European Technical Assessment ETA-17/1013 V2 of 19-12-2023

General Part

Technical Assessment Body issuing the European Technical Assessment: Kiwa Nederland B.V.	
Trade name of the construction product	**Enflx 5 layer piping system [EU]**
Product family to which the construction product belongs	Plastics piping kits for the transport system of hot and cold water, made of Polyethylene Raised Temperature Resistance
Manufacturer	Enetec Plastics GmbH Kalkarer Str. 81, Halle 26 47533 KLEVE, Germany www.enetec.info
Manufacturing plant(s)	*Pipes:* Enetec Plastics GmbH Kalkarer Str. 81, Halle 26 47533 KLEVE, Germany www.enetec.info *Fittings:* IPA Produktions- und Vertriebsges.m.b.H. Betriebsstraße 4 A-3163 ROHRBACH Austria www.ipa-fitting.com
This European Technical Assessment contains	10 pages
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document EAD 280009-00-0802, edition 05/2023.
This version replaces	ETA 17/1013, issued on 15/10/2023

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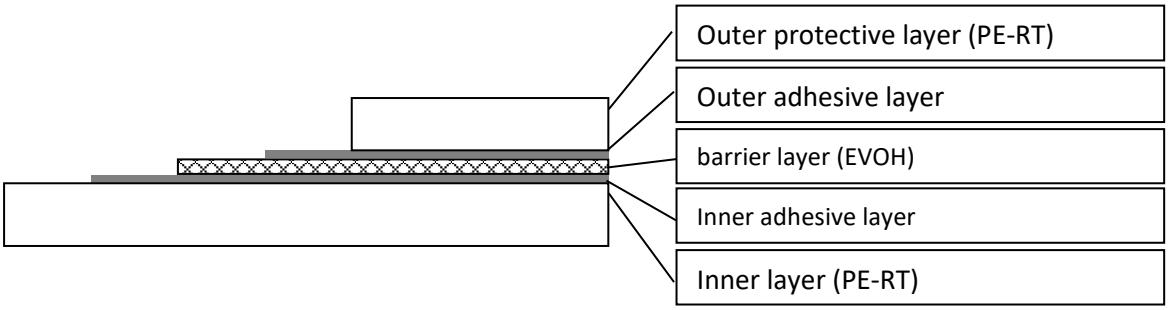
1 Description of the construction product

Plastics piping kits for the transport system of hot and cold water, made of Polyethylene Raised Temperature Resistance with an oxygen barrier layer.

1.1 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 a optional coloured outer layer is depicted in the figure below. The cross section is made downwards from outer till inner layer of the pipe.

5 layer pipe:



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

The presented thickness of the layers in the drawings are not compulsory.

1.2 Technical description of the product

Pipes made of PE-RT Type I or PE-RT Type II

Table 1: Nominal outside diameter (d_n) and nominal wall thickness:

Class 4 / 6 bar		Class 4 / 10 bar		Class 5 / 6 bar			
PE-RT Type I and PE-RT Type II		PE-RT type II		PE-RT type I		PE-RT type II	
Nominal outside diameter (mm)	Wall thickness (mm)	Nominal outside diameter (mm)	Wall thickness (mm)	Nominal outside diameter (mm)	Wall thickness (mm)	Nominal outside diameter (mm)	Wall thickness (mm)
10	1.3			10	1.3	10	1.3
12	2.0			12	2.0	12	2.0
14	1.25						
14	2.0			14	2.0	14	2.0
15	1.5						
16	2.0	16.0	2.2	16	2.0	16	2.0
17	2.0			17	2.0	17	2.0
18	2.0					18	2.0
20	2.0					20	2.0
25	2.3						

Construction type: 5-Layer
Type of barrier layer for 5 layer pipe: EVOH

Metal fittings according to EN 22391-3
Type 1) press:

type of metal	:	brass; CW617N
type of compression ends	:	B, Press contour TH
type of elastomeric sealing elements	:	- material : EPDM - type : WD - hardness (IRHD) : 80
Types	:	1 (Elbows and tees) 2 (Reducers, couplers, end caps) 3 (Adapters)

Type 2) clamp:

type of metal	:	brass; CW617N
type of compression ends	:	A
type of elastomeric sealing elements	:	- material : EPDM - type : WD - hardness (IRHD) : 80
Types	:	1 (Elbows and tees) 2 (Reducers, couplers, end caps) 3 (Adapters)

Piping system, combinations of fittings with the pipes per dimension:

Pipe dimension (mm)	Fitting type 1 “press”	Fitting type 2 “clamp”
10 – 20 mm	X	X
25 mm	X	

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

Plastics piping kits are used for the conveyance of water for heating systems according to class 4 and/or class 5 of ISO 10508.
The operating pressure (p_D) can be 4, 6 or 10 bar and is depending on the wall thickness of the pipe as defined as S value for pipe series (see table 2).

Table 2. S- values for pipe series

PE-RT Type I	Operating pressure (bar)	
	4	6
class 4	S ≤ 6,7	S ≤ 5,4
class 5	S ≤ 6,0	S ≤ 4,0
PE-RT Type II	Operating pressure (bar)		
	4	10	6
class 4	S ≤ 7,5	S ≤ 3,4	S ≤ 5,6
class 5	S ≤ 7,2	-	S ≤ 4,8

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.

3. Performance of the product and references to the methods used for its assessment

3.1 Composition and manufacturing process

The composition and the manufacturing process of the pipe and fitting correspond to the product subject to the assessment testing.
Details of the composition and manufacturing process are deposited at Kiwa Nederland B.V.

3.2 Reaction to fire

No performance determined.

3.3 Characteristics of the kit

3.3.1 Behaviour to internal hydrostatic pressure (Clause 2.2.2.1 of EAD 15-28-0009-08.02)

	PE-RT Type I		**PE-RT Type II**		
	Class 4	Class 5	Class 4		Class 5
Test temperature	80°C	95°C	80°C	80°C	95°C
Operating pressure	6 bar	6 bar	6 bar	10 bar	6 bar
Test pressure	8.4 bar	8.7 bar	8.5 bar	14.2 bar	7.5 bar

For the jointing with fittings type 1-press and fittings type 2-clamp, the testing time without failure is 1000 hours.

3.3.2 Behaviour to bending (Clause 2.2.2.2 of EAD 15-28-0009-08.2)

No performance determined.

3.3.3 Behaviour to pull-out (Clause 2.2.2.3 of EAD 15-28-0009-08.2)

Class 4 and 5	
Nominal dimension (mm)	pull out force (N)
10	118
12	170
14	230
15	265
16	301
17	340
18	382
20	471
25	736

3.3.4 Behaviour to thermal cycling (Clause 2.2.2.4 of EAD 15-28-0009-08.2)

For the jointing with fittings type 1-press and fittings type 2-clamp, the number of cycles without failure is 5000 cycles.

3.3.5 Behaviour to vacuum (Clause 2.2.2.5 of EAD 15-28-0009-08.2)

For the jointing with fittings type 1-press and fittings type 2-clamp. the change in vacuum is less than 0.05 bar after 1 hour.

3.3.6 Behaviour to pressure cycling test (Clause 2.2.2.6 of EAD 15-28-0009-08.2)

No performance determined.

3.3.7 Oxygen permeability of the system with oxygen barrier layer (Clause 2.2.2.7 of EAD 15-28-0009-08.2)

The oxygen permeation flux ($F_{ox,day}$) for PE-RT type 1 and 2 at 40°C is smaller than 0.32 mg/m²·day.
The oxygen permeation flux ($F_{ox,day}$) for PE-RT type 1 and 2 at 80°C is smaller than 3.6 mg/m²·day.

3.4 Characteristics of the pipe

3.4.1 Long-term hydrostatic strength (Clause 2.2.3.1 of EAD 15-28-0009-08.2)

The tested long-term hydrostatic strength of the PE-RT material is performed according EN ISO 9080 and fulfils the $S_{calc,max}$ values in table 6 of this ETA.

3.4.2 Longitudinal reversion (Clause 2.2.3.2 of EAD 15-28-0009-08.2)

The longitudinal reversion is smaller than 2.0%.

3.4.3 Thermal stability (PE-RT) (Clause 2.2.3.3 of EAD 15-28-0009-08.2)

	PE-RT Type I	**PE-RT Type II**
Temperature	110°C	110°C
Hydrostatic hoop stress	1.9 MPa	2.3 MPa
Testing time without failure	8760 h	8760 h

3.4.4 Melt mass flow rate (PE_RT) (Clause 2.2.3.4 of EAD 15-28-0009-08.2)

The deviation in melt mass flow rate of the pipe in comparison with the melt mass flow rate of the raw material is smaller than 20% of the initial value.

3.4.5 Behaviour to internal hydrostatic pressure (Clause 2.2.3.5 of EAD 15-28-0009-08.2

	PE-RT Type I	**PE-RT Type II**
Temperature	95°C	95°C
Hydrostatic hoop stress	3.4 MPa	3.6 MPa

The testing time without failure is 1000 hours

3.4.6 Geometrical characteristics (Clause 2.2.3.6 of EAD 15-28-0009-08.2)

For the nominal outside diameters the tolerances of the mean outside diameter (d_{em}), out-of roundness (ovality) and wall thickness (e) see table 3 and 4.

Table 3. Tolerances of the mean outside diameter (d_{em}), out-of roundness (ovality)

DN/OD (mm) d_n (mm) $d_{em,\ min}$ (mm)	tolerance d_{em} (mm)	ovality (mm)
6 ≤ DN/OD ≤ 32	- 0 - + 0.3	≤ 1.0

Table 4. Tolerances of the wallthickness (e**)**

wall thickness $e_{min,\ overall}$ (mm)	tolerance e (mm)	wall thickness $e_{outer\ layer}$ (mm)
0,5 ≤ e_{min} ≤ 1	- 0 - + 0.2	0.1 - 0.5
1 < e_{min} ≤ 2	- 0 - + 0.3	0.1 - 0.5
2 < e_{min} ≤ 3	- 0 - + 0.4	0.1 - 0.5
3 < e_{min} ≤ 4	- 0 - + 0.5	0.1 - 0.5
4 < e_{min} ≤ 5	- 0 - + 0.6	0.1 - 0.5
5 < e_{min} ≤ 6	- 0 - + 0.7	0.1 - 0.5
6 < e_{min} ≤ 7	- 0 - + 0.8	0.1 - 0.5
7 < e_{min} ≤ 8	- 0 - + 0.9	0.1 - 0.5
8 < e_{min} ≤ 9	- 0 - + 1.0	0.1 - 0.5

Calculations are made in accordance with Miner's rule (EN-ISO 13760), based on the total wall thickness of the stress bearing layer(s) of PE-RT material and taken in account the overall service (operating) coefficients in Table 5.

Table 5. The overall service (operating) coefficients in accordance with EN-ISO 10508:

Temperature		overall service (operating) coefficient
operating temperature	T_D	1.50
maximum temperature	T_{max}	1.30
malfunction temperature	T_{mal}	1.00
cold water temperature	T_{cold}	1.25

For the minimum calculated $S_{calc,max}$ value at a operating pressure (P_D) see table 6:

Table 6. S_{max} values per operating pressure/application class

	$S_{calc,max}$ value			
	PE-RT Type I		**PE-RT Type II**	
Class	4	5	4	5
operating pressure (P_D)				
4 bar	6.7	6.0	7.6	7.6
6 bar	5.4	4.0	6.4	5.2
10 bar	-	-	3,4	-

3.4.7 Peak melting temperature of the adhesive material (Clause 2.2.3.7 of EAD 15-28-0009-08.2)

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

3.4.8 Thermal stability of the outer layer material (Clause 2.2.3.8 of EAD 15-28-0009-08.2)The outer layer is made from the same PE-RT material as used for the inner stress bearing layer and therefore covered by clause 3.4.3 of this ETA.

3.5 Characteristics of the metal fittings

3.5.1 Behaviour to Pressure (Clause 2.2.4.1 of EAD 15-28-0009-08.2)

For transport system of hot and cold water (class 4 and 5) the testing time without leakage, determined during testing at 7.5 bar at 95°C temperature is 1000 hours.

3.5.2 Dezincification resistance (Clause 2.2.4.2 of EAD 15-28-0009-08.2)

Not performance determined

3.5.3 Geometrical characteristics (Clause 2.2.4.3 of EAD 15-28-0009-08.2)

The dimensions are according to the relevant construction drawings of the fittings which are deposit at Kiwa Nederland B.V.

3.5.4 Resistance to stress corrosion (Clause 2.2.4.4 of EAD 15-28-0009-08.2)

No performance determined.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

For the products covered in this ETA the applicable European legal act is: 1999/472/EC, as amended by Commission Decision 2001/596/EC.

Product	**Intended use**	**Level or class**	**System**
Plastics piping kits for the transport system of hot and cold water, made of Polyethylene Raised Temperature Resistance with an oxygen barrier layer	Plastics piping kits to be used for the conveyance of water for hot and cold water systems according to class 4 and/or 5 of ISO 10508.	-	4

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

5.1 Tasks of the manufacturer; factory production control (FPC)

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 Assessment.
In the framework of FPC the manufacturer shall carry out tests and controls with the prescribed control plan which is part of this European Technical Assessment.

In this control plan are detailed extent, nature and frequency of testing and controls to be performed.
The control plan shall address at least the following items/characteristics and (minimum) frequencies:

No	Subject/type of control	Minimum frequency of control
1	**Incoming materials**	
	Raw material Pipe: inner layer PE-RT material - Melt mass flow rate - Oxidation induction time - Density	Per delivery by AoC
	Pipe: Plastic oxygen barrier layer - Thermal stability	At first delivery
	Pipe: adhesive material - Peak melting point	Per delivery by AoC
	Pipe : Outer layer material - PE-RT material -	At first delivery
2	**Produced Pipe:** - Dimensions - Longitudinal reversion - Melt Mass Flow Rate (PE-RT) - Hydrostatic strength	Continuous/ every hour per machine Every start-up and production batch Every start-up and PE-RT batch change Every production batch per machine
3	**Metal Fitting:** - dimensions	Per batch at fitting manufacturer

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

5.2 Tasks of the approved bodies

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

Issued in Rijswijk on 19-12-2023 by



Ron Scheepers

Kiwa Nederland B.V.