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**Plastics piping systems for hot and  
cold water installations — Crosslinked  
polyethylene (PE-X) —**

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

*Systèmes de canalisations en plastique pour les installations d'eau  
chaude et froide — Polyéthylène réticulé (PE-X) —*

*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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/TS 15875-7 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/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).

ISO 15875 consists of the following parts, under the general title *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X)*:

- *Part 1: General*
- *Part 2: Pipes*
- *Part 3: Fittings*
- *Part 5: Fitness for purpose of the system*
- *Part 7: Guidance for the assessment of conformity* [Technical Specification]

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## Foreword

This document (CEN ISO TS 15875-3:2003) has been prepared by Technical Committee CEN /TC 155, "Plastics piping systems and ducting systems", the secretariat of which is held by NEN in collaboration with Technical Committee ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids".

This Technical Specification can be used to support elaboration of national third party certification procedures for products conforming to the applicable Part(s) of EN ISO 15875.

This Technical Specification 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.

System Standards are based on the results of the work undertaken in ISO/TC 138 "*Plastics pipes, fittings and valves for the transport of fluids*", which is a Technical Committee of the International Organization for Standardization (ISO).

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.

This series consists of the following Parts <sup>1)</sup>, under the general title *Plastics piping systems for hot and cold water installations – Crosslinked polyethylene (PE-X)*

- *Part 1: General*
- *Part 2: Pipes*
- *Part 3: Fittings*
- *Part 5: Fitness for purpose of the system*
- *Part 7: Guidance for the assessment of conformity* (this Technical Specification)

This Technical Specification includes a bibliography.

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

EN ISO 15874, *Plastics piping systems for hot and cold water installations — Polypropylene (PP)*

EN ISO 15876, *Plastics piping systems for hot and cold water installations — Polybutylene (PB)*

EN ISO 15877, *Plastics piping systems for hot and cold water installations — Chlorinated poly(vinyl chloride) (PVC-C)*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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1) This System Standard does not incorporate Part 4: *Ancillary equipment* and Part 6: *Guidance for installation*. For ancillary equipment separate standards can apply. For guidance for installation reference is made to separate documents.

NOTE A guidance for installation of plastics piping systems made from different materials, intended to be used for hot and cold water installations, is covered by ENV 12108<sup>[1]</sup>.

## **Introduction**

This series specifies the requirements for a piping system when made from crosslinked polyethylene (PE-X). The piping system is intended to be used for hot and cold water installations.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by EN ISO 15875:

- This Technical Specification provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;
- It should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

Requirements and test methods for material and components are specified in Part 1 to Part 3 of EN ISO 15875. Characteristics for fitness for purpose (mainly for joints) are covered in Part 5.

This Technical Specification gives guidance for the assessment of conformity of materials, components, joints and assemblies and it is intended to be used by certification bodies, inspection bodies, testing laboratories and manufacturers.

## 1 Scope

This Technical Specification gives guidance for the assessment of conformity to be included in the manufacturer's quality plan as part of his quality system.

This Technical Specification includes:

- a) requirements for materials, components, joints and assemblies given in the applicable Part(s) of EN ISO 15875;
- b) requirements for the manufacturer's quality system;

NOTE 1 It is recommended that the quality system conforms to EN ISO 9001:2000<sup>[2]</sup>.

- c) definitions and procedures to be applied if third party certification is involved.

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

In conjunction with the other parts of EN ISO 15875(see Foreword), this Technical Specification is applicable to crosslinked polyethylene (PE-X) 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 Table 1 of EN ISO 15875:2003).

## 2 Normative references

This Technical Specification incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this Technical Specification only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 15875-1:2003, *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) — Part 1: General*

EN ISO 15875-2:2003, *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) — Part 2: Pipes*

EN ISO 15875-3:2003, *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) — Part 3: Fittings*

EN ISO 15875-5:2003, *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) — Part 5: Fitness for purpose of the system*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptable quality limit (AQL) for lot-by-lot inspection*

ISO 3951:1989, *Sampling procedures and charts for inspection by variables for percent nonconforming*

## 3 Definitions, symbols and abbreviations

For the purposes of this Technical Specification, the definitions, symbols and abbreviations given in Part 1 and Part 3 of EN ISO 15875:2003 apply, together with the following.

### 3.1 Definitions

#### 3.1.1

##### **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

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### 3.1.2

#### **inspection body**

impartial organization or company, approved by a 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 European Standard

### 3.1.3

#### **testing laboratory**

laboratory which measures, tests, calibrates or otherwise determines the characteristics of the performance of materials and products

### 3.1.4

#### **quality system**

organizational structure, responsibilities, procedures, processes and resources for implementing quality management (see EN ISO 8402<sup>[5]</sup>)

### 3.1.5

#### **quality plan**

document setting out the specific quality practices, resources and sequence of activities relevant to a particular product or range of products

### 3.1.6

#### **type testing (TT)**

testing performed to prove that the material, component, joint or assembly is capable of conforming to the requirements given in the relevant standard

### 3.1.7

#### **preliminary type testing (PTT)**

type testing carried out by or on behalf of the manufacturer

### 3.1.8

#### **initial type testing (ITT)**

type testing carried out by or on behalf of a certification body for certification purposes

### 3.1.9

#### **batch release test (BRT)**

test performed by the manufacturer on a batch of components, which has to be satisfactorily completed before the batch can be released

### 3.1.10

#### **process verification test (PVT)**

test performed by the manufacturer on materials, components, joints or assemblies at specific intervals to confirm that the process continues to be capable of producing components conforming to the requirements given in the relevant standard

NOTE Such tests are not required to release batches of components and are carried out as a measure of process control.

### 3.1.11

#### **audit test (AT)**

test performed by or on behalf of a certification body to confirm that the material, component, 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 system

### 3.1.12

#### **indirect test (IT)**

test performed by the manufacturer, different from that specified for that particular characteristic, having verified its correlation with the specified test

### 3.1.13

#### **witness testing (WT)**

testing accepted by a certification body for initial type testing and/or audit testing, which is carried out by or on behalf of the manufacturer and supervised by a representative of the certification body, qualified in testing



**3.1.14****material or compound batch**

clearly identifiable quantity of a particular material or compound

**3.1.15****production batch**

clearly identifiable collection of units, manufactured consecutively or continuously under the same conditions, using material or compound conforming to the same specification

**3.1.16****lot**

clearly identifiable sub-division of a batch for inspection purposes

**3.1.17****sample**

one or more units of product drawn from a batch or lot, selected at random without regard to their quality

NOTE The number of units of product in the sample is the sample size.

**3.1.18****acceptable quality level (AQL)**

when a continuous series of lots or batches is considered, the quality level which for the purpose of sampling inspection is the limit of a satisfactory process average [see ISO 2859-1:1999 and ISO 3951:1989]

NOTE The designation of an AQL does not imply that a manufacturer has the right knowingly to supply any nonconforming unit of product.

**3.1.19****inspection level**

relationship between the lot or batch size and the sample size [see ISO 2859-1:1999]

**3.1.20****group**

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

**3.2 Abbreviations**

NOTE 1 For reasons of avoiding misunderstanding the following abbreviations are kept the same in each of the languages. For the same reason the terms are given in the three languages (en: English, fr: French, de: German).

NOTE 2 In the French language the abbreviation AQL for "acceptable quality level" is NQA, however for the purposes of this Technical Specification for all three languages the same abbreviation (AQL) is used.

AQL en : acceptable quality level  
fr : niveau de qualité acceptable  
de : annehmbare Qualitätsgrenzlage

AT en : audit test  
fr : essai d'audit  
de : Überwachungsprüfung

BRT en : batch release test  
fr : essai de libération de campagne de fabrication  
de : Freigabeprüfung einer Charge

IT en : indirect test  
fr : essai indirect  
de : indirekte Prüfung

ITT en : initial type testing  
fr : essai de type initial  
de : Erst-Typprüfung

PTT en : preliminary type testing  
fr : essai de type préliminaire  
de : vorausgehende Typprüfung

- PVT en : process verification test  
fr : essai de vérification du procédé de fabrication  
de : Prozeßüberprüfung
- TT en : type test  
fr : essai de type  
de : Typprüfung
- WT en : witness testing  
fr : essai témoin  
de : Prüfung unter Aufsicht

## 4 Requirements

### 4.1 General

4.1.1 Materials, components, joints and assemblies shall conform to the requirements given in Part 1 to Part 3 and Part 5 of EN ISO 15875:2003, as applicable.

4.1.2 Components and/or assemblies shall be produced by the manufacturer under a quality system which includes a quality plan.

### 4.2 Testing and inspection

#### 4.2.1 Grouping

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

##### 4.2.1.1 Pressure groups

A group of design pressures, from which one individual design pressure,  $p_D$ , shall be selected for testing purposes.

Two pressure groups shall be designated as given in Table 1.

Table 1 — Pressure groups

Pressure group	Design pressure, $p_D$ bar
1	4; 6
2	8; 10

##### 4.2.1.2 Size groups

A group of nominal diameters of pipes and fittings, from which one individual nominal diameter,  $d_n$ , shall be selected for testing purposes.

Two size groups shall be designated as given in Table 2.

Table 2 — Size groups

Size group	Nominal diameter, $d_n$ mm
1	$10 \leq d_n \leq 63$
2	$63 < d_n \leq 160$

### 4.2.1.3 Fitting groups

A group of fittings having a similar design, from which one individual fitting shall be selected for testing purposes. Four fitting groups shall be designated as given in Table 3.

**Table 3 — Fitting groups**

Fitting group	Type of fitting
1	Bends
2	Elbows, tees
3	Reducers, couplers, end caps
4	Unions, flange adaptors, adaptor pieces and/or their plastics parts

## 4.2.2 Type testing (TT)

### 4.2.2.1 General

Type tests shall demonstrate that the products conform to all requirements for the characteristics given in Table 5 to Table 7, as applicable.

In addition, 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 to extensions of the product range.

For the purposes of defining a change of material, Table 4 applies. The characteristics and the values for  $X$  (see Table 4) shall be specified by the manufacturer in his quality plan.

If any characteristic is changed or any level exceeds the band, this variation in formulation constitutes a change in material and the relevant characteristics given in column M1 or column M2 of Table 5 and Table 6, as applicable, shall be retested. A change in the supplier of a material or stabilizer does not necessarily constitute a change in material or compound. If third party certification is involved, retesting shall be agreed between certification body and manufacturer.

**Table 4 — Conditions for change of material**

Type of material change	Characteristics, value $X$ and band
- Change of polymer (M1)	- Change of supplier; - Change of polymerization; - Change of chemical properties of comonomers
- Change of additive package (e.g. pigments, antioxidants) (M2)	- Amount greater than $X \pm 30\%$ of individual additive; - Chemical properties or nature of additive

For the purposes of defining a change in design, the following characteristics are relevant:

- dimensions;
- geometry of the component;
- jointing system.

In the quality plan of the manufacturer the geometry, dimensions and the applied tolerances at least according and in addition to the requirements given in the relevant Part(s) of EN ISO 15875 shall be specified.

If one or more of these characteristics exceed the defined specifications, the relevant characteristics given in Table 5 to Table 7, as applicable, shall be retested. If third party certification is involved, retesting shall be agreed between certification body and manufacturer.

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

Characteristic	Reference to Part, clause and table of EN ISO 15875:2003	Initial/changes/extension <sup>a</sup>				Sampling procedure
		I	M1	M2	E	
Influence on water intended for human consumption	Part 1 - 5.2	+	+	+	-	According to national regulations
Hydrostatic stress properties of material <sup>b</sup>	Part 2 - 4.2	+	+	+ <sup>c</sup>	-	One evaluation per material
Appearance	Part 2 - 5.1	+	+	+	+	One test piece per $d_n$ and pressure group
Opacity	Part 2 - 5.2	+	+	+	-	One test piece with the smallest wall thickness produced
Dimensions	Part 2 - Table 2 to Table 6	+	+	+	+	One test piece per $d_n$ and pressure group
Resistance to internal pressure	Part 2 - Table 7	+	+	+	+	Three test pieces on one $d_n$ per size group
Longitudinal reversion	Part 2 - Table 8	+	+	+	+	Three test pieces on one $d_n$ per size group
Degree of crosslinking	Part 2 - Table 8	+	+	+	+	Two test pieces on one $d_n$ per size group
Thermal stability	Part 2 - Table 8	+	+	+	-	One test piece per material
Marking	Part 2 - Clause 10	+	-	-	+	One test piece per $d_n$ and pressure group

<sup>a</sup> I : initial type test in case of new system;  
M1 : change of polymer;  
M2 : change of additive package;  
E : extension of the product range;  
+ : test to be carried out.

<sup>b</sup> If the material supplier has evaluated the hydrostatic stress properties specified in EN ISO 15875-2:2003, the manufacturer of pipes only has to check conformity with the reference curves for the expected hydrostatic strength given in Figure 1 of EN ISO 15875-2:2003 by testing three test pieces at two different stress levels at 95 °C. The lowest stress level shall give failure times of approximately 2500 h. All failure points shall be on or above the relevant reference curve of Figure 1 of EN ISO 15875-2:2003.

<sup>c</sup> In order to check the effect of a change of additive package (M2) on the hydrostatic stress properties specified in EN ISO 15875-2:2003, three test pieces must be tested at two different stress levels at 95 °C. The lowest stress level shall give failure times of approximately 2500 h. All failure points shall be on or above the relevant reference curve of Figure 1 of EN ISO 15875-2:2003 for the appropriate material.

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

Characteristic	Reference to Part, clause and table of EN ISO 15875:2003	Initial/changes/extension <sup>a</sup>					Sampling procedure
		I	D	M1	M2	E	
Influence on water intended for human consumption	Part 1 - 5.2	+	-	+	+	-	According to national regulations
Hydrostatic stress properties of material <sup>b</sup>	Part 3 - 4.1	+	-	+	+ <sup>c</sup>	-	One evaluation per material
Thermal stability	Part 3 - 4.1.2.2	+	-	+	+	-	One test piece per material <sup>d</sup>
Appearance	Part 3 - 5.1	+	-	+	+	+	One test piece per $d_n$ and fitting group
Opacity	Part 3 - 5.2	+	-	+	+	-	One test piece with the smallest wall thickness produced
Dimensions	Part 3 - Clause 6	+	+	+	+	+	One test piece per $d_n$ and fitting group
Resistance to internal pressure	Part 3 - Clause 7	+	+	+	+	+	One test piece per size group and fitting group for the relevant design pressure and appropriate class of application
Degree of crosslinking	Part 3 - Clause 8	+	+	+	+	+	Two test pieces on one $d_n$ per size group and fitting group
Marking	Part 3 - Clause 11	+	-	-	-	+	One test piece per $d_n$ and fitting group

<sup>a</sup>

- I : initial type test in case of new system;
- D : change in design;
- M1 : change of polymer;
- M2 : change of additive package;
- E : extension of the product range;
- + : test to be carried out.

<sup>b</sup> If the material supplier has evaluated the hydrostatic stress properties specified in EN ISO 15875-2:2003, the manufacturer of fittings only has to check conformity with the reference curves for the expected hydrostatic strength given in Figure 1 of EN ISO 15875-2:2003 by testing three test pieces at two different stress levels at 95 °C. The lowest stress level shall give failure times of approximately 2500 h. All failure points shall be on or above the relevant reference curve of Figure 1 of EN ISO 15875-2:2003

<sup>c</sup> In order to check the effect of a change of additive package (M2) on the hydrostatic stress properties specified in EN ISO 15875-2:2003, three test pieces must be tested at two different stress levels at 95 °C. The lowest stress level shall give failure times of approximately 2500 h. All failure points shall be on or above the relevant reference curve of Figure 1 of EN ISO 15875-2:2003 for the appropriate material.

<sup>d</sup> Only if the fitting material is different from the pipe material.

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

Characteristic	Reference to Part, clause and table of EN ISO 15875:2003	Initial/changes/extension <sup>a</sup>			Sampling procedure
		I	D	E	
Resistance to internal pressure	Part 5 - 4.2	+	+	+	One evaluation per size group and jointing system for the relevant design pressure and appropriate application class
Leaktightness under internal pressure and bending	Part 5 - 4.3	+	+	+	One evaluation per size group and jointing system for the relevant design pressure and appropriate application class
Resistance to pull-out	Part 5 - 4.4	+	+	+	One evaluation for the smallest and largest $d_n$ per size group and jointing system for the relevant design pressure and appropriate application class
Resistance to thermal cycling	Part 5 - 4.5	+	+	+	One evaluation per $d_n$ and jointing system for the relevant design pressure and appropriate application class
Resistance to pressure cycling	Part 5 - 4.6	+	+	+	One evaluation per size group and jointing system for the relevant design pressure
Leaktightness under vacuum	Part 5 - 4.7	+	+	+	One evaluation per size group and jointing system per pressure group
<sup>a</sup> I : initial type test in case of new system; D : change in design; E : extension of the product range; + : test to be carried out.					

**4.2.2.2 Preliminary type testing (PTT)**

The manufacturer shall demonstrate that the products conform to all requirements of the characteristics given in Table 5 to Table 7, as applicable.

**4.2.2.3 Initial type testing (ITT)**

If third party certification is involved, the certification body shall assess the conformity of a product to all requirements for the characteristics given in Table 5 to Table 7, as applicable.

The assessment shall be performed by validation or testing, using the sampling procedure given in Table 5 to Table 7, as applicable and grouping according to 4.2.1, in an approved testing laboratory or by witness testing.

Preliminary test data including long-term characteristics, supplied by the manufacturer and traceable to material and process, validated by the certification body shall be taken into account for initial type testing.

**4.2.3 Batch release tests (BRT)**

Those characteristics specified in Part 2 and Part 3 of EN ISO 15875:2003 and listed in Table 8 shall be batch release tested with the minimum sampling frequency given in Table 8. Alternatively the manufacturer may use the sampling procedures detailed in either ISO 2859-1:1999 with an inspection level S-2 or ISO 3951:1989 with an inspection level S-3, as appropriate. In any case an AQL not greater than 6,5 % shall be used.

Table 8 — Characteristics and minimum sampling frequencies for BRT

Characteristic	Reference to Part, clause and table of EN ISO 15875:2003	Minimum sampling frequency	Retest procedure
<b>Pipes</b>			
Appearance	Part 2 - 5.1	One test piece per 8 h per machine	A or B
Outside diameter	Part 2 - 6.2.1 Table 2 to Table 5	One test piece per 8 h per machine	A
Wall thickness	Part 2 - 6.2.2 Table 2 to Table 6	One test piece per 8 h per machine	A
Resistance to internal pressure (95 °C, 22 h)	Part 2 - Table 7	One test piece per 24 h per machine	A or B
<b>Or</b>			
Resistance to internal pressure (95 °C, 165 h) <sup>a</sup>	Part 2 - Table 7	One test piece per week per machine	
Degree of crosslinking	Part 2 - Table 8	One test piece per 24 h per machine	A
Longitudinal reversion	Part 2 - Table 8	One test piece per week per machine	A or B
Marking	Part 2 - Clause 10	One test piece per 8 h per machine	A or B
<b>Fittings</b>			
Appearance	Part 3 - 5.1	One test piece per 8 h per cavity	A or B
Geometrical characteristics (but only those dimensions which vary by the manufacturing process and affect the function of the joint or fitting)	Part 3 - Clause 6	One test piece per 8 h per cavity	A
Resistance to internal pressure (20 °C, 1 h)	Part 3 - Clause 7	One test piece per week per machine	A or B
Degree of crosslinking	Part 3 - Clause 8	One test piece per 24 h	A
Marking	Part 3 - Clause 11	One test piece per 8 h per cavity	A or B
<sup>a</sup> In case of dispute testing at 95 °C and 165 h shall be done.			

The manufacturer shall specify a batch or lot 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 least once at the specified frequencies and the requirements have been conformed to.

If a product fails in respect of any characteristic given in Table 8, the batch or lot shall be rejected or the retest procedure shall be performed for the characteristic on which the product failed.

The retest procedure shall conform to Table 8 and shall be either Procedure A or Procedure B, as follows:

**Procedure A:**

Find the last product, which conforms to the requirements as specified in Part 2 and Part 3 of EN ISO 15875:2003, as applicable. Release all products produced before that point and reject the products produced after that point;

**Procedure B:**

Use a sampling procedure in accordance with ISO 2859-1:1999 or ISO 3951:1989, as applicable, based on a maximum AQL of 4 % and a minimum inspection level S-3.

If the retest requirements are conformed to, release the batch or lot. If they are not conformed to, reject the batch or lot.

Procedures for dealing with rejected products shall be detailed in the manufacturer's quality plan.

4.2.4 Process verification tests (PVT)

Those characteristics specified in Part 2 and Part 3 of EN ISO 15875:2003 and listed in Table 9 shall be process verification tested with the minimum sampling frequency given in Table 9.

**Table 9 — Characteristics and minimum sampling frequencies for PVT**

Characteristic	Reference to Part, clause and table of EN ISO 15875:2003	Minimum sampling frequency
<b>Pipes</b>		
Resistance to internal pressure (95 °C, 1000 h)	Part 2 - Table 7	One test piece per year per $d_n$ and $e_n$
<b>Fittings</b>		
Resistance to internal pressure (95 °C, 1000 h)	Part 3 - Clause 7	One test piece per year per size group and fitting group

If a product does not conform to the requirements in respect of any characteristic given in Table 9, the retest procedure detailed in the manufacturer's quality plan shall be performed. If third party certification is involved, the certification body shall be informed.

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.

4.2.5 Audit tests (AT)

If third party certification is involved, those characteristics specified in Part 2 and Part 3 of EN ISO 15875:2003 and listed in Table 10 are intended to be audit tested with the minimum sampling frequency given in Table 10.

**Table 10 — Characteristics and minimum sampling frequencies for AT**

Characteristic	Reference to Part, clause and table of EN ISO 15875:2003	Minimum sampling frequency
<b>Pipes</b>		
Appearance	Part 2 - 5.1	Three test pieces per year per size group
Dimensions	Part 2 - Table 2 to Table 6	Three test pieces per year per size group
Resistance to internal pressure (95 °C, 1000 h)	Part 2 - Table 7	Three test pieces per year per size group
Longitudinal reversion	Part 2 - Table 8	Three test pieces per year per size group
Degree of crosslinking	Part 2 - Table 8	Two test pieces per year per size group
Marking	Part 2 - Clause 10	Three test pieces per year per size group
<b>Fittings</b>		
Appearance	Part 3 - 5.1	Three fittings per year per size group and fitting group
Dimensions	Part 3 - Clause 6	Three fittings per year per size group and fitting group
Resistance to internal pressure (95 °C, 1000 h)	Part 3 - Clause 7	Three fittings per year per size group and fitting group
Degree of crosslinking	Part 3 - Clause 8	Three fittings per year per size group and fitting group
Marking	Part 3 - Clause 11	Three fittings per year per size group and fitting group

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

NOTE The sizes, types and classes selected for tests should 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.



#### 4.2.6 Indirect tests (IT)

Generally testing shall be performed according to the test methods referred to in Part 1 to Part 3 and Part 5 of EN ISO 15875:2003.

Indirect testing may be used for BRT and PVT characteristics as given in Table 8 and Table 9, respectively. Indirect testing shall not be applied to TT and AT.

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 case of dispute the BRT or PVT as specified in Table 8 and Table 9, as applicable, shall be used.

If third party certification is involved, the IT shall be acceptable to the certification body.

NOTE Indirect testing may be used to reduce the frequency of use of the specified BRT and PVT but it is not intended to replace these tests completely.

#### 4.2.7 Inspection records and test records

Unless otherwise specified all records shall be maintained for a minimum of ten years.

## Bibliography

- [1] ENV 12108, *Plastics piping systems — Guidance for the installation inside buildings of pressure piping systems for hot and cold water intended for human consumption*
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- [6] *Guide for the definition of factory production control and technical specifications for construction products (Construct 89/106 EC)*

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