

**GRAVITY DRAINAGE SYSTEMS MADE OF  
THERMOPLASTIC MATERIALS**

**Technical document No. 442-07**

Specifications applicable to the PP piping systems group

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## MODIFICATION HISTORY

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Characteristics and test methods (1)	PP
<b>PIPES</b>	
Tensile strength NF EN ISO 6259-1 and ISO 6259-3 (4)	Maximum strength $\geq 25$ MPa
Ring stiffness NF EN ISO 9969	SN 4: $\geq 4$ kN/m <sup>2</sup> SN 8: $\geq 8$ kN/m <sup>2</sup> SN 16: $\geq 16$ kN/m <sup>2</sup>
Compression rate NF EN ISO 9967	$\leq 4.0$
Impact resistance (3) NF EN 1411	Temperature $-10^{\circ}\text{C}$ H50 $\geq 1$ m, one break max. and smaller than 0.5 m Testing parameters see Table 9 of Standard NF EN 1852-1
Impact resistance NF EN 744	Temperature $-0^{\circ}\text{C}$ TIR $\leq 10\%$ Testing parameters see Table 8 of Standard NF EN 1852-1
<b>FITTINGS</b>	
Mechanical strength or flexibility NF EN 12256 only for fabricated fittings made from several parts.	Testing parameters see Table 10 of Standard NF EN 1852-1
Impact resistance (drop test) (2) NF EN 12061	Testing parameters see Table 10 of Standard NF EN 1852-1

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

### Assemblies

Characteristics and test methods (1)	Specifications
Leaktightness of elastomer sealing rings NF EN 1277 Conditions B and C at $23^{\circ}\text{C}$	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 $\leq -0.27$ bar
Quality of elastomer sealing rings (5)	NF EN 681-1, NF EN 681-2, as the case may be
Watertightness (fabricated fittings) NF EN 1053	No leaks at 0.5 bar for 1 min

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

- (2) The specimen must be a complete fitting with, if applicable, the seal and all means associated with fixing the component(s) in place.
- (3) If claimed by the applicant/holder.
- (4) For technical reasons, the tensile test will be performed on DN's with thicknesses  $\leq 14$  mm.
- (5) 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  $(25 \pm 5)$  ppm instead of  $(50 \pm 5)$  ppm.

## Part 2

# MARKING CONDITIONS – REFERENCING THE NF MARK

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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

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 PP 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, 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 NF logo and the symbol of the family: A,

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



- ④ - The material identification symbol: PP,
- ⑤ - The dimensions of the pipes: nominal external diameter SN4 (CR4) or SN8 (CR8) and SN16 (CR16) and the thickness series S
- 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).
- ⑦ - \*: Impacts -10°C according to Standard NF EN 1411 if claimed by the applicant/holder.

**Note:** This symbol cannot be marked between 2 NF marking sequences.

**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:

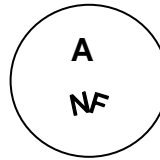
Solid-wall PP pipes for sewerage systems

XXX ①	01/02 ②	 ③	PP ④	125 CR4 (and/or) SN4 S16 ⑤	01 02 09 or 032 09 * ⑥
XXX ①	01/02 ②	 ③	PP ④	125 CR4 (and/or) SN4 S16 ⑤	01 02 09 or 032 09 * ⑥

**2.1.2.2 PP 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 - Either the stiffness class and the thickness series SN4 S16 or SN8 S13.3  
Or the thickness series S16 or S13.3

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 are filed with the mandated bodies, the identification number of the holder, 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 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 (PP),
- 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 – Gravity drainage system 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),
  - Impact resistance at 0°C and -10°C,
  - Ring stiffness,
  - Compression rate,
  - Quality of elastomer sealing rings,
  - Pressure-tightness of the assemblies,
  - Longitudinal reversion,
  - Tension.
- certified product characteristics, fittings:
  - Dimensional characteristics (diameters, thicknesses, sockets),
  - Impact resistance,
  - Effects of heating,
  - Mechanical strength or flexibility,
  - Quality of elastomer sealing rings,
  - Leaktightness of sealing rings.

#### **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

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#### 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 <sup>(1)</sup>	Minimum sampling frequency	Solid-wall PP
Dimensions: diameter, thickness, out-of-roundness Appearance Colour Marking	By extruder: 1 every 4 hours	X
MFR and OIT  Resistance to internal pressure at 95°C 1000 hrs 2.5 MPa	On each delivery or certificate of conformity  Upon approval of each new material	X
Reversion	1 test on 1 specimen at the start of the campaign and at least 1 test per week	X
Tension	1 test per campaign on 5 specimens and at least 1 test per week	X
Ring stiffness	1 test per campaign and at least 1 test every other day <sup>(1)</sup>	X
Impact resistance NF EN 744	1 test per campaign	X
Impact resistance NF EN 1411 (2)	1 test per campaign	X

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

(2) If claimed by the applicant/holder.

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

b) **For fittings:**

Measurements or tests <sup>(1)</sup>	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) <sup>(2)</sup>
MFR and OIT	On each delivery or certificate of conformity
Resistance to internal pressure at 95°C 1000 hrs 2.5 MPa	Upon approval of each new material
Impact resistance	1 test per campaign
Oven test	1 test on 1 specimen per day, per machine, per type and per dimensions <sup>(2)</sup>

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

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

**Note:** 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 PP pipes:

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	-
MFR resin		Specifications accompanied by the certificate of conformity (type 2.1 defined in TD1 chap. 2.20) prepared during each delivery	/
OIT		1 test	1 test
Resistance to pressure at 95°C – 1000 hrs		1 report of tests provided by the manufacturer	/
Impacts NF EN 744		1 test	1 test per type sampled
Impacts NF EN 1411 (3)		1 test	1 test per type sampled
Tension		1 test	1 test per type sampled
Ring stiffness		1 test	1 test per type sampled
Compression rate (2) (4)		-	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 (5)	-	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) For pipes with  $DN > 315$  mm and in stiffness class 16, the compression rate is not performed if the formulation is identical to that of pipes with  $DN < 315$  mm. If the formulation is different, the compression rate will be performed on a pipe with  $DN < 315$  mm made with the second formulation.
- (3) If claimed by the applicant/holder.
- (4) 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.
- (5) 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 conditions 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 PP fittings:**

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	-
MFR and OIT		Specifications accompanied by the certificate of conformity (type 2.1 defined in TD1 chap. 2.20) prepared during each delivery	1 OIT test
Resistance to pressure at 95°C – 1000 hrs		1 report of tests provided by the manufacturer	
Oven test at 150°C		1 test per fitting sampled (2)	1 test per fitting sampled (2)
Impact resistance (Drop Tests)		1 test per fitting sampled (2)	1 test per fitting sampled (2)
Mechanical strength or flexibility		-	1 test
<b>Assemblies</b>	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 <sup>(1)</sup>	-	1 report of tests provided by the manufacturer of elastomer sealing rings.
	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) Limited to 4 fittings.

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

## 4.2 TEST PROCEDURES DURING MONITORING OF CERTIFIED PRODUCTS

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		-
MFR resin	Specifications accompanied by the certificate of conformity (type 2.1 defined in TD1 chap. 2.20) prepared during each delivery		/
OIT	Inspection of records		1 test
Tension	1 type at each visit	1 type per year	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 (2)	-	-	1 test or test report from an EN ISO 17025 accredited body of less than 5 years
Impacts NF EN 744	1 type at each visit	1 type per year	1 type per year
Impacts NF EN 1411 (3)	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.		

### **c) For PP pipes:**

- (1) With additional clarifications indicated in Part 2 of Technical Document 1.
- (2) For pipes with DN > 315 mm and in stiffness class 16, the compression rate is not performed if the formulation is identical to that of pipes with DN < 315 mm. If the formulation is different, the compression rate will be performed on a pipe with DN < 315 mm made with the second formulation.
- (3) If claimed by the applicant/holder.



**d) For PP fittings:**

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		/
MFR resin	Specifications accompanied by the certificate of conformity (type 2.1 defined in TD1 chap. 2.20) prepared during each delivery		/
OIT	Inspection of records		1 test
Mechanical strength or flexibility	-	-	1 type per year
Impact resistance (2)	1 type at each visit	1 type per year	-
Oven test at 150°C (2)	3 diameters per visit	3 diameters per year	1 diameter per year <sup>(1)</sup>
Leaktightness of seal rings			1 diameter per year <sup>(1)</sup>
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.