PD CEN/TS 1451-2:2012

BSI Standards Publication

Plastic piping systems for soil and waste discharge (low and high temperature) within the building structure — Polypropylene (PP)

Part 2: Guidance for the assessment of conformity

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National foreword

This Published Document is the UK implementation of CEN/TS 1451-2:2012. It supersedes DD ENV 1451-2:2001 which is withdrawn.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

Plastic piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) - 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 - Polypropylène (PP) - Partie 2: Guide pour l'évaluation de la conformité

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

This Technical Specification (CEN/TS) was approved by CEN on 31 October 2011 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 1451-2:2012) 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 1451-2:2001.

EN 1451 consists of the following parts, under the general title *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Polypropylene (PP)*

— Part 1: *Specifications 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 testing (TT), batch release test (BRT), process verification test (PVT), and audit test (AT), this document details the applicable characteristics to be assessed as well as the frequency and sampling of testing.

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

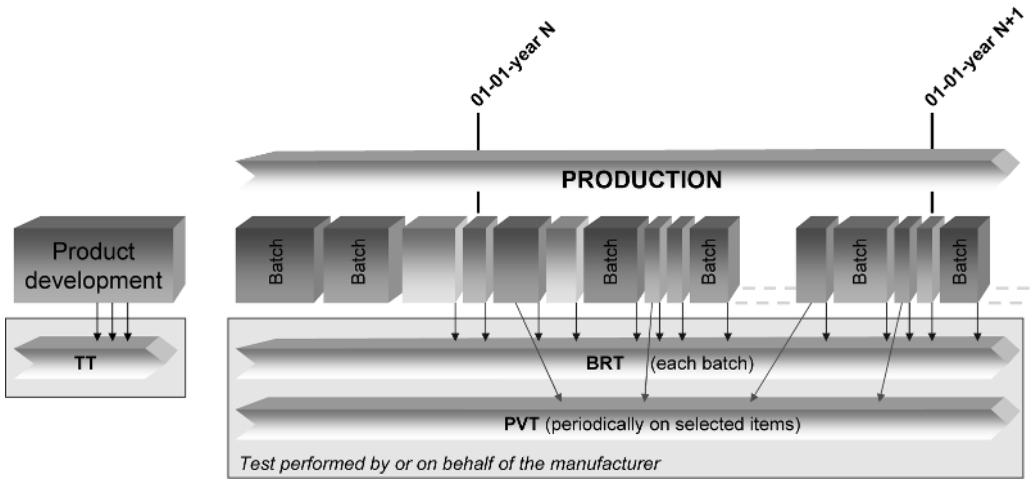

Figure 1 — Typical scheme for the assessment of conformity by a manufacturer

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

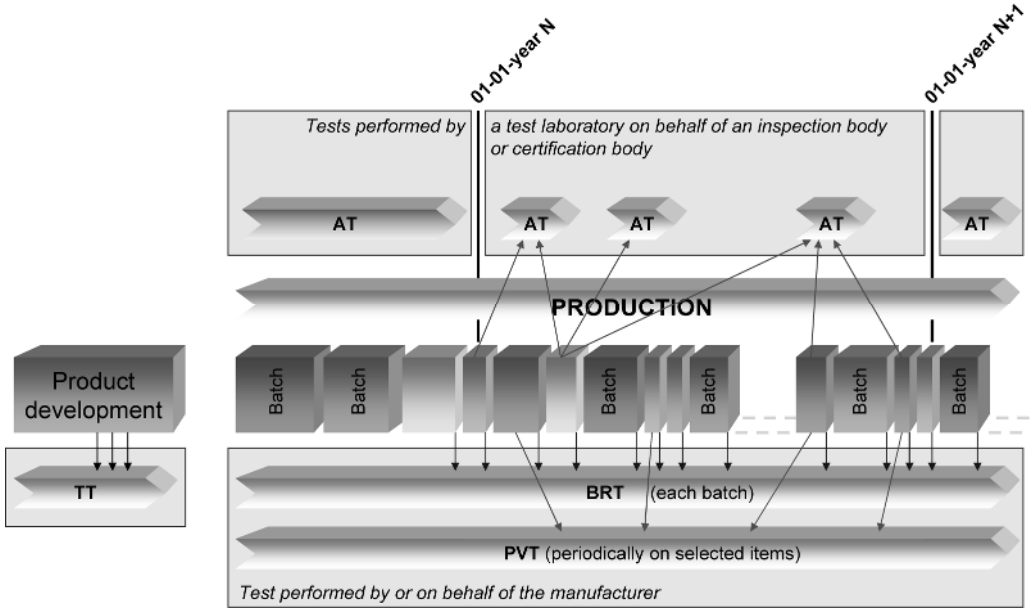

Figure 2 — Typical scheme for the assessment of conformity by a manufacturer, including a third-party certification

1 Scope

This Technical Specification gives guidance for the assessment of conformity of materials, products, joints and assemblies in accordance with the applicable part(s) of EN 1451 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 readers, a summary of the test regime is given in Annex A.

In conjunction with EN 1451-1 this document is applicable to piping systems made of polypropylene (PP) intended to be used:

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

— 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")

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 1451-1, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure — Polypropylene (PP) — Part 1: Specifications for pipes, fittings and the system*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1451-1 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: A 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 1451, 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
management 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 has 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 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 compositions compounds/formulations grouped by families, expressed by generic names, e.g. polypropylene, stainless steel, brass or EPDM

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

3.13
compound/formulation
clearly defined homogenous mixture of base polymer with additives, i.e. antioxidants, 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, fitting, or valve 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 material 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 composition 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 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 valve 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 an 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, products, joints and assemblies shall conform to the requirements given in EN 1451-1.

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

It is recommended that the quality management system conforms to or is no less stringent than the relevant requirements 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 compound/formulation comprising a polypropylene (PP) compound/formulation 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 groups specified in 6.2.2 to 6.2.3 apply.

6.2.2 Size groups

Three 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	$d_n < 75$
2	$75 \leq d_n < 200$
3	$200 \leq d_n \leq 315$

For testing purposes of rainwater piping systems, the entire size range from 50 mm to 160 mm inclusive shall be considered as a single group.

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

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

NOTE Type tests, to be carried out when occurs a change of the production site, 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 subclause of EN 1451-1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
Melt mass-flow rate (MFR-value)	4.3	+	-	+	-	once per material	once per material
Thermal stability (OIT) [c]	4.5	+	-	+	-	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 9	+	-	-	+	once per size per material	once per size group
		-	-	+	-	once per material	once per material
Impact resistance (staircase method) [d]	7.2 – Table 12	+	-	-	+	once per size per material	once per size group
		-	-	+	-	once per material	once per material
Longitudinal reversion	8.1 - Table 13	+	-	-	+	once per size	once per size group
Resistance to internal pressure [e]	10.2 - Table 17	+	-	+	-	once per material with one optional dimension	once per material with one optional dimension
Ring stiffness [e]	10.3 - Table 18	+	-	+	+	once per pipe series and material	once per size group and material

[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 the behalf of a certification body. Testing undertaken in a manufacturers laboratory shall be taken into account provided prior agreement by the certification body.

[c] For butt fusion applications only.

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

[e] For application area BD only.

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

Characteristic	Reference to part, clause or subclause of EN 1451-1	Conditions requiring test [a]					Sampling procedure	
		N	D	M	P	E	Manufacturer	Certification body [b]
Melt mass-flow rate [c] (MFR-value)	4.3	+	-	+	-	-	once per material	once per material
Thermal stability (OIT) [c,d]	4.5	+	-	+	-	-	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 fitting group
Effects of heating	8.2 - Table 14	+	+	-	-	+	once per each fitting	once per fitting group
		-	-	+	-	-	once per size group and fitting group	once per material
Watertightness [e]	8.2 - Table 15	+	+	-	-	+	once per each fitting	once per fitting group
Resistance to internal pressure [c,f]	10.2 - Table 17	+	-	+	-	-	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 the behalf of a certification body. Testing undertaken in a manufacturers laboratory shall be taken into account provided prior agreement by the certification body.

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

[d] For butt fusion applications only.

[e] Only for fabricated fittings made from more than one piece.

[f] For application area BD only.

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

Characteristic	Reference to part, clause or subclause of EN 1451-1	Conditions requiring test [a]				Sampling procedure	
		N	D	M	E	Manufacturer	Certification body [b]
Watertightness [c,d]	9 - Table 16	+	+	-	+	once per size per joint design [e]	once per size per joint design [e]
Airtightness [c,d]	9 - Table 16	+	+	-	+	once per joint design [e]	once per size per joint design [e]
Elevated temperature cycling	9 - Table 16	+	+	+	-	once per material per joint design on the smallest wall thickness produced [e]	once per material per joint design on the smallest wall thickness produced [e]
Application area BD: Tightness of elastomeric ring seal joints	9 - Table 16	+	+	-	+	once per size per joint design [e]	once per size group per joint design [e]
Application area BD: Long-term performance of TPE-seals	9 – Table 16	-	-	-	-	it is not required to carry out this test anymore	it is not required to carry out this test 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 the behalf of a certification body. Testing undertaken in a manufacturers laboratory shall be taken into account provided prior agreement by the certification body.

[c] Not required for butt fusion joints

[d] Only to be tested on fittings if the socket of the fitting is different from the socket of the pipe.

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

6.4 Batch release tests

Those characteristics specified in EN 1451-1 and listed in Table 6 and Table 7 shall be subject to BRTs with the minimum sampling frequency as given in Table 6 or Table 7, as applicable.

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

Characteristic	Reference to part, clause or subclause of EN 1451-1	Minimum sampling frequency
Appearance	5.1	once per 8 h and start up
Colour	5.2	once per 8 h and start up
Mean outside diameter	6.2.1	once per 8 h and start up
Effective length of pipes	6.2.2	once per 8 h and start up
Chamfer [a]	6.2.3	once at start up
Wall thickness	6.2.4	once per 8 h and start up
Socket dimensions [b]	6.4	once per 8 h and start up
Impact resistance (round-the-clock method) [c]	7.1 – Table 9	once per 24 h and start up
Longitudinal reversion	7.1 -Table 10	once per 24 h and start up
Impact resistance (staircase method) [c]	7.2 – Table 12	once per 24 h and start up
Marking	12.2 - Table 19	once per 8 h and start up

a If a chamfer is required

b Only for dimensions which are infulenced by the process

c If the test is carried out 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 subclause of EN 1451-1	Minimum sampling frequency
For injection-moulded fittings:		
Appearance	5.1	once per 8 h / cavity and start up
Colour	5.2	once per 8 h / cavity and start up
Wall thicknesses	6.2.4 – Tables 3 and 4 6.3.3 – Tables 7 and 8	once / cavity at start up
Socket and spigot dimensions [a]	6.3.1 – Tables 1 and 2 6.4 – Tables 5 and 6	once per 8 h / cavity and start up
Marking	12.3 - Table 20	once per cavity at start up
For thermoplastics fabricated fittings:		
Watertightness	8.2 – Table 15	one sample for each type of fabricated fitting / 8 h

a Only for dimensions which are influenced by the process

The manufacturer shall specify a batch in his quality plan.

A batch or lot 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 or Table 7, as applicable, the batch or lot 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 1451-1. 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 1451-1 and listed in Table 8 to Table 10 shall be subject to PVTs with the minimum sampling frequency given in Table 8 to Table 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 subclause of EN 1451-1	Minimum sampling frequency
Thermal stability (OIT) [a]	4.4	once per year per material currently used
Melt mass-flow rate (MFR-value)	8.1 - Table 13	once per year per material currently used
Resistance to internal pressure [b]	10.2 - Table 17	once per year per material currently used with one optional dimension
Ring stiffness [b]	10.3 - Table 18	once per year per material and size group and pipe series
[a] For butt fusion applications only. [b] For application area BD only.		

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

Characteristic	Reference to part, clause or subclause of EN 1451-1	Minimum sampling frequency
Melt mass-flow rate [a] (MFR-value)	4.3	once per year per material currently used
Thermal stability (OIT) [a,b]	4.4	once per year per material currently used
Resistance to internal pressure [a,c]	10.2 - Table 17	once per 2 years per material currently used with one optional dimension
[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 butt fusion applications only. [c] For application area BD only.		

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

Characteristic	Reference to part, clause or subclause of EN 1451-1	Minimum sampling frequency
Watertightness	9 – Table 16	once per 2 years per size group per joint design [b]
Airtightness	9 – Table 16	once per 2 years per size group per joint design [b]
Tightness of elastomeric ring seal joints [a]	9 – Table 16	once per 2 years per size group per joint design [b]
Elevated temperature cycling	9 – Table 16	once per 3 years per joint design on the material currently used [b]
Application area BD: Long-term performance of TPE-seals	9 – Table 16	it is not required to carry out this test anymore

[a] For application area BD only.

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

If the product does not conform to the requirements in respect of any 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, as well as to verify the characteristics given in Table 8 to Table 10, as applicable.

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

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

6.6 Audit tests

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

Those characteristics specified in EN 1451-1 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 subclause of EN 1451-1	Minimum sampling frequency
Melt mass-flow rate (MFR-value)	4.3	once per year per material currently used
Thermal stability (OIT) [a]	4.4	once per year per material currently used
Appearance	5.1	once per year per size group
Colour	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 9	once per year per size group
Impact resistance (staircase method) [b]	7.2 – Table 12	once per year per size group
Longitudinal reversion	8.1 - Table 13	once per year per size group
Resistance to internal pressure [c]	10.2 - Table 17	once per 3 years per material currently used with one optional dimension
Marking	12.2 - Table 19	once per year per size group

[a] For butt fusion application only

[b] Only for pipes intended to be installed at temperature below -10ºC. If this test is required, the round-the-clock method is not necessary.

[c] For application area BD only.

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

Characteristic	Reference to part, clause or subclause of EN 1451-1	Minimum sampling frequency
Melt mass-flow rate (MFR-value) [a]	4.3	once per year per material currently used
Thermal stability (OIT) [b]	4.5	once per year per material currently used
Appearance	5.1	once per year per fitting group
Colour	5.2	once per year per fitting group
Geometrical characteristics	6.3 and 6.4	once per year per fitting group
Resistance to internal pressure[a,c]	10.2 - Table 17	once per 3 years per material currently used with one optional dimension
Marking	12.3 - Table 20	once per year per fitting group

[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 butt fusion application only

[c] For application area BD only

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

Characteristic	Reference to part, clause or subclause of EN 1451-1	Minimum sampling frequency
Watertightness [a]	9 – Table 16	once per year on one size
Airtightness [a]	9 – Table 16	once per year on one size
Elevated temperature cycling	9 – Table 16	once per 3 years per joint design on the smallest wall thickness produced [c]
Tightness of elastomeric ring seal joints [b]	9 – Table 16	once per year on one size

[a] Not required for butt fusion joints

[b] For application area BD only

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

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

6.7 Indirect tests

Generally, testing shall be performed using the test methods referred to EN 1451-1.

ITs 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 BRTs as specified in Table 6 to Table 7, 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)

Survey of test regime

Table A.1

Characteristic	Type	BRT	PVT	AT
Pipes				
Melt mass-flow rate (MFR-value)	+		+	+
Thermal stability (OIT)	+		+	+
Appearance	+	+		+
Colour	+	+		+
Geometrical characteristics	+	+		+
Impact resistance (round the clock method)	+	+		+
Impact strength (staircase method)	+	+		+
Longitudinal reversion	+	+		+
Resistance to internal pressure	+		+	+
Ring stiffness	+		+	
Marking		+		+
Fittings				
Melt mass-flow rate (MFR-value)	+		+	+
Thermal stability (OIT)	+		+	+
Appearance	+	+		+
Colour	+	+		+
Geometrical characteristics	+	+		+
Effect of heating	+			
Resistance to internal pressure	+		+	+
Water tightness	+	+		
Marking		+		+
Fitness for purpose				
Water tightness	+		+	+
Air tightness	+		+	+
Elevated temperature cycling	+		+	+
Tightness of elastomeric sealing ring joints	+		+	+

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