

## **AENOR Certificate of Conformity Specific Rules for crosslinked polyethylene (PE-X) pipes **for water supply for industrial and infrastructure applications****

Note: This document is a translation of the "RP 01.83 rev 1" in Spanish approved by the Plastics Technical Certification Committee (CTC-001). Spanish version always prevails over this translation.

### **RP 001.83**

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## 1 Scope

The present Specific Rules describe the procedure for the application, granting and maintaining of the AENOR Certificate of Conformity for for crosslinked polyethylene (PE-X) pipes for water supply for industrial and infrastructure applications, in accordance with the technical specifications attached to these Specific Rules

Es The RP 01.00 applies except for the marking of certified products part that is defined in paragraph 5 of this document. All the mentions of the AENOR Mark in the RP 01.00 mean Certificate of Conformity AENOR in this document.

## 2 Definiciones y particularidades

Reference: It is called a reference of pipes to the set of the same ones that have the same diameter and nominal thickness.

By applying this Regulation, it is possible to obtain the AENOR certificate of compliance for the following products:

- Crosslinked polyethylene (PE-X) pipes by peroxide method for water supply for industrial and infrastructure applications
- Crosslinked polyethylene (PE-X) pipes by silane method for water supply for industrial and infrastructure applications
- Crosslinked polyethylene (PE-X) pipes by electron beam method for water supply for industrial and infrastructure applications

The certificate applicant must address an independent application for each different product.

## 3 Sampling and testing for granting and maintaining the AENOR product certificate

### 3.1 Test to be carried out in factory (See RP 01.00)

AENOR Services will carry out the tests indicated in table 1 during the initial and surveillance inspection.

## 3.2 Sampling and tests to be carried out by the laboratory (See RP 01.00)

AENOR Services will select and marked the necessary samples to carry out in the laboratory the tests indicated in tables 1 as proceed.

The manufacturer will send the samples to the laboratory indicated by AENOR Services within 7 days since the date of the inspection.

**TABLA 1**

	<b>TESTS</b>	<b>GRANTING/MAINTENANCE</b>	<b>RESULTS EVALUATION</b>
<b>TESTS TO BE CARRIED OUT BY THE INSPECTOR IN THE FACTORY</b>	Appearance	10 pipes randomly	1
	Mean outside diameter	1 pipe per reference, minimum 10 pipes	2
	Total wall thickness	1 pipe per reference, minimum 10 pipes	3
<b>TESTS TO BE CARRIED OUT BY THE LABORATORY</b>	Opacity (only if manufacturer declares it)	1 reference selecting the one with the lowest wall thickness	1
	Longitudinal reversion	20% ref. min. 2 max. 4	1
	Crosslinking degree (1)	5 references	1
	Resistance to internal pressure 20°C 1 h	20% references. min 2 max. 4	1
	Resistance to internal pressure 95°C 1 h	1 reference randomly	1
	Resistance to internal pressure 95°C 22 h	20% references min. 2 max. 4	1
	Resistance to internal pressure 95°C 165 h	20% references min. 2 max. 4	1
	Resistance to internal pressure 95°C 1000h	1 reference randomly	1
Thermal stability by hydrostatic pressure test (Only at the granting, every 5 years, or in case of formulation changes) (2)	1 reference randomly for each raw material	1	

Nota 1: For PEX-b pipes, if the result of the crosslinking test is not conform, and the Company requests the repetition of test, the repetition will be carry out with samples that are available in the laboratory. In this case the manufacturer will not send samples to the laboratory signed by the inspector during the inspection visit

Nota 2: In order to grant the certificate it is not considered necessary that thermal stability test by hydrostatic pressure had concluded taking into account the duration of the test.

## 4 Manufacturer internal control

### 4.1 Raw materials for pipes and fittings

The manufacturer must guarantee that the mixtures, compounds involved in the manufacture of pipes have appropriate characteristics. In addition, will assure that the specifications provided in the Certificate of Analysis, comply with the purchase requirements established and **that these are the compounds declared in the application forms of as raw materials.**

### 4.2 Final products control

Tests and their frequency are stated in table 2,

**TABLE 2**

TESTS	FREQUENCY
Appearance	Every 4 hours / production line
Mean outside diameter	
Total Wall thickness	
Opacity (only if manufacturer declares it)	Once per year per compound, on the one sample with the lowest wall thickness
Longitudinal reversion	Per extrusion line. Minimum twice per week
Crosslinking degree	Per manufacturing period. Minimum twice per week
Resistance to internal pressure 20°C 1 h	Once per year per reference
Resistance to internal pressure 95°C 1 h	Once per year per extrusion line
Resistance to internal pressure 95°C 22 h	Once every two weeks per extrusion line
Resistance to internal pressure 95°C 165 h	
Resistance to internal pressure 95°C 1000h	Once per year per extrusion line
Thermal stability by hydrostatic pressure test	At the granting and in case of formulation changes

## 5 Marking of certified products

The minimum required marking of the pipes is the following:

- Reference to the word AENOR CC;
- Number of the contract signed with AENOR: 001 / XXX;
- Manufacturer identification and/or Trademark;
- The reference to the material (PE-X) and the crosslinked method (a, b, or c);
- Indication of the external diameter and nominal wall thickness in millimetres;
- SDR
- "FOR INDUSTRIAL AND **INFRASTRUCTURE APPLICATION**"
- Manufacturer's information (manufacturing code or data).
- Indication of the maximum service pressure at 20°
- The marking on the pipes will carry out every meter as minimum and will not include any reference to the standard UNE EN ISO 15875.

Example:

AENOR CC Nº 001 / XXX – Trademark – PEX-a - 160x14,6 – SDR 11 - "FOR INDUSTRIAL **AND INFRASTRUCTURE**" - Manufacturer information

## Annex C: Description Questionnaire

APPLICANT COMPANY (HOLDER OF THE CERTIFICATE):

MANUFACTURER COMPANY:

FACTORY SITE:

PRODUCT:

MATERIAL: PEX            a             b             c

STANDARD:

TRADEMARK (S):

DATE:

RANGE FOR WHICH THE MARK IS REQUESTED	
SDR	DIAMETERS

Description of the raw materials used:

SUPPLIER	REFERENCE

For any change of these data, the licensee company will send to the Committee secretary this descriptive questionnaire updated.

**SIGNATURE AND STAMP OF THE MANUFACTURER**

## Anexo D

# Technical Specifications for crosslinked polyethylene (PE-X) pipes for water supply for industrial and infrastructure applications

## 0 Prologue

These technical specifications, together with Specific Rules, are part of the documentation done by the AENOR Plastics Technical Certification Committee (CTC-001 "Plastics") for the obtaining the corresponding AENOR Certificate of Conformity, and both documents shall be applied on the whole.

This document is not a normative document.

## 1 Scope

This Technical Specifications are based on the standard UNE EN ISO 15875-2, in order to define the characteristics that shall comply the product as well as his corresponding test method. Dimensional requirements are based on the standard ISO 4065

## 2 Documentation references

UNE EN ISO 1167-1 y 2 – Determination of the resistance to internal pressure

## 3 Definitions and simbols

(According to chapter 3 of UNE EN ISO 15875-1)

### 3.1 Characteristics of the pipes material

#### 3.1.1 General

(According to chapter 4.1 of UNE EN ISO 15875-2)



## 3.2 General characteristics of the pipes

### 3.2.1 Appearance

When viewed without magnification, the internal and external surfaces of pipes shall be smooth, clean and free from scoring, cavities and other surface defects. . The material shall not contain visible impurities. Each end of the pipe shall be cut clean and perpendicular to its axis.

### 3.2.2 Geometrical characteristics of the pipes

#### 3.2.2.1 Outside diameter.

The outside diameter of the pipe must be in accordance with Table 1 or 3

**Table 1 – Mean outside diameter (metric-sized)**

Nominal outside diameter (dn)(mm)	Minimum nominal outside diameter ( $d_{em,min}$ ) (mm)	Maximum nominal outside diameter ( $d_{em,max}$ ) (mm)	Ovality (mm)
20	20,0	20,30	1,2
25	25,0	25,30	1,2
32	32,0	32,30	1,3
40	40,0	40,40	1,4
50	50,0	50,50	1,4
63	63,0	63,60	1,5
75	75,0	75,70	1,6
90	90,0	90,90	1,8
110	110,0	111,00	2,2
125	125,0	126,2	2,5
140	140,0	141,3	2,8
160	160,0	161,5	3,2
180	180,0	181,7	3,6
200	200,0	201,8	4,0
225	225,0	227,1	4,5
250	250,0	252,3	5,0
280	280,0	282,5	9,8
315	315,0	317,5	11,1
355	355,0	358,2	12,5
400	400,0	403,6	14,0
450	450,0	453,8	15,6
500	500,0	504,5	17,5
560	560	565,0	19,6
630	630	635,7	22,1
710	710	716,4	24,9
800	800	807,2	28,0
900	900	908,1	31,5
1000	1000	1009,0	35,0

### 3.2.2.2 Nominal wall thickness (en)

The wall thickness (minimum thickness ( $e_{min}$ ) and maximum thickness ( $e_{max}$ ) should be in accordance with Table 2 or 4.

**Table 2 – Nominal wall thickness (en) (metric-sized)**

Nominal diameter (mm)	SDR 7,4		SDR 9		SDR 11	
	Minimum thickness ( $e_{min}$ )(mm)	Maximum thickness ( $e_{max}$ )(mm)	Minimum thickness ( $e_{min}$ )(mm)	Maximum thickness ( $e_{max}$ )(mm)	Minimum thickness ( $e_{min}$ )(mm)	Maximum thickness ( $e_{max}$ )(mm)
20	2,8	3,2	2,3	2,7	1,9	2,2
25	3,5	4,0	2,8	3,2	2,3	2,7
32	4,4	5,0	3,6	4,1	2,9	3,3
40	5,5	6,2	4,5	5,1	3,7	4,2
50	6,9	7,7	5,6	6,3	4,6	5,2
63	8,6	9,6	7,1	8,0	5,8	6,5
75	10,3	11,5	8,4	9,4	6,8	7,6
90	12,3	13,7	10,1	11,3	8,2	9,2
110	15,1	16,8	12,3	13,7	10,0	11,1
125	17,1	19,0	14,0	15,5	11,4	12,7
140	19,2	21,3	15,7	17,4	12,7	14,1
160	21,9	24,2	17,9	19,8	14,6	16,2
180	24,6	27,2	20,1	22,3	16,4	18,2
200	27,4	30,3	22,4	24,8	18,2	20,2
225	30,8	34,0	25,2	27,8	20,5	22,7
250	34,2	37,8	27,9	30,8	22,7	25,1
280	38,3	42,3	31,3	34,6	25,4	28,1
315	43,1	47,4	35,2	38,9	28,6	31,6
355	48,5	53,5	39,6	43,7	32,2	35,6
400	54,7	60,2	44,7	49,3	36,3	40,1
450	61,5	67,8	50,2	55,4	40,9	45,1
500	-	-	-	-	45,4	50,1
560	-	-	-	-	50,8	56,0
630	-	-	-	-	57,2	63,1
710	-	-	-	-	-	-
800	-	-	-	-	-	-
900	-	-	-	-	-	-
1000	-	-	-	-	-	-

**Table 2 (Cont.) – Nominal wall thickness (en) (**metric-sized**)**

Nominal diameter (mm)	SDR 13,6		SDR 17	
	Minimum thickness ( $e_{min}$ )(mm)	Maximum thickness ( $e_{max}$ )(mm)	Minimum thickness ( $e_{min}$ )(mm)	Maximum thickness ( $e_{max}$ )(mm)
20	1,5	1,8	-	-
25	1,9	2,2	1,5	1,8
32	2,4	2,8	1,9	2,2
40	3,0	3,4	2,4	2,8
50	3,7	4,2	3,0	3,4
63	4,7	5,3	3,8	4,3
75	5,6	6,3	4,5	5,1
90	6,7	7,5	5,4	6,1
110	8,1	9,1	6,6	7,4
125	9,2	10,3	7,4	8,3
140	10,3	11,5	8,3	9,3
160	11,8	13,1	9,5	10,6
180	13,3	14,8	10,7	11,9
200	14,7	16,3	11,9	13,2
225	16,6	18,4	13,4	14,9
250	18,4	20,4	14,8	16,4
280	20,6	22,8	16,6	18,4
315	23,2	25,7	18,7	20,7
355	26,1	28,9	21,1	23,4
400	29,4	32,5	23,7	26,2
450	33,1	36,6	26,7	29,5
500	36,8	40,6	29,6	32,7
560	41,2	45,5	33,2	36,7
630	46,3	51,1	37,3	41,2
710	52,2	57,6	42,1	46,5
800	58,8	64,8	47,4	52,3
900	-	-	53,5	59,0
1000	-	-	59,3	65,4

**Table 3 – Mean outside diameter (inch-sized)**

<b>Nominal diameter</b>	<b>Average (in)</b>	<b>Tolerance (in)</b>
3,0	3,500	0,016
4,0	4,500	0,020
5,0	5,563	0,025
6,0	6,625	0,030
8,0	8,625	0,039
10,0	10,750	0,048
12,0	12,750	0,057
14,0	14,000	0,063
16,0	16,000	0,072
18,0	18,000	0,081
20,0	20,000	0,090
22,0	22,000	0,099
24,0	24,000	0,108
26,0	26,000	0,117
28,0	28,000	0,126
30,0	30,000	0,135
32,0	32,000	0,144
34,0	34,000	0,153
36,0	36,000	0,162

**Table 4 - Nominal wall thickness (en) (inch-sized). Tolerance +12%**

Nominal diameter (in)	SDR 9		SDR 11	
	Minimum (in)	Maximum (in)	Minimum (in)	Maximum (in)
3,0	0,389	0,394	0,318	0,322
4,0	0,500	0,506	0,409	0,414
5,0	0,618	0,625	0,506	0,512
6,0	0,736	0,745	0,602	0,609
8,0	0,958	0,969	0,784	0,793
10,0	1,194	1,208	0,977	0,989
12,0	1,417	1,434	1,159	1,173
14,0	1,556	1,575	1,273	1,288
16,0	1,778	1,799	1,455	1,472
18,0	2,000	2,024	1,636	1,656
20,0	2,222	2,249	1,818	1,840
22,0	2,444	2,473	2,000	2,024
24,0	2,667	2,699	2,182	2,208
26,0	-	-	2,364	2,392
28,0	-	-	2,545	2,576
30,0	-	-	2,727	2,760
32,0	-	-	2,909	2,944
34,0	-	-	3,091	3,128
36,0	-	-	3,273	3,312

## 3.3 Mechanical characteristics of the pipes

On having realized the tests, according to method and parameters indicated in table 3, the mechanical characteristics of the pipes, must fulfill the requirements indicated in the above mentioned table.

**Table 5 – Mechanical Characteristics**

Characteristics	Requirements	Test parameters				Test method		
Resistance to internal pressure	without fault during the test period	Hydrostact effort (tangential) Mpa	Test temperature°C	Test time h	Number of tests	ISO 1167		
		12	20	1	3*			
		4,8	95	1	3*			
		4,7	95	22	3*			
		4,6	95	165	3*			
		4,4	95	1000	3*			
		<b>General Test parameters</b>						
		Sampling procedure	Unspecified 1)					
Type of plug	Type a)							
Orientation of the test	Unspecified							
Test type	Water-in- water*							

(\*):As a guide see the Technical Specification CEN ISO 15875-7

Nota 1: For internal control tests for diameters  $\geq 110$  mm it is allowed to test one sample and conduct the test in water-in-air

## 3.4 Physical characteristics of the pipes

On having realized the tests, according to method and parameters indicated in table 4, the physical characteristics of the pipe, must fulfill the requirements indicated in the above mentioned table.

**Table 6 – Physical characteristics**

Characteristics	Requirements	Test parameters		Test method
		Characteristics	Value	
Longitudinal reversion	≤ 3%	Temperature Test time for e <sub>n</sub> < 8 mm 8mm ≤ e <sub>n</sub> ≤ 16mm e <sub>n</sub> > 16 mm Number of test pieces	120°C  1h 2h 4h 3	UNE EN ISO 2505 (oven test)
Thermal stability by hydrostatic pressure test	Without break during the test	Sampling Hydrostatic stress (tan) Test temperature Type of test Plug Length Number of test pieces	a)  2,5 Mpa 110°C Water-in-Air Plug a) 8760h 1	UNE EN ISO 1167
Crosslinking degree - Peroxide - Silane - Electron beam	≥ 70% ≥ 65% ≥ 60% ≥ 60%	In accordance to the standard UNE-EN ISO 10147		UNE-EN ISO 10147

a) As a guide see the Technical Specification CEN ISO 15875-7