

**RIGID NON-PLASTICISED
PVC PIPES AND FITTINGS**

**Technical document No.°055-
05**

Specifications applicable to the Biaxially-Oriented
Pressure Group

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MODIFICATION HISTORY

Revision no.	Application date	Modifications
00	21/12/2018	Update to the document layout and reference
01	23/07/2019	Deletion of part 2 – « Marking conditions ... » Creation of the NF Mark appendix.
02	23/05/2023	Integration NF EN 17176 parts 1, 2 and 5 standard

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Part 1. SCOPE

This Technical Document deals with the biaxially-oriented pressure group.

1.1 APPLICABLE REFERENCE STANDARDS AND COMPLEMENTARY

SPECIFICATIONS

1.1.1 Reference standards

NF EN 17176 -1 (April 2019) Plastic piping systems for water supply, sewerage connections and collectors and pressurized, buried or overhead irrigation systems - Unplasticized poly(vinyl chloride) oriented (PVC-O) - Part 1: General

NF EN 17176 -2 (April 2019) Plastic piping systems for water supply, sewerage connections and collectors and pressurized, buried or overhead irrigation systems - Unplasticized poly(vinyl chloride) oriented (PVC-O) - Part 2: Pipes

NF EN 17176-5 (April 2019) Plastic piping systems for water supply, sewerage connections and collectors and pressurized, buried or overhead irrigation systems - Unplasticized poly(vinyl chloride) oriented (PVC-O) – Part 5: Suitability for use of the system

1.1.2 Other Standards

NF EN ISO 3126 (September 2005) Plastics piping systems – Plastics components – Determination of dimensions.

NF EN ISO 1452 (January 2010) Plastic piping systems for water supply – Unplasticised poly (vinyl chloride) (PVC-U).

Part 1: General.

Part 2: Pipes.

Part 3: Fittings.

Part 4: Taps and Auxiliary Equipment.

Part 5: System's Suitability for Use.

NF T 54-029 (February 1981) – Non-plasticised moulded PVC fittings, pressure series – Specifications.

NF EN 545 (December 2010) Ductile iron pipes, fittings, accessories and their joints for water pipelines – Requirements and test methods (Classification Index: A 48-801).

NF EN 12842 (October 2012) Ductile iron fittings for PVC-U or PE piping systems – Requirements and test methods (Classification Index: A 48-880).

NF EN 805 (June 2000) Water supply – Requirements for systems and components outside buildings.

NF EN ISO 13844: Plastics piping systems – Socket joints with elastomeric sealing ring for plastic pipes – Test method for leaktightness under negative pressure, angular deflection and deformation (ISO 13844)

NF EN ISO 13845: Plastics piping systems – Socket joints with elastomer sealing ring for plastic pressure pipes – Test methods for leaktightness under internal pressure and with angular deviation (ISO 13845)

NF EN ISO 13846: Plastics piping systems – Joints and joints with and without bottoming effect for thermoplastic piping under pressure – Test method for checking long-term tightness under internal water pressure (ISO 13846)

1.1.3 Complementary specifications

The reference specifications and test methods for the NF Mark Rigid Non-plasticised PVC Pipes and Fittings are defined in the tables below. They are based on the abovementioned standards with possible additions or changes.

1.1.4 Admission ranges

The admission range presented during the first application must, at a minimum, include the following products: 5 types of tubes.

This range may be produced on 1 or multiple sites with the same trade name.

TABLE 1 - PVC-BO BIAXIALLY-ORIENTED PRESSURE FAMILY

Specifications for pipes

Characteristics and Test methods (3)	Specifications
Reference standard	NF EN 17176-2
Appearance Marking	(1)
Dimensions (2)	Tables 4, 5 and 6
Sockets	NF EN 17176-2 Table 4
Determining axial and tangential orientation coefficients Test in accordance with NF EN 17176-2 Appendix A	According to table 1 (classifying pipes) of Standard NF EN 17176-2 Lambda a: axial orientation coefficient >1.0 Lambda t: circumferential orientation coefficient in accordance with Table 1 of standard NF EN 17176-2
Density (2) NF EN ISO 1183-1 (1987)	1370 to 1430 kg/m ³
Axial uniaxial tension characteristics NF EN ISO 6259-1 and ISO 6259-2 (2) (maximum stress)	TS ≥ 48 MPa
Axial and tangential orientation coefficient	Lambda a: axial orientation coefficient ≥1.0 Lambda t: tangential orientation coefficient compliant with Table 1 of Standard NF T 54-948
Resistance to pressure at 20°C – short duration pipe-to-pipe assembly test Pipes NF EN ISO 1167-1-2 Type B end pieces (2)	Resistance ≥ 10 hours (stress given in table 5 of standard NF T 54-948 and calculated according to the nominal thickness and nominal diameter* Tables 4, 5, 6 and 7 of this technical document) *(option b from standard NF EN ISO 1167-1 paragraph 7.1)
Resistance to pressure at 20°C – long duration Pipes NF EN ISO 1167-1-2 Type B end pieces (2)	Resistance ≥ 1000 hours (stress provided in table 5 of standard NF EN 17176-2 Pressure calculated according to the minimum thickness measured and the average external diameter measured*) *(option a from standard NF EN ISO 1167-1 paragraph 7.1)
Resistance to pressure at 20°C – long duration Pipes NF EN ISO 1167-1-2 Type B end pieces (2)	Resistance ≥ 3000 hours (stress to be defined according to the different regression curves. The class of pipe is determined by the regression curve of the product in question) (Pressure calculated according the minimum thickness measured and the average external diameter measured*) *(option a from Standard NF EN ISO 1167-1 paragraph 7.1)
Resistance to pressure at 60°C long duration NF EN ISO 1167-1-2 (2)	Resistance ≥ 1000 hours (stress provided in table 5 of Standard NF T 54-948 and calculated according to the minimum thickness measured and the average external diameter measured*) *(option a from Standard NF EN ISO 1167-1 paragraph 7.1)
Impact resistance NF EN ISO 3127 - method (2) D25 Striker, Mass according to table 6 of NF EN 17176-2 , 2.0 m Height at 20°C NF EN 17176-2 specifications	TIR ≤ 10%
Ring stiffness NF EN ISO 9969	The minimum values of ring stiffness (KN/m ²) according to DN are provided in table 6 of Standard NF EN 17176-2
Verification of the absence of lead (2)	≤ 0.1%

(1) The internal and external surfaces of the pipes must be smooth, clean and free of streaks or other defects likely to prevent them from meeting the requirements of this technical document.
The ends of the pipes must be cut cleanly and perpendicular to the pipes' axis.

For pipes with wall thickness, t_h , greater than or equal to 3 mm, the spigots must be chamfered in accordance with Figure 1 of standard **NF EN 17176-2** and the chamfer angle, α , must meet the following condition:

$$12^\circ \leq \alpha \leq 15^\circ$$

For pipes with wall thickness, e , less than 3 mm, the spigots must be deburred.

Color

The color of the tubes is homogeneous and must be blue, white or white with blue bands. The blue color is close to the RAL 5012 reference, the white color close to the RAL 9001 or RAL 9003 reference in accordance to RAL 840-HR.

The colour blue is similar to the reference colour RAL 5012.

The colour white is similar to the reference colour RAL 9001 or RAL 9003.

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 editions of the standards cited for use are those in force on the revision date of these Rules (see page 2 of this Technical Document), unless otherwise specified by the Mandated Body.

(4) In case of dispute, the DSC test can be performed instead of the uniaxial tensile

Additional requirements for pipes and fittings

Contact with potable water

The pipes, fittings and components (particularly seals) must comply with French regulations currently in force for products designed to come into contact with potable water. In particular, they must have ACS certification (or CLP, if applicable). These documents must be presented during audits.

Additional requirements for compatibility between iron Pipe/Accessory joints

- The compatibility of the joints between the PVC-O pipes and their accessories must be indicated in the commercial notices or technical guide of the holders / manufacturers or the website of the holders / manufacturers. The holder must make public a compatibility table on its commercial documents or on its website

- These compatibility tables will be audited annually by CSTB.

For information, reminder of the tables cited in ACT 54-985:

Assessment of deformations

Test	DN/OD	Criteria	Comments
Out-of-roundness	≤ 110	Rate of out-of-roundness $\leq 7\%$	After installing the fitting or saddle on the pipe and before performing the tests
	>110	Rate of out-of-roundness $\leq 5\%$	After installing the fitting or saddle on the pipe and before performing the tests
Striction	≤ 110	Rate of striction $\leq 7\%$	After test 2
	>110	Rate of striction \leq	After test 2

		5%	
Kinking	All	No kinking	After installing the fitting or saddle, before and after tests 1, 2, and 3. When installing a tap on the tapping saddles, ensure there is no kinking, regardless of the orientation of the tap

Pipe/Accessory joint validation test table

Caractéristique		Exigences	Paramètres d'essai	Méthode d'essai
Essai 1	Étanchéité de l'assemblage à une pression interne négative	Variation maximale de la pression durant l'essai : 0,08 bar	Pression interne négative : 0,8 bar Durée d'essai : 2 h Effort tranchant : non appliqué	NF EN 12842:2000, 7.2
Essai 2	Étanchéité de l'assemblage à une pression interne positive	Aucune fuite visible de l'assemblage durant l'essai	Pression d'essai : 1,5 $p+5$ bar ^{a)} Durée d'essai : 2 h Effort tranchant : non appliqué	NF EN 12842:2000, 7.1
Essai 3	Étanchéité de l'assemblage à une pression interne cyclique	Aucune fuite visible de l'assemblage durant l'essai	Durée d'essai : 24 000 cycles entre 0 et p ^{a)} Chaque cycle comprenant : — une baisse progressive de la pression jusqu'à 0 — un palier de pression d'au moins 5 s à 0 — une augmentation progressive de la pression jusqu'à p ^{a)} — un palier de pression d'au moins 5 s à p ^{a)} Effort tranchant : non appliqué	NF EN 12842:2000, 7.3
<p><i>a) p est la PFA la plus basse des composants de l'assemblage soumis à essai.</i></p> <p><i>Les Essais 1, 2 et 3 peuvent être réalisés sur la même éprouvette. En cas de litige, seuls les résultats des essais effectués sur des éprouvettes distinctes doivent être pris en compte.</i></p> <p>NOTE Le cycle de l'Essai 3 présente une plus grande amplitude de la plage de pression que celle spécifiée dans la NF EN 12842:2000, 7.3 ($0,5 p$ à p), afin de mieux prendre en compte le phénomène de relâchement des éléments d'étanchéité.</p>				

TABLE 2 - PVC-BO BIAXIALLY-ORIENTED PRESSURE FAMILY

Specifications for PVC-BO/PVC-BO assemblies (Pipes/Pipes or Pipes / PVC-U Fittings)

Characteristics and Test methods (1)	Specifications
Assembly composition and dimensional characteristics	Sealing Ring Assembly Category NF EN 17176, NF EN 1452-2 and NF EN ISO 1452-3
Short-term internal hydrostatic pressure hermetic seal test - Test according to EN ISO 13845	Test pressure: (see fig. 1 of NF EN ISO 1452-5) at a temperature of 15 to 25 °C - Deviation: 2° Test duration: 100 min
Short-term negative air pressure hermetic seal test - Test according to EN ISO 13844	Test pressure: negative pressure (see fig. 2 of EN 1452-5) at a temperature of 15 to 25°C - Deviation: 2° Deformation: 5% - Test duration: compliant with fig. 2
Long-term pressure tightness test (NF EN 17176-5 §5.3) - Test according to EN ISO 13846	Test pressure: 1.4 PN 1000h 20°C
Cyclic pressure test (2) Test in accordance with NF EN 17176-5	Test pressure: from 0.5 PN to 1 PN* at a temperature of 15 to 25°C, without angular deviation or shear force Test duration: 24000 cycles Squarewave signal period of 5 to 10 seconds
Quality of elastomer sealing rings NF EN 681-1 (3)	NF EN 681-1

*: PN of biaxially-oriented pipe

- (1) The editions of the standards cited for use are those in force on the revision date of this Certification Reference System (see page 2 of this Technical Document), unless otherwise specified by the Mandated Body.
- (2) Test carried out on diameters between DN 75 and DN 160 inclusive.
- (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) pphm instead of (50 ± 5) pphm.

TABLE 3 - PVC-BO BIAXIALLY-ORIENTED PRESSURE FAMILY

Specifications for PVC-BO Pipe / Cast Iron Fitting assemblies

Characteristics and Test methods (1)	Specifications
Assembly composition and dimensional characteristics	Sealing Ring Assembly Category NF T 54-948, NF EN ISO 1452-2, NF EN 545 and NF EN 12842
Positive internal pressure hermetic seal test - Test according to EN ISO 12842	Pressure: 1.5 PN +5 bars for 2 hours at a temperature of 15 to 25°C – Deviation: DN ≤300: 3°30, 350≤DN≤400: 2°30
Negative internal pressure hermetic seal test - Test according to EN ISO 12842	Vacuum: 0.8 bars for 2 hours at a temperature of 15 to 25°C – Deviation: DN ≤300: 3°30, 350≤DN≤400: 2°30
Long-term pressure tightness test (NF EN 17176-5 §5.3) - Test according to EN ISO 13846	Test pressure: 1.4 PN 1000h 20°C
Cyclic pressure test Test in accordance with NF EN 17176-5 and NF EN 12842 (2)	Test pressure: from 0.5 PN to 1 PN(*) at a temperature of 15 to 25°C, without angular deviation or shear force Test duration: 24000 cycles Squarewave signal period of 5 to 10 seconds

(*): PN of biaxially-oriented pipe.

- (1) The editions of the standards cited for use are those in force on the revision date of this Certification Reference System (see page 2 of this Technical Document), unless otherwise specified by the Mandated Body.
- (2) Test carried out on diameters between DN 75 and DN 160 inclusive.

TABLE 4 - PVC-BO BIAXIALLY-ORIENTED PRESSURE FAMILY
Dimensional characteristics of pipes in Class 355(*)

 According to **NF EN 17176**

- Preferred length: ≤ 12 m - tolerances ± 5 cm (or $\pm 1\%$ for lengths < 5 m).
- Sockets.
- Other dimensions.

Nominal external diameter DN (mm)	External diameter tolerances (mm)		Minimum thicknesses (mm)	Minimum average internal diameter of the socket	PN (MPa)
	Out-of-roundness (1)	Average (DN)	th min	$d_{im,min}$	
63	1.5	0.3	2.2	63.4	1.6
75	1.6	0.3	2.1 2.6	75.4	1.25 1.6
90	1.8	0.3	2.5 3.1	90.4	1.25 1.6
110	2.2	0.4	3.1 3.8	110.5	1.25 1.6
125	2.5	0.4	3.5 4.3	125.5	1.25 1.6
140	2.8	0.5	3.9 4.8	140.6	1.25 1.6
160	3.2	0.5	4.4 5.5	160.6	1.25 1.6
200	4.0	0.6	5.5 6.9	200.7	1.25 1.6
225	4.5	0.7	6.2 7.7	225.8	1.25 1.6
250	5.0	0.8	6.9 8.6	250.9	1.25 1.6
315	7.6	1.0	8.7 10.8	316.1	1.25 1.6
355	8.6	1.1	9.8 12.2	356.2	1.25 1.6
400	9.6	1.2	11.0 13.7	401.3	1.25 1.6
450	10.8	1.4	12.4 15.4	451.5	1.25 1.6
500	12.0	1.5	13.7 17.1	501.6	1.25 1.6

(1) Out-of-roundness is expressed as being the difference between the largest outside diameter and the smallest outside diameter in a straight section of the pipe ($x = DN \text{ max.} - DN \text{ min.}$), x being the value provided in the above table.

(*) : A usage right request cannot be made on pipes with the same PN and the same DN on 2 different classes.

The safety factor for the PN and the thicknesses for classes 355 and 400 is $C=1.6$ and for classes 450 and 500 is $C=1.4$ (Cf NF EN 17176-2 table 3)

TABLE 5 - PVC-BO BIAXIALLY-ORIENTED PRESSURE FAMILY
Dimensional characteristics of pipes in Class 400(*)

 According to **NF EN 17176-2**

- Preferred length: ≤ 12 m - tolerances ± 5 cm (or $\pm 1\%$ for lengths < 5 m)
- Sockets
- Other dimensions

Nominal external diameter DN (mm)	External diameter tolerances (mm)		Minimum thicknesses (mm)	Minimum average internal diameter of the socket $d_{im,min}$	PN (MPa)
	Out-of-roundness (1)	Average (DN)	th min		
63	1.5	0.3	1.6 2.0	63.4	1.25 / 1.6
75	1.6	0.3	1.9 2.3	75.4	1.25 1.6
90	1.8	0.3	2.2 2.8	90.4	1.25 1.6
110	2.2	0.4	2.7 3.4	110.5	1.25 1.6
125	2.5	0.4	3.1 3.9	125.5	1.25 1.6
140	2.8	0.5	3.5 4.3	140.6	1.25 1.6
160	3.2	0.5	4.0 4.9	160.6	1.25 1.6
200	4.0	0.6	4.9 6.2	200.7	1.25 1.6
225	4.5	0.7	5.5 6.9	225.8	1.25 1.6
250	5.0	0.8	6.2 7.7	250.9	1.25 1.6
315	7.6	1.0	7.7 9.7	316.1	1.25 1.6
355	8.6	1.1	8.7 10.9	356.2	1.25 1.6
400	9.6	1.2	9.8 12.3	401.3	1.25 1.6
450	10.8	1.4	11.0 13.8	451.5	1.25 1.6
500	12.0	1.5	12.3 15.3	501.6	1.25 1.6

(2) Out-of-roundness is expressed as being the difference between the largest outside diameter and the smallest outside diameter in a straight section of the pipe ($x = DN \text{ max.} - DN \text{ min.}$), x being the value provided in the above table.

(*): A usage right request cannot be made on pipes with the same PN and the same DN on 2 different classes.

The safety factor for the PN and the thicknesses for classes 355 and 400 is $C=1.6$ and for classes 450 and 500 is $C=1.4$ (Cf NF EN 17176-2 table 3)

TABLE 6 - PVC-BO BIAXIALLY-ORIENTED PRESSURE FAMILY
Dimensional characteristics of pipes in Class 450(*)

According to NF T 17176-2

 - Preferred length: ≤ 12 m - tolerances ± 5 cm (or $\pm 1\%$ for lengths < 5 m)

- Sockets

- Other dimensions

Nominal external diameter DN (mm)	External diameter tolerances (mm)		Minimum thicknesses (mm)	Minimum average internal diameter of the socket <i>dim,min</i>	PN (MPa)
	Out-of-roundness (1)	Average (DN)	th min		
63	1.5	0.3	1.6 2.5	63.4	1.25 / 1.6 2.5
75	1.6	0.3	1.5 1.9 2.9	75.4	1,25 1,6 2,5
90	1.8	0.3	1.8 2.2 3.5	90.4	1,25 1,6 2,5
110	2.2	0.4	2.2 2.7 4.2	110.5	1,25 1,6 2,5
125	2.5	0.4	2.5 3.1 4.8	125.5	1,25 1,6 2,5
140	2.8	0.5	2.8 3.5 5.4	140.6	1,25 1,6 2,5
160	3.2	0.5	3.2 4.0 6.2	160.6	1,25 1,6 2,5
200	4.0	0.6	3.9 4.9 7.7	200.7	1,25 1,6 2,5
225	4.5	0.7	4.4 5.5 8.6	225.8	1,25 1,6 2,5
250	5.0	0.8	4.9 6.2 9.6	250.9	1,25 1,6 2,5
315	7.6	1.0	6.2 7.7 12.1	316.1	1,25 1,6 2,5
355	8.6	1.1	7.0 8.7 13.6	356.2	1,25 1,6 2,5
400	9.6	1.2	7.9 9.8 15.3	401.3	1,25 1,6 2,5
450	10.8	1.4	8.8 11.0 17.2	451.5	1,25 1,6 2,5

500	12.0	1.5	9.8 12.3 19.1	501.6	1.25 / 1.6 2.5
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(1) Out-of-roundness is expressed as being the difference between the largest outside diameter and the smallest outside diameter in a straight section of the pipe ($x = DN \text{ max.} - DN \text{ min.}$), x being the value provided in the above table.

(*): A usage right request cannot be made on pipes with the same PN and the same DN on 2 different classes.

The safety factor for the PN and the thicknesses for classes 355 and 400 is $C=1.6$ and for classes 450 and 500 is $C=1.4$ (Cf NF EN 17176-2 table 3)

TABLE 7 - PVC-BO BIAXIALLY-ORIENTED PRESSURE FAMILY

Dimensional characteristics of pipes in Class 500(*)

According to **NF EN 17176-2**

- Preferred length: ≤ 12 m - tolerances ± 5 cm (or $\pm 1\%$ for lengths < 5 m)

- Sockets

- Other dimensions

Nominal external diameter DN (mm)	External diameter tolerances (mm)		Minimum thicknesses (mm)	Minimum average internal diameter of the socket	PN (MPa)
	Out-of-roundness (1)	Average (DN)	th min	dim,min	
63	1.5	0.3	2.0 - 2.2	63.4	1.6 / 2.5
75	1.6	0.3	1.7 2.6	75.4	1.6 2.5
90	1.8	0.3	2.0 3.1	90.4	1.6 2.5
110	2.2	0.4	2.4 3.8	110.5	1.6 2.5
125	2.5	0.4	2.8 4.3	125.5	1.6 2.5
140	2.8	0.5	3.1 4.8	140.6	1.6 2.5
160	3.2	0.5	3.5 5.5	160.6	1.6 2.5
200	4.0	0.6	4.4 6.9	200.7	1.6 2.5
225	4.5	0.7	5.0 7.7	225.8	1.6 2.5
250	5.0	0.8	5.5 8.6	250.9	1.6 2.5
315	7.6	1.0	6.9 10.8	316.1	1.6 2.5
355	8.6	1.1	7.8 12.2	356.2	1.6 2.5
400	9.6	1.2	8.8 13.7	401.3	1.6 2.5
450	10.8	1.4	9.9 15.4	451.5	1.6 2.5
500	12.0	1.5	11.0 17.1	501.6	1.6 2.5

(1) Out-of-roundness is expressed as being the difference between the largest outside diameter and the smallest outside diameter in a straight section of the pipe ($x = \text{DN max.} - \text{DN min.}$), x being the value provided in the above table.

(*): A usage right request cannot be made on pipes with the same PN and the same DN on 2 different classes.

The safety factor for the PN and the thicknesses for classes 355 and 400 is $C=1.6$ and for classes 450 and 500 is $C=1.4$ (Cf NF EN 17176-2 table 3)

Part 2. APPLICANT/HOLDER QUALITY REQUIREMENTS

2.1 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 this Certification Reference System specific to each product group, unless otherwise indicated in the tables.

Measurements or tests (1)	Minimum sampling frequency
Dimensions: diameter, thickness, out-of-roundness Appearance Colour Marking	By extruder: 1 every 4 hours
Density	1 test per month on 1 type at random
Tensile properties	At least 1 test per day, on 2 specimens taken from the same pipe
Resistance to pressure at 20°C – 10 hrs	1 test per campaign
Resistance to pressure at 20°C – 1000 hrs	1 test per year per diameter and per PN admitted to the NF mark (2)
Resistance to pressure at 60°C – 1000 hrs	1 test per year per diameter and per PN admitted to the NF mark
Ring stiffness	1 test per campaign

(1) Methods specified in Appendix 1 of the rules of application.

(2) This test can be defined as a type test.

2.2 QUALITY MANAGEMENT OPTION

The implemented quality assurance plan must enable product compliance with the specifications of the standards and of these Rules.

Consequently, the manufacturer 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 3. MONITORING ARRANGEMENTS BY CSTB

3.1 TEST PROCEDURES DURING AN APPLICATION FOR ADMISSION

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Average external diameter	All the types submitted for admission	-
Appearance Marking Colour Length Any diameter Thickness Sockets (depth of groove)	All the types submitted for admission	-
Density (1)	1 test	1 test
Tensile characteristics (maximum stress) (1)	1 test	1 test per type sampled
Axial and tangential orientation coefficient	1 test	1 test per type sampled
Impact resistance (1) NF T 54-948 specifications NF EN 744	-	1 test per type sampled
Resistance to pressure at 20°C – 10 hrs (1)	1 test (choice of category)	1 test per type sampled
Resistance to pressure at 20°C – 3000 hrs (1)	-	1 test per class
Resistance to pressure at 60°C – 1000 hrs (1)	-	1 test per class
Ring stiffness	1 test (choice of category)	1 test per type sampled
Verification of seals (ACS)	Verification of all types submitted for admission	
Verification of the absence of lead (1)		1 test per year

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

For PVC-BO/PVC-BO assemblies (Pipes/Pipes or PVC-BO Pipes / PVC-U Fittings)

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Short-term internal hydrostatic pressure hermetic seal test - Test according to EN ISO 13845 (1)	-	1 test per type sampled up to 3DN
Short-term negative air pressure hermetic seal test (see fig. 2 of EN 1452-5) - Test according to EN ISO 13844 (1)	-	1 test per type sampled up to 3DN
Long-term pressure tightness test (NF EN 17176-5 §5.3)	-	1 test per type sampled capped at 3DN
Cyclic pressure test Test in accordance with NF EN 17176-5 (1)	-	1 test per type sampled up to 3DN
Quality of elastomer sealing rings NF EN 681-1	-	1 report of tests provided by the manufacturer of elastomer sealing rings.

(1) In cases of applications for extension for a same family and a same category, only one test for one type will be done if the manufacturer was not warned or suspended by the last committee.

For PVC-BO Pipe / Cast Iron Fitting assemblies

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Positive internal pressure hermetic seal test - Test according to EN ISO 12842 (1)	-	1 test per type sampled up to 3DN
Negative internal pressure hermetic seal test - Test according to EN ISO 12842 (1)	-	1 test per type sampled up to 3DN
Long-term pressure tightness test (NF EN 17176-5 §5.3)	-	1 test per type sampled capped at 3DN
Cyclic pressure test Test in accordance with NF EN 17176-5 (1)	-	1 test per type sampled up to 3DN

(1) In cases of applications for extension for a same family and a same category, only one test for one type will be done if the manufacturer was not warned or suspended by the last committee.

Pipe/Accessory joint validation tests: the holder must present a record of the 3 tests defined in the Pipe/Accessory joint validation test table. These tests can be carried out in the holder's laboratory.

Change of pipe colour without modifying the MRS (specific risk materials) and without modifying the process: For applications to change the pipe colour, a 20°C/3000 hr pressure test must be carried out at the holder's site in order to prove that the sigma is unchanged, a 20°C/10 hr and 20°C/1000 hr pressure test at CSTB for the MRS in question – renewal of the ACS must be verified during the audit.

TEST PROCEDURES DURING AN APPLICATION FOR ADMISSION

Cases of pipes with DN between DN 250 and DN 500:

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Average external diameter	All the types submitted for admission	-
Appearance Marking Colour Length Any diameter Thickness Sockets (depth of groove)	All the types submitted for admission	-
Density (1)	1 test	1 test
Tensile characteristics (maximum stress) (1)	1 test	1 test per type sampled
Axial and tangential orientation coefficient	1 test	1 test per type sampled
Impact resistance (1) NF EN 17176-2 EN ISO 312	-	1 test per type sampled
Resistance to pressure at 20°C – 10 hrs (1)	1 test per type sampled	-
Resistance to pressure at 20°C – 3000 hrs (1)	-	1 test per class on one DN < 250 manufactured using the same process, same class and same formulation
Resistance to pressure at 60°C and 20°C – 1000 hrs (1)	CSTB assessment of a control test at 20°C on an assembly and 60°C on a plain end	-
Ring stiffness	1 test (choice of category)	1 test per type sampled
Verification of seals (ACS)	Verification of all types submitted for admission	
Verification of the absence of lead (1)		1 test per year

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

For PVC-BO/PVC-BO assemblies (Pipes/Pipes or PVC-BO Pipes / PVC-U Fittings)

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Short-term internal hydrostatic pressure hermetic seal test - Test according to EN ISO 13845 (1)	-	1 test per class on one DN < 250 manufactured using the same process, same class and same formulation
Short-term negative air pressure hermetic seal test (see fig. 2 of EN 1452-5) - Test according to EN ISO 13844 (1)	-	1 test per class on one DN < 250 manufactured using the same process, same class and same formulation
Quality of elastomer sealing rings NF EN 681-1	-	1 report of tests provided by the manufacturer of elastomer sealing rings.

- (1) In cases of applications for extension for a same family and a same category, only one test for one type will be done if the manufacturer was not warned or suspended by the last committee.

For PVC-BO Pipe / Cast Iron Fitting assemblies

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Positive internal pressure hermetic seal test - Test according to EN ISO 12842 (1)	-	1 test per class on one DN < 250 manufactured using the same process, same class and same formulation
Negative internal pressure hermetic seal test - Test according to EN ISO 12842 (1)	-	1 test per class on one DN < 250 manufactured using the same process, same class and same formulation

In cases of applications for extension for the same family and the same category, only one test for one type will be done if the manufacturer was not warned or suspended by the last committee.

3.2 TEST PROCEDURES DURING MONITORING OF CERTIFIED PRODUCTS

Measurement or test	Tests conducted in the factory		Tests conducted in the laboratory
	Quality control	Quality management	
Average external diameter Appearance Marking Colour Length Any diameter Thickness Sockets (depth of groove)	5 types per visit divided between each family admitted and product category See circular		-
Density	Inspection of test records		1 type per year
Tensile characteristics (maximum stress)	1 type at each visit	1 type per year, except in the case where this test is a type test	1 type per year
Axial and tangential orientation coefficient	1 type at each visit	1 type per year, except in the case where this test is a type test	1 type per year
Resistance to pressure at 20°C – 10 hrs	Inspection of test records		1 type per year
Resistance to pressure at 60°C – 1000 hrs	-	-	1 type per year
Ring stiffness	1 type at each visit	1 type per year	1 type per year
Verification of seals (ACS)	1 type at each visit		
Verification of the absence of lead (1)	-		1 test

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

For PVC-B0/PVC-B0 assemblies (Pipes/Pipes or PVC-B0 Pipes / PVC-U Fittings)

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Short-term internal hydrostatic pressure hermetic seal test - Test according to EN ISO 13845	-	1 diameter per year
Short-term negative air pressure hermetic seal test (see fig. 2 of EN 1452-5) - Test according to EN ISO 13844	-	1 diameter per year

For PVC-B0 Pipe / Cast Iron Fitting assemblies

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Positive internal pressure hermetic seal test - Test according to EN ISO 12842	-	1 diameter per year
Negative internal pressure hermetic seal test - Test according to EN ISO 12842	-	1 diameter per year