

**GRAVITY DRAINAGE SYSTEMS MADE OF
THERMOPLASTIC MATERIALS**

Technical document No. 442-06

Specifications applicable to the solid-wall PVC-U
piping systems group

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Part 1

SCOPE

This Technical Document covers the solid-wall PVC-U piping systems group.

1.1 APPLICABLE REFERENCE STANDARDS AND COMPLEMENTARY SPECIFICATIONS

1.1.1 Reference standards:

NF EN 1401-1 (April 2009) Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U) — **Part 1: Specifications for pipes, fittings and the system.**

1.1.2 Complementary specifications and additional requirements

The reference specifications and test methods for the NF Mark – Thermoplastic material drain or sewer system operating without pressure are defined in the tables below. They are based on the abovementioned standards with possible additions or changes.

TABLE 1:

Specifications for Pipes and Fittings

Characteristics and test methods (4) (2)	PVC-U pipes and fittings
Reference standard	NF EN 1401-1
Material characteristics	See ¶ 4 and appendix A and B of NF EN 1401-1
Colour	Homogeneous colour (clear, medium grey-blue between A624 and A625) in accordance with Standard NF X 08-002 and the walls must be opaque. (1)
Dimensions DN See ¶ 7.2	Pipes: Table 5 Fittings Table 6 to 11(c) (7)
Sockets	NF EN 1401-1
Pipe thicknesses	Table 5
Socket dsm, Amin	Table 6
Thicknesses of moulded and fabricated fittings	Table 6(b) to 11(c) (7)
Vicat softening temperature NF EN 727 (2)	Pipes $\geq 79^{\circ}\text{C}$ Fittings $\geq 77^{\circ}\text{C}$
Density (resin) NF EN ISO 1183-1 Method A (2)	Pipes and fittings: $\geq 1360 \text{ kg/m}^3$
Tensile characteristics NF EN ISO 6259-1 and ISO 6259-2 (2)	Pipes: Maximum stress R $\geq 45 \text{ MPa}$ Elongation at break A $\geq 80\%$
Reversion after annealing at 150°C NF EN ISO 2505 - (2)	Pipes: T $\leq 5\%$ No blisters
Resistance to internal pressure 60°C 1000 hrs (2) NF EN ISO 1167-1/2	Pipes and fittings: No break during the test period Pipes: 10 MPa Fittings: 6.3 MPa
Oven test at 150°C “Effects of heating” Method A of NF EN ISO 580 hot air (2) (6)	Fittings: (3)

TABLE 2:
Specifications for pipes

Characteristics and test methods (2)	PVC-U pipes
Ring stiffness NF EN ISO 9969	SN8: $\geq 8 \text{ kN/m}^2$ (CR8) SN4: $\geq 4 \text{ kN/m}^2$ (CR4)
Compression rate NF EN ISO 9967	≤ 2.0
Impact resistance NF EN 744	TIR $\leq 10\%$ Testing parameters see Table 9 of Standard NF EN 1401-1

TABLE 3:
Specifications for fittings

Characteristics and test methods (2)	PVC-U fittings
Impact resistance (Drop Test) NF EN 12061 (5)	No crazing in the wall; detached seals must be able to be put back in the correct place manually
Mechanical strength or flexibility test of fabricated fittings NF EN 12256	Minimum moment DN ≤ 250 $0.15(\text{DN})^3 \times 10^{-6} \text{ kNm}$ DN > 250 $0.01(\text{DN}) \text{ kNm}$ Or Minimum Displacement No signs of cracking, crazing, separation or leaks

- (1) The pipes and fittings may not have any defects visible to the naked eye such as scratches, marks, grains, cracks or air pockets that negatively impact use. They must be homogeneous in colour (clear, medium grey-blue between A624 and A625) in accordance with Standard NF X 08-002 and the walls must be opaque.
The marking must be consistent with the requirements provided in this Technical Document.
- (2) With additional clarifications indicated in Part 2 of Technical Document 1.
- (3) The fittings may not have any openings along the entire thickness of their walls in any given seam nor deterioration of the surface, penetrating more than 1/2 the thickness of the wall, particularly near an injection point. The exposure time must be consistent with the durations defined in Standard NF EN ISO 580 Table 1 according to the thickness of the fitting.
- (4) The editions of the standards cited for use are those in force on the revision date of the certification reference system (see page 2 of this Technical Document), unless otherwise specified by the mandated body.
- (5) The specimen must be a complete fitting with, if applicable, the seal and all of the components' associated fixing methods in place.
- (6) The standards cited for these 2 tests that have the same number (580) are indeed 2 different standards.
- (7) The wall thickness of fabricated fittings, with the exception of spigots and sockets, may vary locally due to the manufacturing process insofar as the minimum wall thickness of the body is compliant with $e_{3\text{min}}$ indicated in Table 6 of Standard NF EN 1401-1 according to the relevant SDR.

TABLE 4:
Specifications for the assemblies

Characteristics and test methods (1) (2)	Specifications
Leaktightness of elastomer sealing rings NF EN 1277 Conditions B and C at 23°C	Deformation of the spigot: 10% Deformation of the socket: 5% Under P = 0.05 bar and 0.5 bar: No leaks Under P = -0.3 bar: Final P ≤ -0.27 bar
Watertightness (fabricated fittings) NF EN 1053	No leaks at 0.5 bar for 1 min
Quality of elastomer sealing rings (3)	NF EN 681-1, NF EN 681-2, as the case may be

- (1) The editions of the standards cited for use are those in force on the revision date of the certification reference system (see page 2 of this Technical Document), unless otherwise specified by the mandated body.
- (2) With additional clarifications indicated in Part 2 of Technical Document 1.
- (3) Ozone resistance test: Rubber sealing elements that are protected and packaged separately until the time of their assembly must meet the same requirements, except using an ozone concentration of (25 ± 5) ppm instead of (50 ± 5) ppm.

TABLE 5: PVC DRAINAGE FAMILY

Dimensional characteristics of the pipes

In accordance with NF EN 1401-1 and NF EN ISO 3126

- Total length: ≤ 12 m
- Tolerance $\pm 1\%$ for $L < 5$ m
- ± 5 cm for $L \geq 5$ m

- other dimensions

Nominal external diameter (DN)	Tolerances for mean external diameter (mm)	Stiffness class 8 (SN (CR) 8)			Stiffness class 4 (SN (CR) 4)		
		Thickness		Ring Stiffness (kN/m ²)	Thickness		Ring Stiffness (kN/m ²)
		Min (mm)	Max (mm)		Min (mm)	Max (mm)	
110	+0.3 0	3.2	3.8	8	3.2	3.8	4
125	+0.3 0	3.7	4.3		3.2	3.8	
160	+0.4 0	4.7	5.4		4.0	4.6	
200	+0.5 0	5.9	6.7		4.9	5.6	
250	+0.5 0	7.3	8.3		6.2	7.1	
315	+0.6 0	9.2	10.4		7.7	8.7	
400	+0.7 0	11.7	13.1		9.8	11.0	
500	+0.9 0	14.6	16.3		12.3	13.8	
630	+1.1 0	18.4	20.5		15.4	17.2	
710	+1.2 0	-	-		17.4	19.4	
800	+1.3 0	-	-		19.6	21.8	
1000	+1.6 0	-	-		24.5	27.2	

Nominal thickness

The nominal thicknesses of the pipes are equal to the minimum values provided in the tables above, expressed without size.

The wall thickness, e, must comply with Table 4. Nevertheless, a maximum wall thickness at a given point of less than 1.2e_{min} is permitted if the mean wall thickness value, e_m, is less than or equal to the e_{m,max} specified thickness.

Concerning the U application, for DN 200 and greater, a reduction of e_{min} of up to 5% is permitted on the condition that the thickness e_m is greater than or equal to the e_{min} values indicated in Table 4.

Out-of-roundness

The out-of-roundness, measured immediately after production, must be less than or equal to 0.024 x DN, expressed in mm.

Table 6: PVC DRAINAGE FAMILY
Characteristics of fitting sockets
Figure 2 of Standard NF EN 1401-1

Nominal diameter r	Socket by sealing ring			Wall thickness of sockets SDR41 fittings		Wall thickness of sockets SDR34 fittings	
	Minimum mean internal diameter $d_{sm, min}$	A_{min}	C_{max}				
				$e_{2, min}$	$e_{3, min}$	$e_{2, min}$	$e_{3, min}$
110	110.4	32	26	2.9	2.4	2.9	2.4
125	125.4	35	26	2.9	2.4	3.4	2.8
160	160.5	42	32	3.6	3.0	4.3	3.6
200	200.6	50	40	4.4	3.7	5.4	4.5
250	250.8	55	70	5.5	4.7	6.6	5.5
315	316.0	62	70	6.9	5.8	8.3	6.9

Excerpt from Standard NF EN 1401-1 paragraph 6.4.1.2.

The thicknesses of sockets e_2 and e_3 (see Figure 2) must comply with Table 15 of Standard NF EN 1401-1, with the exception of the sockets' inlets.

A 5% reduction in e_2 and e_3 due to core offset is permitted. In such a case, the average of the two opposing-wall thicknesses must be equal to or exceed the values given in Table 6.

When the sealing ring is fixed by means of a retaining ring (see the figure below), the thickness in this area must be calculated by adding the thickness of the socket to that of the retaining ring at the corresponding location in the same section.

Figure 5 of Standard NF EN 1401-1

Dimensional characteristics of fittings

Thicknesses

The thicknesses of the body of the fitting and the spigot must comply with the specifications contained in the below tables, with the exception of an authorised 5% reduction due to core offset. In such a case, the average of the 2 opposing-wall thicknesses must be equal to or exceed the values given in the tables below.

Design dimension Z

The Z-lengths of fittings must be provided by the applicant/holder.

Figures 8, 9, 10, 11, 12 and 13 of Standard NF EN 1401-1

Out-of-roundness (fabricated fittings)

The out-of-roundness measured immediately after production must be less than or equal to $0.024 d_n$.

TABLE 6b: PVC DRAINAGE FAMILY
**Dimensional characteristics of fittings
(Dimensions and tolerances in mm)**

Elbows FF (Female/Female)

Elbows MF (Male/Female)

 $\alpha = 15^\circ - 30^\circ - 45^\circ - 87^\circ 30' / 90^\circ$
 α
Table 6b

Nominal diameter	Spigot (d_n)		Body Thickness of the body SDR41 (1)		Body Thickness of the body SDR34 (1)		Socket by sealing ring
	Mean external diameter tolerances	Length L_1	e min	em max	e min	em max	Minimum mean internal diameter $d_{sm, min}$
110	+0.3 0	≥ 60	3.2	3.8	3.2	3.8	110.4
125	+0.3 0	≥ 67	3.2	3.8	3.7	4.3	125.4
160	+0.4 0	≥ 81	4.0	4.6	4.7	5.4	160.5
200	+0.5 0	≥ 99	4.9	5.6	5.9	6.7	200.6
250	+0.5 0	≥ 125	6.2	7.1	7.3	8.3	250.8
315	+0.6 0	≥ 132	7.7	8.7	9.2	10.4	316.0

(1) The em max thickness is provided for informational purposes.

TABLE 7: PVC DRAINAGE FAMILY

**Dimensional characteristics of fittings
(Dimensions and tolerances in mm)**

Sleeves with stops and slip sleeves

Figure 12 of Standard NF EN 1401-1

Nominal diameter	Sleeve with sealing ring	
	Minimum internal diameter	2 A _{min}
110	110.4	64
125	125.4	70
160	160.5	84
200	200.6	100
250	250.8	110
315	316.0	124

TABLE 8: PVC DRAINAGE FAMILY

**Dimensional characteristics of fittings
(Dimensions and tolerances in mm)**

Increases

Figure 13 of Standard NF EN 1401-1

Nominal diameter		Spigot (dn ₂)		Socket (dn ₁)
		Mean external diameter tolerances	Length L ₁	Socket by sealing ring
dn ₁	dn ₂			
110	125	+0.3 0	≥ 67	110.4
110	160	+0.4 0	≥ 81	110.4
125	160	+0.4 0	≥ 81	125.4
125	200	+0.5 0	≥ 99	125.4
160	200	+0.5 0	≥ 99	160.5
200	250	+0.5 0	≥ 125	200.6
250	315	+0.6 0	≥ 132	250.8

TABLE 9: PVC DRAINAGE FAMILY
Dimensional characteristics of fittings
(Dimensions and tolerances in mm)

Tees

$$\alpha = 87^{\circ}30/90^{\circ}$$

Wyes FF (Female/Female)

Wyes MF (Male/Female)

$$\alpha = 45$$

Figures 14, 15, 16 and 17 of Standard NF EN 1401-1

DN1	DN2	Spigot (D 3)		Socket by sealing ring	Socket by sealing ring	Body Fittings SDR41		Body Fittings SDR34	
		Mean external diameter tolerances (mm)	Length (mm)	Minimum mean internal diameter (mm)	Minimum mean internal diameter (mm)	Thickness of the body (mm) (3)		Thickness of the body (mm) (3)	
						DN1 e min – em max	DN2 e min – em max	DN1 e min – em max	DN2 e min – em max
110	110 (2)	+0.3 0	≥ 60	110.4	110.4	3.2 – 3.8	3.2 – 3.8	3.2 – 3.8	3.2 – 3.8
125	110	+0.3 0	≥ 67	125.4	110.4	3.2 – 3.8	3.2 – 3.8	3.7 – 4.3	3.2 – 3.8
125	125 (2)	+0.3 0	≥ 67	125.4	125.4	3.2 – 3.8	3.2 – 3.8	3.7 – 4.3	3.7 – 4.3
160	110	+0.4 0	≥ 81	160.5	110.4	4.0 – 4.6	3.2 – 3.8	4.7 – 5.4	3.2 – 3.8
160	125	+0.4 0	≥ 81	160.5	125.4	4.0 – 4.6	3.2 – 3.8	4.7 – 5.4	3.7 – 4.3
160	160 (2)	+0.4 0	≥ 81	160.5	160.5	4.0 – 4.6	4.0 – 4.6	4.7 – 5.4	4.7 – 5.4
200	125	+0.5 0	≥ 99	200.6	125.4	4.9 – 5.6	3.2 – 3.8	5.9 – 6.7	3.7 – 4.3
200	160	+0.5 0	≥ 99	200.6	160.5	4.9 – 5.6	4.0 – 4.6	5.9 – 6.7	4.7 – 5.4
200	200 (2)	+0.5 0	≥ 99	200.6	200.6	4.9 – 5.6	4.9 – 5.6	5.9 – 6.7	5.9 – 6.7
250	125	+0.5 0	≥125	250.8	125.4	6.2 – 7.1	3.2 – 3.8	7.3 – 8.3	3.7 – 4.3
250	160	+0.5 0	≥125	250.8	160.5	6.2 – 7.1	4.0 – 4.6	7.3 – 8.3	4.7 – 5.4
250	200	+0.5 0	≥125	250.8	200.6	6.2 – 7.1	4.9 – 5.6	7.3 – 8.3	5.9 – 6.7
250 (1)	250	+0.5 0	≥125	250.8	250.8	6.2 – 7.1	6.2 – 7.1	7.3 – 8.3	7.3 – 8.3

(1) Only for tees.

(2) Can only be used with a reducer.

(3) The em max thickness is provided for informational purposes.

		Spigot (D 3)		Socket by sealing ring	Socket by sealing ring	Body Fittings SDR41		Body Fittings SDR34	
		Mean external diameter tolerances (mm)	Length (mm)	Minimum mean internal diameter (mm)	Minimum mean internal diameter (mm)	Minimum thickness of the body (mm) (3)		Minimum thickness of the body (mm) (3)	
DN ₁	DN ₂					DN1 e min – em max	DN2 e min – em max	DN1 e min – em max	DN2 e min – em max
315	125	+0.6 0	≥132	316.0	125.4	7.7 – 8.7	3.2 – 3.8	9.2 – 10.4	3.7 – 4.3
315	160	+0.6 0	≥132	316.0	160.5	7.7 – 8.7	4.0 – 4.6	9.2 – 10.4	4.7 – 5.4
315	200	+0.6 0	≥132	316.0	200.6	7.7 – 8.7	4.9 – 5.6	9.2 – 10.4	5.9 – 6.7
315	250	+0.6 0	≥132	316.0	250.8	7.7 – 8.7	6.2 – 7.1	9.2 – 10.4	7.3 – 8.3
315 ⁽¹⁾	315	+0.6 0	≥132	316.0	316.0	7.7 – 8.7	7.7 – 8.7	9.2 – 10.4	9.2 – 10.4

- (1) Only for tees.
- (2) Can only be used with a reducer.
- (3) The em max thickness is provided for informational purposes.

TABLE 10: PVC DRAINAGE FAMILY

**Dimensional characteristics of fittings
(Dimensions and tolerances in mm)**

Saddle branch with seal for PVC pipes
 $\alpha = 45^\circ - 87^\circ30' \text{ or } 90^\circ$

Figure 18 of Standard NF EN 1401-1

Nominal diameter DN		(d ₁)	(d ₂)
		Minimum mean internal diameter (mm)	Minimum mean internal diameter (mm)
DN1	DN2		
200	125	200.6	125.4
250	125	250.8	125.4
250	160	250.8	160.5
315	125	316.0	125.4
315	160	316.0	160.5
315	200	316.0	200.6

Nominal angle α can have a value between $87^\circ30'$ and 90° only if $dn2/dn1 \leq 2/3$;
Minimum axial coverage L :

Dimensions in millimetres

DN2	110	125	160	200
L min	50	60	70	80

For saddle branches with $dn1 < 315$ mm, the cover must not be smaller than half the circumference; for saddle branches with $dn1 \geq 315$ mm, the lateral cover a must not be smaller than 80 mm.

Note: Saddle branches rely on Technical Document 4.

TABLES 11, 11b and 11c: PVC DRAINAGE FAMILY

List of parts not covered under NF EN 1401-1
 (PVC/PVC tapping saddles, PVC/concrete tapping saddles, PVC plugs, reducing plugs)

TABLE 11: Tapping saddles

Nominal diameter DN	Spigot (dn ₁)	Socket by sealing ring (ds ₂)	Body
	Mean external diameter tolerances	Minimum mean internal diameter	Minimum thickness of the body
110	+0.3 0	110.4	3.2
125	+0.3 0	125.4	3.2
160	+0.4 0	160.5	4.0
200	+0.5 0	200.6	4.9
250	+0.5 0	250.8	6.2
315	+0.6 0	316.0	7.7

TABLE 11b: Plugs and caps

Nominal diameter DN	Spigot		Body
	Maximum external diameter	Minimum interlocking $M_{\min} = C_{\max} + 10 \text{ mm}$	Minimum thickness of the body
110	110.3	36	3.2
125	125.3	36	3.2
160	160.4	42	4.0
200	200.5	50	4.9
250	250.5	80	6.2
315	315.6	80	7.7

TABLE 11c: Reducing plugs

Nominal diameter		Spigot (dn ₂) Mean external diameter tolerances	Socket (dn ₁) Socket by sealing ring
DN ₁	DN ₂		Minimum internal diameter
110	125	+0.3 0	110.4
110	160	+0.4 0	110.4
125	160	+0.4 0	125.4
125	200	+0.5 0	125.4
160	200	+0.5 0	160.5
200	250	+0.5 0	200.6
250	315	+0.6 0	250.8

Part 2

MARKING CONDITIONS – REFERENCING THE NF MARK

This Technical Document specifies the conditions for marking and referencing the NF mark provided in the certification reference system of the NF mark – Gravity drainage systems.

2.1 REPRODUCING THE NF LOGO ON THE CERTIFIED PRODUCT

2.1.1 General

Se référer au § 2.4.1 du corps du référentiel

Refer to § 2.4.1 of the body of the reference system.

The trade reference of the certified product must be reserved for the NF mark.





The NF logo must ensure identification of all certified products in accordance with the provisions set down in this technical document. The requirements relating to marking in the reference standards listed on page 2 of this Technical Document must also be followed.

The black and white version of the NF logo can be used.

2.1.2 Marking pipes and fittings

2.1.2.1 Marking pipes

- Holders have the option to use:

- Either the new logo  followed by the letter A, as follows:  A
- Or, as an exception, when using the logo  creates technical and/or material difficulties, the old logo 

Marking of pipes must be carried out in a way that is visible and indelible and which can be read by the naked eye, on a generatrix and contain, every 2 metres or less, at a minimum, the following set of information:

- ① - the trademark or symbol filed by the applicant/holder with the mandated bodies,
- ② - the holder's identification number assigned upon notification of admission and possibly the production site designated upon notification of admission (if there are multiple factories),
- ③ - the logo and the symbol of the family: A,



Note: a negative version of the logo can be used,

- ④ - the material identification symbol: PVC,
- ⑤ - the dimensions of the pipes: nominal external diameter SN4 (CR4) or SN8 (CR8),
- ⑥ - mark for production identification: date (dd/mm/yy) or day number and year of manufacture (xxx/yy) (or batch no. indicating the manufacturing date: in this case, the definition of this number must be sent to the mandated body).




Note: the choice of marking method is left to the applicant/holder. Any other additional marking is permitted on the condition that the sequence of NF information is not broken and it causes no confusion during use; in this case, the sequence of NF information must be framed by lines of approximately 3 cm.

Examples:

Solid-wall PVC pipes for sewerage systems

	XXX ①	01/02 ②	 A ③	PVC ④	125 CR4 (and/or) SN4 ⑤	01 02 10 or 032 10 ⑥	
	XXX ①	01/02 ②	 A ③	PVC ④	125 CR4 (and/or) SN4 ⑤	01 02 10 or 032 10 ⑥	

2.1.2.2 Marking fittings


- Holders have the option to use:
 - Either the new logo  followed by the letter A, as follows:  A
 - Or, as an exception, when using the logo  creates technical and/or material difficulties, the following monogram:



The new certified products shall comply with the NF graphic charter in force.

Each fitting must bear the following information, marked indelibly (marking a permanently affixed label is permitted):

- ① - trademark or symbol filed by the applicant/holder with the mandated bodies,
- ② - nominal dimensions (in the case of a single fitting or a reducing fitting; in the latter case, the order indicated for the designation must be followed),
- values of connection angles,
- ③ - NF logo and the symbol of the family: A,
- ④ - The thickness series: SDR41 or SDR34.

In cases of FF sleeve couplings and if moulding conditions do not allow marking of the NF monogram described above, this is optional, unless using the monogram  A is possible.

- If multiple trademarks or maintenance applications are filed with CSTB, the identification number of the holder/manufacturer, assigned upon notification of admission, must be mentioned in addition to the above information.

In cases of fittings made from pipes which themselves are NF mark certified, the marking is completed on the pipes.

In cases of parts made from fittings which themselves are certified by the mark, the NF marking can be retained on the condition that the fittings were in no way modified.

Note: the location of the marking and the methods used are left to the applicant/holder. Any other additional marking is permitted on the condition that its location is separate from the NF marking and it causes no confusion during use.

2.1.2.3 Additional recommended information on fittings (optional)

Each fitting may bear the following information:

- the symbol identifying the material (PVC),
- a mark for production identification.

2.2 REPRODUCTION OF THE NF LOGO ON THE PACKAGING OF THE NF-CERTIFIED PRODUCT

- The following NF logo is to be used:



- *or, by exception, due to technical difficulties, printing the NF logo on the packaging can be*

completed without the title of the application, in black and white:



The NF logo must be associated with the symbol of the application in question, so that NF mark certified products can be distinguished from other products, without any risk of confusion, being:



- Marking primary packaging (optional) Primary packaging may

include the following indelibly marked information:

Primary packaging may include the following indelibly marked information:

- * company name and/or trademark filed,
- * symbol identifying the material,
- * NF logo as defined below:



2.3 MARKING CERTIFIED AND ASSOCIATED CHARACTERISTICS

All documentation relating to an NF - Drain or sewer system operating without pressure certified product must use the following form:

- name and address of the applicant/holder,
- identification of the Reference System on which the certification is based (**see 2.4.2 of the body of the reference system**)
- (name and address of the delegate in France, if applicable),
- designation of the product (trademark and trade reference),
- licence or certificate number,
- certified product characteristics, pipes:
 - Dimensional characteristics (diameters, thicknesses, sockets),
 - Longitudinal (heat) reversion,
 - Tensile strength,
 - Impact resistance,
 - Ring stiffness,
 - Compression rate,
 - Pressure-tightness of the assemblies,
 - Quality of elastomer sealing rings,
 - Density,
 - Vicat.
- certified product characteristics, fittings:
 - Dimensional characteristics (diameters, thicknesses, sockets),
 - Impact resistance,
 - Behaviour when submitted to heating,
 - Leaktightness of sealing rings,
 - Quality of elastomer sealing rings,
 - Density,
 - Vicat,
 - Watertightness of saddle branches with plug.

2.4 REPRODUCING THE NF LOGO ON DOCUMENTATION AND IN PUBLICATIONS (technical and commercial documents, labels, posters, advertising, websites, etc.)

- The following NF logo is to be used:



Part 3

APPLICANT/HOLDER QUALITY REQUIREMENTS

3.1 QUALITY CONTROL OPTION

The tests specified in these tables are to be performed with the number of specimens stipulated in the testing standards and addendums indicated in Technical Document 1 of the Certification Reference System specific to each product group, unless otherwise indicated in the tables.

a) For pipes:

Measurements or tests ⁽¹⁾	Minimum sampling frequency	Solid-wall PVC
Dimensions: diameter, thickness, out-of-roundness Appearance Colour Marking	By extruder: 1 every 4 hours	X
Density Vicat softening temperature Resistance to internal pressure	Once a month Once every 3 months Upon approval of each new material	X
Tensile characteristics	By extruder: 1 test per campaign and at least 1 test per week (2)	X
Reversion	1 test on 1 specimen at the start of the campaign and at least 1 test per week	X
Ring stiffness	1 test at the start of the campaign with at least 1 test every other day	X
Impact resistance	1 test per campaign	X

(1) Methods specified in Technical Document 1 Part 2.

(2) Test to be completed on at least 5 specimens.

For fittings:

Measurements or tests ⁽¹⁾	Minimum sampling frequency
Dimensions (spigots and sockets)	- per machine, per type and per dimensions: Once every 4 hours, with increased inspections at the start of the campaign (2 specimens during the first 2 hours of production) ⁽²⁾
Density	Once a month
Vicat softening temperature	Once every 3 months
Impact resistance	1 test per campaign
Oven test	1 test on 1 specimen per day, per machine, per type and per dimensions ⁽²⁾
Resistance to internal pressure at 60°C 1000 hrs	Upon approval of each new material ⁽³⁾

(1) Methods specified in Technical Document 1 Part 2.

(2) 1 specimen corresponding to as many fittings (cavities) as the mould used contains.

(3) Changing the type of stabiliser is considered a change in formulation.

A campaign corresponds to the period between the start of manufacturing of a product reference number and the switch to the next number.

3.2 QUALITY MANAGEMENT OPTION

The implemented quality assurance plan must enable product compliance with the specifications of the standards and of this reference system.

Consequently, the applicant/holder must complete or ensure completion of the specified tests per the frequencies defined in the quality assurance plan, certain tests being able to be considered "type" tests (for putting new equipment in place or using a new formulation, for example).

Part 4

MONITORING ARRANGEMENTS BY CSTB

4.1 TEST PROCEDURES DURING AN APPLICATION FOR ADMISSION

a) For pipes in the solid-wall Sewerage family:

Measurement or test (1)		Tests conducted in the factory	Tests conducted in the laboratory
Mean external diameter Appearance Marking Colour Length Any diameter Thickness Sockets (depth of groove)		All the types submitted for admission	/
Resin density		Specifications accompanied by the certificate of conformity or analysis (type 2.1 or greater as defined in TD1 chap. 2.20) prepared during each delivery	/
Vicat softening temperature		1 test	1 test
Resistance to pressure at 60°C – 1000 hrs		1 report of tests provided by the manufacturer	/
Tensile characteristics (maximum stress)		1 test, unless this test is a type test	1 test per type sampled
Impacts		1 test	1 test per type sampled
Ring stiffness		1 test	1 test per type sampled
Compression rate (2)		/	1 test or test report from an EN ISO 17025 accredited body of less than 5 years
Reversion at 150°C		1 test	1 test per type sampled
Assemblies	Leaktightness of elastomer sealing rings (3)	-	3 diameters from throughout the range, if there is only one model of seal ring; 2 diameters per model of seal ring if the number of models is greater than 1.
	Quality of elastomer sealing rings	-	1 report of tests provided by the manufacturer of elastomer sealing rings.

(1) With additional clarifications indicated in Part 2 of Technical Document 1.

- (2) This test is not to be performed again as part of an extension application for one or more DN's produced using the same raw material, the same process and at the same production site as the NF mark certified products.
- (3) For SN (CR) 16 pipes with $DN \leq 315$, the leak test will be carried out under condition B (diametral deformation) and C (angular deflection).
 - For SN (CR) 16 pipes with $DN > 315$:
 - if the design of the seal is the same for SN (CR) 8 or SN (CR) 4 pipes, the test will not be conducted.
 - if the design of the seal is different than that for SN (CR) 8 or SN (CR) 4 pipes, the test will be conducted under condition B and C on an SN (CR) 8 or SN (CR) 4 pipe made for testing purposes with an assembly matching that of the SN (CR) 16 pipes.

b) For fittings in the solid-wall PVC Drainage family:

Measurement or test (3)		Tests conducted in the factory	Tests conducted in the laboratory
Mean external diameter Appearance Marking Colour Thickness Assembly dimensions		All the types submitted for admission: by dimensional inspection of stock on at least half the range presented and by verification of the inspection registers for the entire range	-
Sockets		All fittings submitted for admission	-
Resin density		Specifications accompanied by the certificate of conformity or analysis (type 2.1 or greater as defined in TD1 chap. 2.20) prepared during each delivery	/
Vicat softening temperature		1 test	1 test
Resistance to internal pressure at 60°C – 1000 hrs (2)		1 report of tests provided by the manufacturer	/
Oven test at 150°C		1 test per fitting sampled (4)	1 test per fitting sampled (4)
Impact resistance (Drop Tests)		1 test per fitting sampled (4)	1 test per fitting sampled (4)
Assemblies	Leaktightness of seal rings	-	1 diameter if there is only one model of seal ring; 1 diameter per model of seal ring if the number of models is greater than 1
	Quality of elastomer sealing rings ⁽¹⁾	-	1 report of tests provided by the manufacturer of elastomer sealing rings.
	Watertightness of saddle branches with plug	-	1 test consisting of the fitting with the largest diameter joined to the smallest header
	Watertightness NF EN 1053 (fabricated fittings)	-	1 test consisting of the fitting with the largest diameter joined to the smallest header
	Mechanical strength or flexibility test (fabricated fittings) NF EN 12256	-	1 test

- (1) If the seals are made of elastomer identical in quality to that used for the NF-certified pipes, this test is not conducted.
- (2) In cases of extension applications without a change in formulation or raw materials, this test is not conducted.
- (3) With additional clarifications indicated in Part 2 of Technical Document 1.
- (4) Limited to 4 fittings.

4.2 TEST PROCEDURES DURING MONITORING OF CERTIFIED PRODUCTS

c) For pipes in the solid-wall Drainage family:

Measurement or test (1)	Tests conducted in the factory		Tests conducted in the laboratory
	Quality control	Quality management	
Mean external diameter Appearance Marking Colour Length Any diameter Thickness Sockets (depth of groove)	3 types per visit		-
Density Vicat softening temperature	Inspection of test records		1 test per year 1 test per year
Tensile characteristics (maximum stress and elongation at break)	Inspection of test records		1 type per year
Reversion at 150°C	Test record	Test record	1 type per year
Ring stiffness	1 type at each visit	1 type per year	1 type per year
Ring flexibility	1 type each visit / structure / process / material	1 type/year/structure/process/material	/
Compression rate	-	-	1 type every 5 years or one test report from an EN ISO 17025 accredited body of less than 5 years
Impacts	1 type at each visit	1 type per year	1 type per year
Leaktightness of elastomer sealing rings	-	-	1 type per year
Technical and commercial documents and website (body of reference system, chap. 2.5.3.3)	All information and specifications mentioned on the certificate must be consistent with the technical and commercial documents and website of the holder.		

(1) With additional clarifications indicated in Part 2 of Technical Document 1.

d) For fittings in the solid-wall PVC Sewerage family:

Measurement or test (2)	Tests conducted in the factory		Tests conducted in the laboratory
	Quality control	Quality management	
Appearance Marking Colour Mean external diameter Any diameter Thickness of the fitting's body Sockets	3 types/visit and at least 1 fitting per mould cavity		/
Resin density	Inspection of test records		/
Vicat softening temperature			1 test per year
Impact resistance	1 type at each visit	1 type per year	/
Oven test at 150°C Only for injection-moulded fittings	3 diameters per visit (choice of type)	3 diameters per year (choice of type)	1 diameter per year (choice of type) ⁽¹⁾
Leaktightness of seal rings			1 diameter per year (choice of type) ⁽¹⁾
Watertightness NF EN 1053 (fabricated fittings)			1 diameter per year (choice of type) ⁽¹⁾
Mechanical strength or flexibility test (fabricated fittings) NF EN 12256			1 diameter per year (choice of type) ⁽¹⁾
Technical and commercial documents and website (body of reference system, chap. 2.5.3.3)	All information and specifications mentioned on the certificate must be consistent with the technical and commercial documents and website of the holder.		

(1) 1 DN/year even if admission took place the same year.

(2) With additional clarifications indicated in Part 2 of Technical Document 1.