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BSI Standards Publication

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

Part 2: Guidance for the assessment of conformity

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National foreword

This Published Document is the UK implementation of CEN/TS 1455-2:2012. It supersedes DD ENV 1455-2:2001 which is withdrawn.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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Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Acrylonitrile-butadiene-styrene (ABS) - 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 - Acrylonitrile-butadiène-styrène (ABS) - Partie 2: Guide pour l'évaluation de la conformité

Kunststoff-Rohrleitungssysteme zum Ableiten von Abwasser (niedriger und hoher Temperatur) innerhalb der Gebäudestruktur - Acrylnitril-Butadien-Styrol (ABS) - 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 1455-2:2012) 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 1455-2:2001.

Compared with ENV 1455-2:2001, 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) Deletion of all requirements for TPE seals as they are no longer required;

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

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

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

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

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, joints or assemblies by manufacturers is given in Figure 1.

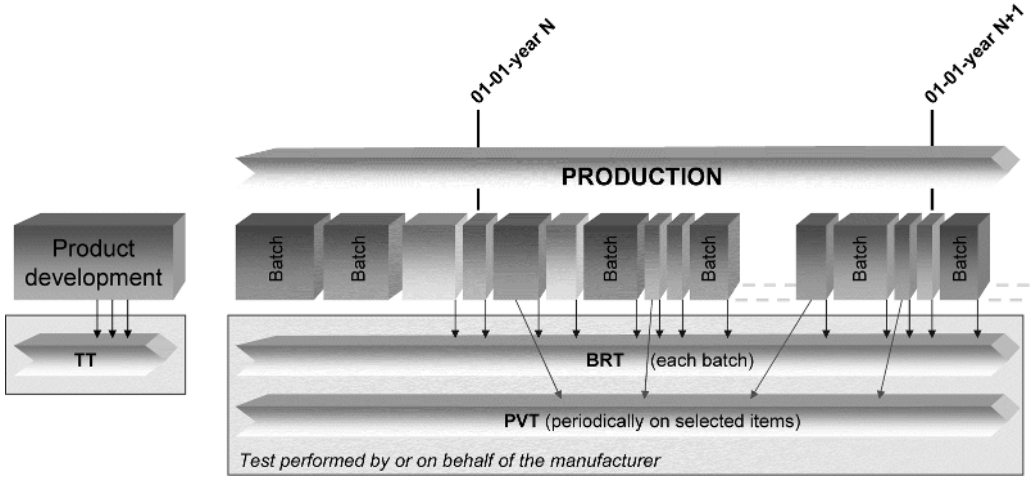

Figure 1 — Typical scheme for the assessment of conformity by a manufacturer

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.

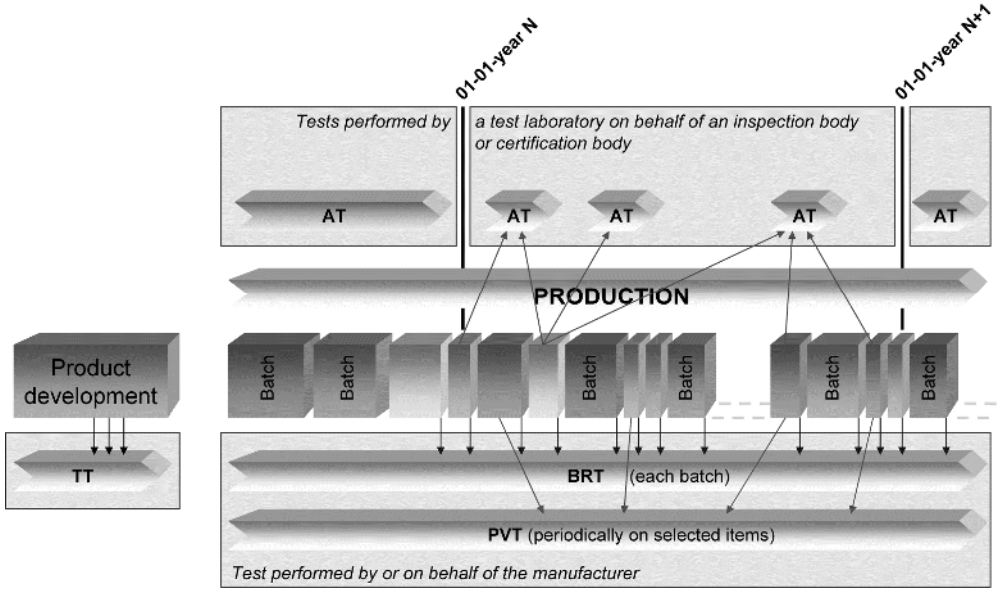

Figure 2 — Typical scheme for the assessment of conformity by a manufacturer, including a third-party certification

1 Scope

This Technical Specification gives guidance for the assessment of conformity of materials (compounds/formulations), products and assemblies in accordance with EN 1455-1 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 1455-1, this document is applicable to solid-wall piping systems made of acrylonitrile-butadiene-styrene (ABS) intended to be used for the following purposes:

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

— for soil and waste discharge (low and high temperature) 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 1455-1:1999, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Acrylonitrile-butadiene-styrene (ABS) — Part 1: Requirements for pipes, fittings and the system*

3 Terms and definitions

For the purposes of this Technical Specification, the terms and definitions given in EN 1455-1:1999 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 boby 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 1455, 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 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 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 1455-1.

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 comprising an ABS material with specific trade name and additives with known dosage level.

6.2 Grouping

6.2.1 General

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

6.2.2 Size groups

Two size groups are defined for pipes and fittings, as given in Table 1.

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

Table 1 — Size groups

Size group	Nominal diameter, d_n mm
1	$32 \leq d_n < 75$
2	$75 \leq d_n < 160$

6.2.3 Fitting groups

Three groups of fittings each having a similar design are defined, as given in Table 2.

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

Table 2 — Fitting groups

Fitting group	Type of fitting
1	Bends
2	Branches
3	Other fittings

6.3 Type testing (TT)

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 3 to Table 5, as applicable.

Table 3 — Characteristics of pipes that require type testing (TT)

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
ABS compound	4.1	+	-	+	-	Once per material	Once per material
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 material	Once per size group
		-	-	+	-	Once per material	Once per material
Impact resistance [c] (staircase method)	7.2 – Table 16	+	-	-	+	Once per size per material	Once per size group
		-	-	+	-	Once per material	Once per material
Vicat Softening Temperature (VST)	8.1 – Table 17	+	-	+	-	Once per material	Once per material
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.1 – Table 16	+	-	+	-	Once per material	Once per material
Longitudinal reversion	8.1 – Table 17	+	-	-	+	Once per size	Once per size group
Water absorption	8.1 – Table 17	+	-	+	-	Once per material	Once per material
Resistance to internal pressure [d]	10.2 – Table 21	+	-	+	-	Once per material with one optional dimension	Once per material with one optional dimension
Ring stiffness [d]	10.3 – Table 22	+	-	+	+	Once per size per material	Once per size group

[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] Only for pipes intended to be installed at temperatures below -10 °C.

[d] For application area BD only. It has been noted that EN 1455-1:1999 wrongly requires SN5 instead of SN4.

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

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	Conditions requiring test [a]					Sampling procedure	
		N	D	M	P	E	Manufacturer	Certification body [b]
ABS compound	4.1	+	-	+	-	-	Once per material	Once per material
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 material	Once per material
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.2 – Table 18	+	-	+	-	-	Once per material	Once per material
Effect of heating [f]	8.2 – Table 18	+	+	-	+	+	Once per each fitting	Once per fitting group
		-	-	+	-	-	Once per size group and per fitting group	Once per material
Water absorption	8.2 – Table 18	+	-	+	-	-	Once per material	Once per material
Watertightness [c]	8.2 – Table 19	+	+	-	+	+	Once per each fitting	Once per fitting group
Resistance to internal pressure [d] [e]	10.2 – Table 21	+	-	+	-	-	Once per material with one optional dimension	Once per material 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] Only for fabricated fittings made from more than one piece.

[d] For application area BD only.

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

[f] Only for injection-moulded parts

Table 5 — Characteristics of fitness for purpose of the system that require type testing (TT)

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	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 material per joint design on the smallest produced wall thickness [d]	Once per material 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 material;
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 EN1455-1).

[f] Only for application area BD

6.4 Batch release tests (BRTs)

Those characteristics specified in EN 1455-1 and listed in Table 6 and Table 7 shall be batch release tested with the minimum sampling frequency as given in Table 6 and Table 7, as applicable.

Table 6 — Characteristics of pipes and minimum sampling frequencies for BRTs

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	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
Effective 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 24h
Impact resistance [c] (staircase method)	7.2 – Table 16	Once at start up and then every 24h
Longitudinal reversion	8.1 – Table 17	Once at start up and then every 24h
Marking	13.2 – Table 23	Once at start up and then every 8 h

a If a chamfer is required.
b Only for the dimensions that 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 7 — Characteristics of fittings and minimum sampling frequencies for BRTs

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	Minimum sampling frequency
Appearance and colour	5.1 / 5.2	Once per cavity at start up and then every 8 h
Wall thickness	6.3.3	Once per cavity at start up
Socket and spigot dimensions [a]	6.4	Once per cavity at start up and then every 8 h
Effects 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 the dimensions that 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 his 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 6 and Table 7, 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 1455-1. 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 (PVTs)

The characteristics specified in EN 1455-1 and listed in Table 8 to Table 10 shall be process verification tested with the minimum sampling frequency given in Tables 8 to 10, as applicable, if not type tested or audit tested in the same period.

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

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	Minimum sampling frequency
Vicat Softening Temperature (VST)	8.1 – Table 17	Once per year per material currently used
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.1 – Table 17	Once per year per material currently used
Water absorption	8.1 – Table 17	Once per year per material currently used
Resistance to internal pressure [a]	10.2 – Table 21	Once per year per material currently used
Ring stiffness [a]	10.3 – Table 22	Once per year per material and size group and pipe series

[a] For application area BD only. It has been noted that EN 1455-1:1999 wrongly requires SN5 instead of SN4.

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

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	Minimum sampling frequency
Water absorption [a]	8.1 – Table 18	Once per year per material currently used
Vicat Softening Temperature (VST)	8.2 – Table 18	Once per year per material currently used
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.2 – Table 18	Once per year per material currently used
Resistance to internal pressure [a] [b]	10.2 – Table 21	Once per 2 years per material currently used

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

[b] For application area BD only.

Table 10 — Characteristics for fitness for purpose and minimum sampling frequencies for PVTs

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	Minimum sampling frequency
Watertightness [a]	9 – Table 20	Once per 3 years and size group and joint design [b]
Airtightness [a]	9 – Table 20	Once per 3 years and size group and joint design [b]
Tightness of elastomeric sealing ring joints [a c]	9 – Table 20	Once per 3 years and size group and joint design [b]
Elevated temperature cycling	9 – Table 20	Once per 3 years and joint design [b] and material
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 8 to Table 10, 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 8 to Table 10, as applicable, shall also be verified.

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 (including WT) does not need to be repeated as a PVT.

6.6 Audit tests (ATs)

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

Those characteristics specified in EN 1455-1 and listed in Table 11 to Table 13 are intended to be audit tested with the minimum sampling frequency as given in Table 11 to Table 13, as applicable.

Table 11 — Characteristics of pipes and minimum sampling frequencies for ATs

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	Minimum sampling frequency
ABS compound [a]	4.1	Once per year per material currently used
Appearance and colour	5.1 / 5.2	Once per year and size group
Geometrical characteristics	6.2 and 6.4	Once per year and size group
Impact resistance (round-the-clock method)	7.1 – Table 13	Once per year and size group
Impact resistance [b] (staircase method)	7.2 – Table 16	Once per year and size group
Vicat Softening Temperature (VST)	8.1 – Table 17	Once per year per material currently used
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.1 – Table 17	Once per year per material currently used
Longitudinal reversion	8.1 – Table 17	Once per year and size group
Resistance to internal pressure [c]	10.2 – Table 21	Once per 3 years per material currently used
Ring stiffness [c]	10.3 – Table 22	Once per 3 years per material and size group and pipe series
Marking	13.2 – Table 23	Once per year and size group

[a] On basis of specification on the material or accompanying documents.

[b] 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.

[c] For application area BD only. It has been noted that EN 1455-1:1999 wrongly requires SN5 instead of SN4.

Table 12 — Characteristics of fittings and minimum sampling frequencies for ATs

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	Minimum sampling frequency
ABS compound [a]	4.1	Once per year per material currently used
Appearance and colour	5.1 / 5.2	Once per year per fitting group
Geometrical characteristics	6.3 / 6.4	Once per year per fitting group
Vicat Softening Temperature (VST)	8.2 – Table 18	Once per year per material currently used
Vicat Softening Temperature (VST) after conditioning 16 h in water at 90 °C	8.2 – Table 18	Once per year per material 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 material currently used
Marking	13.3 – Table 24	Once per year and size group

[a] On basis of specification on the material or accompanying documents.

[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 13 — Characteristics for fitness for purpose of the system and minimum sampling frequencies for ATs

Characteristic	Reference to part, clause or sub-clause of EN 1455-1	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 cement joints.
b For application area BD only.
c 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.

6.7 Indirect tests (ITs)

Generally, testing shall be performed using the test methods referred to in EN 1455-1.

Indirect testing may be used for BRT characteristics as given in Table 6 and Table 7. 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 6 and Table 7, 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 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				
ABS compound	+			+
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	+		+	+
Longitudinal reversion	+	+		+
Water absorption	+		+	
Resistance to internal pressure	+		+	+
Ring stiffness	+		+	+
Marking		+		+
Fittings				
ABS compound	+			+
Appearance and colour	+	+		+
Geometrical characteristics	+	+		+
Vicat softening temperature (VST)	+		+	+
Vicat softening temperature (VST) after conditioning 16 h in water at 90 °C	+		+	+
Effects of heating	+	+		+
Water absorption	+		+	
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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