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AENOR Certificate of Conformity Specific Rules for (PP-RCT) and fiber glass (FV) piping systems for hot and cold water installations inside buildings

Note: This document is a translation of the Spanish document RP 001.78 rev. 6 approved by the Plastics Technical Certification Committee (CTC-001). Spanish version always prevails over this translation.

RP 001.78

Revision 6

Date 2021-09-23

Index

1 Purpose and scope

The present Specific Rules describe the procedure for the application, granting and maintaining of the Certificate of Conformity for polypropylene random with modified crystal structure (PP-RCT)/polypropylene random with modified crystal structure + fiber glass (PP-RCT+FV)/polypropylene random with modified crystal structure (PP-RCT) piping systems for hot and cold water installations inside buildings, at the design pressure and temperature according to the application class, in accordance with the technical specifications attached to these Specific Rules.

The RP 001.00 applies except for the marking of certified products part that is defined in paragraph 5 of this document. All the mentions of the N Mark in the RP 001.00 mean Certificate of Conformity in this document.

2 Definitions and special requirements

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

Groups of dimensions

The following groups of dimensions are considered depending on the diameter:

- **Group 1:** Nominal outside diameter dn ≤ 63
- **Group 2:** Nominal outside diameter 75 ≤ dn ≤ 160
- **Group 3:** Nominal outside diameter 180 ≤ dn ≤ 450

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

- Polypropylene random with modified crystal structure pipes + fiber glass (PP-RCT/PP-RCT+FV/PP-RCT) for hot and cold water installations inside buildings in accordance with the technical specifications attached to these Specific Rules.
- Polypropylene random with modified crystal structure and fiber glass (PP-RCT/ PP-RCT+FV/PP-RCT) piping systems for hot and cold water installations inside buildings, in accordance with the technical specifications attached to these Specific Rules formed by polypropylene random with modified crystal structure pipes (PP-RCT/PP-RCT+FV/PP-RCT) and polypropylene fittings (PP-R) or polypropylene with modified crystal structure (PP-RCT).

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

Pipes with or without additional barrier layer (s) should be differentiated, with differens trademarks.

Due the length of the test is not considered necessary that the thermal stability test by hydrostatic pressure test is completed to grant the certificate.

WATER QUALITY FOR HUMAN CONSUMPTION

With regard to potential adverse effects on water quality for human consumption caused by the products included in the scope of this certificate, the clients of the Mark, will provide to AENOR during the inspection visit the evidence that their product complies with the RD 140/2003.

Article 14 of the mentioned document states that "Products that are in contact with the water of human consumption, by themselves or by the practices that are used, shall not transmit to the water for human consumption, substances or properties that contaminate or get worse its quality, and involve a failure to comply the requirements specified in Annex I or a risk to the health of the population supplied.

This evidence must be provided, either through migration tests and/or certificates issued by competent authorities of compliance with the RD / 140/2003.

3 Sampling and testing for granting and maintaining the product conformity certificate

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

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

3.2 Sampling and tests to be carried out by the laboratory (See RP 001.00)

AENOR will select and marked the necessary samples to carry out in the laboratory the tests indicated in tables 1 (pipes) and/or 2 (fittings and systems) as proceed.

TABLE 1 (PIPES)

	TESTS	GRANTING/MAINTENANCE	RESULTS EVALUATION
TESTS TO BE CARRIED OUT BY THE INSPECTOR IN THE FACTORY	Appearance	10 pipes at random	1
	Mean outside diameter	1 pipe per reference, minimun 10 pipes	2
	Total wall thickness	1 pipe per reference, minimun 10 pipes	3
	Minimum thickness of the inner layer (e_1) ≥1/4 of the emin	1 pipe per reference	3
TESTS TO BE CARRIED OUT BY THE LABORATORY	Opacity (only if declares it)	1 reference, selecting the one with lowest wall thickness	1
	Impact resistance	20% ref. minimum 2	1
	Longitudinal retraction	20% ref. minimum 2	1
	Melt flow index (compound + on internal and external layer of the pipe) (1)	1 reference	1
	Resistance to internal pressure 1 h-20°C	20% references. Minimum 2	1
	Resistance to internal pressure 22 h-95°C	20% references. Minimum 2	1
	Resistance to internal pressure 165 h-95°C	20% references. Minimum 2	1
	Resistance to internal pressure 1000 h-95°C	1 reference randomly	1
	Thermal stability by hydrostatic pressure test (Only at the granting, every 5 years, or in case of formulation changes)	1 reference randomly	1
	Determination of the content of the total fiber glass and intermediate layer	1 reference per group of dimension	1

Note (1) When the manufacturer of the pipe pigment the raw material, he is not required to perform this test.

TABLE 2 (FITTINGS AND SYSTEM)

	TEST	FREQUENCY
TESTS TO BE CARRIED OUT BY THE LABORATORY	Resistance to internal pressure 20°C 1h	5% references per type of join
	Resistance to internal pressure 95°C 1000 h	2% references per type of join
	Bending (2)	50% of the diameters
	Pull out (23°C and 80, 90 or 95°C 1h) (2)	50% of the diameters
	Thermal cycling (2)	1 diameter
	Pressure cycling (2)	50% of the diameters
	Vacuum (2)	50% of the diameters

Note (2) The realization of these functional test will be done for those types of connection of fittings that are applicable.

In general, for systems consisting of fittings which system of union is mechanical, there will be necessary to realize all applicable tests defined in Table 2.

In case the union is for termofusion or electrofusion only it will be necessary to realize the test of cycles of temperature.

4 Manufacturer internal control

4.1 Characteristics under factory production control

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 tables 3 and 4. Furthermore, all tests mentioned in the above table should be made any time under the following circumstances:

- Change of the material supplier
- Changing the polymerization process
- Changing the chemical properties of co-monomer
- Change of additives (eg: pigments, antioxidants)

- Change of chemical or natural properties of the additive
- Change of the supplier of fiber
- Changing the chemical properties (eg. coating) on the fiber type
- Changing the dimensions of the fiber type

TABLE 3 (PIPES)

TESTS	FREQUENCY
Appearance	Every 4 hours / production line
Mean outside diameter	
Total Wall thickness	
Minimum thickness of the inner layer (e_1)	
Opacity only if the manufacturer declares its	At the granting and in case of formulation changes
Impact resistance	Per period of production, minimum twice a week
longitudinal retraction	Per line. Minimum twice a week
Melt flow rate (composite + internal and external layer of the pipe) (1)	Each batch of raw material
Resistance to internal pressure 1 h-20°C	Once a year per reference
Resistance to internal pressure 22 h-95°C	Once per period of production. Minimum once a week
Resistance to internal pressure 165 h-95°C	Every 3 manufacturing period of the same reference
Resistance to internal pressure 1000 h-95°C	One pipe per machine, minimum once per year
Thermal stability by hydrostatic pressure test	At the granting and in case of formulation changes
Determination of the total fiber glass content and intermediate layer	Once per period of manufacture. Minimum once a week

Note (1) When the manufacturer of the pipe pigment the raw material, he is not required to perform this test.

TABLE 4 (FITTINGS AND SYSTEM)

TESTS	FREQUENCY
Resistance to internal pressure 20°C 1 h	Once per year per reference
Resistance to internal pressure 95°C 1000 h	Once every 4 months
Bending (2)	Once per year
Vacuum (2)	Once per year
Pull out (23°C and 80, 90 or 95°C 1 h)(2)	Once per year
Thermal cycling (2)	Once per year
Pressure cycling (2)	Once per year

Note (2) The realization of these functional test will be done for those types of connection of fittings that are applicable.

In general, for systems consisting of fittings which system of union is mechanical, there will be necessary to realize all applicable tests defined in Table 4.

In case the union is for termofusion or electrofusion only it will be necessary to realize the test of cycles of temperature.

5 Marking of certified products

5.1 Making of the pipes

The minimum required marking of the pipes is the following:

— Reference to the word AENOR CC;

— Contract number signed with AENOR or certificate number: 001/XXX;

— Manufacturer identification and/or Trademark;

— Pipe material and its classification (PP-RCT+FV+PP-RCT);

— Nominal outside diameter x thickness nominal;

— Application class combined with design pressure;

— Opacity (only if the manufacturer has declared it);

— Manufacture's information (manufacturing period, year, month, etc.).

The marking on the pipes will carry out every meter as minimum.

Example:

AENOR CC Nº 001 / XXX – Trademark – PP-RCT+FV+PP-RCT - 20 x 2,8 – Application class 1/10; 2/10; 4/10; 5/8 - Manufacturer information

5.2 Marking of the fitting / packaging

5.2.1 Marking of the fitting

The minimum required marking of each fitting is the following:

— Trademark;

— Nominal diameter;

— Identification of the material (only for fusion fittings);

— Information provided by the manufacturer (year of manufacture).

5.2.2 Marking of the packaging

The minimum required marking of the fittings packaging is the following:

— Reference to the word AENOR;

— AENOR Mark logotype, with a size not less than 3 mm;

— Contract number signed with AENOR or certificate number: 001/XXX;

— Reference to the applicable standard

— Aapplication class and design pressure

— Reference to the word "opaque" (only if the manufacturer has declared it)

— Month and year of manufacture if not marked on the fitting

5.3 Marking of Systems

Where reference is made to the Conformity Certificate of the system in commercial or other documentation, indicate the type of application and pressure that appears in the Conformity Certificate.

Annex C1

Pipes Description Questionnaire

CLIENT:

MANUFACTURER COMPANY:

SITE OF MANUFACTURE:

PRODUCT:

TRADEMARK (S):

CONTENT FIBERGLASS TOTAL (%):

GLASSFIBER CONTENT OF THE MIDDLE LAYER (%):

DATE:

RANGE FOR WHICH THE MARK IS REQUESTED				
SERIES	**DIAMETERS**	**APPLICATION CLASS**	**DESIGN PRESSURE**	**OPACITY YES/NO**

For any modification of these data, the client will send to the Committee secretary this descriptive questionnaire updated.

Manufacturer shall inform AENOR on all materials (formulations) used in order to ensure a clear identification of the materials for the purpose of the inspection. The manufacturer shall specify the glass fibers, description of the fiber, fiber type, fiber length, fiber diameter and fiber ratio (weight percent) of the intermediate layer and total.

…….…… on …… of …… 20……

SIGNATURE AND STAMP OF THE MANUFACTURER

Annex C2

Descriptive Questionnaire for pipes and fittings systems

CLIENT:

PIPES MANUFACTURER COMPANY:

FITTINGS MANUFACTURER COMPANY:

NUMBER OF AENOR CERTIFICATE FOR THE FITTINGS:

TRADEMARK:

DATE:

FITTINGS:

FIGURE	DIÁMETERS(mm)	MANUFACTURER INTERNAL REFERENCE

For any modification of the indicated data, the client shall send to the Committee Secretary this updated descriptive questionnaire.

…….…… on …… of …… 20……

SIGNATURE AND STAMP OF THE MANUFACTURER

Annex D

Technical Specifications for polypropylene random with modified crystal structure (PP-RCT)/polypropylene random with modified crystal structure + fiber glass (PP-RCT+FV)/ polypropylene random with modified crystal structure (PP-RCT) piping systems for hot and cold water installations inside buildings

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 and purpose

This Technical Specifications are based on the standard ISO/DIS 15874-2, in order to define the dimensions and characteristics that have to assembled the polypropylene random with modified crystal structure (PP-RCT)/ polypropylene random with modified crystal structure (PP-RCT) + glass fiber (FV) / polypropylene random with modified crystal structure (PP-RCT) systems for installation of hot and cold water inside the structure of buildings, to the temperatures and pressures of design according to the attached table, as well as its corresponding test method, in accordance with this Technical Specifications.

It is applicable to pipes with or without additional barrier layer (s).

The value for Scalc, max for each application class is illustrated in table 1.

Note: For certification purposes, when a plastic barrier layer is incorporated into the polypropylene pipe wall (for example to prevent or greatly decrease the diffusion of gases and the transmission of light through the tube wall) this structure is covered by part 2 of EN ISO 15874.

TABLE 1

pD [bar1)]	Application class			
	Class 1	Class 2	Class 4	Class 5
	Scalc,max-values 2)			
4	8,2	8,2	8,2	7,3
6	6,1	5,7	6,1	4,9
8	4,5	4,3	4,6	3,7
10	3,6	3,4	3,7	2,9

1) 1 bar = 10^5 N/mm^2

2) Values are rounded to the nearest one decimal place

2 Documentation references

- EN ISO 15874-1, 2, 3 y 5 – Plastic pipes system for installation of hot and cold water
- UNE EN ISO 7686 – Determination of the opacity
- UNE EN ISO 2505 – Longitudinal retraction
- UNE EN ISO 3126 – Determination of the dimensions
- UNE EN ISO 1167-1 y 2 – Determination of the resistance to internal pressure
- EN 1411 – Determination of the impact resistance (ball drop method)
- ISO 3451-1 – Determination of the percentage of glass fiber of the intermediate layer
- ISO 1133 – Determination of the melt flow index
- UNE 53526 – Linear expansion coefficient
- ISO 4065:1996 – Thermoplastic pipes – thickness universal table
- ISO 11922-1:1997 – Thermoplastic pipes for fluids conduction – Dimensions and tolerances – Part 1 metric series

3 Definitions and simbols

According to chapter 3 of EN ISO 15874-1.

3.1 Characteristics of the pipes material

3.1.1 General

The material of the pipes is composed of polypropylene random with modified crystal structure, as well as a reinforcement consisting of polypropylene random with modified crystal structure and fiber glass.

3.1.2 Influence of materials on water quality

When used in the manner for which they are designed, the materials that are in contact with drinking water should not constitute a toxic hazard, shot not allow microbial growth and should not cause any smell or test, or turbidity or water discoloration. Where applicable, the pipes should be in accordance with national regulations that may apply, in relation to materials in contact with drinking water.

3.1.3 Clasification of the material

Do not use reprocessed material obtained from external sources or recycled materials.

The manufacturer will inform to AENOR about all materials (formulations) that it should use in order to assure a clear identification of the same ones during the inspection.

The manufacturer shall specify the glass fibers, description of the fiber, fiber type, fiber length, fiber diameter and fiber ratio (weight percent) of total and intermediate layer.

3.2 General characteristics of the pipes

3.2.1 Appearance

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

3.2.2 Opacity

If it is required that the pipe is opaque for use in underground installations, the pipe wall will not transmit more than 0.2% of visible light, when tested in accordance with the UNE EN ISO 7686.

3.3 Geometrical characteristics of the pipes

3.3.1 General

The dimensions of the pipes have to measure up according to UNE EN ISO 3126.

The values for external diameter and / or wall thickness apply to polypropylene pipes and are exclusive of additional external layers. For pipes with barrier layer, the values of internal diameter and wall thickness can be applied to the finished product, including the barrier layer, provided that the thickness of the outer barrier layer, including any adhesive layer, is ≤ 0, 4 mm and the design calculations using values of the external diameter and wall thickness of the base pipe (PP) are in accordance with the values of Scal.max. from tables 1 to 4 of UNE-EN ISO 15874-2.

The manufacturer must declare the dimensions and tolerances of the base pipe in its documentation when these are different from those of tables 5 to 9 of UNE-EN ISO 15874-2.

3.3.2 Dimensions of the pipes

3.3.2.1 Outside diameter

The outside diameter of the pipe must be in accordance with Table 2.

TABLE 2

Dimensions of the pipes for the dimension Class A (measures according to ISO 4065:1996 and applicable for all the classes and service conditions)

Nominal Dimension DN/OD	Nomimal outside diameter (dn)(mm)	Minimum nominal outside diameter (dem, min) (mm)	Maximun nominal outside diameter (dem,max) (mm)	Pipes series						
				S 8	S 6,3	S5	S4	S 3,2	S 2,5	S 2
				Thicknesses emin y en						
12	12	12,0	12,3	1,8	1,8	1,8	1,8	1,8	2,0	2,4
16	16	16,0	16,3	1,8	1,8	1,8	1,8	2,2	2,7	3,3
20	20	20,0	20,30	1,8	1,8	1,9	2,3	2,8	3,4	4,1
25	25	25,0	25,30	1,8	1,9	2,3	2,8	3,5	4,2	5,1
32	32	32,0	32,30	1,9	2,4	2,9	3,6	4,4	5,4	6,5
40	40	40,0	40,40	2,4	3,0	3,7	4,5	5,5	6,7	8,1
50	50	50,0	50,50	3,0	3,7	4,6	5,6	6,9	8,3	10,1
63	63	63,0	63,60	3,8	4,7	5,8	7,1	8,6	10,5	12,7
75	75	75,0	75,70	4,5	5,6	6,8	8,4	10,3	12,5	15,1
90	90	90,0	90,90	5,4	6,7	8,2	10,1	12,3	15,0	18,1
110	110	110,0	111,00	6,6	8,1	10,0	12,3	15,1	18,3	22,1
125	125	125,0	126,2	7,4	9,2	11,4	14,0	17,1	20,8	25,1
140	140	140,0	141,3	8,3	10,3	12,7	15,7	19,2	23,3	28,1
160	160	160,0	161,5	9,5	11,8	14,6	17,9	21,9	26,6	32,1
180	180	180,0	181,7	10,7	13,3	16,4	20,1	24,6	29,9	36,1
200	200	200,0	201,8	11,9	14,7	18,2	22,4	27,4	33,2	40,1
225	225	225,0	227,1	13,4	16,6	20,5	25,2	30,8	37,4	45,1
250	250	250,0	252,3	14,8	18,4	22,7	27,9	34,2	41,5	-
280	280	280,0	282,5	16,6	20,6	25,4	31,3	38,3	-	-
315	315	315,0	317,5	18,7	23,2	28,6	35,2	43,1	-	-
355	355	355,0	358,2	21,1	26,1	32,2	39,7	-	-	-
400	400	400,0	403,6	23,7	29,4	36,3	44,7	-	-	-
450	450	450,0	453,8	26,7	33,1	40,9	-	-	-	-

The value of the tolerance is according to the Grade A of ISO 11922-1

3.3.2.2 Nominal wall thickness (en)

The wall thickness (minimum thickness (emin) and maximum thickness (emax) should be in accordance with Table 3.

TABLE 3

Thickness tolerances

Minimum thickness		Degree V tolerance	Minimum thickness		Degree V tolerance
Ey,min		tY	Ey,min		tY
>	≤		>	≤	
-	1,0	0,2	23,0	24,0	2,5
1,0	2,0	0,3	24,0	25,0	2,6
2,0	3,0	0,4	25,0	26,0	2,7
3,0	4,0	0,5	26,0	27,0	2,8
4,0	5,0	0,6	27,0	28,0	2,9
5,0	6,0	0,7	28,0	29,0	3,0
6,0	7,0	0,8	29,0	30,0	3,1
7,0	8,0	0,9	30,0	31,0	3,2
8,0	9,0	1,0	31,0	32,0	3,3
9,0	10,0	1,1	32,0	33,0	3,4
10,0	11,0	1,2	33,0	34,0	3.5
11,1	12,0	1,3	34,0	35,0	3,6
12,0	13,0	1,4	35,0	36,0	3,7
13,0	14,0	1,5	36,0	37,0	3,8
14,0	15,0	1,6	37,0	38,0	3,9
15,0	16,0	1,7	38,0	39,0	4,0
16,0	17,0	1,8	39,0	40,0	4,1
17,0	18,0	1,9	40,0	41,0	4,2
18,0	19,0	2,0	41,0	42,0	4,3
19,0	20,0	2,1	42,0	43,0	4,4
20,0	21,0	2,2	43,0	44,0	4,5
21,0	22,0	2,3	44,0	45,0	4,6
22,,0	23,0	2,4	45,0	46,0	4,7

Tolerance is expressed as $^{+x}_{0}$ mm where x is the value of the given tolerance.

The tolerance value is according to Degree V of ISO 11922-1.

3.3.2.3 Wall thickness of inner layer(e1)

The thickness of inner layer (e1) will be major or equal to 1/4 of the specified thickness (emin).

3.4 Mechanical characteristics of the pipes

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

TABLE 4

Mechanical Characteristics

<table>
<tr><th>Characteristics</th><th>Requirements</th><th colspan="4">Test paremeters</th><th>Test method</th></tr>
<tr><td rowspan="10">Resistance to internal pressuree</td><td rowspan="10">Without fault during the test period</td><td>Hydrostatic effort (tangential) MPa</td><td>Test temperature °C</td><td>Test time h</td><td>Number of test pieces</td><td rowspan="10">ISO 1167</td></tr>
<tr><td>15.0</td><td>20</td><td>1</td><td>3</td></tr>
<tr><td>4.2</td><td>95</td><td>22</td><td>3</td></tr>
<tr><td>4.0</td><td>95</td><td>165</td><td>3</td></tr>
<tr><td>3.8</td><td>95</td><td>1000</td><td>3</td></tr>
<tr><td colspan="4">General Test parameters</td></tr>
<tr><td colspan="2">Sampling procedure</td><td colspan="2">Unspecified 1)</td></tr>
<tr><td colspan="2">Type of plug</td><td colspan="2">Type a)</td></tr>
<tr><td colspan="2">Orientation of the test</td><td colspan="2">Unspecified</td></tr>
<tr><td colspan="2">Type of test</td><td colspan="2">Water-in-water</td></tr>
</table>

1) As a guide see the Technical Specification CEN ISO/TS 15874-7

3.5 Physical characteristics of the pipes

On having realized the tests, according to method and parameters indicated in table 5, the physical characteristics of the pipe, must fulfill the requirements indicated in the above mentioned table.

TABLE 5

Physical characteristics

Characteristics	Requirements	Test parameters		Test method
		Characteristics	Value	
Longitudinal retraction	**≤1%**	Temperature Test time for $e_n < 8$ mm $8mm \leq e_n \leq 16mm$ $e_n > 16$ mm Number of test pieces	135°C 1h 2h 4h 3	Method B of UNE EN ISO 2505 (oven test)
Thermal stability by hidrostatic pressure test	Without break during the test (after realizing the test, should perform an analysis in order to check the adherence between the layers with a magnifying glass of 8 increases as minimum)	Sampling Hydrostatic stress (tan) Test temperature Type of test Plug Length Number of test pieces	a) 2,6 Mpa 110°C Water-in-Air Plug a) 8760h 1	UNE EN ISO 1167-1 and 2
Impact resistance (Charpy Method) For DN ≤ 25 mm	≤10%	Test temperature Conditioning medium Test piece type Number of test pieces	0°C Liquid bath or air 1 (Whole pipe) 10 (Nota b)	ISO 9854-1 ISO 9854-2
Impact resistance (Round-the clock Method) For DN ≥ 32 mm	TIR ≤ 10%	Test temperature Conditioning medium Type de Striker Mass of striker Fall High of striker	0°C Liquid bath or air d25 for striker mass ≤ 0,8 kg or d90 for striker mass ≥ 1,6 kg according to table 6 according to table 6	ISO 3127
Melt flow index (COMPOSITE)	≤ 0.5 g/10 min	Test Temperature Mass Number of test pieces	230°C 2,16 kg 3	ISO 1133
Melt flow index (diference between composite and inner and outer layer of the pipe)	≤ 30%	Test temperature Mass Number of test pieces	230°C 2,16 kg 3	ISO 1133
Determination of the percentage of glass fiber of the intermediate layer	According to value declared by the manufacturer **± 3%** will not be able to be lower than **15 %** Note c	Test temperature Mass Time Test pieces	verify for each reference. According to the % of alleged fiber 30 min Minimum 3	UNE EN ISO 3451-1 (Method A)

Determination of the percentage of the total fiber glass	According to value declared by the manufacturer ± 3% will not be able to be lower than 5 % Note c	Test temperature Mass Time Test pieces	verify for each reference. According to the % of alleged fiber 30 min Minimum 3	UNE EN ISO 3451-1 (Method A)

a) Not specify the sampling procedure. As a guide, see Technical Specification CEN ISO/TS 15874-7

b) Initially, 10 pieces should be tested, allowing a single break. If 2 or 3 breaks occur, 20 additional pieces should be tested. The total number of breaks, expressed as a percentage, must not exceed 10%.

c) The final result of these tests will be applied the rounding rule to the nearest value as indicated:
Digit <5, the previous number is not modified (Example: 5.2 would be 5; 15.2 would be 15).
Digit ≥ 5, the previous number is increased by one unit (Example: 4.6 would be 5; 14.6 would be 15).

3.5.1 Impact test round-the-clock method

	S 8		S 6,3		S 5		S 4		S 3,2		S 2,5		S 2	
DN	Mass	High	Mass	High	Mass	High	Mass	High	Mass	High	Mass	High	Mass	High
	Kg	m	Kg	m	Kg	m	Kg	m	Kg	m	Kg	m	Kg	m
32	0,25	0,5	0,25	0,5	0,25	0,5	0,25	0,5	0,25	0,6	0,25	0,7	0,25	0,8
40	0,25	0,5	0,25	0,6	0,25	0,7	0,25	0,8	0,50	0,5	0,50	0,6	0,50	0.7
50	0,25	0,7	0,25	0,9	0,50	0,5	0,50	0,6	0,50	0,8	0,50	0,9	0,50	1,1
63	0,50	0,6	0,50	0,7	0,80	0,5	0,80	0,6	0,80	0,7	0,80	0,9	0,80	1,1
75	0,80	0,5	0,80	0,6	0,80	0,7	0,80	0,9	0,80	1,1	1,60	0,6	1,60	0.7
90	0,80	0,7	0,80	0,9	0,80	1,1	1,60	0,6	1,60	0,8	1,60	0,9	1,60	1,0
110	1,60	0,5	1,60	0,7	1,60	0,8	1,60	1,0	2,50	0,7	2,50	0,9	2,50	1,0
125	1,60	0,7	2,50	0,5	2,50	0,7	2,50	0,8	2,50	0,9	2,50	1,1	3,20	1,0
140	2,50	0,6	3,20	0,5	3,20	0,6	3,20	0,8	3,20	0,9	3,20	1,1	4,00	1,0
160	3,20	0,6	3,20	0,7	3,20	0,8	3,20	1,0	3,20	1,2	3,20	1,4	4,00	1,3
180	3,20	0,7	3,20	0,9	3,20	1,1	3,20	1,3	3,20	1,5	3,20	1,8	4,00	1,7
200	3,20	0,9	3,20	1,1	3,20	1,3	3,20	1,6	3,20	1,9	4,00	1,8	5,00	1,6
225	3,20	1,1	3,20	1,4	3,20	1,7	3,20	2,0	4,00	1,9	5,00	1,8	6,30	1,6
250	3,20	1,4	3,20	1,7	4,00	1,7	4,00	2,0	5,00	1,9	6,30	1,8	-	-
280	3,20	1,8	4,00	1,7	5,00	1,7	5,00	2,0	6,30	1,9	-	-	-	-
315	4,00	1,8	5,00	1,7	6,30	1,7	6,30	2,0	8,00	1,9	-	-	-	-
355	5,00	1,8	6,30	1,7	8,00	1,7	8,00	2,0	-	-	-	-	-	-
400	6,30	1,8	8,00	1,7	10,00	1,7	10,00	2,0	-	-	-	-	-	-
450	8,00	1,8	10,00	1,8	12,50	1,7	-	-	-	-	-	-	-	-

Note: The proposed fall height (m) and masses (kg) have been calculated to provide a specific impact energy of E / A = 4 KJ / m2. The impact energy has been evaluated from E = mass x height of fall x 9.81 and pipe section from A = π x [DN2 - (DN - 2 x in) 2] / 4. (Exceptionally, DN 32 S5-S6,3-S8 pipes have a specific impact energy greater than 4 KJ / m2 because a minimum fall height of 0.5 m has been selected).

4 Characteristics and system test method

It applies the established in the UNE-EN ISO 15874-3 and UNE-EN ISO 15874-5.