [b]
Elevated temperature cycling	9 – Table 21	Once per 3 years per joint design on the compound/formulation currently used [b]
Long-term performance of TPE seals	9 – Table 21	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.
d Until further revision, this requirement is contained in EN 1329-1:1999 as "Combined tightness for application area BD".

If the product does not conform to the requirements in respect of any characteristics given in Table 10 to Table 12, 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 10 to Table 12, 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 only if a third-party certification is involved.

Those characteristics specified in EN 1329-1 and listed in Table 13 to Table 15 are intended to be audit tested with the minimum sampling frequency as given in Table 13 to Table 15, as applicable.

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

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Minimum sampling frequency
PVC content [a]	4.1	Once per year per compound/formulation currently used
Appearance/colour	5.1 / 5.2	Once per year per size group
Geometrical characteristics	6.2	Once per year per size group
Impact resistance (round the clock method)	7.1.1 – Table 16	Once per year per size group
Impact resistance (staircase method) [b]	7.1.2 – Table 16	Once per year per size group
Vicat Softening Temperature (VST)	8.1 – Table 19	Once per year per compound/formulation currently used
Longitudinal reversion	8.1 – Table 19	Once per year per size group
Degree of gelation [c]	8.1 – Table 19	Once per year per size group
Resistance to internal pressure [d]	10 – Table 22	Once per 3 years per compound/formulation currently used
Marking	13.2 – Table 24	Once per year per size group

a Done by calculation using Table 1.

b Only for pipes intended also to be installed at temperatures below -10 °C. If this test is required, the round-the-clock method is not necessary.

c Until revision of EN 1329-1:1999, interpretation shall be realized in accordance with Note a from Table 12, Clause 8.1 of EN 1401-1:2009.

d For application area BD only.

Table 14 — Characteristics of fittings and minimum sampling frequencies for ATs

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Minimum sampling frequency
PVC content [a]	4.1	Once per year per compound/formulation currently used
Appearance/colour	5.1 / 5.2	Once per year per fitting group
Geometrical characteristics	6.3	Once per year per fitting group
Mechanical characteristics - mechanical strength [b] - drop test	7.2 [c]	 Once per 2 years per size group and per fitting group Once per 2 years per size group and per fitting group
Vicat Softening Temperature (VST)	8.2 – Table 20	Once per year per compound/formulation currently used
Effect of heating [d]	8.2 – Table 20	Once per year per fitting group
Resistance to internal pressure [e]	10 – Table 23	Once per 3 years per compound/formulation currently used
Marking	13.3 – Table 25	Once per year per fitting group

a Done by calculation using Table 1.
b Only for fabricated fittings made from more than one piece. A sealing ring retaining mean is not considered as a piece.
c There is a misprint in EN 1329-1:1999 where 7.2 is wrongly numbered 7.1.3 in the English version.
d Only for injection-moulded parts.
e For application area BD only.

Table 15 — Characteristics for fitness for purpose of the system and minimum sampling frequencies for ATs

Characteristic	Reference to part, clause or sub-clause of EN 1329-1	Minimum sampling frequency
Watertightness [a]	9 – Table 21	Once per year on one size
Airtightness [a]	9 – Table 21	Once per year on one size
Tightness of elastomeric sealing ring joints [a b c]	9 – Table 21	Once per year on one size
Elevated temperature cycling	9 – Table 21	Once per 3 years per joint design [d]
Long-term performance of TPE seals	9 – Table 21	Not required anymore

a Not required for solvent cement joints.
b For application area BD only.
c Until further revision, this requirement is contained in EN 1329-1:1999 as "Combined tightness for application area BD".
d Joint design at least includes: seal design, groove geometry and seal hardness (± 5 IHRD).

Preferably, 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 1329-1.

Indirect testing may be used for BRT characteristics as given in Table 8 and Table 9. 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 BRTs as specified in Table 8 and Table 9, as applicable, shall be used.

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

Annex A
(informative)

Basic test matrix

Table A.1 — Basic test matrix

Characteristic	TT	BRT	PVT	AT
Pipes				
PVC content	+			+
Appearance	+	+		+
Colour	+	+		+
Geometrical characteristics	+	+		+
Impact resistance (round-the-clock method)	+	+		+
Impact resistance (staircase method)	+	+		+
Vicat softening temperature (VST)	+		+	+
Longitudinal reversion	+	+		+
Degree of gelation	+	+		+
Resistance to internal pressure	+		+	+
Marking		+		+
Fittings				
PVC content	+			+
Appearance	+	+		+
Colour	+	+		+
Geometrical characteristics	+	+		+
Mechanical characteristics - mechanical strength - drop test	 + +		 + +	 + +
Vicat softening temperature (VST)	+		+	+
Effect of heating	+	+		+
Resistance to internal pressure	+		+	+
Marking		+		+
Fitness for purpose				
Watertightness	+		+	+
Airtightness	+		+	+
Tightness of elastomeric sealing ring joints [a]	+		+	+
Elevated temperature cycling	+		+	+
Long-term performance of TPE- seals	Not required anymore			

[a] Until further revision, this requirement is contained in EN 1329-1:1999 either as "Combined tightness for application area BD only" or as "(Leak) Tightness of elastomeric sealing ring joints".

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)*

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™