
**Multilayer piping systems for hot
and cold water installations inside
buildings —**

Part 7:
**Guidance for the assessment of
conformity**

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*Systèmes de canalisations multicouches pour installations d'eau
chaude et froide à l'intérieur des bâtiments —*

Partie 7: Guide pour l'évaluation de la conformité

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html. (standards.iteh.ai)

This document was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems*, in collaboration with ISO Technical Committee TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 2, *Plastics pipes and fittings for water supplies*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO/TS 21003-7:2008), which has been technically revised. It also incorporates the Amendment ISO/TS 21003-7:2008/Amd1:2010.

The major technical changes are:

- New definition of the terms “material”, “material grade” and “compound”;
- Revision of [6.2](#) “type testing”;
- Addition of [Annex A](#) “Interchangeability of different material grades — Testing of an alternative material grades for a layer in a Multilayer M-Pipe (second sourcing)”.

A list of all parts in the ISO 21003 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document can be used to support elaboration of national third party certification procedures for products conforming to the applicable part(s) of ISO 21003.

This document is a part of a System Standard for plastics piping systems of a particular material for a specified application. There are a number of such System Standards.

At the date of publication of this document, System Standards for piping systems of other plastics materials used for the same application are the following:

- ISO 15874, *Plastics piping systems for hot and cold water installations — Polypropylene (PP)*
- ISO 15875, *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X)*
- ISO 15876, *Plastics piping systems for hot and cold water installations — Polybutene (PB)*
- ISO 15877, *Plastics piping systems for hot and cold water installations — Chlorinated poly (vinyl chloride) (PVC-C)*
- ISO 22391, *Plastics piping systems for hot and cold water installations — Polyethylene of raised temperature resistance (PE-RT)*

They are supported by separate standards on test methods to which references are made throughout the System Standard.

The System Standards are consistent with general standards on functional requirements and on recommended practice for installation.

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, compounds, pipes, fittings, valves, joints or assemblies by product manufacturers is given in Figure 1

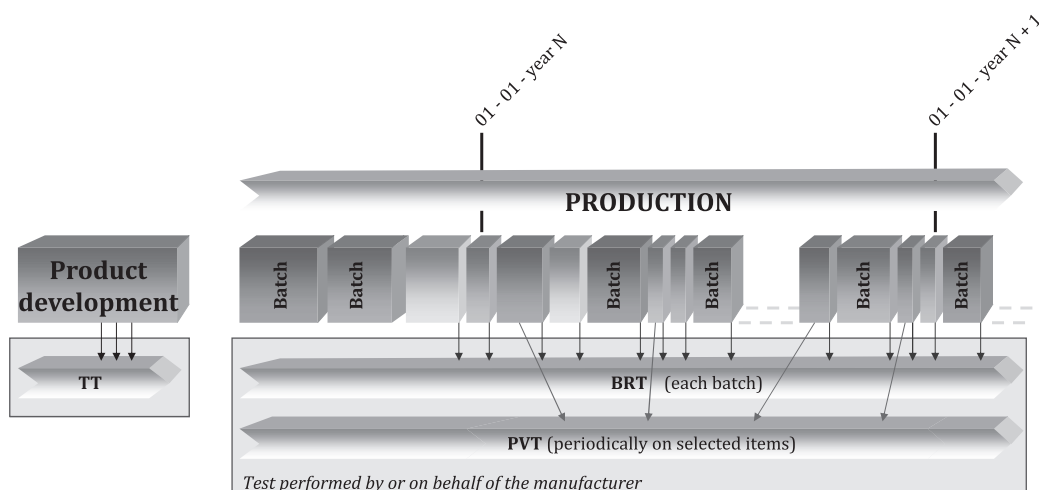


Figure 1 — Typical scheme for the assessment of conformity by a product manufacturer

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

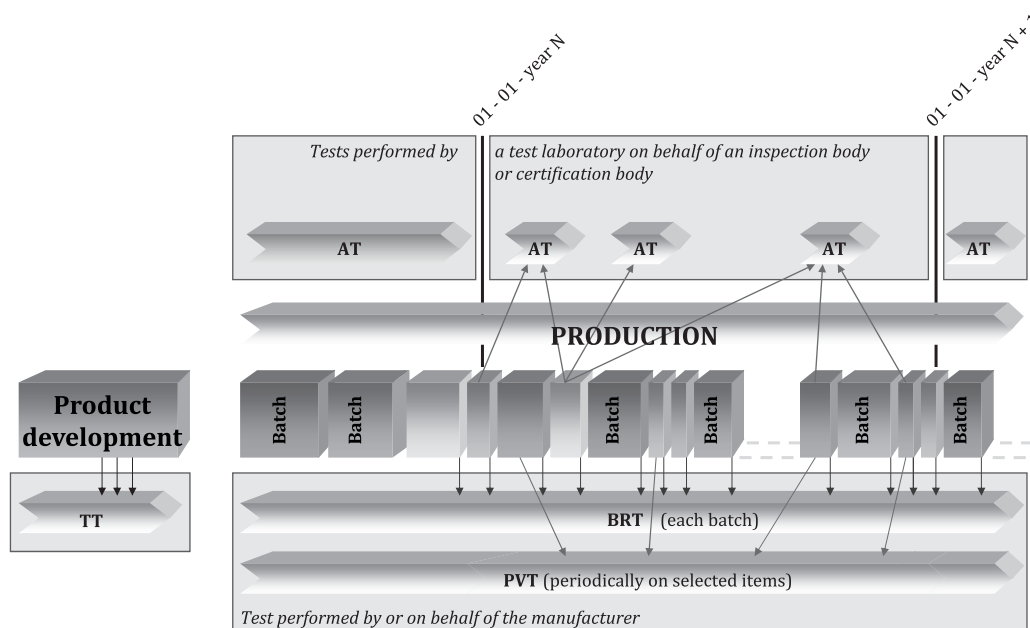


Figure 2 — Typical scheme for the assessment of conformity by product a manufacturer, including certification.

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Multilayer piping systems for hot and cold water installations inside buildings —

Part 7: Guidance for the assessment of conformity

1 Scope

This document gives requirements and guidance for the assessment of conformity of compounds, products, and assemblies in accordance with the applicable part(s) of ISO 21003 intended to be included in the manufacturer's quality plan as part of the quality management system and for the establishment of certification procedures.

In conjunction with the other parts of ISO 21003 (see Foreword), this document is applicable to multilayer piping systems intended to be used for hot and cold water installations within buildings for the conveyance of water, whether or not intended for human consumption (domestic systems) and for heating systems, under design pressures and temperatures appropriate to the class of application (see ISO 21003-1:2008, Table 1).

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2 Normative references (standards.iteh.ai)

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17456, *Plastics piping systems — Multilayer pipes — Determination of long-term strength*

ISO 21003-1, *Multilayer piping systems for hot and cold water installations inside buildings — Part 1: General*

ISO 21003-2, *Multilayer piping systems for hot and cold water installations inside buildings — Part 2: Pipes*

ISO 21003-3, *Multilayer piping systems for hot and cold water installations inside buildings — Part 3: Fittings*

ISO 21003-5, *Multilayer piping systems for hot and cold water installations inside buildings — Part 5: Fitness for purpose of the system*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21003-1, ISO 21003-3 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

**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 compliant with ISO/IEC 17065.

**3.2
inspection body**

body that performs inspection

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

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

[SOURCE: ISO/IEC 17020:2012[3], 3.5]

**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: A testing laboratory is preferably compliant with ISO/IEC 17025.

**3.4
quality management system**

part of a management system with regard to quality

Note 1 to entry: Requirements for quality management systems are given in ISO 9001[4].

[SOURCE: ISO 9000:2015 [6], 3.5.4, modified — Note 1 to entry has been added]

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**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 compound, component, 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 compound 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 material compound, components 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 product manufacturer on compounds, components, products or joints at specific intervals to confirm that the process continues to be capable of producing components and 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, compound, components 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, compound, components, 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

composition grouped by families, expressed by generic names used in material standards, e.g. PP-H, PB-R, PE-RT Type II, PE-Xa, aluminium alloy type 8006

3.13
material grade

material with a defined specification from a material manufacturer

3.14
alternative material grade

material grade available for the production of a multilayer pipe, but different from the one used in the type test (second sourcing)

Note 1 to entry: The pipe manufacturer might have alternative material grades for the inner layer, inner adhesive layer, metal layer, outer adhesive layer and/or outer layer of the multilayer pipe.

3.15
compound

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

3.16
batch of material grade

clearly identified quantity of a given homogeneous materials or compound manufactured under uniform conditions and defined and identified by the materials or compound manufacturer

3.17
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

3.18
product batch

clearly identified collection of units or products, manufactured consecutively or continuously under the same conditions, using the same compounds conforming to the same specifications

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

3.19

lot

clearly identifiable sub-division of a batch for inspection purposes

3.20

sample

one or more units or 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.

3.21

group

collection of similar components from which samples are selected for testing purposes

3.22

component

product manufactured out of a specific material or compound, brought to the market as part of another product or as a spare part

Note 1 to entry: For drinking water application, components may be considered as products and be individually approved (e.g. o-ring, gasket) or they are tested as an integral part of a product (e.g. in a valve).

3.23

joint

connection between two or more products

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3.24

assembly/assembled product

product consisting of two or more parts

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3.25

sampling plan

specific plan, which defines the test and the number of units or products or assemblies to be inspected

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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 and symbols

4.1 Abbreviated terms

To avoid misunderstanding, the abbreviated terms 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	Freigabepfung einer Charge
IT	indirect test	essai indirect	indirekte Prüfung

	EN	FR	DE
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

4.2 Symbols

- I_0 Material grade used in the inner layer of the initial type-tested M-pipe
- A_{i0} Material grade used in the inner adhesive layer of the initial type-tested M-pipe
- M_0 Material grade used in the metal layer of the initial type-tested M-pipe
- A_{o0} Material grade used in the outer adhesive layer of the initial type-tested M-pipe
- O_0 Material grade used in the outer layer of the initial type-tested M-pipe
- I_1 Alternative material grade to be introduced in the inner layer
- A_{i1} Alternative material grade to be introduced in the inner adhesive layer
- M_1 Alternative material grade to be introduced in the metal layer
- A_{o1} Alternative material grade to be introduced in the outer adhesive layer
- O_1 Alternative material grade to be introduced in the outer layer

5 General

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Compounds, products and assemblies shall conform to the requirements given of ISO 21003 (all parts).

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

6 Testing and inspection

6.1 Grouping

6.1.1 General

For the purposes of this document, the groups specified in 6.1.2 to 6.1.4 apply.

6.1.2 Pressure groups

Two pressure groups are defined, as given in Table 1.

Table 1 — Pressure groups

Pressure group	Operating pressure, p_{op} bar
1	4; 6
2	8; 10

6.1.3 Size groups

Three size groups are defined for pipes and fittings, as given in [Table 2](#).

Table 2 — Size groups

Size group	Nominal diameter, d_n mm
1	$10 \leq d_n \leq 26$
2	$26 < d_n \leq 63$
3	$d_n > 63$

6.1.4 Fitting groups

Two groups of fittings having a similar design are defined, as given in [Table 3](#).

Table 3 — Fitting groups

Fitting group	Type of fitting
1	Elbows, tees, reducers, couplers, end caps
2	Unions, flange adaptors, transition fitting, adaptor pieces and/or their plastics parts and others

6.2 Type testing

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

Type tests shall demonstrate that the products conform to all requirements for the characteristics given in [Table 6](#) to [Table 10](#), as applicable.

Conditions considered as leading to a change of compound (M) of M-pipes and P-pipes are given in [Tables 4](#) and [5](#). [Tables 4](#) and [5](#) offer a wide range of changes.

NOTE 1

- Example 1: A change of the inner layer material from PE-Xa to PERT Type II
- Example 2: A change of the metal layer material from an aluminium alloy type 8006 to a different aluminium alloy type or even to a steel alloy.
- Example 3: A change of a material grade used for the inner layer to another material grade from another raw material supplier.

The relevant characteristics to be tested in case of change of compound of M-pipes and P-pipes are given in [Tables 6](#), [7](#) and [10](#) in columns M1 –M5, as applicable.

However, combinations of such compound changes are not covered by [Tables 6](#), [7](#) and [10](#). In case of a combination of compound changes of a pipe, a full type testing is required, if [Annex A](#) (see below) is not applicable.

A special case, similar to change of compound, but with a different intention is described in [Annex A](#). [Annex A](#) defines the testing of second sourcing material grades. It describes a qualified test scheme to test the interchangeability of a currently used material grade for a layer of an initial type-tested multilayer pipe by an alternative material grade intended to be used for this layer of this pipe. The testing does not only ensure the interchangeability of a material grade for one layer, it covers also all possible combinations, which can occur in the production later on, when for each layer the initial material grade and a positive tested alternative material grade can be used.