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Lid van EOTA  
Member of EOTA

**European Technical Approval**  
(original version is in the Dutch language)

**ETA 05/0042**

**Trade name**

**>MIDI< SYSTEM**

**Holder of the approval**

**HPG Heizrohr Produktions GmbH  
Christinenstrasse 19  
D-40880 Ratingen  
[www.hpg-online.de](http://www.hpg-online.de)**

**Generic type and use  
of construction product**

**Plastics piping kits for heating systems,  
made of PE-RT Type I with an oxygen barrier  
layer**

**Validity**                      **from**  
   **to**

**14-03-2005  
14-03-2010**

**Manufacturing plant**

***Pipes:*  
HPG Heizrohr Produktions GmbH  
Christinenstrasse 19  
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[www.hpg-online.de](http://www.hpg-online.de)**

***Fittings:*  
Kalliopi Karipidis  
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**Report number**

**Kiwa K26786**

**This European Technical Approval  
contains**

**12 pages**



Europese Organisatie voor Technische Goedkeuringen  
European Organisation for Technical Approvals  
Europäische Organisation für Technische Zulassungen  
Organisation pour l'Agrément Technique Européen

## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European Technical Approval is issued by Kiwa N.V., Certificatie en Keuringen, further mentioned as Kiwa N.V., in accordance with:

Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by the Council Directive 93/68/EEC of 22 July 1993<sup>2</sup>;

Besluit van 7 augustus 2001, houdende vaststelling van voorschriften met betrekking tot het bouwen van bouwwerken uit het oogpunt van veiligheid, gezondheid, bruikbaarheid, energiezuinigheid en milieu (Bouwbesluit)<sup>3</sup>, gewijzigd door Besluit van 17 april 2002, houdende wijziging van het Bouwbesluit en enige andere maatregelen van bestuur (correcties en aanvullingen van het Bouwbesluit en aanpassing van andere besluiten aan het Bouwbesluit) en de Ministeriële regeling Bouwbesluit 2003<sup>4</sup>;

Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex of Commission Decision 94/23/EC<sup>5</sup>.

CUAP 08.02/13<sup>6</sup>; Plastics piping kits for heating systems, made of PE-RT Type I with an oxygen barrier layer.

- 2 Kiwa N.V. is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Kiwa N.V., in particular after information by the Commission on the basis of Article 5 (1) of Council Directive 89/106/EEC.
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- 6 The European technical approval is issued by the approval body in its official language. The version corresponds to the English version which is circulated within EOTA. Translations into other languages have to be designated as such.

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<sup>1</sup> Official Journal of the European Communities N° L 40, 11.02.1989, p. 12

<sup>2</sup> Official Journal of the European Communities N° L 220, 30.08.1993, p. 1

<sup>3</sup> Staatsblad 2001: 410; Staatsblad 2002: 203, 516, 518 en 582

<sup>4</sup> Staatscourant 2002, nr. 241; 2003, nr. 101

<sup>5</sup> Official Journal of the European Communities N° L 17, 20.01.1994, p.34

<sup>6</sup> CUAP 08.02/13 :2004-05-26; Plastics piping kits for heating systems, made of PE-RT Type I with an oxygen barrier layer + Amendment dated 2004-11-29

## II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of products and intended use

#### 1.1 Definition of products

This European Technical Approval applies to the following kit:

Pipes made of PE-RT Type I

nominal outside diameter ( $d_n$ )	:	- 12 x 2,0
and nominal wall thickness ( $e_n$ )	:	- 14 x 2,0
	:	- 16 x 2,0
	:	- 17 x 2,0
	:	- 18 x 2,0
	:	- 20 x 2,0
type of oxygen barrier layer	:	EVOH
construction type	:	5 layer
Size group (according to prEN 15015)	:	1 ( $d_n \leq 63$ )

Metal fittings according to EN 1254-3

type of metal	:	brass; CW614N
type of compression ends	:	A
type of elastomeric sealing elements (EN 681-1)	:	- material : EPDM
	:	- type : WD
	:	- hardness (IRHD) : 70
Type groups (according to prEN 15015)	:	2 (Elbows and tees)
	:	3 (Reducers, couplers, end caps)

Criteria on acceptance and rejection are laid down in the FPC system of the manufacturer.

#### 1.2 Intended use

Plastics piping kits are used for the conveyance of water (not intended for human consumption) for heating systems according to class 4 and/or class 5 of ISO/FDIS 10508.

The design pressure ( $p_D$ ) shall be 4 or 6 bar; pressure group according prEN 15015: 1 ( $p_D \leq 6$  bar), according to following table:

Class	$p_D$ (bar)	12 x 2,0	14 x 2,0	16 x 2,0	17 x 2,0	18 x 2,0	20 x 2,0
4	4	x	x	x	x	x	x
	6	x	x	x	x	x	x
5	4	x	x	x	x	x	x
	6	x	x	x	x	x	-

The provisions made in this ETA are based on an assumed intended working life of 50 years for the plastics piping kits. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a mean for choosing the right product in relation the expected reasonable working life of the works.

## 2 Characteristics of the product and methods of verification

### 2.1 Composition and manufacturing process

The composition and the manufacturing process of the pipe and fitting correspond to the product subject to the approval testing.

Details of the composition and manufacturing process are deposited at Kiwa N.V.

### 2.2 Safety in case of fire

#### 2.2.1 Reaction to fire on the pipe

Euroclass F according to EN 13501-1, no performance determined.

#### 2.2.2 Reaction to fire on the fitting

Euroclass F according to EN 13501-1, no performance determined.

### 2.3 Raw materials of the pipe

#### 2.3.1 PE-RT material of the stress bearing layer

##### 2.3.1.1 Melt mass flow rate

The melt mass flow rate (MFR) is determined in accordance with prEN-ISO 1133 with the following test conditions:

Load	: 2,16 kg
Test temperature	: 190°C
Time	: 10 min

The melt mass flow rate is between 0,6 g/10 min and 0,9 g/10 min.

##### 2.3.1.2 Oxidation induction time

The oxidation induction time (OIT) is determined in accordance with EN 728 at a temperature of 210°C. The OIT is greater than 40 minutes.

##### 2.3.1.3 Density

The density is determined in accordance with prEN-ISO 1183-1 at a temperature of 23°C. The density is between 0,931 kg/m<sup>3</sup> and 0,935 kg/m<sup>3</sup>.

##### 2.3.1.4 Demonstrating conformance to the reference curves

The tested PE-RT Type I material shows conformance to the reference curves of ISO/DIS 24033 according to annex A of CUAP 08.02/13.

#### 2.3.2 EVOH oxygen barrier layer

The thermal stability ( $T_{50y}$ ) of the ethylene vinyl-alcohol copolymer (EVOH) oxygen barrier layer is determined in accordance with annex B of CUAP 08.02/13. The thermal stability ( $T_{50y}$ ) is greater than 70°C.

#### 2.3.3 Adhesive layer(s)

The peak melting temperature is determined in accordance with EN-ISO 11357-3. The peak melting temperature is greater than 120°C.

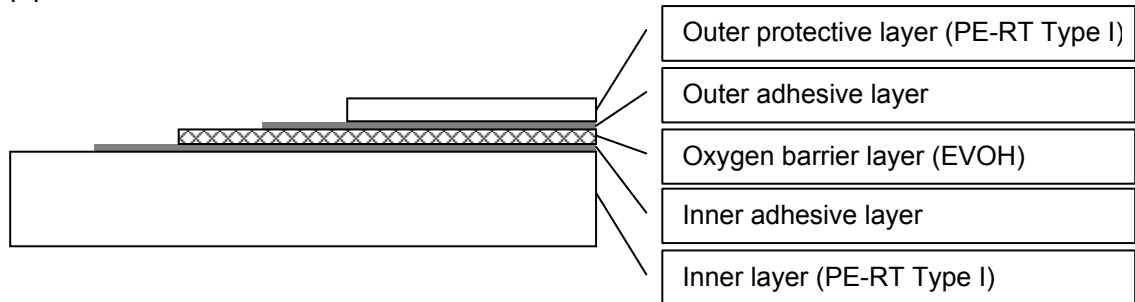
#### 2.3.4 Outer layer

The outer layer is made from the same PE-RT material as used for the inner stress bearing layer and therefore covered by clause 2.3.1 of this ETA.

## 2.4 Extruded pipe, inclusive oxygen barrier layer and outer layer

### 2.4.1 Build up of the pipe

For the build up of the pipes a schematic representation of the cross section of the wall of the PE-RT pipe with an oxygen barrier layer and outer protective layer is depicted in the figure below. The cross section is made downwards from outer till inner layer of the pipe.



All pipes are 5 layer pipes as depicted above. The inner and outer adhesive layers are of the same material as are the inner stress bearing layer and the outer protective layer.

The colour of the inner and/or outer layer of the pipes is dependent on the market driven choices of the customer.

### 2.4.2 Geometrical characteristics

The dimensions of the extruded pipes are measured in accordance with prEN-ISO/FDIS 3126. For the nominal outside diameters the tolerances of the mean outside diameter ( $d_{em}$ ), out-of roundness (ovality) and wall thickness ( $e$ ) are within the following ranges:

DN/OD	$d_{em}$ (mm)	ovality (mm)	$e$ (mm)
12	12,1 - 12,4	$\leq 0,5$	2,0 - 2,4
14	14,1 - 14,4	$\leq 0,5$	2,0 - 2,4
16	16,1 - 16,4	$\leq 0,5$	2,0 - 2,4
17	17,1 - 17,4	$\leq 0,5$	2,0 - 2,4
18	18,1 - 18,4	$\leq 0,5$	2,0 - 2,4
20	20,1 - 20,4	$\leq 0,5$	2,0 - 2,4

### 2.4.3 Longitudinal reversion

The longitudinal reversion of the extruded pipe inclusive barrier and protective layers, is determined in accordance with EN 743, method B with the following testing conditions:

Medium	: air
Temperature	: 110°C
Exposure time	: 60 min

The longitudinal reversion is smaller than 2,0%.

### 2.4.4 Elongation at break (PE-RT)

The elongation at break of the extruded pipe is determined in accordance with EN-ISO 6259-1 with the following conditions:

Temperature	: 23°C
Test piece	: Type 2
Speed of test	: 100 mm/min

The elongation at break is greater than 350%.

#### 2.4.5 Thermal stability (PE-RT)

The thermal stability of the extruded pipe is determined in accordance with EN 921 with the following testing conditions:

Temperature	: 110°C
Hydrostatic hoop stress	: 1,8 MPa
End caps	: Type A
Medium	: Water in air

The thermal stability exceeds the 8760 hours.

#### 2.4.6 Melt mass flow rate (PE-RT)

The melt mass flow rate (MFR) of the extruded pipe is determined in accordance with prEN-ISO 1133 with the following test conditions:

Load	: 2,16 kg
Test temperature	: 190°C
Time	: 10 min

The deviation of the melt mass flow rate with the MFR of the PE-RT raw material as determined in clause 2.3.1.1 of this ETA is smaller than 20% of the initial value.

#### 2.4.7 Hydrostatic strength

The resistance to the internal hydrostatic pressure of the extruded pipe is determined in accordance with EN 921 with the following testing conditions:

Testing temperature	: 95°C
Hoop stress ( $\sigma$ )	: 3,5 N/mm <sup>2</sup>
End caps	: Type A
Medium	: Water in water

The testing time exceeds the 1000 hours.

#### 2.4.8 Release of dangerous substances

The PE-RT Type I pipe with an oxygen barrier layer as defined in 1.1, in regard to the release of dangerous substances has been assessed with the procedures detailed in Guidance Paper H<sup>7</sup>.

The manufacturers have made declarations that the PE-RT Type I pipes with an oxygen barrier layer do not contain dangerous substances according to the European regulations.

The composition and used colour master batches are deposited at Kiwa N.V.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

## 2.5 Raw materials of the fittings

### 2.5.1 Metal fittings

#### 2.5.1.1 Pressure test

The bodies of the fittings are tested in accordance with clause 5.1 of EN 1254-3.

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<sup>7</sup> Guidance paper H, a harmonised approach relating to Dangerous Substances under the Construction Products Directive (revision August 2002)

The testing time without leakage, determined during testing at 20 bar at an ambient temperature exceeds 1 hour.

**2.5.2 Elastomeric sealing elements**

The elastomeric sealing elements are according to EN 681-1. The elastomeric sealing elements are fabricated from EPDM with an IRHD of 70 and of type WD according to EN 681-1.

**2.5.3 Release of dangerous substances**

The fittings as defined in 1.1, in regard to the release of dangerous substances has been assessed with the procedures detailed in Guidance Paper H.

The manufacturer has made a declaration that the fittings do not contain dangerous substances according to the European regulations.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

**2.6 Fitting characteristics**

**2.6.1 Geometrical characteristics**

The dimensions of the fittings are measured in accordance with prEN-ISO/FDIS 3126. The measured dimensions were according to the given drawings of the fittings and EN 1254-3. The relevant drawings of the fittings are deposited at Kiwa N.V..

**2.7 Tightness of the jointing**

**2.7.1 Internal pressure test**

The resistance to internal hydrostatic strength of the piping system is tested in accordance with annex C of CUAP 08.02/13. The testing time without failure exceeds the 1000 hours.

**2.7.2 Bending test**

The effects of bending are not determined since the dimensions of the piping system are smaller than 32mm.

**2.7.3 Pull-out test**

The pull out test of the jointing is tested in accordance with annex E of CUAP 08.02/13. For the 17x2,0mm pipe the minimum pull-out force without failures at 23°C exceeds 340 N.

**2.7.4 Thermal cycling test**

The resistance of joints to temperature cycling is tested in accordance with annex F of CUAP 08.02/13. The number of cycles without failure is greater than 5000 cycles.

**2.7.5 Leaktightness under vacuum**

The leaktightness under vacuum is tested in accordance with annex G of CUAP 08.02/13. The testing time without failure, is greater than 1 hour. The change in vacuum is less than 0,05 bar.

**2.8 Oxygen permeability of the system**

The oxygen permeation of the piping system is tested in accordance with Annex H of CUAP 08.02/13. The oxygen permeation flux ( $F_{\text{ox,day}}$ ) at 80°C is smaller than 1,2 mg/m<sup>2</sup>·day.

### 3 Evaluation of conformity and CE marking

#### 3.1 Attestation of conformity system

The system of attestation of conformity for piping kits for heating systems, as shown in table 1 is specified by the Commission Decision 1999/472/EC<sup>8</sup> of 1 July 1999 and amended by Commission Decision 2001/596/EC<sup>9</sup> of 8 January 2001.

**Table 1**, System of attestation of conformity of piping kits for heating systems according to Commission Decision 1999/472/EC of 1 July 1999 and letter from the commission to EOTA<sup>10</sup> (ENTR/G/5/GB/si D(2004) – 790051, No 001250 dated 13.02.2004)

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Plastics piping systems	Heating systems	-	4
System 4: See Directive 89/106/EEC (CPD), Annex III(2)(ii), Third possibility			

Additionally, for products to be applied in uses subject to regulations on reaction to fire, the following applies:

<sup>8</sup> Official Journal of the European Communities, Commission Decision 1999/472/EC of 1 July 1999

<sup>9</sup> Official Journal of the European Communities, Commission Decision 2001/596/EC of 8 January 2001

<sup>10</sup> Commission letter to EOTA, reference ENTR/G/5/GB/si D(2004) – 790051, No 001250 dated 13.02.2004



**Table 2**, System of attestation of uses subject to reaction to fire regulations according to Commission Decision 2001/596/EC of 8 January 2001

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	Attestation of conformity system(s)
Plastics piping systems	For uses subject to regulations on reaction to fire	A1*, A2*, B*, C*	1
		-----	---
		A1**, A2**, B**, C**, D, E	3
		-----	----
		(A1 to E)***, F	4
System 1: See Directive 89/106/EEC (CPD), Annex III.2.(i), without audit-testing of samples			
System 3: See Directive 89/106/EEC (CPD), Annex III.2.(ii), Second possibility			
System 4: See Directive 89/106/EEC (CPD), Annex III.2.(ii), Third possibility			
* Products/ materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)			
** Products/ materials not covered by footnote (*).			
***Products/ materials that do not require to be tested for reaction to fire (eg. Products/materials of classes A1 according to Commission Decision 96/603/EC, as amended).			

According to clause 2.2 of this ETA, the pipe and fitting are classified as Euroclass F and consequently it falls in attestation of conformity system class 4.

## 3.2 Responsibilities

### 3.2.1 Tasks of the manufacturer; factory production control (FPC)

The manufacturer has a FPC system as detailed in Guidance Paper B<sup>11</sup> and exercises permanent internal control of production.

All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. The FPC system has to ensure that the products are in conformity with the declarations in this European Technical Approval.

In the framework of FPC the manufacturer shall carry out tests and controls with the prescribed test plan<sup>12</sup>, which is part of this European Technical Approval.

In this test plan are detailed extent, nature and frequency of testing and controls to be performed.

The FPC as part of the control plan shall contain provisions for the control of incoming materials and manufacturing process. The frequency of testing is in accordance with the parts 7 of the hot & cold water standards EN-ISO 15874, EN-ISO 15875, EN-ISO 15876 and EN-ISO 15877.

<sup>11</sup> Guidance Paper B: The definition of Factory Production Control in Technical Specifications for Construction Products (revision August 2002)

<sup>12</sup> The prescribed test plan has been deposited at Kiwa N.V. and is handed over only to the approved body(ies) involved in the conformity attestation procedure

The control plan shall address at least the following items/characteristics:

Pipes:

- control of the incoming raw materials : PE-RT, EVOH, adhesive, etc.;
- control of dimensions;
- longitudinal reversion;
- melt mass flow rate;
- hydrostatic strength.

Metal fittings:

- control of incoming raw materials, including the elastomeric sealing elements;
- control of dimensions;
- internal pressure test.

### 3.2.2 Tasks of the approved bodies

The attestation of conformity system is 4, therefore the approved body is not involved.

### 3.3 CE marking

The plastic piping kits manufactured and controlled in accordance with this European Technical Approval shall bear the initials CE on their packaging and also on the accompanying commercial documents; the initial CE shall be accompanied by the following information:

For the pipes:

- Number of ETA: 05/0042;
- Trade name of the product and identifying mark of the producer: >MIDI< SYSTEM;
- Production code of the manufacturer: #hhddmmyy in which:
  - # is the number of the extruder(line)
  - hh is the hour of the day
  - dd is the day of the month
  - mm is the month of the year
  - yy are the last two digits of the year
- Nominal outside diameter and nominal wall thickness: see clause 1.1 of this ETA;
- Application class combined with design pressure: see clause 1.2 of this ETA;
- Type of oxygen barrier layer: EVOH;
- Type of material: PE-RT Type I;
- The class of reaction to fire: Euroclass F;
- CE.

For the metal fittings:

- Number of ETA; 05/0042;
- Trade name of the product: Thekal/GE;
- Name or identification mark of the producer (including code of plant and production code): GE yyww in which:
  - GE is the production location
  - yy are the last two digits of the year
  - ww is the week of the year
- Nominal outside diameter and nominal wall thickness of the accompanying pipe: see clause 1.1 of this ETA;
- Application class combined with design pressure: see clause 1.2 of this ETA;
- Type of material: CW614N;
- The class of reaction to fire: Euroclass F;
- CE.

#### **4 Assumptions under which the fitness of the product for the intended use was favourably assessed**

##### **4.1 Manufacturing**

The plastics piping kits shall correspond, as far as their composition and manufacturing process is concerned, to the products subject to the approval tests. Details of composition of the products and the manufacturing process are deposited at Kiwa N.V..

##### **4.2 Installation**

The plastics piping kits shall be used correspond to the intended use as defined in clause 1.2 of this ETA. The installation shall be made in accordance with the installation manual of the manufacturer.

#### **5 Recommendations for the manufacturer**

##### **5.1 Recommendations on packaging, transport and storage**

The products shall be packed, transported and stored so that no damages shall occur to the products. In the information accompanying the CE marking it shall be stated that the product shall be protected for damaging during transport, storage and installation. The type of packaging is depending on the distributor.

##### **5.2 Recommendations on installation**

The products shall be used for applications as stated in clause 2 of this ETA. The responsibility of the manufacturer is further to ensure that the information on the installation procedure is clearly shown on the package and/or the enclosed instruction sheet.

##### **5.3 Accompanying information**

Maintenance and repair shall be performed as given by the manufacturer.

## 6 Bibliography

EN 681-1 :1996	Elastomeric seals - Materials requirements for pipe joints seals used in water and drainage applications - Part 1: Vulcanized rubber; inclusive EN 681-1/A1:1998 and EN 681-1/A2:2002
EN 728 :1997	Plastic piping and ducting systems - Polyolefin pipes and fittings - Determination of oxidation induction time
EN 743 :1994	Plastic piping and ducting systems - Thermoplastics pipes - Determination of the longitudinal reversion
EN 921 :1995	Plastics piping systems - Thermoplastic pipes - Determination of resistance to internal pressure at constant temperature; inclusive EN 921/C1:1997
prEN-ISO 1133 :2003	Plastics - Determination of melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics
prEN-ISO 1183-1 :2002	Plastics – Methods for determining the density of non cellular plastics – Part 1: Immersion method, pyknometer method and titration method
EN 1254-3 :1998	Copper and copper alloys – Plumbing fittings - Part 3: Fittings with compression ends for use with plastics pipes
prEN-ISO/FDIS 3126 :1999	Plastics piping systems - Plastics piping components - Measurement and determination of dimensions
EN-ISO 6259-1 :2001	Thermoplastic pipes – Determination of tensile properties - Part 1: General test method
ISO/FDIS 10508 :2003	Plastics pipes and fittings for water supply - Plastics piping system for hot and cold water installation
ISO 11357-3 :1999	Plastics - Differential scanning calorimetry (DSC) - Part 3: Determination of temperature and enthalpy of melting and crystallization
EN 13501-1 :2003	Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests
prEN 15105: 2004	Plastics piping systems – Systems for hot and cold water not intended for human consumption – Performance characteristics for pipes, fittings and their joints
CEN-ISO/TS 15874-7: 2003	Plastics piping systems for hot and cold water installations – Polypropylene (PP) – part 7: Guidance for the assessment of conformity
CEN-ISO/TS 15875-7: 2003	Plastics piping systems for hot and cold water installations – Crosslinked polyethylene (PE-X) – part 7: Guidance for the assessment of conformity
CEN-ISO/TS 15876-7: 2003	Plastics piping systems for hot and cold water installations – Polybutylene (PB) – part 7: Guidance for the assessment of conformity
CEN-ISO/TS 15877-7: 2003	Plastics piping systems for hot and cold water installations – Chlorinated poly(vinyl chloride) (PVC-C) – part 7: Guidance for the assessment of conformity
ISO/DIS 24033 :2003	Polyethylene of raised temperature resistance (PE-RT) pipes – Effect of time and temperature on the expected strength.