DRAFT FOR DEVELOPMENT

DD CEN/TS
13244-7:2003

Plastics piping systems for buried and above-ground pressure systems for water for general purposes, drainage and sewerage — Polyethylene (PE) —

Part 7: Guidance for the assessment of conformity

ICS 93.030

BSI
British Standards

National foreword

This Draft for Development (DD) is the official English language version of CEN/TS 13244-7:2003. No existing British Standard will be superseded by the implementation of CEN/TS 13244-7:2003.

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.

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.

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 relations.

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 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.

Summary of pages

This document comprises a front cover, an inside front cover, the CEN/TS title page, pages 2 to 26, the National Annex NA page and a back cover.

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ICS 93.030

English version

Plastics piping systems for buried and above-ground pressure systems for water for general purposes, drainage and sewerage — Polyethylene (PE) — Part 7: Guidance for the assessment of conformity

Systèmes de canalisations en plastique pour les applications générales de transport d'eau, de branchement et de collecteurs d'assainissement, enterrés sous pression — Polyéthylène (PE) — Partie 7: Guide pour l'évaluation de la conformité

Kunststoff-Rohrleitungssysteme für erd- und oberirdisch verlegte Druckrohrleitungen für Brauchwasser, Entwässerung und Abwasser — Polyethylen (PE) — Teil 7: Empfehlungen für die Beurteilung der Konformität

This Technical Specification (CEN/TS) was approved by CEN on 9 October 2002 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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Foreword

This document CEN/TS 13244-7:2003 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 13244.

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 13244 consists of the following Parts, under the general title "Plastics piping systems for buried and above-ground pressure systems for water for general purposes, drainage and sewerage — 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 Technical Specification includes the following annexes.

— 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, drainage and sewerage under pressure include the following:

EN 1456, *Plastics piping systems for buried and above- ground drainage and sewerage under pressure – Unplasticized poly(vinyl chloride) (PVC-U)*

prEN 14364, *Plastics piping systems for pressure and non-pressure drainage and sewerage — Glass-reinforced thermosetting (GRP) plastics based on 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.

Introduction

The System Standard, of which this is Part 7, specifies the requirements for a piping system and its components made from polyethylene (PE). It is intended to be used for buried and above-ground pressure systems for water for general purposes, drainage and sewerage.

This Part of EN 13244 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 13244 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 13244;

b) requirements for the manufacturer's quality system;

NOTE 1 It is recommended that the quality system conforms to EN ISO 9001 [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 13244 (see Foreword) it is applicable to polyethylene (PE) piping systems intended to be used for buried and above-ground pressure systems for water for general purposes, drainage and sewerage.

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 13244-1:2002, *Plastics piping systems for buried and above-ground pressure systems for water for general purposes, drainage and sewerage — Polyethylene (PE) — Part 1: General.*

EN 13244-2:2002, *Plastics piping systems for buried and above-ground pressure systems for water for general purposes, drainage and sewerage — Polyethylene (PE) — Part 2: Pipes.*

EN 13244-3:2002, *Plastics piping systems for buried and above-ground pressure systems for water for general purposes, drainage and sewerage — Polyethylene (PE) — Part 3: Fittings.*

EN 13244-4:2002, *Plastics piping systems for buried and above-ground pressure systems for water for general purposes, drainage and sewerage — Polyethylene (PE) — Part 4: Valves.*

EN 13244-5:2002, *Plastics piping systems for buried and above-ground pressure systems for water for general purposes, drainage and sewerage — 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.*

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 13244, 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, witness 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 an inspection or 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 inspection or 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 unit of product.

3.1.22
inspection level
relationship between the lot or batch size and the sample size (see ISO 2859-1:1999)

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: Freigabeprüfung 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 given in Parts 1 to 5 of EN 13244, 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 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	32 and < 75	75 and < 250	250 and < 710	710

4.2.2 Type tests (TT)

4.2.2.1 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.

4.2.2.2 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.

4.2.2.3 Initial type testing (ITT)

If third party certification is involved the certification body shall assess the conformity of a product to all requirements for 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 4.2.1, in an approved testing laboratory or by witness testing.

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 samples [a]	Number of measurements per sample
Compound density	1 – 4.3	Once per compound	3	1
Carbon black content	1 – 4.3	Once per compound	3	1
Carbon black dispersion	1 – 4.3	Once per compound	1	6
Pigment dispersion	1 – 4.3	Once per compound	1	6
Oxidation induction time	1 – 4.3	Once per compound	3	1
Volatile content	1 – 4.3	Once per compound	1	1
Water content [b]	1 – 4.3	Once per compound	1	1
Melt mass-flow rate	1 – 4.3	Once per compound	3	1
Classification	1 – 4.5	Once per compound (pipe d_n 32 mm selected from size group 1, see Table 1)	Shall conform to EN ISO 12162:1995	Shall conform to EN ISO 12162:1995
Slow crack growth	1 – 4.3	Once per compound (pipe size 110 or 125 SDR 11)	3	1
Resistance to RCP [c]	1 – 4.3	Once per compound (pipe size 250 SDR 11 or 500 SDR 11)	1	1
Resistance to weathering [d]	1 – 4.3	Once per compound	3/3/5 [e]	1/1/1 [e]
Fusion compatibility [f]	1 – 4.4	Once per compound	3	1

[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 non black 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] Three samples for OIT,/ three samples for hydrostatic strength,/ five 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 [c]	3	1
Hydrostatic strength 80 °C; 1000 h [b]	2 – 7.2	Two diameters per size group [c]	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 13244-5			

[a] The number of test piece(s) given in the table are the minimum. All test pieces shall pass the relevant tests.

[b] Attention is drawn to the fact that the test requirements/parameters may be modified when revising this TS when result of work being undertaken in ISO/TC 138 or CEN/TC 155 is known.

[c] 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.

[d] The number of test pieces and 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.

[e] Samples to be taken from the inner wall surface.

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
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	3–12.1/12.2	Once per size per product type	-	1	1
Fitness for purpose	For preparation of assemblies, tests and frequency see EN 13244-5				

[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 13244-5.

[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 type	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 – 7.3	Once per size per product type	Two diameter / size group / product type	3	1
Hydrostatic strength 80 °C; 1000 h[b]	4 – 7.3	Once per size per product type	Two diameter / size group / product type	3	1
Leaktightness of seat and packing	4 – 7.3	Once per body type	—	1	1
Operating torque	4 – 7.3	Once per body type	—	1	2
Stop resistance	4 – 7.3	Once per body type	Once per body type	1	2
Leaktightness a) under bending between supports b) under loading	4 – 7.3 4 – 7.3	Once per size group per product type Once per size group per product type	Once per size group / product type [for a) & b)]	1 1	1 1
Actuation mechanism resistance	4 – 7.3	Once per body type	—	1	1
Leaktightness under and after bending applied to the operating mechanism	4 – 7.3	Once per size per product type	Once per size group / product type	1	1
Impact loading	4 – 7.3	Once per size per product type	Once per body type	1	1
Leaktightness and ease of operation after long term internal pressure loading	4 – 7.3	Once per size per product type	Once per body type	1	1
Oxidation induction time [b]	4 – 8.2	Once per size	Once per size	3	1
Melt mass-flow rate [b]	4 – 8.2	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 13244-5.

[b] Only applicable to PE valve bodies.

4.2.3 Batch release tests (BRT)

Those characteristics specified in Parts 1 to 5 of EN 13244 and listed in Tables 6 to 9 shall be batch release tested with the minimum sampling frequency as given in Tables 6 to 9.

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 – 4.3	Once per compound batch per week	1	1
Carbon black dispersion	1 – 4.3	Once per compound batch per week	1	6
Pigment dispersion	1 – 4.3	Once per compound batch per week	1	6
Oxidation induction time	1 – 4.3	Once per compound batch per week	1	1
Melt mass-flow rate	1 – 4.3	Once per compound batch per week	1	1
Volatile content	1 – 4.3	Once per compound batch per week	1	1
Water content [b]	1 – 4.3	Once per compound batch per week	1	1
Compound density	1 – 4.3	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 [b]: > 4 h, every item	1	1
Geometrical (coils and straight lengths)	2 – 6	Continuously or every 4 h If production of an item [b]: > 4 h, every item	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 coiled or straight pipe as it is manufactured.

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

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	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 – 12.1, 12.2	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 TS 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 first the 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	a) 1	a) 1
		b) Once per valve batch per week	b) 1	b) 1
Melt mass-flow rate [d]	4 – 8.2	Once per valve batch	1	1
Oxidation induction time [d]	4 – 8.2	Once per valve batch	1	1
Marking	4 – 10.1/10.2	Once per batch	1	1

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

[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 TS 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.

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 13244. 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.

4.2.4 Process verification tests (PVT)

Those characteristics contained in Parts 1 to 5 of EN 13244 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	See note b	1
Slow crack growth	1 – 4.3	Once / year / compound	1	1
Resistance to RCP	1 – 4.3	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 data set 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 13244-1:2002. [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 per 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.				

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 [b]	4 – 7.3	Once / size group per year [a]	3	1
Stop resistance	4 – 7.3	Once / size group per year [a]	1	1
Leaktightness under bending between supports	4 – 7.3	Once /size group per year [a]	1	1
Leaktightness under loading	4 – 7.3	Once / size group per year [a]	1	1
Oxidation induction time [b]	4 – 8.2	Once / size group 2 per year	1	1
Impact resistance	4 – 7.3	Once / size group per year [a]	1	1
[a] Rotate sizes and SDR each year. [b] Only for valves with PE bodies.				

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.

4.2.5 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 per size group per year [a]	3 [b]	1
Hydrostatic strength 80 °C; 1000 h [c]	2 – 7.2	Once per size group per year [a]	3 [b]	1
Elongation at break	2 – 8.2	Once per size group per year	See Table 3	1
Oxidation induction time	2 – 8.2	Once per size group per year	1	1
Melt mass-flow rate	2 – 8.2	Once per 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, fittings type 1and 2	5 – 4.5	Once per size group per year	1	Shall conform to ISO 13954:1997, ISO 13955:1997 & ISO/DIS 13956:1996
Resistance to pull-out for fitting type 4	5 – 4.5	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] One 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 [a]	3[b]	1
Hydrostatic strength 80 °C; 1000 h [c]	4 – 7.3	Once per size group per year [a]	3[b]	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] One for size groups 1 and 2.

[c] Only for valves with PE bodies.

4.2.6 Indirect tests (IT)

Generally testing shall be performed according to the test methods referred to in Parts 1 to 5 of EN 13244. 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.

4.2.7 Inspection records and test records

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

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/10 min (whichever is the largest value);

b) change of density > 3 kg/m^3.

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

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 be carried out as given 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 13244-5 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 4.2.2.1).

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 13479[2)]. 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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