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ICS 23.040.20; 91.140.60

EAST AFRICAN STANDARD

**Plastics piping systems for water supply — Polyethylene (PE) —
Part 7: Guidance for the assessment of conformity**

EAST AFRICAN COMMUNITY

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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Introduction

In the preparation of this East African Standard, the following source was consulted extensively:

DD CEN/TS 12201-7:2003, *Plastics piping systems for water supply — Polyethylene (PE) — Part 7: Guidance for the assessment of conformity*

Assistance derived from this source and others inadvertently not mentioned is hereby acknowledged.

Draft for comments only — Not to be cited as East African Standard

DRAFT FOR DEVELOPMENT

**DD CEN/TS
12201-7:2003**

Plastics piping systems for water supply — Polyethylene (PE) —

Part 7: Guidance for the assessment of conformity

ICS 23.040.20; 91.140.60

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BSi
British Standards

National foreword

This Draft for Development (DD) is the official English version of CEN/TS 12201-7:2003. No existing British Standard will be superseded by the implementation of CEN/TS 12201-7:2003.

The UK participation in its preparation was entrusted by Technical Committee PRI/88, (previously PRI/61), Plastics piping systems to Subcommittee PRI/88/2, (previously PRI/61/2), Plastics piping systems for pressure applications, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Attention is drawn to any appropriate safety precautions. It is assumed in the drafting of a standard that the execution of its provisions is entrusted to appropriately qualified people.

Additional information

As yet, there is no pan-European agreement on water quality requirements, so existing UK regulations remain in force. Regulation 25 of the Water Supply (Water Quality) Regulations 1989 specifies the circumstances in which water undertakers may use products in contact with water supplies in England and Wales. As part of the UK regulations, all pipes and fittings used to convey drinking water supplies are required to be approved under the provisions of Regulation 25(1) (a) or (b) as appropriate and the Water Regulation Advisory Scheme (WRAS) to ensure that their use will not cause adverse effect on water quality or a risk to health of consumers. In Scotland and Northern Ireland there are similar provisions. These regulations will be revised as necessary to comply with the EU Drinking Water Quality Directive.

The UK National Annex NA attached to this Standard provides additional information on the selection and installation of piping systems and components in the UK.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 29 January 2004

Amendments issued since publication

Amd. No.	Date	Comments

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Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Attention is drawn to the following statutory regulations:

Health and Safety at Work etc. Act 1974 and subsequent regulations.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because this is not a full European standard and under CEN rules member bodies have only to announce that it is available; however, the DD documents are an accepted means of announcing that the CEN/TS is available. It should be applied on this provisional basis, so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European standard. A review of this publication will be initiated 2 years after its publication by the European organization so that a decision can be taken on its status at the end of its 3-year life. Notification of the start of the review period will be made in an announcement in the appropriate issue of Update Standards.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European standard, to extend the life of the Technical Specification or to withdraw it. Comments should be sent in writing to the Secretary of BSI Technical Committee PRI/88/2 at British Standards House, 389 Chiswick High Road, London W4 4AL, giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, page i and ii, the EN title page, pages 2 to 27 and a back cover.

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TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN/TS 12201-7

August 2003

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English version

**Plastics piping systems for water supply - Polyethylene (PE) -
Part 7: Guidance for the assessment of conformity**

Systèmes de canalisations en plastiques pour
l'alimentation en eau – Polyéthylène (PE) - Partie 7: Guide
pour l'évaluation de la conformité

Kunststoff-Rohrleitungssysteme für die Wasserversorgung
– Polyethylen (PE) – Teil 7 : Empfehlungen für die
Beurteilung der Konformität

This Technical Specification (CEN/TS) was approved by CEN on 9 February 2003 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. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.



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CEN/TS 12201-7:2003 (E)

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Foreword

This document CEN/TS 12201-7:2003 has been prepared by Technical Committee CEN /TC 155, "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

This Technical Specification can be used to support the elaboration of national third party certification procedures for products conforming to the applicable Parts of EN 12201.

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 being 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 standards on general functional requirements and standards on recommended practice for installation.

EN 12201 consists of the following Parts, under the general title "*Plastics piping systems for water supply — Polyethylene (PE)*".

- *Part 1: General*
- *Part 2: Pipes*
- *Part 3: Fittings*
- *Part 4: Valves*
- *Part 5: Fitness for purpose of the system*
- *Part 7: Guidance for the assessment of conformity (this Technical Specification)*

NOTE It was decided not to publish a Part 6: Recommended practice for installation. Instead, existing national installation practices would be applicable.

This Part of EN 12201 includes the following:

- *Annex A (Normative) Change of PE compound*
- *Annex B (Normative) Change of design*
- *Bibliography*

System Standards for piping systems of other plastics materials used for the conveyance of water under pressure include the following:

EN 1452, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U)*

EN 1796, *Plastics piping systems for water supply with or without pressure — Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP)*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this CEN 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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Introduction

The System Standard, of which this is Part 7, specifies the requirements for a piping system and its components made from polyethylene (PE), intended to be used for water supply intended for human consumption including the conveyance of raw water prior to treatment.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this Technical Specification:

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

This Part of EN 12201 gives guidance for the procedures and requirements for the assessment of conformity of materials, components, joints and assemblies and is intended to be used by certification bodies, inspection bodies, testing laboratories and manufacturers.

1 Scope

This Part of EN 12201 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 Parts 1 to 5 of EN 12201;
- b) requirements for the manufacturer's quality system;

NOTE 1 It is recommended that the quality system conforms to EN ISO 9001:2000 [1]

- 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[2] or EN 45012[3], as applicable.

In conjunction with one or more Parts of EN 12201 (see Foreword) it is applicable to polyethylene (PE) piping systems intended to be used for water supply intended for human consumption including the conveyance of raw water prior to treatment.

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 12201-1:2003, *Plastics piping systems for water supply — Polyethylene (PE) — Part 1: General.*

EN 12201-2:2003, *Plastics piping systems for water supply — Polyethylene (PE) — Part 2: Pipes.*

EN 12201-3:2003, *Plastics piping systems for water supply — Polyethylene (PE) — Part 3: Fittings.*

EN 12201-4:2001, *Plastics piping systems for water supply — Polyethylene (PE) — Part 4: Valves.*

EN 12201-5:2003, *Plastics piping systems for water supply — Polyethylene (PE) — Part 5: Fitness for purpose of the system.*

EN ISO 6259-1:2001, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method (ISO 6259-1:1997).*

EN ISO 12162:1995, *Thermoplastics materials for pipes and fittings for pressure applications — Classification and designation — Overall service (design) coefficient (ISO 12162:1995).*

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

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

ISO 6259-3:1997, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes.*

ISO 13954:1997, *Plastics pipes and fittings — Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm.*

ISO 13955:1997, *Plastics pipes and fittings — Crushing decohesion test for polyethylene (PE) electrofusion assemblies.*

ISO/DIS 13956:1996, *Plastics pipes and fittings — Determination of cohesive strength — Tear test for polyethylene (PE) assemblies.*

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3 Terms, definitions, symbols and abbreviations

For the purposes of this Technical Specification the terms, definitions, symbols and abbreviations given in Part 1 and Part 3 to Part 5 of EN 12201, apply together with the following.

3.1 Terms and 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

3.1.2

inspection body

impartial organisation 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 management system

organisational structure, responsibilities, procedures, processes and resources for implementing quality management (see EN ISO 9000^[4])

3.1.5

quality management 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)

tests 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 that 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 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 batch**

clearly identifiable quantity of a particular material

3.1.15**compound batch**

clearly identifiable quantity of a given homogeneous compound manufactured under uniform conditions. The compound batch is defined and identified by the compound manufacturer

3.1.16**production batch**

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

3.1.17**pipe batch**

number of pipes, all of them the same nominal diameter and nominal wall thickness, extruded from the same compound on the same machine. The pipe batch is defined and identified by the pipe manufacturer

3.1.18**fitting or valve batch**

number of fittings or valves of the same type, identical dimensional characteristics, all the same nominal diameter and wall thickness, from the same compound. The fitting or valve batch is defined and identified by the fitting or valve manufacturer

3.1.19**lot**

clearly identifiable sub-division of a batch for inspection purposes

3.1.20**sample**

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

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

3.1.21**acceptable quality level (AQL)**

when a continuous series of lots or batches is considered, the quality level which for 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 non-conforming.

3.1.22**inspection level**

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

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3.1.23

group

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

3.1.24

product type

pipe or an individual fitting or valve or their main parts, of the same design, from a particular compound

3.1.25

body type

valve body which can have different end connections

3.1.26

cavity

part of the injection mould which gives the form to the injection moulded product

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.

NOTE 2 In the French language the abbreviation for "acceptable quality level (AQL)" is NQA, however for the purpose 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: Freigabepfung einer Charge
IT	en: indirect test fr: essai indirect de: indirekte Prüfung
ITT	en: initial type testing fr: essais de type initiaux de: Erst-Typprüfung
PTT	en: preliminary type testing fr: essais 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: essais témoin de: Prüfung unter Aufsicht

4 Requirements

4.1 General

4.1.1 Materials, components, joints and assemblies shall conform to the requirements in Parts 1 to 5 of EN 12201, 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 Effect on water quality

Attention is drawn to the requirements of National regulations (see introduction).

4.3 Testing and inspection

4.3.1 Grouping

For purpose of this Technical Specification the following groups for pipes, fittings and valves given in Table 1 shall apply.

Table 1 — Size groups for pipes, fittings and valves

	Size group			
	1	2	3	4
Nominal outside diameter, d_n	≥ 16 and < 75	≥ 75 and < 250	≥ 250 and < 710	≥ 710

4.3.2 Type tests (TT)

4.3.2.1 General

Type tests shall demonstrate that products conform to all requirements for the characteristics in Tables 2 to 5 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 to extensions of the product range.

In the case of change in PE compound as defined in A.2, relevant type tests required for re-evaluation given in A.3 shall apply.

For the extension of the product range for fittings and valves the relevant characteristics given in Tables 4 and 5 shall be tested. If applicable the test schedule shall be agreed between the certification body and the manufacturer.

4.3.2.2 Preliminary type testing (PTT)

The manufacturer shall demonstrate that the products conform to all requirements of the characteristics given in Tables 3 to 5.

For the purpose of this Technical Specification the compound manufacturer shall demonstrate the conformity to all requirements given in Table 2.

4.3.2.3 Initial type testing (ITT)

If third party certification is involved the certification body shall assess the conformity of a product to all requirements for characteristics given in Tables 2 to 5.

In such case, the assessment shall be performed by validation or testing, using the sampling procedure in Tables 2 to 5 and grouping according to 4.3.1, in an approved testing laboratory or by witness testing.

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

NOTE A manufacturer can choose to offer samples for ITT without having previously carried out PTT.

Table 2 — Characteristics that require type testing (TT) of the compound by the compound manufacturer

Characteristics	Reference to Part and clause	Minimum sampling frequency	Number of test pieces ^a	Number of measurements per test piece
Compound density	1 - 4.4	Once per compound	3	1
Carbon black content	1 - 4.4	Once per compound	3	1
Carbon black dispersion	1 - 4.4	Once per compound	1	6
Pigment dispersion	1 - 4.4	Once per compound	1	6
Oxidation induction time	1 - 4.4	Once per compound	3	1
Volatile content	1 - 4.4	Once per compound	1	1
Water content ^b	1 - 4.4	Once per compound	1	1
Melt mass flow rate	1 - 4.4	Once per compound	3	1
Classification	1 - 4.6	Once per compound (pipe $d_n \geq 32$ mm selected from size group 1, see Table 1)	Shall conform to EN ISO 12162:1995	
Slow crack growth	1 - 4.4	Once per compound (pipe size 110 or 125 SDR 11)	3	1
Resistance to RCP ^c	1 - 4.4	Once per compound (pipe size 250 SDR 11 or 500 SDR 11)	1	1
Resistance to weathering ^d	1 - 4.4	Once per compound	3/3/5 ^e	1/1/1 ^e
Fusion compatibility ^f	1 - 4.5	Once per compound	3	1
Effect on water quality	1 - 5	For effect on water quality national regulations are applicable (see introduction)		

^a The number of samples given in the table are the minimum. All samples shall pass the relevant tests.
^b Only applicable if the requirement for volatile content is not conformed to. In case of dispute the requirement for water content shall apply.
^c To be taken into account for compounds intended to be used in the manufacture of pipes having a wall thickness ≥ 32 mm. Assessment of RCP on compounds for fittings is not applicable.
^d Only for blue compounds. Samples for the OIT test shall be taken from the weathered surface, with the surface prepared as for jointing. The diameter of the test piece should be included in the test report.
^e Respectively number of samples for OIT; samples for hydrostatic strength; and samples for elongation at break, with one measurement on each sample.
^f For butt fusion pipe to pipe, both components from the same compound.

Table 3 — Characteristics that require type testing (TT) of the pipe per compound by the pipe manufacturer

Characteristics	Reference to Part and clause	Sampling procedure	Number of test piece(s) ^a	Number of measurements per test piece
Appearance and colour	2 - 5.1/5.2	Two diameters per size group	1	1
Geometrical	2 - 6	Two diameters per size group	1	1
Hydrostatic strength 20 °C; ≥ 100 h	2 - 7.2	Two diameters per size group ^b	3	1
Hydrostatic strength 80 °C; ≥ 1000 h ^c	2 - 7.2	Two diameters per size group ^b	3	1
Elongation at break	2 - 8.2	Two diameters per size group ^d	see note d	1
Oxidation induction time	2 - 8.2	Once per size groups 2, 3 and 4 ^e	3	1
Melt mass flow rate	2 - 8.2	Once per size group	3	1
Marking	2 - 11	Once per size group	1	1
Fitness for purpose	For preparation of assemblies, tests and frequency see EN 12201-5			
<p>^a The number of test piece(s) given in the table are the minimum. All test pieces shall pass the relevant tests.</p> <p>^b If the product range covers more than one size group, samples shall comprise the smallest and largest diameters manufactured plus a sample from each intermediate size group. The successful testing will validate all diameters within the range tested. Successful testing on the lowest SDR pipe will validate pipes with the same OD having a higher SDR i.e. thinner wall thickness. Where a manufacturer extends his production beyond his approval then additional type testing shall be carried out.</p> <p>^c Attention is drawn to the fact that the test requirements/parameters may be modified when revising this CEN/TS when the results of work being undertaken in ISO/TC 138 or CEN/TC 155 are known.</p> <p>^d The number of test pieces and the test piece shape shall conform to EN ISO 6259-1:2001 and ISO 6259-3:1997 respectively. The test pieces are taken from the circumference of one pipe sample.</p> <p>^e Samples to be taken from the inner wall surface.</p>				

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Table 4 — Characteristics that require type testing (TT) of the fittings per compound by the fitting manufacturer

Characteristics	Reference to part and clause	Sampling procedure	Change of PE compound	Number of test piece(s) ^a	Number of measurements per test piece
Appearance and colour	3 - 5.1/5.3	Once per size per product type per cavity	One diameter / size group / product type / cavity	1	1
Geometrical	3 - 6	Once per size per product type per cavity	One diameter / size group / product type / cavity	1	1
Hydrostatic strength 20 °C; ≥ 100 h	3 - 7.3	Once per size per product type	One diameter / size group / product type	3	1
Hydrostatic strength 80 °C; ≥ 1000 h	3 - 7.3	Once per size per product type	One diameter / size group / product type	3	1
Impact resistance of tapping tees	3 - 8.2	Once per size group per product type	One diameter / size group / product type	1	1
Leaktightness ^b a) under internal pressure b) under internal pressure subjected to bending	5 - 4.5	Once per size group per product type	—	1	1
Resistance to pull-out ^b	5 - 4.5	Once per size group per product type	—	1	1
Melt mass flow rate	3 - 8.2	Once per size group	One diameter per size group	3	1
Oxidation induction time	3 - 8.2	Once per size group	One diameter per size group	3	1
Marking	3-11	Once per size per product type per cavity	—	1	1
Fitness for purpose	For preparation of assemblies, tests and frequency see EN 12201-5				
^a The number of test pieces given in the table is the minimum. All test pieces shall pass the relevant test(s). Where applicable, test assemblies shall be prepared in accordance with EN 12201-5.					
^b Tests are for mechanical fittings only.					

Table 5 — Characteristics that require type testing (TT) of valves per compound by the valve manufacturer

Characteristics	Reference to Part and clause	Sampling procedure	Change of PE compound	Number of test pieces ^a	Number of measurements per test piece
Appearance and colour	4 - 5.1/5.3	Once per size per product group	One diameter /size group/product type	1	1
Geometrical	4 - 6	Once per size per product type	One diameter /size group/product type	1	1
Hydrostatic strength 20 °C; ≥ 100 h	4 - 7.2	Once per size per product type	Two diameter /size group/product type	3	1
Hydrostatic strength 80 °C; ≥ 1000 h ^b	4 - 7.2	Once per size per product type	Two diameter /size group/product type	3	1
Leaktightness of seat and packing	4 - 7.2	Once per body type	—	1	1
Operating torque	4 - 7.2	Once per body type	—	1	2
Stop resistance	4 - 7.2	Once per body type	Once per body type	1	2
Leaktightness a) under bending between supports b) under loading	a) 4 - 7.2 b) 4 - 7.2	a) Once per size group per product type b) Once per size group per product type	Once per size group / product type [for a) & b)]	a) 1 b) 1	a) 1 b) 1
Actuation mechanism resistance	4 - 7.2	Once per body type	—	1	1
Leaktightness under and after bending applied to the operating mechanism	4 - 7.2	Once per size per product type	Once per size group per product type	1	1
Impact loading	4 - 7.2	Once per size per product type	Once per body type	1	1
Leaktightness and ease of operation after long term internal pressure loading	4 - 7.2	Once per size per product type	Once per body type	1	1
Oxidation induction time ^b	4 - 8	Once per size	Once per size	3	1
Melt-mass flow rate ^b	4 - 8	Once per size	Once per size	3	1
Marking	4 - 10.1/10.2	Once per size per product type	—	1	1

^a The number of test pieces given in the table are the minimum. All test pieces shall pass the relevant test(s). Where applicable, test assemblies shall be prepared in accordance with EN 12201-5.

^b Only applicable to PE valve bodies.

4.3.3 Batch release tests (BRT)

Those characteristics specified in Parts 1 to 5 of EN 12201 and listed in Tables 6 to 9 shall be batch release tested with the minimum sampling frequency as given in Tables 6 to 9.

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Table 6 — Characteristics and minimum sampling frequencies for BRT, for the compound by the compound manufacturer

Characteristics ^a	Reference to Part and clause	Minimum sampling frequency	Number of samples	Number of measurements per sample
Carbon black content	1 - 4.4	Once per compound batch per week	1	1
Carbon black dispersion	1 - 4.4	Once per compound batch per week	1	6
Pigment dispersion	1 - 4.4	Once per compound batch per week	1	6
Oxidation induction time	1 - 4.4	Once per compound batch per week	1	1
Melt-mass flow rate	1 - 4.4	Once per compound batch per week	1	1
Volatile content	1 - 4.4	Once per compound batch per week	1	1
Water content ^b	1 - 4.4	Once per compound batch per week	1	1
Compound density	1 - 4.4	Once per compound batch per week	1	1

^a The compound manufacturer shall provide a certificate of conformity for each delivery at the request of the component manufacturer.
^b Only applicable if the requirement for volatile content is not conformed to. In case of dispute the requirement for water content shall apply.

Table 7 — Characteristics and minimum test frequencies for BRT for pipes by the pipe manufacturer

Characteristics	Reference to Part and clause	Minimum sampling frequency	Number of test pieces ^a	Number of measurements per test piece
Appearance and colour (coils and straight lengths)	2 - 5.1/5.2	Every 4 h. If production of an item: > 4 h, every item ^b	1	1
Geometrical (coils and straight lengths)	2 - 6	Continuously or every 4 h. If production of an item: > 4 h, every item ^b	1	1
Hydrostatic strength 80 °C; ≥ 165 h ^c	2 - 7.2	Once per pipe batch per week ^d	1	1
Melt mass-flow rate ^e	2 - 8.2	Once per pipe batch	1	1
Elongation at break	2 - 8.2	Once per pipe batch	See note f	1
Oxidation induction time ^e	2 - 8.2	Once per pipe batch	1	1
Marking	2 - 11	At start up, then every 4 h	1	1

^a The number of test pieces given in the table are the minimum. All test pieces shall pass the relevant tests.

^b An item is a coil or straight length of pipe, as it is manufactured.

^c Attention is drawn to the fact that the test requirements/parameters may be modified when revising this Technical Specification when the results of work being undertaken in ISO/TC 138 or CEN/TC 155 are known.

^d Once per batch for size groups 3 and 4.

^e Tests to be carried out where reprocessed materials are used.

^f Number of test pieces and the test piece shape are specified in EN ISO 6259-1:2001 and ISO 6259-3:1997 respectively. The test pieces are taken from the circumference of one pipe sample.

Table 8 — Characteristics and minimum sampling frequencies for BRT for fittings

Characteristics	Reference to Part and clause	Minimum sampling frequencies	Number of test pieces ^a	Number of measurements per test piece
Appearance and colour	3 - 5.1/5.3	At start of production, then after the first hour and thereafter every 4 h per size	1 ^b	1 ^b
Geometrical	3 - 6	At start of production, then after the first hour and thereafter every 4 h per size	1 ^b	1 ^b
Hydrostatic strength 80 °C; ≥ 165 h ^c	3 - 7.3	Once per fittings batch	1	1
Melt mass-flow rate ^d	3 - 8.2	Once per fittings batch per week	1	1
Oxidation induction time ^d	3 - 8.2	Once per fittings batch	1	1
Electrical resistance ^e	3 - 5.4	Each fitting	1	1
Marking	3 - 11	Once per fittings batch	1	1

^a The number of test pieces given in the table are the minimum. All test pieces shall pass the relevant tests.

^b The manufacturer can apply a sampling procedure according to ISO 2859-1:1999 as an alternative with an AQL of 4 and an inspection level S3.

^c Attention is drawn to the fact that the test requirements/parameters may be modified when revising this Technical Specification when the results of work being undertaken in ISO/TC 138 or CEN/TC 155 is known.

^d Tests to be carried out where reprocessed materials are used.

^e Applicable to electrofusion socket fittings and electrofusion saddle fittings.

Table 9 — Characteristics and minimum sampling frequencies for BRT for valves

Characteristics	Reference to Part and clause	Minimum sampling frequency	Number of test pieces ^a	Number of measurements per test piece
Appearance and colour	4 - 5.1/5.3	At start of production, then after the first hour and thereafter every 4 h per size	1 ^b	1 ^b
Geometrical	4 - 6	At start of production, then after the first hour and thereafter every 4 h per size	1 ^b	1 ^b
Hydrostatic strength 80 °C; ≥ 165 h ^c	4 - 7.3	Once per valve batch	1	1
Operating torque at 23 °C	4 - 7.3	Each valve	1 ^b	1 ^b
Actuation mechanism resistance	4 - 7.3	Once per valve batch	1	1
Leaktightness of seat and packing a) at 6 bar; b) at 25 mbar	4 - 7.3	a) each valve; b) Once per valve batch per week	a) 1 b) 1	a) 1 b) 1
Melt mass-flow rate ^d	4 - 8	Once per valve batch	1	1
Oxidation induction time ^d	4 - 8	Once per valve batch	1	1
Marking	4 - 10.1/10.2	Once per batch	1	1
<p>^a The number of test pieces given in the table are the minimum. All test pieces shall pass the relevant tests.</p> <p>^b The manufacturer can apply a sampling procedure according to ISO 2859-1:1999 as an alternative with an AQL of 4 and an inspection level S3.</p> <p>^c Attention is drawn to the fact that the test requirements/parameters may be modified when revising this Technical Specification when the results of work being undertaken in ISO/TC 138 or CEN/TC 155 is known.</p> <p>^d Tests to be carried out where reprocessed materials are used.</p>				

The manufacturer shall specify a batch or a 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 in Tables 6 to 9, the batch or lot shall be rejected or the retest procedures shall be performed for the characteristics on which the product failed.

The retest procedure shall conform to Tables 6 to 9 and shall be either procedure A or procedure B as follows:

a) Procedure A

Find the last product which conforms to the requirements as specified in Parts 1 to 5 of EN 12201.

Release all products produced before that point and reject the products after that point.

b) Procedure B

Use retest procedures in accordance with ISO 2859-1:1999 or ISO 3951:1989, as applicable, with an AQL of at least 4 and an inspection level S3, if the retest requirements are conformed to then release the batch or lot if they are not conformed to then reject the batch or lot.

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

4.3.4 Process verification tests (PVT)

Those characteristics contained in Parts 1 to 5 of EN 12201 listed in Tables 10 to 13, shall be process verification tested with the minimum sampling frequency as given in Tables 10 to 13.

Table 10 — Characteristics and minimum test frequencies for PVT for the compound by the compound manufacturer per production site

Characteristics	Reference to Part and clause	Minimum sampling frequency	Number of samples	Number of measurements per sample
Classification ^a	1 - 4.6	Once / 2 years / compound	b	1
Slow crack growth	1 - 4.4	Once / year / compound	1	1
Resistance to RCP	1 - 4.4	Once / compound / five years	1	1

^a Test shall be performed on size group 1 pipe (see Table 1). Check two stress levels at 20 °C taken from the predicted LCL-curve of the original classification dataset corresponding to 2500 h and at least 100 h respectively.

^b Test three test pieces at each stress level. The corresponding times shall be exceeded without failure.

Table 11 — Characteristics and minimum sampling frequencies for PVT for pipes per production site

Characteristics	Reference to part and clause	Minimum sampling frequency	Number of test pieces	Number of measurements per test piece
Hydrostatic strength at 80 °C; ≥ 1000 h	2 - 7.2	Once per size group per year / compound designation ^{a b}	3 ^c	1
Oxidation induction time	2 - 8.2	Once per size groups 2, 3 and 4 per year	1	1

^a Rotate sizes, SDR and compound as applicable.

^b For compound designation see Table 3 of EN 12201-1:2003.

^c One for size groups 3 and 4.

Table 12 — Characteristics and minimum sampling frequencies for PVT for fittings

Characteristics	Reference to part and clause	Minimum sampling frequency	Number of test pieces	Number of measurements per test piece
Hydrostatic strength 80 °C; ≥ 1000 h	3 - 7.3	Once / size group per year ^a	3 ^b	1
Oxidation induction time	3 - 8.2	Once per size groups 2, 3 and 4 per year	1	1

^a Rotate sizes, SDR and compound each year.

^b One for size groups 3 and 4.

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Table 13 — Characteristics and minimum sampling frequencies for PVT for valves

Characteristics	Reference to part and clause	Minimum sampling frequency	Number of test pieces	Number of measurements per sample
Hydrostatic strength 80 °C; ≥ 1000 h ^a	4 - 7	Once / size group per year ^b	3	1
Stop resistance	4 - 7	Once / size group per year ^b	1	1
Leaktightness under bending between supports	4 - 7	Once /size group per year ^b	1	1
Leaktightness under loading	4 - 7	Once / size group per year ^b	1	1
Oxidation induction time ^a	4 - 7	Once per size groups 2 per year	1	1
Impact loading	4 - 7	Once / size group per year ^b	1	1
^a Only for valves with PE bodies.				
^b Rotate sizes and SDR each year.				

If the product does not conform to the requirements in respect of any characteristics in Tables 10 to 13, the retest procedures 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 in the manufacturer's quality plan.

4.3.5 Audit tests (AT)

All respective requirements of this System Standard may be subject to auditing. If third party certification is involved the selection of the tests shall be agreed between the manufacturer and the certification body and shall at least consist of the characteristics listed in Tables 14 to 17 and may be validated by auditing. Audit test data validated by the certification body may be deemed acceptable for PVT purposes.

NOTE The sizes, types and classes selected for tests should be primarily those which have not previously been selected for audit testing.

Samples should preferably be taken from the largest volume of production per size group.

Table 14 — Characteristics and minimum sampling frequencies for AT for the compound

Characteristics	Reference to part and clause	Minimum sampling frequency	Number of samples	Number of measurements per sample
Classification ^a	1 - 4.6	Once per compound per two years	See note ^b	1
Resistance to slow crack growth	1 - 4.4	Once per compound per year	1	1
Resistance to rapid crack growth RCP	1 - 4.4	Once per compound per five years	1	1
^a Test shall be performed on size group 1 pipe (see Table 1). Check two stress levels at 20 °C taken from the predicted LCL curve of the original classification dataset corresponding to 2500 h and at least 100 h respectively.				
^b Test three test pieces at each stress level. The corresponding times shall be exceeded without failure.				

Table 15 — Characteristics and minimum sampling frequencies for AT for pipes

Characteristics	Reference to Part and clause	Minimum sampling frequency	Number of test pieces	Number of measurements per test piece
Appearance and colour	2 - 5.1/5.2	Once per size group per year	1	1
Geometrical	2 - 6	Once per size group per year	1	1
Hydrostatic strength 20 °C; ≥ 100 h	2 - 7.2	Once / size group per year ^a	3 ^b	1
Hydrostatic strength 80 °C; ≥ 1000 h ^c	2 - 7.2	Once / size group per year ^a	3 ^b	1
Oxidation induction time	2 - 8.2	Once / size group per year	1	1
Melt mass flow rate	2 - 8.2	Once / size group per year	1	1

^a Sizes and SDR shall be rotated each year.
^b One for size groups 3 and 4.
^c Samples to include butt fused pipe to pipe and pipe to spigot fitting.

Table 16 — Characteristics and minimum sampling frequencies for AT for fittings

Characteristics	Reference to Part and clause	Minimum sampling frequency	Number of test pieces	Number of measurements per test piece
Appearance and colour	3 - 5.1/5.3	Once per size group per year	1	1
Geometrical	3 - 6	Once per size group per year	1	1
Hydrostatic strength 20 °C; ≥ 100 h	3 - 7.3	Once per size group per year ^a	3 ^b	1
Hydrostatic strength 80 °C; ≥ 1000 h	3 - 7.3	Once per size group per year ^a	3 ^b	1
Cohesive resistance for electrofusion fittings type 1 and 2	5 - 4.4	Once per size group per year	1	Shall conform to ISO 13954:1997, ISO 13955:1997 and ISO/DIS 13956: 1996
Resistance to pull out for fitting type 4	5 - 4.5	Once per size group per year	1	1
Impact resistance for fitting types 2	3 - 8.2	Once per size group per year	1	1
Leaktightness under bending for fitting type 4	5 - 4.5	Once per size group per year	1	1

^a Sizes and SDR shall be rotated each year
^b 1 for size groups 3 and 4.
Fitting types: 1 - electrofusion socket fittings;
2 - electrofusion saddle fittings;
3 - spigot end fittings fabricated by butt fusion;
4 - mechanical fittings; .

Table 17 — Characteristics and minimum sampling frequencies for AT for valves

Characteristics	Reference to Part and clause	Minimum sampling frequency	Number of test pieces	Number of measurements per test piece
Appearance and colour	4 - 5.1/5.3	Once per size group per year	1	1
Geometrical	4 - 6	Once per size group per year	1	1
Hydrostatic strength 20 °C; ≥ 100 h	4 - 7.3	Once per size group per year	3 ^a	1
Hydrostatic strength 80 °C; ≥ 1000 h ^b	4 - 7.3	Once per size group per year	3 ^a	1
Stop resistance	4 - 7.3	Once per size group per year	1	1
Operating torque	4 - 7.3	Once per size group per year	1	1
Leaktightness under bending	4 - 7.3	Once per size group per year	1	1
Leaktightness under loading	4 - 7.3	Once per size group per year	1	1
Impact resistance	4 - 7.3	Once per size group per year	1	1
^a Rotate sizes and SDR each year.				
^b Only for valves with PE bodies.				

4.3.6 Indirect tests (IT)

Generally testing shall be performed according to the test methods referred to in Parts 1 to 5 of EN 12201. Indirect testing may be used for the BRT and PVT characteristics as given in Tables 6 to 13. 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 cases of dispute the BRT or PVT as specified in Tables 6 to 13 shall be used.

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

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

4.3.7 Inspection records and test records

Unless otherwise specified all records shall be maintained for a minimum of 10 years.

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Annex A
(normative)

Change of PE compound

A.1 General

For the purposes of this Technical Specification the following definitions of the changes of compound formulation and the necessary type testing required for re-evaluation shall apply.

A.2 Change

A.2.1 Change of base polymer

Change of polymer manufacturer, polymerisation process or chemical nature of the co-monomer shall be considered as a change of the base polymer.

A.2.2 Change of grade

The following shall be considered a change of grade:

A.2.2.1 Any change of nominated density and/or MFR outside the following limits:

- a) increase in MFR (5 kg) > 20 % or 0,1 g/10min (whichever is the largest value);
- b) change of density > 3 kg/m³.

If the changes are within these limits, only PVT testing as Table 10 is required.

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A.2.2.2 Production of the same base polymer at a different site.

A.2.3 Change of pigment

The following shall be considered a change of pigment:

A.2.3.1 change of the chemical nature or colour of the pigment;

A.2.3.2 increase of pigment level by > 30 %.

A.2.4 Change of additives other than pigments

The following shall be considered a change of additives other than pigments:

A.2.4.1 Change of chemical nature or addition or deletion of any additive.

A.2.4.2 Change of any additive (other than UV stabilisers) level by more than 30 %;

A.2.4.3 Decrease of UV stabiliser by > 30 % or increase by > 50 %.

A.3 Type testing required for re-evaluation

A.3.1 Changes A.2.1 and A.2.3.1

Changes according to A.2.1 and A.2.3.1 are generally regarded as a new compound. Therefore all type tests are required. Exception: In the case of A.2.1 weathering tests are not required if the same pigments and additive package are used and are within the limits given in A.2.3 and A.2.4. For fittings and valves retest requirements as listed in Tables 4 and 5.

A.3.2 Changes A.2.2.1, A.2.2.2, A.2.3.2, A.2.4.1, A.2.4.2 and A.2.4.3

In case of changes according to A.2.2.1, A.2.2.2, A.2.3.2, A.2.4.1, A.2.4.2 and A.2.4.3, tests shall to be carried out as identified in Table A.1 in accordance with Tables 2 and 10.

Failure to meet the specified requirements for a given change is not acceptable.

Table A.1

Test	Change ^a					
	A.2.2.1	A.2.2.2	A.2.3.2	A.2.4.1	A.2.4.2	A.2.4.3
Physical ^b	X	X	X	X	X	X
Slow crack growth	X	X	X	X	X	X
Rapid crack propagation	X	X	X	X	—	—
Fusion compatibility	X	—	X	X	X	X
Weathering	—	—	—	X	—	X
Hydrostatic strength 20 °C ^c	X	X	—	X	—	—
Hydrostatic strength 80 °C ^c	X	X	X	X	X	X

^a "X" denotes the type of test to be carried out when there is a change of PE compound
^b As given in Table 2 of this Technical Specification (density, OIT, water content, carbon black content and dispersion, pigment dispersion and MFR).
^c Test shall be performed on size group 1 pipe (see Table 1). Check two stress levels at 20 °C and 80 °C taken from the predicted LCL curve of the original classification dataset corresponding to 2500 h and at least 100 h respectively. Test three test pieces at each stress level. The corresponding times shall be exceeded without failure. Failure to meet this requirement will mean that the compound has changed sufficiently to require full re-evaluation.

Annex B
(normative)

Change of design

The following characteristics are relevant for the purpose of the change of design of fittings and valves.

- a) dimensions / change in geometry;
- b) change in the jointing design. e.g. change of wiring resistance in electrofusion fittings.

In the case of dimensions a change shall be considered if the dimensional changes are outside the tolerances specified in the manufacturers quality plan.

For the purpose of re-evaluation the fittings shall be tested in accordance with EN 12201-5 for those properties affected by the change.

If there is an extension to the range of fittings to those already type tested then type tests specified in Tables 4 and 5 shall be carried out (see 4.3.2.1).

Bibliography

- [1] EN ISO 9001, *Quality management systems — Requirements (ISO 9001: 2000)*.
- [2] EN 45011, *General requirements for bodies operating product certification systems (ISO/IEC Guide 65:1996)*.
- [3] EN 45012, *General requirements for bodies operating assessment and certification/registration of quality systems (ISO/IEC Guide 62:1996)*.
- [4] EN ISO 9000, *Quality management systems — Fundamentals and vocabulary (ISO 9000:2000)*.

National Annex NA (informative)**Additional information on the selection and installation of piping systems and components in the UK**

The responsible UK committee gives the following advice: This DD CEN/TS is a document with a limited life and will be reviewed in two years, during which time its suitability to be converted into a full European Standard, or for it to remain as a CEN/TS for a further period, will be assessed. This DD CEN/TS can be invoked as a contractual agreement.

Attention is drawn to the requirements for slow crack growth (SCG) in WIS 4-32-17 (Issue 2)¹⁾ which requires the pipe manufacturers to carry out a 165 h SCG test for batch release test (BRT) in accordance with BS EN ISO 13479²⁾. This is an alternative test to the BRT 165 h test in Table 7 and is allowed as an “indirect test” (IT) as defined in 3.1.12.

¹⁾ WRc. WIS 4-32-17 (Issue 2), *Specification for polyethylene pressure pipes for pressurised water supply and sewerage duties*. Swindon: WRc, 2001.

²⁾ BS EN ISO 13479:1997, *Polyolefin pipes for the conveyance of fluids — Determination of resistance to crack propagation — Test method for slow crack growth on notched pipes (notch test)*.

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