

# CSTB

*le futur en construction*

CENTRE SCIENTIFIQUE ET  
TECHNIQUE DU BATIMENT

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CERTIFICATION

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## NF MARK

### RIGID NON-PLASTICISED

### PVC PIPES AND FITTINGS

## TECHNICAL DOCUMENT 3: PRESSURE GROUP

Part 1: FIELD OF APPLICATION

Part 2: MARKING CONDITIONS – REFERENCING THE NF MARK

Part 3: APPLICANT/HOLDER QUALITY REQUIREMENTS

Part 4: ARRANGEMENTS FOR MONITORING BY THE MANDATED BODY



TUBES ET RACCORDS EN  
PVC NON PLASTIFIE RIGIDE

**AFNOR Certification Identification No.: NF 055**

*Revision no. 17 effective as of 1 March 2017*

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Certification reference system - Date first brought into application:  
February 1994

*The English version is provided for information. In case of doubt or dispute, the French version only is valid.*

## Part 1 FIELD OF APPLICATION

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This Technical Document deals with the pressure group.

### 1.1 APPLICABLE REFERENCE STANDARDS AND ADDITIONAL SPECIFICATIONS

#### 1.1.1 Reference standards:

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

**NF EN ISO 1452** (January 2010) Plastics –

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 54-034** (October 2005) Piping systems made of unplasticised poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) and/or biaxially-oriented poly (vinyl chloride) (PVC-BO) for conveyance under pressure of non-gaseous fluids – Rules for design, choice of components.

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

**NF T 54-039** (July 1988) Plastics – Fixed assemblies with sealing rings for non-plasticised PVC pipes with pressure – Suitability for use.

#### 1.1.2 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.

The nominal pressure (PN) for the injected fittings is defined as follows:

- 25 bars, for  $DN \leq 20$  mm
- 16 bars, for  $20 \text{ mm} < DN \leq 90$  mm
- 10 bars, for  $DN > 90$  mm.

Pressure fittings must meet the applicable specifications set out in tables 1 and 2, in particular. Additionally, the dimensional characteristics must be compliant with the specifications in table 4; their geometrical characteristics are defined in the series of tables 5 to 17.

#### 1.1.3 Admission ranges

The admission range presented during the 1st application must, at a minimum, include the following products:

Cases of pipes:

- Range presented  $\leq DN63$ : 3 diameters
- Range presented all DN: 5 diameters

Cases of fittings:

- Range presented  $\leq DN63$ : 3 diameters and 3 fittings per DN.
- Range presented all DN: 5 diameters and 3 fittings per DN.

**TABLE 1 - PVC PRESSURE FAMILY**  
**Pipes and fittings specifications**

Characteristics and Test methods (5)	Specifications		
	Pipes	Injected fittings	Fittings with seals shaped from pipes in the factory (6)
Reference standard	NF EN ISO 1452-2 NF T 54-034	NF EN ISO 1452-3 NF T 54-034	NF EN ISO 1452-3
Appearance Marking	(1)	(1)	(1)
Dimensions (4)	Table 3	Table 4	Table 4
Sockets	NF EN ISO 1452-2	NF T 54-038	NF T 54-038
Density NF EN ISO 1183-1 Method A (4)	1370 to 1430 kg/m <sup>3</sup>		
Vicat softening temperature NF EN 727 (4)	T ≥ 80°C	T ≥ 76°C	T ≥ 80°C
Non-toxicity	Compliant with legislation in force (brochure 1227)		
Tensile Characteristics NF EN ISO 6259-1 and ISO 6259-2 (4) (maximum stress elongation at break)	TS ≥ 45 MPa E ≥ 80%		TS ≥ 45 MPa E ≥ 80% (3)
Reversion after annealing at 150°C (4) NF EN ISO 2505	T ≤ 5% No blisters		
Oven test at 150°C NF EN ISO 580 - method A (4)		(2)	
Resistance to pressure at 20°C Pipes NF EN ISO 1167-1-2 (4) Fittings NF EN ISO 1167-3	Resistance ≥ 1 hour (42 MPa stress calculated according to the nominal thickness and nominal diameter) (option b from standard NF EN ISO 1167-1 paragraph 7.1)	Resistance ≥ 1 hour (test pressure equal to 4.2 times the PN)	Resistance ≥ 1 hour (42 MPa stress calculated according to the nominal thickness and nominal diameter) (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 Fittings NF EN ISO 1167-3 (4)		Resistance ≥ 1000 hours (test pressure equal to 3.2 times the PN)	
Resistance to pressure at 60°C – short duration NF EN ISO 1167-1-2 (4)	Resistance ≥ 10 hours (Test stress provided in table 3 of this appendix 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)		
Resistance to pressure at 60°C long duration NF EN ISO 1167-1-2 (4)	Resistance ≥ 1000 hours (stress 12.5 MPa) (option a from standard NF EN ISO 1167-1 paragraph 7.1) Pressure calculated according the minimum thickness measured and the average external diameter measured		
Impact resistance NF EN 744 - method (4)	TIR ≤ 10%		
Resistance to alternating pressure stress T 54-094 (7)		according to NF T 54-034	
Verification of the absence of lead (4)	≤ 0.1%	≤ 0.1%	≤ 0.1

- (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. The pipes and fittings must be a homogeneous grey-blue colour similar to the colour RAL 7039 or darker and the walls must be opaque. The marking must be consistent with the requirements provided in this Technical Document.
- (2) The fittings may not have any openings along the entire thickness of their walls in any given welding line nor deterioration of the surface, penetrating more than **50%** 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.
- (3) Specifications relating to the pipes.
- (4) With additional clarifications indicated in part 2 of Technical Document 1.
- (5) 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.
- (6) The pipes must be NF mark certified.
- (7) The resistance to alternating pressure stress test is performed with pressure thresholds of 20 bars - 60 bars and the specification of 5000 cycles on fittings with  $DN \leq 90$ . It is carried out with pressure thresholds of 16 bars - 48 bars and the specification of 2500 cycles on fittings with  $DN > 90$ .

#### **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.

**TABLE 2 - PVC PRESSURE FAMILY**

**Specifications for assemblies**

<b>Characteristics and Test methods (1)</b>	<b>Specifications</b>
Assembly composition and dimensional characteristics	Sealing Ring Assembly Category
	NF T 54-038
Short-term internal hydrostatic pressure hermetic seal test - Test according to EN ISO 13845	Test pressure: (see fig. 1 of EN 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 NF EN ISO 1452-5) at a temperature of 15 to 25°C - Deviation: 2° Deformation: 5% - Test duration: compliant with fig. 2
Long-term internal hydrostatic pressure hermetic seal - Test according to EN ISO 13846	Test pressure: 1.7 [PN] to 20°C, 1.3 [PN] to 40°C - Design stress of the pipe: $\sigma_s = 10 \text{ MPa}$ for PVC-U Test duration: 1000 hours
Quality of elastomer sealing rings NF EN 681-1 (2)	NF EN 681-1
Socket resistance to pressure at 20°C according to NF EN ISO 1167-1-2	Test pressure: (page 16 of standard EN 1452-2) DN ≤ 90 mm: 4.2*PN Test duration: 1 hour DN > 90 mm: 3.36*PN Test duration: 1 hour

(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) 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  $(25 \pm 5)$  pphm instead of  $(50 \pm 5)$  pphm.

**TABLE 3 - PVC PRESSURE FAMILY**  
**Dimensional characteristics of the pipes**

In accordance with NF EN ISO 1452-2, NF T 54-034 and NF EN ISO 3126 with the exception of those diameters with an asterisk (\*).

- Preferred length:  $\leq 12$  m - tolerances  $\pm 5$  cm (or  $\pm 1\%$  for lengths  $< 5$  m) (2)
- sockets in accordance with NF EN ISO 1452-2
- Other dimensions

Nominal external diameter DN (mm)	External diameter tolerances (mm)		Thickness (mm)		PN (MPa)	Value of S	Level of impact test M/H	Stress P60°C 10h (MPa)
	(Da) (1)	Average (DN)	Nominal	Maximum				
12	$\pm 0.5$	+ 0.2	1.5	1.9	2.5	4		13.7
16	$\pm 0.5$	+ 0.2	1.8	2.2	2.5	4		
20	$\pm 0.5$	+ 0.2	2.3	2.8	2.5	4	M	
25	$\pm 0.5$	+ 0.2	2.8	3.3	2.5	4	M	
32	$\pm 0.5$	+ 0.2	2.4	2.9	1.6	6.3	M	
	$\pm 0.5$	0	3.6	4.2	2.5	4	M	
40	$\pm 0.5$	+ 0.2	3	3.5	1.6	6.3	M	
	$\pm 0.5$	0	4.5	5.2	2.5	4.0	M	
50	$\pm 0.6$	+ 0.2	3.7	4.3	1.6	6.3	M	
		0	5.6	6.4	2.5	4	M	
63	$\pm 0.8$	+ 0.3	3.0	3.5	1.0	10	M	
		0	4.7	5.4	1.6	6.3	M	
			7.1	8.1	2.5	4	M	
75	$\pm 0.9$	+ 0.3	3.6	4.2	1.0	10	M	
		0	5.6	6.4	1.6	6.3	M	
90	$\pm 1.1$	+ 0.3	4.3	5	1	10	M	
		0	6.7	7.6	1.6	6.3	M	
110 (*)	$\pm 1.4$	+ 0.4	3.2	3.8	0.6	16.7	H	
		0	5.3	6.1	1	10	M	
			8.1	9.2	1.6	6.3	M	
125 (*)	$\pm 1.5$	+ 0.4	3.7	4.3	0.6	16.7	H	
		0	6.0	6.8	1	10	M	
			9.2	10.4	1.6	6.3	M	
140 (*)	$\pm 1.7$	+ 0.5	3.7	4.3	0.6	18.4	H	
		0	6.1	7.0	1	11	H	
			9.3	10.5	1.6	7	M	
160	$\pm 2$	+ 0.5	4.0	4.6	0.6	20	H	
		0	6.2	7.1	1	12.5	H	
			9.5	10.7	1.6	8	M	
200	$\pm 2.4$	+ 0.6	4.9	5.6	0.6	20	H	
		0	7.7	8.7	1	12.5	H	
			11.9	13.3	1.6	8	M	
225	$\pm 2.7$	+ 0.7	5.5	6.3	0.6	20	H	
		0	8.6	9.7	1	12.5	H	
			13.4	15	1.6	8	M	
250	$\pm 3$	+ 0.8	6.2	7.1	0.6	20	H	
		0	9.6	10.8	1	12.5	H	
			14.8	16.5	1.6	8	M	
315	$\pm 3.8$	+ 1.0	7.7	8.7	0.6	20	H	
		0	12.1	13.6	1	12.5	H	
			18.7	20.8	1.6	8	M	
400	$\pm 4.8$	+ 1.2	9.8	11.0	0.6	20	H	
		0	15.3	17.1	1	12.5	H	
			23.7	26.3	1.6	8	M	
500	$\pm 6$	+ 1.5	12.3	13.8	0.6	20	H	
		0	19.1	21.3	1	12.5	H	
			29.7	32.8	1.6	8	M	

(1) Any external diameter (Da)

(2) The length of the pipe is the total length of the pipe including the socket.

**TABLE 4 - PVC PRESSURE FAMILY**

**Dimensional characteristics common to the fittings**

Dimensional characteristics common to the fittings						
DN	Spigot			Socket		
	Average External Diameter tolerances	Max. variation of a given diameter	Length of socket h	Average Internal Diameter tolerances	Maximum out-of-roundness	Socket depth L (1)
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
16	+0/+0.2	0.5	≥ 14	+0.1/+0.3	0.2	14
20	+0/+0.2	0.5	≥ 16	+0.1/+0.3	0.2	16
25	+0/+0.2	0.5	≥ 18.5	+0.1/+0.3	0.2	18.5
32	+0/+0.2	0.5	≥ 22	+0.1/+0.3	0.2	22
40	+0/+0.2	0.5	≥ 26	+0.1/+0.3	0.25	26
50	+0/+0.2	0.6	≥ 31	+0.1/+0.3	0.35	31
63	+0/+0.3	0.8	≥ 37.5	+0.1/+0.3	0.45	37.5
75	+0/+0.3	0.9	≥ 43.5	+0.1/+0.3	0.50	43.5
90	+0/+0.3	1.1	≥ 51	+0.1/+0.3	0.60	51
110	+0/+0.4	1.4	≥ 61	+0.1/+0.4	0.75	61
125	+0/+0.4	1.5	≥ 68.5	+0.1/+0.4	0.85	68.5
140	+0/+0.5	1.7	≥ 76	+0.2/+0.5	1.00	76
160	+0/+0.5	2	≥ 86	+0.2/+0.5	1.10	86

(1) Socket depth tolerances: +0/+2 (mm)

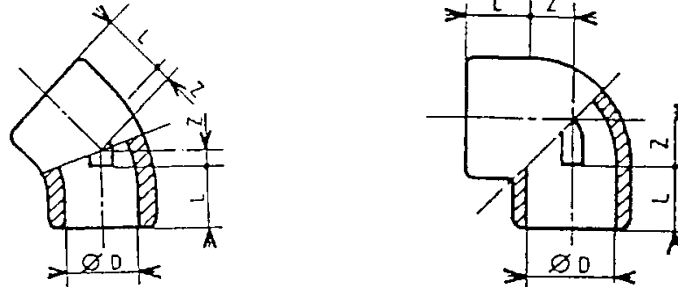
**Other dimensions**

see table 5 below.

**TABLE 5 - PVC PRESSURE FAMILY**

**Dimensional characteristics of Elbows**

SOLVENT WELDING ASSEMBLY  
(dimensions and tolerances in mm)



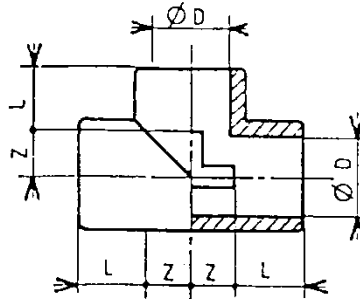
	Elbows 45° FF		Elbows 90° FF	
	Assembly dimension Z	Tolerances	Assembly dimension Z	Tolerances
<b>16</b>	4.5	± 1	9	± 1
<b>20</b>	5	± 1	11	± 1
<b>25</b>	6	+ 1.2 - 1	13.5	+ 1.2 - 1
<b>32</b>	7.5	+ 1.6 - 1	17	+ 1.6 - 1
<b>40</b>	9.5	+ 2 - 1	21	+ 2 - 1
<b>50</b>	11.5	+ 2.5 - 1	26	+ 2.5 - 1
<b>63</b>	14	+ 3.2 - 1	32.5	+ 3.2 - 1
<b>75</b>	16.5	+ 4 - 1	38.5	+ 4 - 1
<b>90</b>	19.5	+ 5 - 1	46	+ 5 - 1
<b>110</b>	23.5	+ 6 - 1	56	+ 6 - 1
<b>125</b>	27	+ 6 - 1	63.5	+ 6 - 1
<b>140</b>	30	+ 7 - 1	71	+ 7 - 1
<b>160</b>	34	+ 8 - 1	81	+ 8 - 1



**TABLE 6 - PVC PRESSURE FAMILY**

**Dimensional characteristics of Tees**

SOLVENT WELDING ASSEMBLY  
 (dimensions and tolerances in mm)



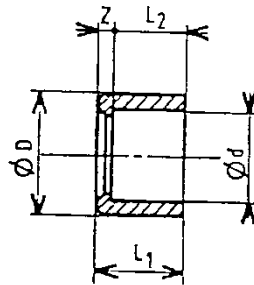
Nominal diameter	Body	
	Assembly dimension (Z)	Tolerances
16	9	$\pm 1$
20	11	$\pm 1$
25	13.5	+ 1.2 - 1
32	17	+ 1.6 - 1
40	21	+ 2 - 1
50	26	+ 2.5 - 1
63	32.5	+ 3.2 - 1
75	38.5	+ 4 - 1
90	46	+ 5 - 1
110	56	+ 6 - 1
125	63.5	+ 6 - 1
140	71	+ 7 - 1
160	81	+ 8 - 1

**TABLE 7 - PVC PRESSURE FAMILY**

**Dimensional characteristics of short Reducers**

SOLVENT WELDING ASSEMBLY  
 (dimensions and tolerances in mm)

*(previous designation = short reducing nipples MF)*



Nominal diameter	Body	
	Assembly dimension	Assembly dimension tolerances
<b>D and d</b>	<b>Z</b>	<b>Z</b>
<b>20 - 16</b>	2	$\pm 1$
<b>25 - 20</b>	2.5	$\pm 1$
<b>32 - 25</b>	3.5	$\pm 1$
<b>40 - 32</b>	4	$\pm 1$
<b>50 - 40</b>	5	$\pm 1$
<b>63 - 50</b>	6.5	$\pm 1$
<b>75 - 63</b>	6	$\pm 1$
<b>90 - 75</b>	7.5	$\pm 1$
<b>110 - 90</b>	10	$\pm 1$
<b>125 - 110</b>	7.5	$\pm 1$
<b>140 - 125</b>	7.5	$\pm 1$
<b>160 - 140</b>	10	$\pm 1$

**TABLE 8 - PVC PRESSURE FAMILY**

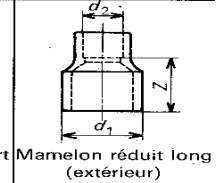
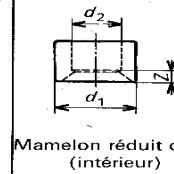
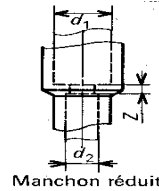
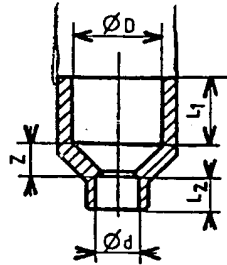
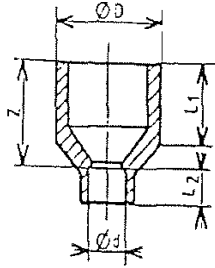
**Dimensional characteristics of multiple Reducers**

SOLVENT WELDING ASSEMBLY  
(dimensions and tolerances in mm)

long reducing nipples MF

long reducing coupling FF

mixed reducers



Nominal diameters D - d	Long Reducing Nipples (MF)	
	Assembly dimension (Z)	Tolerances on (Z)
20 - 16	21	1
25 - 16	25	1
25 - 20	25	1
32 - 16	30	1
32 - 20	30	1
32 - 25	30	1
40 - 20	36	1.5
40 - 25	36	1.5
40 - 32	36	1.5
50 - 25	44	1.5
50 - 32	44	1.5
50 - 40	44	1.5
63 - 32	54	1.5
63 - 40	54	1.5
63 - 50	54	1.5
75 - 40	62	1.5
75 - 50	62	1.5
75 - 63	62	1.5
90 - 50	74	2
90 - 63	74	2
90 - 75	74	2
110 - 90	88	2
125 - 75	100	2
125 - 90	100	2
125 - 110	100	2
140 - 90	111	2
140 - 110	111	2

Reducing couplings (FF)	
Assembly dimension (Z)	Tolerances on (Z)
3	1
3	+1.2 / -1
3	+1.2 / -1
3	+1.6/-1
3	+1.6/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1
3	+2/-1

Mixed reducers (1) (FF)	
Nominal int. diameter (Di)	Min. assembly dimension on Di (Z)
20	3
25	3
25	3
32	3
32	3
40	3
40	3
50	3
50	3
63	3
63	3
75	3
75	3

		<b>Long Reducing Nipples (MF)</b>		<b>Reducing couplings (FF)</b>		<b>Mixed reducers (1) (FF)</b>	
<b>Nominal diameters D - d</b>	<b>Assembly dimension (Z)</b>	<b>Tolerances on (Z)</b>	<b>Assembly dimension (Z)</b>	<b>Tolerances on (Z)</b>	<b>Nominal int. diameter (Di)</b>	<b>Min. assembly dimension on Di (Z)</b>	
<b>140 - 125</b>	111	2					
<b>160 - 110</b>	126	2					
<b>160 - 125</b>	126	2					
<b>160 - 140</b>	126	2					

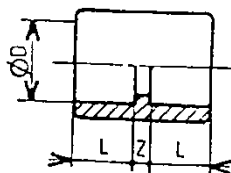
(1) For mixed reducers:

- MF use taking into account D and d; FF use taking into account Di and d.
- the applicable D and d assembly dimensions are those of the corresponding long reducing nipples.

**TABLE 11 - PVC PRESSURE FAMILY**

**Dimensional characteristics of equal Sleeve Couplings**

SOLVENT WELDING ASSEMBLY  
 (dimensions and tolerances in mm)

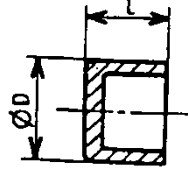


Nominal diameter	Body	
	Assembly dimension (Z)	Assembly dimension tolerances (Z)
16	3	± 1
20	3	± 1
25	3	+ 1.2 - 1
32	3	+ 1.6 - 1
40	3	+ 2 - 1
50	3	+ 2 - 1
63	3	+ 2 - 1
75	4	+ 2 - 1
90	5	+ 2 - 1
110	6	+ 3 - 1
125	6	+ 3 - 1
140	8	+ 3 - 1
160	8	+ 4 - 1

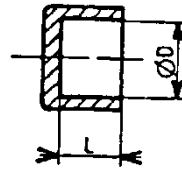
**TABLE 12 - PVC PRESSURE FAMILY**

**Dimensional characteristics of Plugs and Caps**

SOLVENT WELDING ASSEMBLY  
(dimensions and tolerances in mm)



**Bouchon mâle**



**Bouchon femelle**

Nominal diameter D	Plug	Cap	
	Minimum length (L)	Socket length (L)	Socket depth tolerances (L)
16	14	14	+2 0
20	16	16	+2 0
25	18.5	18.5	+2 0
32	22	22	+2 0
40	26	26	+2 0
50	31	31	+2 0
63	37.5	37.5	+2 0
75	43.5	43.5	+2 0
90	51	51	+2 0
110	61	61	+2 0
125	68.5	68.5	+2 0
140	76	76	+2 0
160	86	86	+2 0

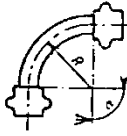
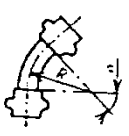
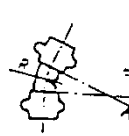
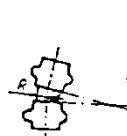
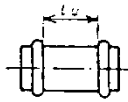
**TABLE 13 - PVC PRESSURE FAMILY**

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

ASSEMBLIES WITH SEAL RINGS

OBTAINED BY MOULDING OR FORMING

SEE TABLES NO. 12 AND NO. 13 IN NF EN ISO 1452-3

Socket diameter	Fitting type								
									
	courbes 90° FF		Courbes 45° FF		Courbes 22°30 FF		Courbe 11°15 FF		Manchons égaux
	R min	α	R min	α	R min	α	R min	α	Useful length min. Lu
63	126	90° ± 4°	126	45° ± 3°	126	22°30 ± 2°30	126	11°15 ± 1°15	80
75	150	90° ± 4°	150	45° ± 3°	150	22°30 ± 2°30	150	11°15 ± 1°15	84
90	180	90° ± 4°	180	45° ± 3°	180	22°30 ± 2°30	180	11°15 ± 1°15	70
110	275	90° ± 4°	275	45° ± 3°	275	22°30 ± 2°30	275	11°15 ± 1°15	72
125	312	90° ± 4°	312	45° ± 3°	312	22°30 ± 2°30	312	11°15 ± 1°15	74
140	350	90° ± 4°	350	45° ± 3°	350	22°30 ± 2°30	350	11°15 ± 1°15	76
160	400	90° ± 4°	400	45° ± 3°	400	22°30 ± 2°30	400	11°15 ± 1°15	78

**TABLE 14 - PVC PRESSURE FAMILY**

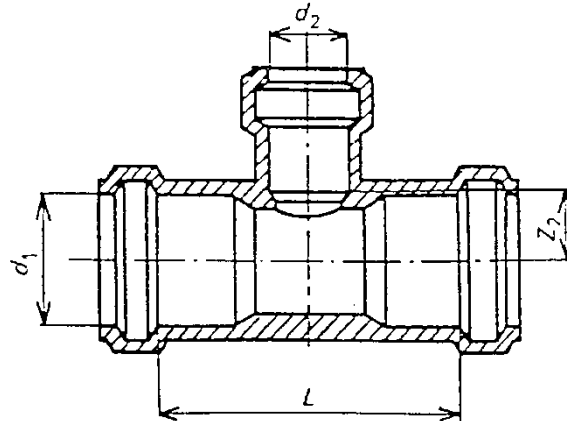
**Dimensional characteristics of fittings**  
(dimensions and tolerances in mm)

ASSEMBLIES WITH SEAL RINGS

OBTAINED BY MOULDING OR FORMING

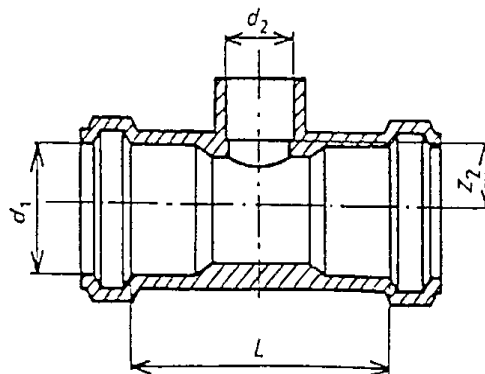
SEE TABLES NO. 12 AND NO. 13 IN NF EN ISO 1452-3

THREE-SOCKET EQUAL AND REDUCING TEES WITH SEAL RINGS (FFF)



d1	75		90		110		125		140		160	
	L min	Z2 min	L min	Z2 min	L min	Z2 min	L min	Z2 min	L min	Z2 min	L min	Z2 min
63	199	38	205	45	213	55	219	63				
75	213	38	217	45	225	55	231	63	237	70		
90			231	45	240	55	246	63	252	70	262	80
110					264	55	266	63	272	70	282	80
125							283	63	287	70	297	80
140									304	70	312	80
160											330	80

TWO-SOCKET REDUCING TEES (FF) WITH SEAL RINGS AND SOLVENT-WELD TAPPING



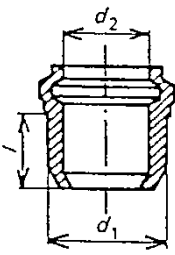
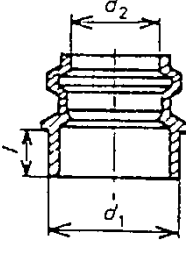
d1	75		90		110		125		140		160	
	L min	Z2 min	L min	Z2 min	L min	Z2 min	L min	Z2 min	L min	Z2 min	L min	Z2 min
50	186	38	192	45	200	55	206	63	212	70	222	80
63	199	38	205	45	213	55	219	63	225	70	235	80



**TABLE 15 - PVC PRESSURE FAMILY**

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

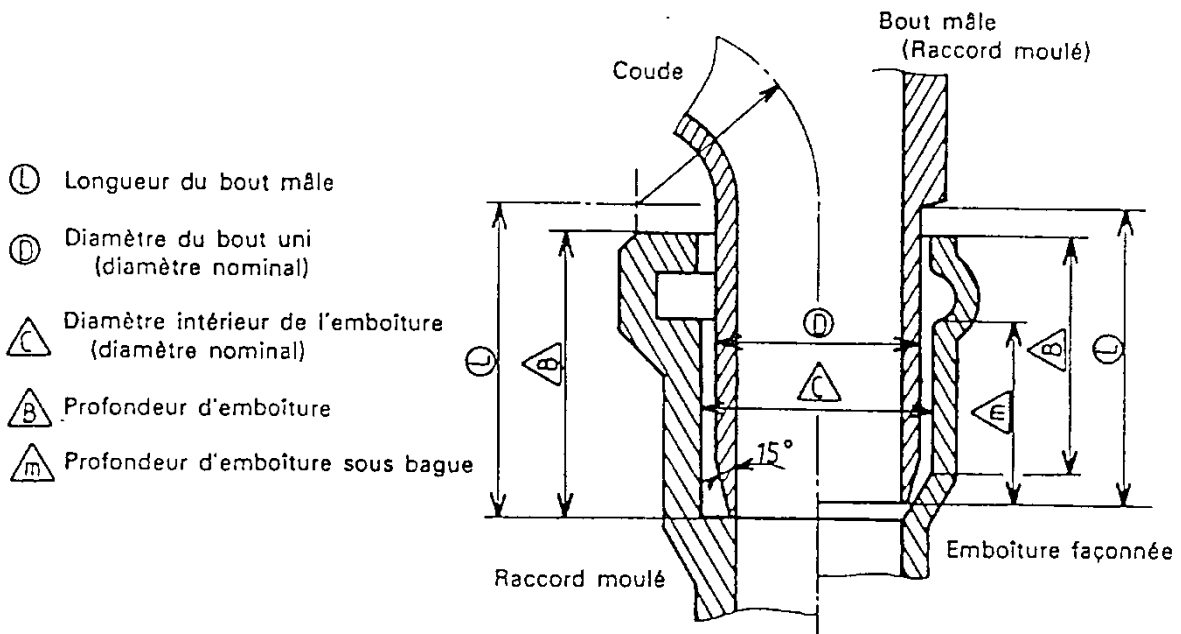
SOLVENT-WELD REDUCER WITH SEAL RING MF (Male-Female)  
 (previously designated as mixed reducing nipples)

Nominal	Fitting type			
				
d1 - d2	l min	l max	l min	l max
63 - 50			76	104.6
75 - 50			82	111
75 - 63	82	111	82	111
90 - 50			89	116
90 - 63	89	116	89	116
90 - 75	89	116	89	116
110 - 63			98	127
110 - 75			98	127
110 - 90	98	127	98	127
125 - 75			104	135
125 - 90			104	135
125 - 110			104	135
140 - 90			111	142
140 - 110	111	142	111	142
140 - 125			111	142
160 - 110			121	151
160 - 125	121	151	121	151
160 - 140	121	151	121	151

**TABLE 16 - PVC PRESSURE FAMILY**

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

SIMPLE ASSEMBLY WITH SEALING RING  
 (NF T 54-038)

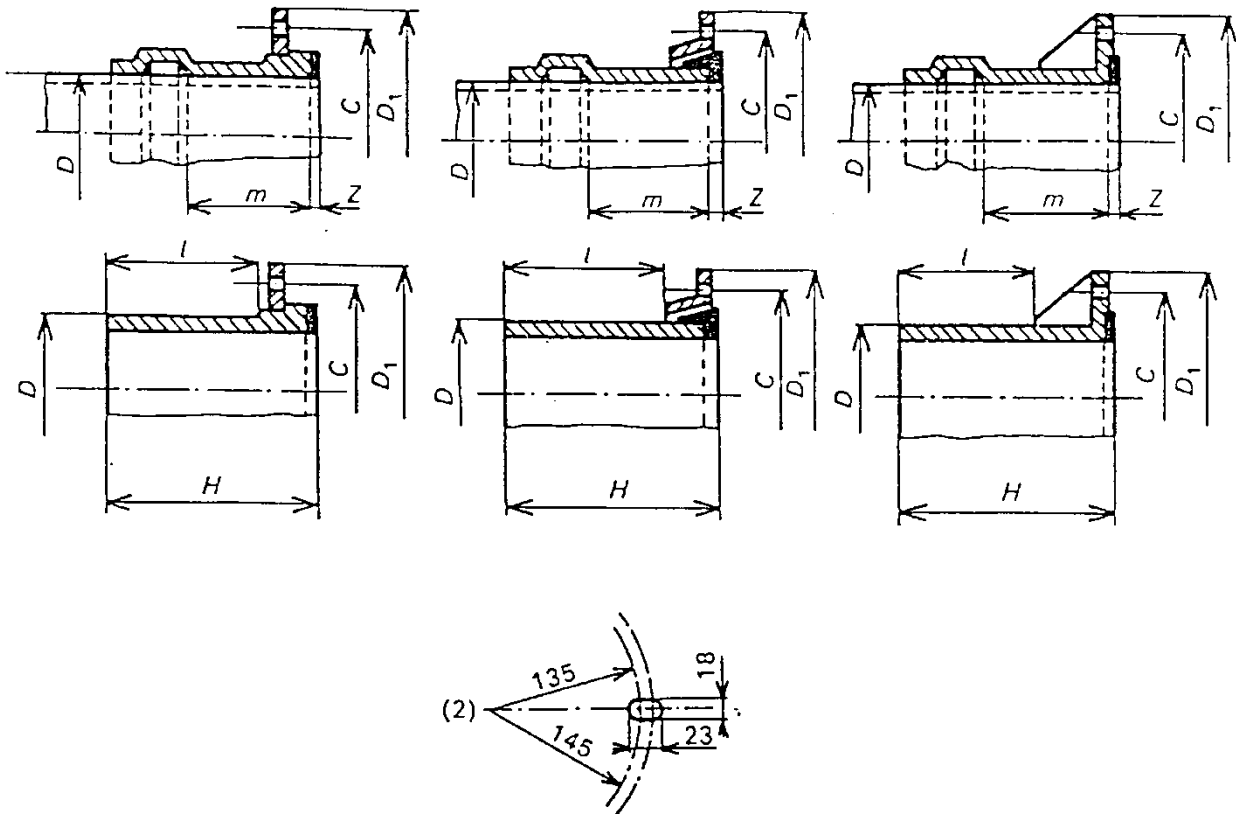


Nominal diameter	Tolerances for average external diameter of the spigot D	Length of the spigot L	Socket		Fittings
			Average internal diameter of the socket C	Maximum out-of-roundness	Minimum socket depth below ring m
63	+ 0.3 0	L ≥ depth socket	63.5	0.7	40
75	+ 0.3 0		75.5	0.8	42
90	+ 0.3 0		90.5	1.0	44
110	+ 0.4 0		110.6	1.2	47
125	+ 0.4 0		125.6	1.4	49
140	+ 0.5 0		140.7	1.6	51
160	+ 0.5 0		160.7	1.8	54

**TABLE 17 - PVC PRESSURE FAMILY**

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

FLANGE ASSEMBLY  
MAIN "PRESSURE" FITTING DIMENSIONS



External diameter of the pipe D	DN flange no.	Case of female socket		Case of a male barrel		Flange				
		m min	Z min	l min	H min	GN (1)	D1	C	Holes	
									number	diameter
40	32	59	3	64	94	40	140	100	4	18
50	40	61	3	69	100	40	150	110	4	18
63	40	65	3	76	109	40	150	110	4	18
63	50	65	3	76	109	40	165	125	4	18
75	60/65	68	3	82	116	16	175/185	135/145 (2)	4	18/23 (2)
90	80	71	5	89	124	40	200	160	8	18
110	100	75	5	98	135	16	220	180	8	18
125	100	78	5	104	143	16	220	180	8	18
125	125	78	5	104	143	16	250	210	8	18
140	125	81	5	111	151	16	250	210	8	18
160	150	86	5	121	163	16	285	240	8	22

(1) Nominal template

## Part 2

# MARKING CONDITIONS – REFERENCING THE NF MARK

This Technical Document specifies the conditions of marking and referencing the NF Mark provided in the certification reference system of the NF Mark - Rigid Non-Plasticised PVC Pipes and Fittings.

### 2.1. REPRODUCING THE NF LOGO ON THE CERTIFIED PRODUCT

#### 2.1.1 General

The NF logo shall ensure the identification of each certified product.

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

The manufacturer must not use the NF mark except to single out certified products without there being any risk of confusion whatsoever.

The logo's graphic tools are available from the CSTB Technical Department  
(Tel.: + 33 (0)1 64 68 89 52 - E-mail: certification@cstb.fr).

It is recommended that the holder remit to CSTB, in advance, all the documents upon which the NF mark appears.

The NF logo, constituting certification identification by a third party with regards to the reference standards cited on page 2 of this Technical Document, must be affixed in accordance with the conditions defined in those standards.

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

#### 2.1.2 Product marking





##### 2.1.2.1 Marking pipes

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 meter or less, the following set of information:

- ① - the trademark or symbol filed by the manufacturer with the mandated bodies if one trademark is admitted to the NF mark; if  $\geq 2$  trademarks, then marking the trade name is required.
- ② - the manufacturer'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 NF monogram with the Pressure family symbol P



Holders have the option to use:




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

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

**Note:** a negative version of the logo can be used.



Holders have the option to use:

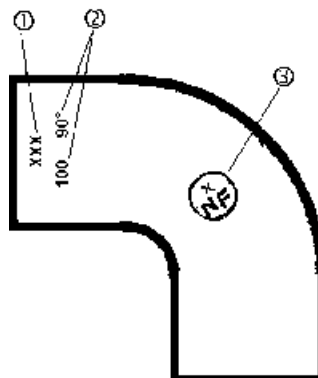
- Either the new logo  followed by the letter P,  
as follows:  P
- Or, as an exception, when using the logo  creates technical and/or material difficulties, the following monogram:



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

- In cases of FF sleeve couplings **or** moulding conditions that do not allow marking of the NF monogram described above, **this is optional.**
- If multiple trademarks are filed with the mandated bodies, the identification number of the manufacturer, assigned upon notification of admission, must be mentioned in addition to the above information.

Example:



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

In cases of parts shaped 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 manufacturer. 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.

#### B - Additional recommended information on fittings (optional)

Each fitting may bear the following information:

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

### C - Marking primary packaging (Mandatory information)

Primary packaging must include the following indelibly marked information:

- company name and/or trademark filed,
- symbol identifying the material,
- NF monogram as defined in paragraph 2.2 below.

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

- The following NF monogram is to be used:



The black and white version of the NF logo can 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, including in black and white:**



## 2.3 MARKING CERTIFIED AND ASSOCIATED CHARACTERISTICS

All documentation relating to an NF - Rigid Non-Plasticised PVC Pipes and Fittings certified product must use the following form:

- Name and address of the manufacturer,
- 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,
- the name or company name of the certification body or its collective Certification mark as well as its address,
- certified product characteristics:
  - Dimensional characteristics (diameter, thickness, out-of-roundness, sockets)
  - Tensile strength
  - Impact resistance
  - Resistance to pressure
  - Resistance to alternating pressure stress (for fittings)
  - Pressure-tightness of the assemblies

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

- The following NF monogram is to be used:



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



## Part 3

### APPLICANT/HOLDER QUALITY REQUIREMENTS

This Technical Document specifies the conditions of marking and referencing the NF Mark provided in the certification reference system of the NF Mark - Rigid Non-Plasticised PVC Pipes and Fittings.

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

**TABLE 17 - For pipes:**

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
Vicat softening temperature	1 test every 3 months on 1 type at random
Tensile properties	At least, 1 test per day, on 2 specimens taken from the same pipe
Reversion	1 test on 1 specimen at the start of the campaign (2) (3)
Impact resistance	1 test per campaign (2) (5)
Resistance to pressure at 20°C – 1 hr	1 test per campaign (2)
Resistance to pressure at 60°C – 10 hrs	1 test per campaign (2)
Resistance to pressure at 60°C – 1000 hrs	1 test per year per diameter and per PN admitted to the NF mark

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

(2) Campaign: for each extruder, the period between the start of manufacturing of a product reference number and the switch to the next number.

(3) With a minimum of one test per week (if the campaign lasts more than a week).

(4) Results not taken into account for establishing batch conformity.

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

**TABLE 18 - For fittings:**

Measurements or tests (1)	Minimum sampling frequency
Dimensions (spigots and sockets)	Injected fittings: - 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)
	Shaped seals: per machine: Once a day
Density	Injected fittings: 1 test per month on 1 type at random
Vicat softening temperature	Injected fittings: 1 test every 3 months on 1 type at random
Oven test	1 test on 1 specimen per day, per machine, per type and per dimensions (2)
Resistance to pressure at 20°C – 1 hr	Injected fittings: 1 test on 1 specimen per day, per machine, per type and per dimensions (2)
	Shaped seals: 1 test on every 1000 fittings manufactured and at least 1 test per campaign if a campaign is < 1000 fittings
Resistance to pressure at 20°C – 1000 hours	1 test each time the formulation changes (3)
Alternating pressure	1 test per campaign or 1 test on every 1000 fittings manufactured and at least 1 test per campaign if a campaign is < 1000 fittings (possibly outsourced)

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

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

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

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

### 3.2 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 4 MONITORING ARRANGEMENTS BY CSTB

### 4.1 TEST PROCEDURES DURING AN APPLICATION FOR ADMISSION

**TABLE 19 - For pipes in the Pressure family:**

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Average external diameter Appearance Marking Colour Length Any diameter Thickness Sockets (depth of groove)	All the types submitted for admission	-
Density (1)	1 test (choice of type and category)	1 test (choice of type and category)
Vicat softening temperature (1)	1 test (choice of type and category)	1 test (choice of type and category)
Tensile characteristics (maximum stress and elongation at break) (1)	1 test (choice of category), except in the case where this test is a type test	1 test per type sampled (choice of category)
Reversion at 150°C (1)	1 test (choice of category)	1 test per type sampled (choice of category)
Impact resistance (1) NF EN 744	1 test (choice of category)	1 test per type sampled (choice of category)
Resistance to pressure at 20°C – 1 hr (1)	1 test (choice of category)	1 test per type sampled (choice of category)
Resistance to pressure at 60°C – 10 hrs (1)	1 test (choice of category)	1 test per type sampled (choice of category)
Resistance to pressure at 60°C – 1000 hrs (1)	-	1 test per type sampled (choice of category)
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 Technical Document 1 part 2.

**TABLE 20 - For pipe and fitting assemblies in the Pressure family:**

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Short-term internal hydrostatic pressure hermetic seal test (100 min) (1) Test according to EN ISO 13845	-	1 test per type sampled
Short-term negative air pressure hermetic seal test (1) Test according to EN ISO 13844	-	On 3 diameters
Long-term internal hydrostatic pressure hermetic seal (1.7 PN 20°C) (1000 hrs) (1) Test according to EN ISO 13846	-	1 test per type sampled
Quality of elastomer sealing rings Test in accordance with NF EN 681-1	-	1 report of tests provided by the manufacturer of elastomer sealing rings.
Socket resistance to pressure at 20°C according to NF EN ISO 1167-1-2 (2)	-	1 test per type sampled

(1) In the case of fittings with seal rings, perform the test on a sleeve coupling with a seal ring only.

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

**For fittings in the Pressure family:**

Measurement or test	Tests conducted in the factory	Tests conducted in the laboratory
Average diameter Any diameter Appearance Marking Colour Thickness Assembly dimensions Sockets	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	-
Vicat softening temperature (1)	1 test (choice of category)	1 test (choice of category)
Density	1 test (choice of category)	1 test (choice of category)
Oven test at 150°C (1)	All fittings submitted for admission	1 test per fitting sampled
Resistance to pressure at 20°C – 1 hr (1)	1 test (choice of category)	1 test per fitting sampled
Resistance to pressure at 20°C – 1000 hrs (1)		1 type test (choose a DN)
Resistance to alternating pressure stress	1 test on 3 fittings (1 fitting per geometric shape)	1 test per fitting sampled from each category
Verification of seals (ACS)	Verification of all types submitted for admission	
Verification of the absence of lead (1)		1 test (choice of category)

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

#### 4.2 TEST PROCEDURES DURING MONITORING OF CERTIFIED PRODUCTS

**TABLE 21 - For pipes in the Pressure family:**

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		-
Density (1)	Inspection of test records		1 type per year (choice of category)
Vicat softening temperature (1)	Inspection of test records		1 type per year (choice of category)
Tensile characteristics (maximum stress and elongation at break) (1)	Inspection of test records		1 type per year (choice of category)
Reversion at 150°C (1)	1 type at each visit (choice of category)	1 type per year (choice of category)	1 type per year (choice of category)
Impact resistance (1)	1 type at each visit (choice of category)	1 type per year (choice of category)	1 type per year (choice of category)
Resistance to pressure at 20°C – 1 hr (1)	1 type at each visit (choice of category)	1 type per year (choice of category)	1 type per year (choice of category)
Resistance to pressure at 60°C – 10 hrs (1)	Inspection of test records		1 type per year (choice of category)
Resistance to pressure at 60°C – 1000 hrs (1)	-	-	1 type per year (choice of category)
Verification of seals (ACS)	1 type at each visit		
Verification of the absence of lead (1)	-	-	1 type per year (choice of category)

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

**TABLE 22 - For pipe and fitting assemblies in the Pressure family:**

Measurement or test	Tests conducted in the factory		Tests conducted in the laboratory
	Quality control	Quality management	
Short-term internal hydrostatic pressure hermetic seal test (100 min) (1) Test according to EN ISO 13845	-	-	1 diameter per year
Short-term negative air pressure hermetic seal test (1) Test according to EN ISO 13844	-	-	1 diameter per year
Socket resistance to pressure at 20°C according to NF EN ISO 1167-1-2 (2)	1 diameter per year if the manufacturer is equipped	1 diameter per year if the manufacturer is equipped	1 test per year. If the manufacturer is equipped, no test

(1) In the case of fittings with seal rings, perform the test on a sleeve coupling with a seal ring only.

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

**TABLE 23 - For fittings in the Pressure family:**

Measurement or test	Tests conducted in the factory		Tests conducted in the laboratory
	Quality control	Quality management	
Average external diameter Any diameter	3 diameters per visit, per family and per category (choice of type)		-
Appearance Marking Colour Thickness Assembly dimensions			-
Sockets			-
Vicat softening temperature (1)	Inspection of test records		1 test per year (choice of category)
Density			1 test per year (choice of category)
Oven test at 150°C (1)	3 diameters per visit and per family (choice of category and type)	3 diameters per year and per family (choice of category and type)	1 test per year (choice of category)
Resistance to pressure at 20°C – 1 hr (1)	1 diameter per visit and per family (choice of category and type)	1 diameter per year and per family (choice of category and type)	1 test per year (choice of category)
Resistance to alternating pressure stress	1 test per visit on 3 identical fittings if the manufacturer is equipped		1 test per year. If the manufacturer is equipped, no test
Verification of seals (ACS)	1 type at each visit (choice of category)		
Verification of the absence of lead (1)	-		1 test per year (choice of category)

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