LABORATOIRE NATIONAL DE MÉTROLOGIE ET D'ESSAIS

Organisme certificateur mandaté par
AFNOR Certification

CERTIFICATION RULES

NF MARK
Polyethylene pipes for gaseous fuel distribution networks, drinking water distribution networks, irrigation and industrial applications, not drinkable water and pressurised sewerage, electrical transmission confinement

AFNOR Certification identification No.:
NF 114
CL - LNE Author ref.

Review No. 40 - July 2025
Approval by AFNOR Certification:
April, 24th, 2025

1st implementation: January 1990

Reference document:
GENERAL RULES OF THE NF MARK
Approved by the President of AFNOR and in force

Only the French version of this document shall be considered as the authentic text

Founded in 1938, the NF mark is a collective certification mark to certify the compliance of products with the national, European and international standards documents that relate to them, and which may be supplemented by additional specifications, in conditions defined by the certification reference standards. The mark is granted by AFNOR Certification and its network of partner bodies that make up the NF network.

The NF mark is a voluntary product certification mark that meets the requirements of the French Consumer Code, in particular by associating stakeholders with the validation of certification reference standards, by defining marking rules for certified products and by clear and transparent communication on main certified characteristics.

The right to use the NF mark is granted on the basis of compliance with one (or more) standard(s) and more generally with the whole certification reference standard, for a product coming from an applicant and a designated design and/or manufacturing and/or marketing process. Granting the right to use the mark shall in no circumstances substitute the LNE's responsibility for the statutory duties of the company holding the right to use the NF mark.

The NF mark controls characteristics covering the safety of persons and goods, the suitability for use and the durability of products, as well as any additional characteristics enabling products to stand out on the market.

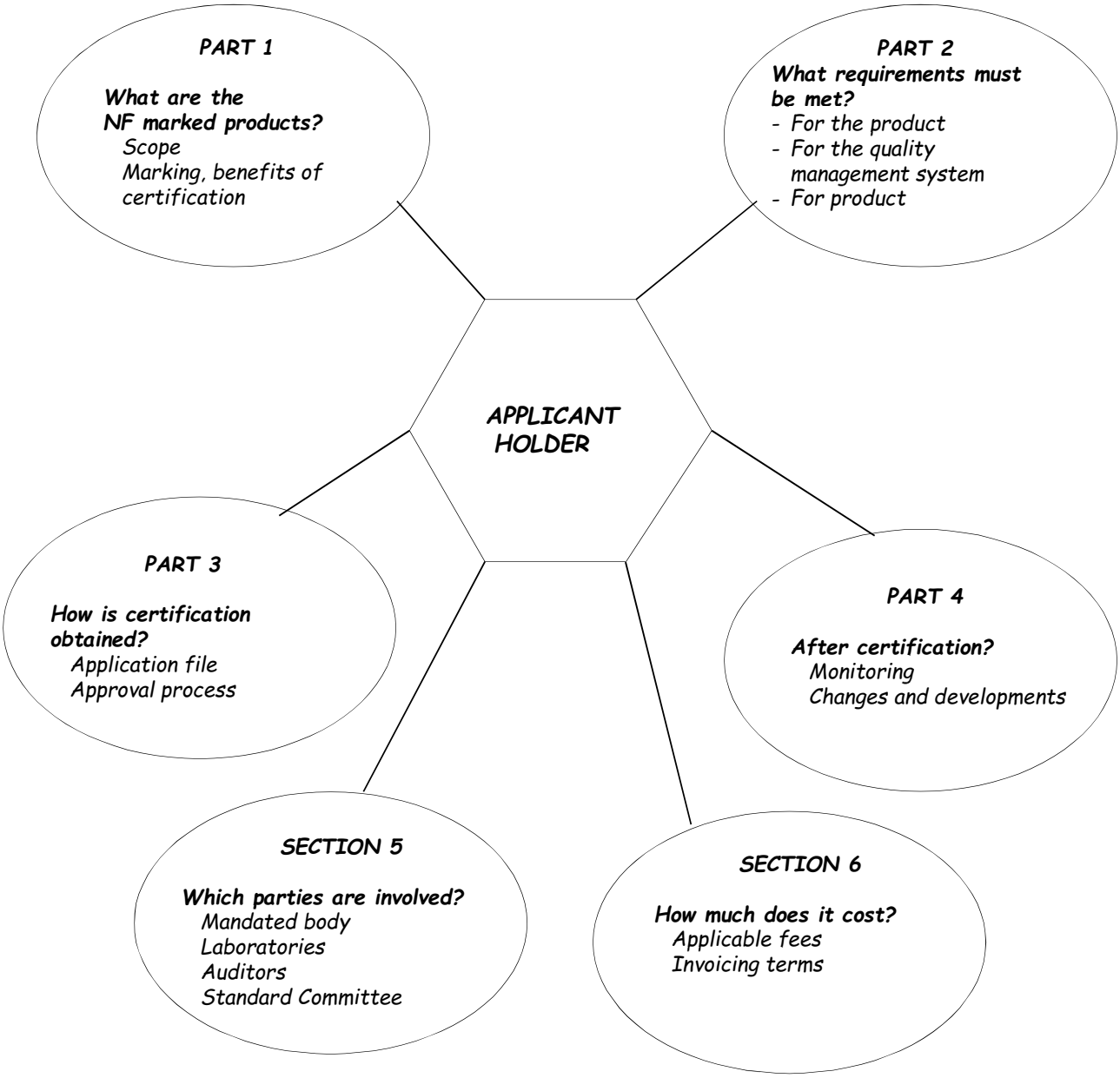
The applicable documents in this certification are:
- the general rules of the NF mark, which set out the general organisation and conditions of use of the mark,
- these certification rules which, in part 2, define the technical characteristics to be observed.

In accordance with the General Rules of the NF mark, AFNOR Certification entrusts the management of mark NF 114 to the LNE, the mandated certifying body.

The LNE is accountable to AFNOR Certification for the operations entrusted to it, which are set out in a contract with AFNOR Certification.

Reminder:
Note that all products or services must comply with regulations relating to forgery, compliance and safety requirements, etc., regardless of any certification application.

CERTIFICATION RULES



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These certification rules were submitted for the approval of AFNOR Certification for acceptance into the NF certification system. They have been approved by the Legal Representative for AFNOR Certification.

They cancel and replace all previous versions.

The certification rules may therefore be revised, in part or in whole, by the LNE following consultation with stakeholders.

UPDATES

Certification rules	Reason for update (compared to previous revision)	Revision	Date
Whole document		Rev40	July 2025
Part 1: Scope - Marking	§ 1.1 Addition of type 1, 2, and 3 concepts for PE 100-RC pipes	Rev40	July 2025
Part 2: Quality requirements to be observed by the manufacturer	§ 2.1- 2.2 – 2.3 Updates related to PE 100-RC pipes of types 1, 2, and 3 § 2.1 Change in the display of the nominal pressure GAS 4 by MOP 5 bar for pipes in group 1 SDR 17 (instead of SDR17.6) in PE 100 and PE 100-RC Addition of 125 and 160 mm SDR 9 GAS MOP 10 bar diameters for Group 1 pipes in PE 100 and PE 100-RC Precision of test piece length for slow crack propagation resistance cone test for pipes with an outside diameter of 75 < Dn ≤ 200 mm § 2.2 Addition of a method for measuring the ovality of coiled pipes § 2.3 Distinction between character heights for laser marking	Rev40	July 2025
Part 3: Obtaining certification	§ 3.2 Update of Table 3 on pipe acceptance tests	Rev40	July 2025
Part 4: Certified product monitoring process - Changes and developments	§ 4.1 Update of the table on pipe surveillance tests Addition of suspensive conditions to the right of use	Rev40	July 2025
Part 5: Participating organisations	§ 5.5 Editorial additions to the applicable conditions for the appointment of manufacturer members § 5.8 Deletion of the financial regime subcommittee	Rev40	July 2025
Part 6: Applicable rate - billing conditions		Rev40	July 2025

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PART 1

SCOPE - NF MARK

SUMMARY

Rev. 40 - July 2025

1.1. Scope

Products covered by the rules are polyethylene (PE) compositions and the pipes these compositions are used to manufacture.

It is the responsibility of the applicant/holder to ensure that the regulations applicable to his product are effectively adhered to (e.g. CE marking).

The applicant/holder is solely responsible for the compliance of their products. LNE tests cannot replace the applicant/holder's responsibility.

The main characteristics certified under the PE Pipes NF mark include nominal pressure at 20°C and dimensions (outer diameter, thickness).

PE pipes belong to one of the following five groups, depending on their application

GROUP 1
Fuel gas applications, extruded pipes with PE 80, PE 100 or PE 100-RC compositions,

GROUP 2
Drinking water applications, pipes extruded with PE 80, PE 100, PE 100-RC or PE 100-RD compositions.

GROUP 3
Irrigation applications, pipes extruded with PE 80, PE 100 or PE 100-RC compositions

GROUP 4
Industrial, non-potable water and pressurized sewerage applications, pipes extruded with PE 80, PE 100 or PE 100-RC compositions.

GROUP 5
Electricity transmission containment applications with PE 80, PE 100, PE 100-RC or PE 100-HT compositions

A PE pipe type is defined as follows for all groups:

A nominal outside diameter, a nominal thickness, a nominal pressure, a composition and an extrusion line

PE 100-RC pipes, whether or not they have the additional designation PE 100-RD, are classified into three types:

Type 1: Pipes in groups 1 to 5 with color identification stripes as specified in § 2.3.2 according to the different application groups. For group 2, PE 100-RC must have the additional designation PE 100-RD.

Type 2: Co-extruded pipes in group 2 with a blue outer layer of PE 100-RC and a black inner layer of PE 100-RC with the additional designation PE 100-RD (RCD).

Type 3: Pipes Pipes in groups 1, 2, and 4 may have an additional contiguous peelable thermoplastic outer layer on the outer surface ("coated pipe") in yellow, blue, and black or brown, respectively, depending on the different application groups. For group 2, PE 100-RC must have the additional designation PE100-RD.

The peelable layer cannot be outsourced by a holder of the NF114 mark.
These rules do not provide performance evaluation of the peelable layer.

1.2. DEFINITIONS

The definitions of certain terms used in these rules are listed below:

Applicant/holder:
A legal person who manages and/or is responsible for meeting all of the requirements defined in these certification rules.
Means both producers of compositions and pipe extruders (composition processors).
Whenever appropriate, the distinction between these two types of holder will be retained.
The requirements of these rules cover at least the following stages: design, manufacturing, quality control, marking, packaging and marketing, and they specify the critical points of these various stages.
When the manufacturer is not established in the European Community, they must nominate an agent.

Agent:
A natural or legal person established in the European Economic Area (EEA) who represents the applicant/holder outside the EEA and has a written mandate from them stating that they can act on their behalf in the NF certifying process, in accordance with provisions of these rules.
The agent may also be the distributor or importer of the certified products, their various roles are therefore clearly identified.

Distributor:
A legal person who distributes the applicant/holder's products, or those of their agent, and who does not work on the product, nor its packaging. When the distributor markets NF products independently of the authorised representative, it assumes responsibility for the verification of compliance with applicable NF certification rules and standards.

The following may act as distributors:
- Distributors who distribute the product under the holder's commercial trademark. In this case, no action is required with regard to the NF mark.
- Distributors who distribute the product under a different trademark. The applicant/holder and the distributor must file an application to maintain the right of usage.

If the distributor does not wish to make explicit reference to the manufacturing site, a request for certification must be made by the distributor. In this case, the manufacturing plant is not mentioned on the certificate. Depending on the operations performed by the applicant/holder or the distributor, the sites audited and the audit duration as part of the initial certification or monitoring are defined on a case-by-case basis.

Approval

The term approval will generally be used to denote both "approval" and "authorisation"

Raw materials

- Polyethylene used for the manufacture of pipes, in the form of:

  - Virgin material:

base composition marketed in the form of granules by a producer. In the text, this material is also referred to as “composition”.

- **Reprocessable material:**
  Material obtained by grinding and/or regranulation by the extruder of its own pipes, manufactured using virgin material with the same commercial reference (possibly with the labelling composition).
- **Internal recycled material:**
  Material obtained by grinding and/or regranulation, by the extruder, pipes of its manufacture, made of virgin materials of different commercial references from the same PE designation (possibly with their marking composition).

- Thermoplastic polymer (e.g. PP) used to manufacture the coating for tubes with a peelable layer; in the form of virgin material.

Peelable layer: Additional thermoplastic layer without adhesive on the outer surface of a pipe, easily removable by mechanical means.

Naming of materials in pipe form

This is made up of a combination of the symbol of the material (PE) and its classification number.

This number is 10 times the MRS(*) value in MPa. The table below gives the names used in these rules.

Name	LCL range (MPa)	MRS
PE 80	8 to 9.99	8
PE 100	10 to 11.19	10
PE 100-RC	10 to 11.19	10
PE 100-RD	10 to 11.19	10
PE 100-HT	10 to 11.19	10

(*)Minimum Required Strength (MRS): LCL rounded down to the nearest lower value in the R10 series when the LCL is less than 10 MPa, or the nearest lower value in the R20 series when the LCL exceeds 10 MPa.

- LCL = Lower Confidence Limit: Amount expressed as a stress unit in Megapascals representing the lower confidence limit estimated at 97.5% of expected long-term hydraulic resistance at 20°C for 50 years in water.

- - PE 100-RC: PE 100 composition with better resistance to slow crack propagation for pipes in groups 1 to 5.
- - PE 100-HT: PE 100 or PE 100-RC composition with improved high-temperature resistance for group 5 pipes.
- PE 100-RD: PE 100 or PE 100-RC composition with improved resistance to chlorinated disinfectants for group 2 pipes.

Pipes with several of the above characteristics are marked accordingly. Cf. § 2.3.1.

1.3. NF MARK

The NF mark is represented by the NF monogram below:

Conditions for marking products, packaging and technical and commercial documents are defined in part 2.

The NF graphic charter is available upon request from LNE.

The standard's rules are designed to aid the holder with the regulatory requirements and NF certification requirements. NF's General Rules detail the terms of use, conditions and sanctions applicable in case of improper use of the NF mark.

Without prejudice to the sanctions listed in the NF mark's General Rules, any wrongful advertisement of the certified items, or any fraudulent use of the NF logo, leaves holder liable to be pursued for fraud and/or false advertising.

1.4. REQUIREMENTS RELATED TO THE NF MARK

- For pipes covered by these certification rules (see § 2.1 Product requirements), a manufacturer authorised to use the mark for an application covered by these certification rules must only manufacture and sell products bearing the NF mark for this application on the French market.

  This requirement does not apply to group 3 and 5 or to pipes not covered by these certification rules.

- The LNE may ask the holder for information regarding PE pipes marketed in France but that are not within the scope of this certification in order to monitor market developments.

1.5. CERTIFIED PRODUCTS

The list of certified products is available through the certificate search engine at www.lne.fr, in the section marked "Certification", "Certificates issued by the LNE".

The LNE provides information on the validity of a given certificate upon request.

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PART 2

REQUIREMENTS TO BE FULFILLED BY THE APPLICANT/HOLDER

SUMMARY

Rev. 40 - July 2025

2.1. PRODUCT REQUIREMENTS

The pipes must be manufactured with NF-mark approved base and labelling compositions for the groups in question.

The use of recycled polyethylene on the outside is prohibited. The use of processable material (see definition in Part 1 - § 1.2.) inside the manufacturing site is permitted for group 3, 4 and 5 applications.

The use of internal recycled polyethylene to the manufacturing site (see definition in part 1 - § 1.2.) Is permitted for the application of group 3 for watering.

The NF mark's reference specifications and test methods are defined in the table below. They are based on the reference standards with any potential additions or modifications.

The masses per meter specified in the dimensional tables are provided for information only.

2.1.1. APPLICABLE STANDARDS AND ADDITIONAL SPECIFICATIONS

2.1.1.1. Group 1 - Combustible gas applications

- Reference standard: NF EN 1555-1 (2021) – Plastics piping system for the distribution of gaseous fuels - Polyethylene - general.
- Reference standard: NF EN 1555-2 (2021) – Plastics piping system for the distribution of gaseous fuels - Polyethylene - Pipes.
- Reference standard: NF EN 1555-5 (2021) – Plastics piping system for the distribution of gaseous fuels - Polyethylene - Fitness for purpose of the system.
- Specifications for base and labelling compositions (see table I).
- Additional test methods: see § 2.1.2.
- Specifications for pipes (see table II)
- Requirements for pipes with a peelable (coated) layer: see § 2.2.4

2.1.1.2. Group 2 - Drinking water applications

- Reference standard: NF EN 12201-1 (2024) - Plastic piping systems for water supply and sewerage service lines and collectors under pressure – Polyethylene (PE) – Part 1: General.
- Reference standard: NF EN 12201-2 (2024) - Plastic piping systems for water supply and sewerage service lines and collectors under pressure – Polyethylene (PE) – Part 2: pipes.
- Reference standard: NF EN 12201-5 (2024) - Plastic piping systems for water supply and sewerage service lines and collectors under pressure – Polyethylene (PE) – Part 5: Fitness for purpose of the system.
- Specifications for base and labelling compositions (see table I).
- Additional test methods: see § 2.1.2.
- Specifications for pipes (see table III)
- Requirements for pipes with a peelable (coated) layer: see § 2.2.4

2.1.1.3. Group 3 - Irrigation applications

<u>Pipes for winding reels and utilities supply pipes</u>

- Compounds and pipes specifications and test methods: (see Tables I and IV)

2.1.1.4. Group 4 - Applications in industry, non-drinking water and pressurised sewerage

- Reference standard: NF EN 12201-1 (2024) - Plastic piping systems for water supply and sewerage service lines and collectors under pressure – Polyethylene (PE) – Part 1: General.

- Reference standard: NF EN 12201-2 (2024) - Plastic piping systems for water supply and sewerage service lines and collectors under pressure – Polyethylene (PE) – Part 2: pipes.
- Reference standard: NF EN 12201-5 (2024) - Plastic piping systems for water supply and sewerage service lines and collectors under pressure – Polyethylene (PE) – Part 5: Fitness for purpose of the system.
- Reference standard: NF EN ISO 15494 (2018) – Plastic piping systems for industrial applications – Polybutylene (PB), polyethylene (PE), polyethylene resistant to temperature (PE-RT), cross-linked polyethylene (PE-X), polypropylene (PP) – Metric series for specifications for components and the system
- Specification of compositions, pipes and test methods: (see tables I and V)
- Requirements for pipes with a peelable (coated) layer: see § 2.2.4

2.1.1.5. Group 5 - Application in containment of electric power transmission

- Specification of compositions, pipes and test methods: (see tables I and VI)

TABLE I - SPECIFICATIONS FOR BASE COMPOSITIONS AND IDENTIFICATION STRIPE COMPOUNDS

Application groups		gr. 1 - PE 80, PE 100, PE 100-RC		gr. 2 - PE 80, PE 100, PE 100-RC, PE 100-RD		gr. 3 PE80, PE100, PE 100-RC	gr. 4 PE 80, PE 100, PE100-RC		gr. 5 PE 80, PE 100, PE 100-RC, PE100-HT	
Characteristics and (1) test methods	**Compound type**	**Base compound**	**Identification stripe compound (2)**	**Base compound**	**Identification stripe compound (2)**	**Base compound**	**Base compound**	**Identification stripe compound (2)**	**Base compound**	**Identification stripe compound (2)**
Conventional density (kg/m3) (ISO 1872/1 preparation NF EN 17855-1		≥930 producer value ± 5 at 23°C		> 930 producer value + 5		≥930 producer value	≥930 producer value		≥930 producer value	
Method ISO 1183-1and 2 + § 1.1.2						5	5		5	
Fluidity index at 190° under 5 kq (g/10 min.) (NF EN ISO 1133-1)		Nominal value reported by the producer ± 20%		Nominal value reported by the producer ± 20%		Nominal value reported by the producer ± 20%	Nominal value reported by the producer ± 20%		Nominal value reported by the producer ± 20%	
Oxidation stability at 210°C (min) (ISO 11357-6) + § 2.1.2.		t ≥ 20 .	t ≥ 20.	t ≥ 20	t ≥ 20.	t ≥ 20.	t ≥ 20.	t ≥ 20.	t ≥ 20 (PE80 and PE100 or 30 (PE100-HT)	t ≥ 20.
Carbon black content (%) (ISO 6964 + § 2.1.2)		2.0 to 2.5		2.0 to 2.5		2.0 to 2.5	2.0 to 2.5		2.0 to 2.5	
Carbon black dispersion (ISO 18553		≤ 3		≤ 3		≤ 3	≤ 3		≤ 3	
+ § 2.1.2.) - note										
Volatile matter content (mg/kg) (NF EN 12 099) (3)		≤ 350		≤ 350		≤ 350	≤ 350		≤ 350	
Organoleptic properties on granules (NF T 54-951 + § 2.1.2) note				≤1						
Suitability for foodstuffs (4)		Presence of all the constituents on the Fraud Control lists concerning food contact materials (Brochure 1227– Official Gazette (JO) of the French Republic)								
Sanitary conformity				Compounds must conform to the provisions of the French Decree dated 29.05.97 related to materials and objects used in fixed installations of production, treatment and distribution of water intended for human consumption and its appendices (JO 01.06.97) in addition to the circular DGS/VS4 No. 2000 –232 dated 27/04/2000 (5)						
Resistance to gas components (NF EN 1555-1)		Resistance at 80°C 2 MPa - ≥20h								
Lower confidence limit (reference static stress) (NF EN ISO 9080)		8,00 à 9, 99 MPa (PE 80) 10,00 to 11,19 Mpa (PE 100 - PE 100-RC)		8,00 à 9, 99 MPa (PE 80) 10,00 to 11,19 Mpa (PE 100 - PE 100-RC - PE 100-RD)		8,00 à 9, 99 MPa (PE 80) 10,00 to 11,19 Mpa (PE 100 - PE 100-RC)	8,00 à 9, 99 MPa (PE 80) 10,00 to 11,19 Mpa (PE 100 - PE 100-RC)		8,00 à 9, 99 MPa (PE 80) 10,00 à 11,19 Mpa (PE 100 - PE 100-RC - PE100-HT)	
Resistance to rapid crack propagation: Test S4 (ISO 13477) (6)		Pc ≥ 1,5 MOP with Pc according NF EN 1555-1)		PE 80 : Pc ≥ 8 bar PE 100-PE 100-RC-PE 100-RD : Pc ≥ 10 bar (according NF EN 12201-1)			PE 80 : Pc ≥ 8 bar PE 100-PE 100-RC-PE 100-RD : Pc ≥ 10 bar (according NF EN 12201-1)		Pc ≥ 10 bar with Pc according NF EN 12201-1)	
Critical pressure Pcs4 at 0°C on 250 mm SDR11 pipe										
Resistance to slow cracking test: Test on notched pipes (NF EN ISO 13479 at 80°c on 110 mm SDR11 pipe) + § 2.1.2.)		≥ 500 h – 80°c . 9,2 bar (PE 100) . 8,0 bar (PE 80)		≥ 500 h – 80°c . 9,2 bar (PE 100) . 8,0 bar (PE 80)			≥ 500 h – 80°c . 9,2 bar (PE 100) . 8,0 bar (PE 80)		≥ 500 h – 80°c . 9,2 bar (PE 100) . 8,0 bar (PE 80)	
Improved resistance to chlorinated disinfectants (ClO2) : Accelerated aging in a semi-open loop of ClO2 (§ 2.1.2.12)				≥ 18 months - No breake (PE 100-RD)						

(1) The versions of the standards cited are those which are current on the date of revision of these rules (see page 1), unless otherwise stated by the LNE.
(2) The composition of the identification strips shall be made from a PE base polymer which is used for one of the pipe compositions for which welding compatibility has been established. The identification bands of groups 1, 2, 3, 4 (sanitation) and 5 shall be yellow, blue, violet, brown and red respectively. All these compositions must be cadmium free.
(3) or water content in accordance with NF EN ISO 15512 or ISO 760 in the event of litigation (specification ≤ 300 mg/kg)
(4) Food compatibility does not assign the organoleptic properties required for gr. 2 to the pipes.
(5) except for identification band compositions
(6) For Group 2 compositions, the test in accordance with ISO 13478 may also be performed

TABLE I - SPECIFICATIONS FOR BASE COMPOSITIONS AND IDENTIFICATION STRIPE COMPOUNDS (CONTINUED)

Application groups		gr. 1 - PE 80, PE 100, PE 100-RC		gr. 2 - PE 80, PE 100, PE 100-RC, PE 100-RD		gr. 3 PE80, PE100, PE 100-RC	gr. 4 PE 80, PE 100, PE100-RC		gr. 5 PE 80, PE 100, PE 100-RC, PE100-HT	
Characteristics and (1) test methods	Compound type	Base compound	Identification stripe compound (2)	Base compound	Identification stripe compound (2)	Base compound	Base compound	Identification stripe compound (2)	Base compound	Identification stripe compound (2)
Thermal durability at 110 ° c (NF EN ISO 21003-2) (8) Δ elongation at break in tension (NF EN ISO 527-2) after 18 months									≥ 25% of the elongation after exposure (PE100- HT only (on an experimental basis)	
Resistance to slow crack propagation : Notched pipe test at 80°c on pipe dn : 110 mm SDR 11 (NF EN ISO 13479 + § 2.1.2.)		≥ 8760 h – 80°c . 9,2 bar (PE 100-RC)		≥ 8760 h – 80°c . 9,2 bar (PE 100-RC)		≥ 8760 h – 80°c . 9,2 bar (PE 100-RC)	≥ 8760 h – 80°c . 9,2 bar (PE 100-RC)		≥ 8760 h – 80°c . 9,2 bar (PE 100-RC)	
Resistance to slow crack propagation : Strain Hardening test (SHT) (ISO 18488 + § 2.1.2.)		< Gp > ≥ 53,0 Mpa (PE 100-RC)		< Gp > ≥ 53,0 Mpa (PE 100-RC)		< Gp > ≥ 53,0 Mpa (PE 100-RC)	< Gp > ≥ 53,0 Mpa (PE 100-RC)		< Gp > ≥ 53,0 Mpa (PE 100-RC)	
Resistance to slow crack propagation : Cracked Round Bar test (CRB) (ISO 18489 + § 2.1.2.)		≥ 1,5 × 10^6 cycles over an interpolated stress range ($\Delta\sigma$0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm (PE 100-RC)		≥ 1,5 × 10^6 cycles over an interpolated stress range ($\Delta\sigma$0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm (PE 100-RC)		≥ 1,5 × 10^6 cycles over an interpolated stress range ($\Delta\sigma$0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm (PE 100-RC)	≥ 1,5 × 10^6 cycles over an interpolated stress range ($\Delta\sigma$0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm (PE 100-RC)		≥ 1,5 × 10^6 cycles over an interpolated stress range ($\Delta\sigma$0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm (PE 100-RC)	
Resistance to slow crack propagation : Accelerated Full Notch Creep Test (AFNCT) (ISO 16770 + § 2.1.2.)		≥ 550 h at an interpolated reference tensile stress of 4 Mpa (Note: recommended stress levels 3.7 - 3.9 - 4.2 - 4.5 Mpa), or ≥ 300 h at an interpolated reference tensile stress of 5 Mpa (Note: recommended stress levels 4.7 - 4.9 - 5.2 - 5.5 MPa) (PE 100-RC)		≥ 550 h at an interpolated reference tensile stress of 4 Mpa (Note: recommended stress levels 3.7 - 3.9 - 4.2 - 4.5 Mpa), or ≥ 300 h at an interpolated reference tensile stress of 5 Mpa (Note: recommended stress levels 4.7 - 4.9 - 5.2 - 5.5 MPa) (PE 100-RC)		≥ 550 h at an interpolated reference tensile stress of 4 Mpa (Note: recommended stress levels 3.7 - 3.9 - 4.2 - 4.5 Mpa), or ≥ 300 h at an interpolated reference tensile stress of 5 Mpa (Note: recommended stress levels 4.7 - 4.9 - 5.2 - 5.5 MPa) (PE 100-RC)	≥ 550 h at an interpolated reference tensile stress of 4 Mpa (Note: recommended stress levels 3.7 - 3.9 - 4.2 - 4.5 Mpa), or ≥ 300 h at an interpolated reference tensile stress of 5 Mpa (Note: recommended stress levels 4.7 - 4.9 - 5.2 - 5.5 MPa) (PE 100-RC)		≥ 550 h at an interpolated reference tensile stress of 4 Mpa (Note: recommended stress levels 3.7 - 3.9 - 4.2 - 4.5 Mpa), or ≥ 300 h at an interpolated reference tensile stress of 5 Mpa (Note: recommended stress levels 4.7 - 4.9 - 5.2 - 5.5 MPa) (PE 100-RC)	
Resistance to slow crack propagation : Accelerated Notched Pipe Test (ANPT) (NF EN ISO 13479 + § 2.1.2.)		≥ 300 h - 80°c - 9,2 bar on pipe 110 mm SDR 11 Water in aqueous nonylphenol ethoxylate solution 2 %		≥ 300 h - 80°c - 9,2 bar on pipe 110 mm SDR 11 Water in aqueous nonylphenol ethoxylate solution 2 %		≥ 300 h - 80°c - 9,2 bar on pipe 110 mm SDR 11 Water in aqueous nonylphenol ethoxylate solution 2 % (PE 100-RC)	≥ 300 h - 80°c - 9,2 bar on pipe 110 mm SDR 11 Water in aqueous nonylphenol ethoxylate solution 2 %		≥ 300 h - 80°c - 9,2 bar on pipe 110 mm SDR 11 Water in aqueous nonylphenol ethoxylate solution 2 %	
Welding compatibility (ISO 13953) Determining the failure mode in a tensile test on a butt weld		According NF EN 1555-1		According norme NF EN 12201-1		According norme NF EN 12201-1	According norme NF EN 12201-1		According norme NF EN 12201-1	

(2) The versions of the standards cited are those which are current on the date of revision of these rules (see page 1), unless otherwise stated by the LNE.
(2) The composition of the identification strips shall be made from a PE base polymer which is used for one of the pipe compositions for which welding compatibility has been established. The identification bands of groups 1, 2, 3, 4 (sanitation) and 5 shall be yellow, blue, violet, brown and red respectively. All these compositions must be cadmium free.
(3) or water content in accordance with NF EN ISO 15512 or ISO 760 in the event of litigation (specification ≤ 300 mg/kg)
(4) Food compatibility does not assign the organoleptic properties required for gr. 2 to the pipes.
(5) except for identification band compositions
(6) For Group 2 compositions, the test in accordance with ISO 13478 may also be performed

TABLE II - SPECIFICATIONS FOR PIPES

GROUP 1 - COMBUSTIBLE GAS APPLICATIONS

Characteristics and test methods (1)		PE 80	PE 100	PE 100-RC (type 1 and 3)
Reference standard		NF EN 1555-2		
Appearance		§ 6.1 NF EN 1555-2		
Dimensions		Tables on following pages		
Melt-flow index at 190°C - 5 kg (g / 10 min.) (NF EN ISO 1133-1)		value measured on the base composition ± 10 %	value measured on the base composition ± 20%	
Dispersion of carbon black (ISO 18553 + § 2.1.2.)		score ≤ 3		
Oxidation stability at 210°C (NF EN ISO 11357-6 + § 2.1.2.)		t ≥ 10 min.		
Heat shrinkage (NF EN ISO 2505 + § 2.1.2.)		≤ 3% appearance preserved		
Tensile strength: (NF EN ISO 6259-1 and ISO 6259-3 + § 2.1.2.)	yield strength	≥ 15 MPa	≥ 19 MPa	
		manufacturer value ± 10%		
	elongation at break (%)	≥ 500 %		
Resistance to hydraulic pressure NF EN ISO 1167-1 and 1167-2 + § 2.1.2.)	20°C	≥ 100 h 10.0 MPa	≥ 100 h 12.0 MPa	
	80°C	≥ 165h 4.5 MPa	≥ 165 h 5.4 MPa	
		≥ 1000h 4.0 MPa	≥ 1000 h 5.0 MPa	
Resistance to slow crack growth: cone test (ISO 13480 + § 2.1.2.)		Pipe e ≤ 5 mm V ≤ 10 mm/day		Pipe diameter ≤ 200 mm V ≤ 2 mm/day (experimental)
Resistance to slow crack growth pipe e > 5 mm at 80°c : notch test (NF EN ISO 13479)		≥ 500 h Test pressures defined in the NF EN ISO 13479 standard, appendix B, based on the SDRs		
Resistance to slow crack propagation Strain-hardening test (SHT) for pipes in size group d n < 75 mm (ISO 18488 + § 2.1.2.)				< Gp > ≥ 50,0 MPa
Resistance to slow crack propagation Accelerated notched pipe test (ANPT) for tubes in size group 75 ≤ d n < 250 (NF EN ISO 13479 + § 2.1.2.) On 110 mm SDR 11 pipe				≥ 300 h - 80°C - 9,2 bar

(1) The versions of the standards cited are those which are current on the date of review of these rules (see update page), unless otherwise stated by the LNE.

GROUP 1 - COMBUSTIBLE GAS APPLICATIONS (CONTINUED)

<table>
<tr><th>Characteristics and test methods (1)</th><th>PE 80</th><th>PE 100</th><th>PE 100-RC
(type 1 and 3)</th></tr>
<tr><td>Resistance to slow crack propagation
Cracked round bar test (CRB)
(ISO 18489 + § 2.1.2.) for pipes of size group
250 ≤ d n < 710 or 710 ≤ d n ≤ 1000
over an interpolated stress range (Δσ0) of 12.5 Mpa
Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm</td><td colspan="2"></td><td>≥ 1,5 × 10^6 cycles</td></tr>
<tr><td>Resistance to rapid crack growth: Test S4 (NF EN ISO 13477): critical pressure (Pcs4) at 0°C</td><td colspan="3">Pc ≥ 1,5 MOP
(avec Pc suivant NF EN 1555-2)</td></tr>
<tr><td>Circumferential shrinkage: for nd ≥ 250 pipes
(NF EN 1555-2)</td><td></td><td colspan="2">In accordance with NF EN 1555-2</td></tr>
<tr><td>Regulatory framework</td><td colspan="3">Environmental Code covering gas networks and internal gas installations, supplemented respectively by the decrees of July 13, 2000 and February 23, 2018.
The decree of February 23, 2018 is also supplemented by its 5 CNPG guides:
- Indoor Gas Installations Guide (IG)
- Gas Appliances and Materials Guide (AMG)
- Guide to Energy Production Sites (SPE)
- Combustion Products Evacuation Systems Guide (EVAPDC)
- Welding Aptitude Certificate Guide (AAS)</td></tr>
<tr><td>Fitness for purpose
NF EN 1555-5</td><td colspan="3">In accordance with NF EN 1555-5</td></tr>
</table>

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PIPE DIMENSIONS - GROUP 1 COMBUSTIBLE GASES

PE 100 and PE 100-RC PIPES

Nominal diameter (ND) ND (1) (mm)	S.D.R (2)	Working pressure	Nominal Thickness (3) (e) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (mm) on straight pipes (4)	Metric mass (kg/m)
				on average outside diameter	on thickness		
20	11(5)	GAS MOP 10 bar	3.0	+ 0.3 0	+ 0.4 0	1.2	0.170
25	11(5)	GAS MOP 10 bar	3,0	+ 0,3 0	+ 0,4 0	1,2	0.220
32	11	GAS MOP 10 bar	3,0	+ 0,3 0	+ 0,4 0	1.3	0.280
40	11	GAS MOP 10 bar	3.7	+ 0,4 0	+ 0.5 0	1.4	0.431
50	11	GAS MOP 10 bar	4.6	+ 0,4 0	+ 0.6 0	1,4	0.670
63	11	GAS MOP 10 bar	5.8	+ 0,4 0	+ 0.7 0	1.5	1.060
75	11	GAS MOP 10 bar	6.8	+ 0,5 0	+ 0.8 0	1.6	1.480
90	11	GAS MOP 10 bar	8.2	+ 0,6 0	+ 1.0 0	1.8	2.150
110	11	GAS MOP 10 bar	10.0	+ 0,7 0	+ 1.1 0	2.2	3.190
125	9 (6)	GAZ MOP 10 bar	14,0	+ 0,8 0	+ 1,6 0	2,5	4,940
	11	GAS MOP 10 bar	11.4	+ 0,8 0	+ 1.3 0	2.5	4.130
140	11	GAS MOP 10 bar	12.7	+ 0.9 0	+ 1.4 0	2.8	5.150
160	9 (6)	GAZ MOP 10 bar	17,9	+ 1,0 0	+ 1,9 0	3,2	8,070
	11	GAS MOP 10 bar	14.6	+ 1,0 0	+ 1.6 0	3.2	6.750
200	17	GAZ MOP 5 bar	11,9	+ 1.2 0	+ 1,3 0	4.0	7,150
225	17	GAZ MOP 5 bar	13,4	+ 1,4 0	+ 1.5 0	4.5	9,0500
250	17	GAZ MOP 5 bar	14,8	+ 1,5 0	+ 1,6 0	5.0	11,100
280	17	GAZ MOP 5 bar	16,6	+ 1.7 0	+ 1.8 0	9.8	14,000
315	17	GAZ MOP 5 bar	18,7	+ 1.9 0	+ 2.0 0	11.1	17,700
355	17	GAZ MOP 5 bar	21,1	+ 2.2 0	+ 2.3 0	12.5	22,500
400	17	GAZ MOP 5 bar	23,7	+ 2.4 0	+ 2.5 0	14.0	28,400

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)
(5) The calculated values are 3.0 mm for an SDR 11
(6) S.D.R. not covered by standard NF EN 1555-2 (Note: change planned for the next update of the standard)

PIPE DIMENSIONS - GROUP 1 COMBUSTIBLE GASES

PE 80 PIPES (EN 1555-2 standard)

Diameter Nominal diameter ND (1) (mm)	S.D.R (2)	Working pressure	Nominal Nominal thickness (3) (e) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (mm) on straight pipes (4)	Metric Metric mass (kg/m)
				on average outside diameter	on thickness		
20	11(5)	GAZ 4	3,0	+ 0,3 0	+ 0,4 0	1,2	0.162
25	11(5)	GAZ 4	3,0	+ 0,3 0	+ 0,4 0	1,2	0.210
32	11	GAZ 4	3,0	+ 0,3 0	+ 0,4 0	1,3	0.277
40	11	GAZ 4	3,7	+ 0,4 0	+ 0,5 0	1,4	0.428
50	11	GAZ 4	4,6	+ 0,4 0	+ 0,6 0	1,4	0.665
63	11	GAZ 4	5,8	+ 0,4 0	+ 0,7 0	1,5	1.050
75	11	GAZ 4	6,8	+ 0,5 0	+ 0,8 0	1,6	1.470
90	11	GAZ 4	8,2	+ 0,6 0	+ 1,0 0	1,8	2.130
110	11	GAZ 4	10,0	+ 0,7 0	+ 1,1 0	2,2	3.150
125	11	GAZ 4	11,4	+ 0,8 0	+ 1,3 0	2,5	4.090
140	11	GAZ 4	12,7	+ 0,9 0	+ 1,4 0	2,8	5.100
160	11	GAZ 4	14,6	+ 1,0 0	+ 1,6 0	3,2	6.700
180	11	GAZ 4	16.4	+ 1,1 0	+ 1,8 0	3.6	8.450
200	11	GAZ 4	18.2	+ 1,2 0	+ 2,0 0	4,0	10.400
225	11	GAZ 4	20.5	+ 1,4 0	+ 2,2 0	4,5	13.200

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)
(5) The calculated values are 3.0 mm for an SDR 11

TABLE III - SPECIFICATIONS FOR PIPES

GROUP 2 - DRINKING WATER APPLICATION

Characteristics and test methods (1)		PE 80	PE 100	PE 100-RC-RD (type 1 and 3)	PE 100-RD
Reference standard		NF EN 12201-2			
Appearance		§ 6.1. of NF EN 12201-2 standard			
Dimensions		Tables on following pages			
Melt-flow index at 190°C - 5 kg (g/10 min.) (NF EN ISO 1133-1)		Value measured on the base composition ± 10%	Value measured on the base composition ± 20%		
Dispersion of carbon black ISO 18553 + § 2.1.2.)		score ≤ 3			
Oxidation stability at 210°C (NF EN ISO 11357-6 + § 2.1.2.)		t ≥ 10 min.			
Heat shrinkage (NF EN ISO 2505 + § 2.1.2.)		≤ 3% appearance preserved			
Tensile strength: (NF EN ISO 6259-1 and ISO 6259-3 + § 2.1.2.)	yield strength	≥ 15 MPa	≥ 19 MPa Manufacturer value ± 10%		
	elongation at break (%)	≥ 500 %			
Resistance to hydraulic pressure (NF EN ISO 1167-1 and 1167-2 + § 2.1.2.)	20°C	≥ 100h 10.0 MPa	≥ 100 h 12.0 MPa		
	80°C	≥ 165 h 4.5 MPa	≥ 165 h 5.4 MPa		
		≥ 1000 h 4.0 MPa	≥ 1000 h 5.0 MPa		
Organoleptic properties (NF T 54-951 + § 2.1.2)		Threshold ≤ 3			
Resistance to slow crack growth: cone test (ISO 13480 + § 2.1.2.)		Pipe e ≤ 5 mm V ≤ 10 mm/day		Pipe diameter ≤ 200 mm V ≤ 2 mm/day (experimental)	Pipe e ≤ 5 mm V ≤ 10 mm/day
Resistance to slow crack growth pipe e > 5 mm at 80°c : notch test (NF EN ISO 13479) Test pressures defined in NF EN ISO 13479 annex B, according to SDR		≥ 500 h			≥ 500 h
Resistance to slow crack propagation Strain-hardening test (SHT) for pipes in size group d n < 75 mm (ISO 18488 + § 2.1.2.)				< Gp > ≥ 50,0 MPa	

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GROUP 2 - DRINKING WATER APPLICATION (CONTINUED)

Characteristics and test methods (1)	PE 80	PE 100	PE 100-RC-RD (type 1 and 3)	PE 100-RD
Resistance to slow crack propagation Accelerated notched pipe test (ANPT) for tubes in size group 75 ≤ d n < 250 (NF EN ISO 13479 + § 2.1.2.) On 110 mm SDR 11 pipe			≥ 300 h - 80°C - 9,2 bar	
Resistance to slow crack propagation Cracked round bar test (CRB) (ISO 18489 + § 2.1.2.) for pipes of size group 250 ≤ d n < 710 or 710 ≤ d n ≤ 1000 over an interpolated stress range (Δσ0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm			≥ 1,5 × 10^6 cycles	
Improved resistance to chlorinated disinfectants (ClO2) : Accelerated aging in ClO2 semi-open loop (§ 2.1.2.12)			No breakage before 18 months	
Resistance to rapid crack growth: Test S4 (NF EN ISO 13477): critical pressure (Pcs4) at 0°C	Pc ≥ 8 bar (according NF EN 12201-1)	Pc ≥ 10 bar (suivant NF EN 12201-1)		
Health compliance	The pipes must comply with the provisions of the decree dated 29.05.97 on materials and objects used in fixed installations for the production, treatment and distribution of water intended for human consumption and its appendices (OJ of 01.06.97) supplemented by circular DGS/VS4 No. 2000 -232 of 27/04/2000			
Fitness for purpose	In accordance with NF EN 12201-5			

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GROUP 2 - DRINKING WATER APPLICATION : pipes in PE 100-RC-RD type 2

Characteristics and test methods (1)		Coextruded pipe	Internal layer	External layer (2)
Reference standard		NF EN 12201-2		
Appearance		§ 6.1. of NF EN 12201-2 standard		
Dimensions		Tables on the following pages - Annex B.3 of NF EN 12201-2 standard		
Délaminage		Annex B.7 of NF EN 12201-2 standard		
Melt-flow index at 190°C - 5 kg (g/10 min.) (NF EN ISO 1133-1)			Value measured on the base composition ± 20%	
Dispersion of carbon black ISO 18553 + § 2.1.2.)			note ≤ 3	
Oxidation stability at 210°C (NF EN ISO 11357-6 + § 2.1.2.)			t ≥ 10 min	
Heat shrinkage (NF EN ISO 2505 + § 2.1.2.)		≤ 3 % aspect conservé		
Tensile strength: (NF EN ISO 6259-1 and ISO 6259-3 + § 2.1.2.)	yield strength	≥ 19 MPa		
		Manufacturer value ± 10%		
	elongation at break (%)	≥ 500 %		
Resistance to hydraulic pressure (NF EN ISO 1167-1 and 1167-2 + § 2.1.2.)	20°C	≥ 100 h 12,0 MPa		
	80°C	≥ 165 h 5,4 MPa		
		≥ 1000 h 5,0 MPa		
Structural integrity after deformation (NF EN ISO 13968)		> 80% of the initial ring stiffness value		
Organoleptic properties (NF T 54-951 + § 2.1.2)		Threshold ≤ 3		
Resistance to slow crack growth: cone test (ISO 13480 + § 2.1.2.)		Pipe diameter ≤ 200 mm V ≤ 2 mm/day (experimental)		
Resistance to slow crack propagation Strain-hardening test (SHT) for pipes in size group d n < 75 mm (ISO 18488 + § 2.1.2.)		< Gp > ≥ 50,0 MPa		

GROUP 2 - DRINKING WATER APPLICATION : pipes in PE 100-RC-RD type 2 (continued)

Characteristics and test methods (1)	Coextruded pipe	Internal layer	External layer (2)
Resistance to slow crack propagation Accelerated notched pipe test (ANPT) for tubes in size group 75 ≤ d n < 250 (NF EN ISO 13479 + § 2.1.2.) On 110 mm SDR 11 pipe	≥ 300 h - 80°C - 9,2 bar		
Resistance to slow crack propagation Cracked round bar test (CRB) (ISO 18489 + § 2.1.2.) for pipes of size group 250 ≤ d n < 710 or 710 ≤ d n ≤ 1000 over an interpolated stress range (Δσ0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm	≥ 1,5 × 10^6 cycles		
Resistance to rapid crack growth: Test S4 (NF EN ISO 13477): critical pressure (Pcs4) at 0°C	Pc ≥ 10 bar (according NF EN 12201-1)		
Improved resistance to chlorinated disinfectants (ClO2) : Accelerated aging in ClO2 semi-open loop (§ 2.1.2.12)	No breakage before 18 months		
Health compliance	The pipes must comply with the provisions of the decree dated 29.05.97 on materials and objects used in fixed installations for the production, treatment and distribution of water intended for human consumption and its appendices (OJ of 01.06.97) supplemented by circular DGS/VS4 No. 2000 -232 of 27/04/2000		
Fitness for purpose	In accordance with NF EN 12201-5		

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(2) The outer layer must not exceed a thickness corresponding to 10% of the total thickness of the pipe.

PIPE DIMENSIONS - GROUP 2 DRINKING WATER

PE 100, PE 100-RC and PE 100-RD PIPES

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
20	7.4	25	3.0	0.3	+ 0.4 0	1.2	0.170
	7.4	20	3.0(*)				0.170
	7.4	16	3.0(*)				0.170
25	7.4	25	3.5	0.3	+ 0.50	1.2	0.250
	9	20	3.0		+ 0.4 0		0.220
	9	16	3.0(*)				0.220
	9	12.5	3.0(*)				0.220
32	7.4	25	4.4	0.3	+ 0.6 0	1.3	0.390
	9	20	3.6		+ 0.5 0		0.326
	11	16	3.0(*)		+ 0.4 0		0.280
	11	12.5	3.0(*)				0.280
	11	10	3.0(*)				0.280
40	7.4	25	5.5	0.4	+ 0.7 0	1.4	0.610
	9	20	4.5		+ 0.6 0		0.510
	11	16	3.7		+ 0.5 0		0.431
	13.6	12.5	3.0				0.365
	13.6	10	3.0(*)				0.365
50	7.4	25	6.9	0.4	+ 0.8 0	1.4	0.948
	9	20	5.6		+ 0.7 0		0.790
	11	16	4.6		+ 0.6 0		0.670
	13.6	12.5	3.7		+ 0.5 0		0.555
	17	10	3.0		+ 0.4 0		0.462

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)
(*) nominal thickness; not matching the value of the standard

PE 100, PE 100-RC and PE 100-RD PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
63	7.4	25	8.6	0.4	+ 1.0 0	1.5	1.500
	9	20	7.1		+ 0.9 0		1.260
	11	16	5.8		+ 0.7 0		1.060
	13.6	12.5	4.7		+ 0.6 0		0.885
	17	10	3.8		+ 0.5 0		0.730
75	7.4	25	10.3	0.5	+ 1.2 0	1.6	2.120
	9	20	8.4		+ 1.0 0		1.770
	11	16	6.8		+ 0.8 0		1.480
	13.6	12.5	5.6		+ 0.7 0		1.250
	17	10	4.5		+ 0.6 0		1.040
90	7.4	25	12.3	0.6	+ 1.4 0	1.8	3.040
	9	20	10.1		+ 1.2 0		2.570
	11	16	8.2		+ 1.0 0		2.150
	13.6	12.5	6.7		+ 0.8 0		1.770
	17	10	5.4		+ 0.7 0		1.470
110	7.4	25	15.1	0.7	+ 1.7 0	2.2	4.550
	9	20	12.3		+ 1.4 0		3.820
	11	16	10.0		+ 1.1 0		3.190
	13.6	12.5	8.1		+ 1.0 0		2.650
	17	10	6.6		+ 0.8 0		2.190

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)
(*) nominal thickness; not matching the value of the standard

PE 100, PE 100-RC and PE 100-RD PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
125	7.4	25	17.1	0.8	+ 1.9 0	2.5	5.830
	9	20	14.0		+ 1.6 0		4.940
	11	16	11.4		+ 1.3 0		4.130
	13.6	12.5	9.2		+ 1.1 0		3.410
	17	10	7.4		+ 0.9 0		2.790
140	7.4	25	19.2	0.9	+ 2.1 0	2.8	7.350
	9	20	15.7		+ 1.7 0		6.200
	11	16	12.7		+ 1.4 0		5.150
	13.6	12.5	10.3		+ 1.2 0		4.270
	17	10	8.3		+ 1.0 0		3.500
160	7.4	25	21.9	1.0	+ 2.3 0	3.2	9.580
	9	20	17.9		+ 1.9 0		8.070
	11	16	14.6		+ 1.6 0		6.750
	13.6	12.5	11.8		+ 1.3 0		5.600
	17	10	9.5		+ 1.1 0		4.570
180	7.4	25	24.6	1.1	+ 2.6 0	3.6	12.100
	9	20	20.1		+ 2.2 0		10.200
	11	16	16.4		+ 1.8 0		8.550
	13.6	12.5	13.3		+ 1.5 0		7.100
	17	10	10.7		+ 1.2 0		5.800
200	7.4	25	27.4	1.2	+ 2.9 0	4.0	15.000
	9	20	22.4		+ 2.4 0		12.650
	11	16	18.2		+ 2.0 0		10.600
	13.6	12.5	14.7		+ 1.6 0		8.700
	17	10	11.9		+ 1.3 0		7.150

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅min)

PE 100, PE 100-RC and PE 100-RD PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
225	7.4	25	30.8	1.4	+ 3.2 0	4.5	18.950
	9	20	25.2		+ 2.7 0		16.000
	11	16	20.5		+ 2.2 0		13.300
	13.6	12.5	16.6		+ 1.8 0		11.000
	17	10	13.4		+ 1.5 0		9.050
250	7.4	25	34.2	1.5	+ 3.6 0	5.0	23.400
	9	20	27.9		+ 2.9 0		19.650
	11	16	22.7		+ 2.4 0		16.400
	13.6	12.5	18.4		+ 2.0 0		13.600
	17	10	14.8		+ 1.6 0		11.100
280	7.4	25	38.3	1.7	+ 4.0 0	9.8	29.300
	9	20	31.3		+ 3.3 0		24.700
	11	16	25.4		+ 2.7 0		20.600
	13.6	12.5	20.6		+ 2.2 0		17.000
	17	10	16.6		+ 1.8 0		14.000
315	7.4	25	43.1	1.9	+ 4.5 0	11.1	37.100
	9	20	35.2		+ 3.7 0		31.200
	11	16	28.6		+ 3.0 0		26.000
	13.6	12.5	23.2		+ 2.5 0		21.600
	17	10	18.7		+ 2.0 0		17.700
355	7.4	25	48.5	2.2	+ 5.0 0	12.5	47.000
	9	20	39.7		+ 4.1 0		39.700
	11	16	32.2		+ 3.4 0		33.000
	13.6	12.5	26.1		+ 2.8 0		27.300
	17	10	21.1		+ 2.3 0		22.500

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅min)

PE 100, PE 100-RC and PE 100-RD PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
400	7.4	25	54.7	2.4	+ 5.6 0	14.0	59.700
	9	20	44.7		+ 4.6 0		50.300
	11	16	36.3		+ 3.8 0		42.000
	13.6	12.5	29.4		+ 3.1 0		34.600
	17	10	23.7		+ 2.5 0		28.400
450	7.4	25	61.5	2.7	+ 6.3 0	15.6	75.600
	9	20	50.3		+ 5.2 0		63.700
	11	16	40.9		+ 4.2 0		53.100
	13.6	12.5	33.1		+ 3.5 0		43.900
	17	10	26.7		+ 2.8 0		35.900
500	9	20	55.8	3.0	+ 5.7 0	17.5	78.500
	11	16	45.4		+ 4.7 0		65.500
	13.6	12.5	36.8		+ 3.8 0		54.500
	17	10	29.7		+ 3.1 0		44.500
560	11	16	50.8	3.4	+ 5.2 0	19.6	82.500
	13.6	12.5	41.2		+ 4.3 0		68.000
	17	10	33.2		+ 3.5 0		55.500
630	11	16	57.2	3.8	+ 5.9 0	22.1	104.000
	13.6	12.5	46.3		+ 4.8 0		86.000
	17	10	37.4		+ 3.9 0		70.500
710	11	16	64,5	6.4	+ 6,6 0	-	134,000
	13.6	12.5	52.2		+ 5.4 0		109.000
	17	10	42.1		+ 4.4 0		89.000
800	13.6	12.5	58.8	7.2	+ 6.0 0	-	139.000
	17	10	47.4		+ 4.9 0		113.000
900	17	10	53.3	8.1	+ 5.5 0	-	144.000
1,000	17	10	59.3	9.0	+ 6.1 0	-	177.000

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PIPE DIMENSIONS - GROUP 2 DRINKING WATER (CONTINUED)

PE 80 PIPES

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
20	6	25	3.4	0.3	+ 0.5 0	1.2	0.182
	7.4	20	3.0(*)		+ 0.4 0		0.162
	7.4	16	3.0(*)				0.162
	7.4	12.5	3.0 (*)				0.162
25	6	25	4.2	0.3	+ 0.6 0	1.2	0.279
	7.4	20	3.5		+ 0.5 0		0.241
	9	16	3.0		+ 0.4 0		0.210
	9	12.5	3.0 (*)				0.210
	9	10	3.0 (*)				0.210
32	6	25	5.4	0.3	+ 0.7 0	1.3	0.456
	7.4	20	4.4		+ 0.6 0		0.387
	9	16	3.6		+ 0.5 0		0.326
	11	12.5	3.0		+ 0.4 0		0.277
	11	10	3.0 (*)				
40	6	25	6.7	0.4	+ 0.8 0	1.4	0.705
	7.4	20	5.5		+ 0.7 0		0.603
	9	16	4.5		+ 0.6 0		0.510
	11	12.5	3.7		+ 0.5 0		0.428
	13.6	10	3.0				0.361
50	9	16	5.6	0.4	+ 0.7 0	1.4	0.790
	11	12.5	4.6		+ 0.6 0		0.665
	13.6	10	3.7		+ 0.5 0		0.550
63	9	16	7.1	0.4	+ 0.9 0	1.5	1.260
	11	12.5	5.8		+ 0.7 0		1.050
	13.6	10	4.7		+ 0.6 0		0.870

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)
(*) nominal thickness; not matching the value of the standard

PE 80 PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
75	9	16	8.4	0.5	+ 1.0 0	1.6	1.770
	11	12.5	6.8		+ 0.8 0		1.470
	13.6	10	5.6		+ 0.7 0		1.220
90	9	16	10.1	0.6	+ 1.2 0	1.8	2.550
	11	12.5	8.2		+ 1.0 0		2.130
	13.6	10	6.7		+ 0.8 0		1.750
110	9	16	12.3	0.7	+ 1.4 0	2.2	3.790
	11	12.5	10.0		+ 1.1 0		3.150
	13.6	10	8.1		+ 1.0 0		2.620
125	9	16	14.0	0.8	+ 1.6 0	2.5	4.880
	11	12.5	11.4		+ 1.3 0		4.090
	13.6	10	9.2		+ 1.1 0		3.370

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

TABLE IV - SPECIFICATIONS FOR PIPES

GROUP 3 - IRRIGATION APPLICATIONS

Application groups		group 3 pipes for feed	group 3 pipes for reels	group 3 pipes for watering	
Characteristics and test methods (1)		PE 80		PE 100	PE 100-RC (type 1 and 3)
Appearance		(2)			
Dimensions		tables on following pages			
Melt-flow index at 190°C - 5 kg (g/10 min.) (NF EN ISO 1133-1)		producer reference value ± 40% (3)			
Dispersion of carbon black (ISO 18553 + § 2.1.2.)		Score ≤ 3			
Oxidation stability at 210°C (NF EN ISO 11357-6 + § 2.1.2.)		t ≥ 10 min.			
Heat shrinkage (NF EN ISO 2505 + § 2.1.2.)		≤ 3% appearance preserved			
Tensile strength (ISO 6259-1-3 + § 2.1.2.)	yield strength	≥ 15 MPa		≥ 19 MPa	
		manufacturer value ± 10%			
	elongation at break (%)	≥ 350 %			
Resistance to hydraulic pressure (NF EN ISO 1167-1 and 1167-2 + § 2.1.2.)	20°C	≥ 100 h 10.0 MPa		≥ 100 h 12.0 MPa	
	80°C	≥ 165h 4.5 MPa		≥ 165h 5.4 MPa	
		≥ 1000 h 4.0 MPa		≥ 1000 h 5.0 MPa	
Resistance to slow crack propagation Strain-hardening test (SHT) for pipes in size group d n < 75 mm (ISO 18488 + § 2.1.2.)					< Gp > ≥ 50,0 MPa
Resistance to slow crack propagation Accelerated notched pipe test (ANPT) for tubes in size group 75 ≤ d n < 250 (NF EN ISO 13479 + § 2.1.2.) On 110 mm SDR 11 pipe					≥ 300 h - 80°C - 9,2 bar

(1) The versions of the standards cited are those which are current on the date of review of these rules (see update page), unless otherwise stated by the LNE.
(2) The pipes shall have clean and smooth outside and inner surfaces and shall be free from defects which may be detrimental to their quality (e.g. scratches, pits, bubbles, grains, cracks and pores).
(3) if internal recycled content is used, the reference value of the producer is those of the composition mainly present.

GROUP 3 - IRRIGATION APPLICATIONS (CONTINUED)

Application groups	group 3 pipes for feed	group 3 pipes for reels	group 3 pipes for watering	
Characteristics and test methods (1)	PE 80		PE 100	PE 100-RC (type 1 and 3)
Resistance to slow crack propagation Cracked round bar test (CRB) (ISO 18489 + § 2.1.2.) for pipes of size group 250 ≤ d n < 710 or 710 ≤ d n ≤ 1000 over an interpolated stress range (Δσ0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm				R≥ 1.5 × 106 cycles over an interpolated stress range (Δσ0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm

(1) The versions of the standards cited are those which are current on the date of review of these rules (see update page), unless otherwise stated by the LNE.
(2) The pipes shall have clean and smooth outside and inner surfaces and shall be free from defects which may be detrimental to their quality (e.g. scratches, pits, bubbles, grains, cracks and pores).
(3) if internal recycled content is used, the reference value of the producer is those of the composition mainly present.

PIPE DIMENSIONS - GROUP 3 IRRIGATION

PIPES FOR FEED

PE80 PIPES

Applicable dimensions for PE 80 pipes

Outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e) (3) (mm)	Tolerances in relation to nominal values (mm)		Maximum ovalisation on straight pipes (4) (mm)	Mass per metre (kg/m)
				outside diameter	on thickness		
20	11	12.5	2.0	+ 0,3 0	+ 0,4 0	For NP 10 pipes, ovalisation of less than 5%.	0.119
25	17	8	2,0	+ 0,3 0	+ 0,4 0		0.152
	11	12.5	2.3		+ 0,5 0		0.173
32	17	8	2,0	+ 0,3 0	+ 0,4 0		0.198
	11	12.5	2.9		+ 0,5 0		0.275
40	17	8	2.4	+ 0,4 0	+ 0,5 0		0.299
	11	12.5	3,7		+ 0,6 0		0.435
50	17	8	3,0	+ 0,5 0	+ 0,5 0		0.459
	11	12.5	4,6		+ 0,7 0		0.675
63	17	8	3.8	+ 0,6 0	+ 0,6 0		0.730
	11	12.5	5,8		+ 0,8 0		1.070
75	17	8	4,5	+ 0,7 0	+ 0,7 0		1.030
	11	12.5	6,8		+ 0,9 0		1.490
90	17	8	5,4	+ 0,9 0	+ 0,8 0		1,480
	11	12.5	8,2		+ 1,1 0		2,150
110	17	8	6.6	+ 1,0 0	+ 0,9 0		2.190
	11	12.5	10,0		+ 1,2 0		3.180
125	17	8	7.4	+ 1,2 0	+ 1,0 0		2.790
	11	12.5	11,4		+ 1,4 0		4,130

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PIPE DIMENSIONS - GROUP 3 IRRIGATION

PIPES FOR REELS

PE80 PIPES

Nominal outside diameter ND (1)	Nominal thickness (e) (mm)		Tolerances in relation to nominal values (mm)		Mass per metre (kg/m)	
			on average outside diameter	On thickness		
	Series 1	Series 2			Series 1	Series 2
50	3,7	4,6	+ 0,5 0	+ 0,6 0	0.555	0,670
63	4.7	5,8	+ 0,6 0	+ 0,7 0	0.885	1,060
70	5,0	6.5	+ 0,7 0	+ 0,7 0	1,050	1.310
75	5.5	6,8	+ 0,7 0	+ 0,8 0	1.230	1,480
82	6.0	7.5	+ 0,8 0	+ 0,8 0	1.460	1.770
90	6.7	8,2	+ 0,9 0	+ 0,9 0	1.790	2,130
100	7,4	9.1	+ 0,9 0	+ 1,0 0	2.200	2.620
110	8,2	10,0	+ 1,0 0	+ 1,1 0	2.680	3.170
125	9.3	11,4	+ 1,1 0	+ 1,5 0	3.490	4.140

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) Represents the minimum thickness, expressed in millimetres

PIPE DIMENSIONS - GROUP 3 IRRIGATION

PIPES FOR WATERING

PE100 and PE 100-RC PIPES

Outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e) (3) (mm)	Tolerances in relation to nominal values (mm)		Maximum ovalisation on straight pipes (4) (mm)	Mass per metre (kg/m)
				outside diameter	on thickness		
20	11	20	2,0	+ 0,3 0	+ 0,3 0	For PN 10 pipes, ovalisation less than 10 %	0,119
25	17	10	2,0	+ 0,3 0	+ 0,3 0		0,152
32	17	10	2,0	+ 0,3 0	+ 0,3 0		0,198
40	17	10	2,4	+ 0,4 0	+ 0,4 0		0,299
50	17	10	3,0	+ 0,4 0	+ 0,4 0		0,462
63	17	10	3,8	+ 0,4 0	+ 0,5 0		0,730
75	17	10	4,5	+ 0,5 0	+ 0,6 0		1,040
90	17	10	5,4	+ 0,6 0	+ 0,7 0		1,470
110	17	10	6,6	+ 0,7 0	+ 0,8 0		2,190
125	17	10	7,4	+ 0,8 0	+ 0,9 0		2,790
140	17	10	8,3	+ 0,9 0	+ 1,0 0		3.500
160	17	10	9,5	+ 1,0 0	+ 1,1 0		4.570
180	17	10	10,7	+ 1,1 0	+ 1,2 0		5.800
200	17	10	11,9	+ 1,2 0	+ 1,3 0		7.150
225	17	10	13,4	+ 1.4 0	+ 1.5 0		9.050
250	17	10	14,8	+ 1,5 0	+ 1,6 0		11.100

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) Represents the minimum thickness, expressed in millimetres

TABLE V - SPECIFICATIONS FOR PIPES

GROUP 4 - APPLICATIONS IN INDUSTRY, NON-DRINKING WATER AND PRESSURISED SEWERAGE

Characteristics and test methods (1)		PE 80	PE 100	PE 100-RC (type 1 and 3)
Reference standard		NF EN 12201-2		
Appearance		§ 6.1. NF EN 12201-2		
Dimensions		tables on following pages		
Melt-flow index at 190°C - 5 kg (g/10 min.) (NF EN ISO 1133-1)		producer reference value ± 30%		
Dispersion of carbon black (ISO 18553 + § 2.1.2.)		score ≤ 3		
Oxidation stability at 210°C (NF EN ISO 11357-6) + § 2.1.2.		t ≥ 10 min.		
Heat shrinkage (NF EN ISO 2505 + § 2.1.2.)		≤ 3% appearance preserved		
Tensile strength (ISO 6259-1-3 + § 2.1.2.)	yield strength	≥ 15 MPa	≥ 19 MPa	
		manufacturer value ± 10%		
	elongation at break (%)	≥ 350 %		
Resistance to hydraulic pressure (NF EN ISO 1167-1 and 1167-2 + § 2.1.2.)	20°C	≥ 100 h 10.0 MPa	≥ 100 h 12.0 MPa	
	80°C	≥ 165 h 4.5 MPa	≥ 165 h 5.4 MPa	
		≥ 1000 h 4.0 MPa	≥ 1000 h 5.0 MPa	
Resistance to slow crack growth pipe e > 5 mm at 80°c : notch test (NF EN ISO 13479)		≥ 500 h Test pressures defined in the NF EN ISO 13479 standard, appendix B, based on the SDRs		
Resistance to rapid crack growth: Test S4 (NF EN ISO 13477): critical pressure (Pcs4) at 0°C		Pc ≥ 8 bar (according NF EN 12201-1)	Pc ≥ 10 bar (suivant NF EN 12201-1)	
Resistance to slow crack propagation Strain-hardening test (SHT) for pipes in size group d n < 75 mm (ISO 18488 + § 2.1.2.)				< Gp > ≥ 50,0 MPa
Resistance to slow crack propagation Accelerated notched pipe test (ANPT) for tubes in size group 75 ≤ d n < 250 (NF EN ISO 13479 + § 2.1.2.) On 110 mm SDR 11 pipe				≥ 300 h - 80°C - 9,2 bar

(1) The versions of the standards cited are those which are current on the date of review of these rules (see update page), unless otherwise stated by the LNE.

GROUP 4 - APPLICATIONS IN INDUSTRY, NON-DRINKING WATER AND PRESSURISED SEWERAGE (CONTINUED)

Characteristics and test methods (1)	PE 80	PE 100	PE 100-RC (type 1 and 3)
Resistance to slow crack propagation Cracked round bar test (CRB) (ISO 18489 + § 2.1.2.) for pipes of size group $250 \leq d_n < 710$ or $710 \leq d_n \leq 1000$ over an interpolated stress range ($\Delta\sigma 0$) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm			$\geq 1{,}5 \times 10^6$ cycles

(1) The versions of the standards cited are those which are current on the date of review of these rules (see update page), unless otherwise stated by the LNE.

PIPE DIMENSIONS - GROUP 4 INDUSTRY, NON-DRINKING WATER AND PRESSURISED SEWERAGE

PRESSURE SERIES - PE 100 and PE 100-RC PIPES

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
20	7.4	25	3.0	0.3	+ 0.4 0	1.2	0.170
	7.4	20	3.0(*)				0.170
	7.4	16	3.0(*)				0.170
25	7.4	25	3.5	0.3	+ 0.50	1.2	0.250
	9	20	3.0		+ 0.4 0		0.220
	9	16	3.0(*)				0.220
	9	12.5	3.0(*)				0.220
32	7.4	25	4.4	0.3	+ 0.6 0	1.3	0.390
	9	20	3.6		+ 0.5 0		0.326
	11	16	3.0(*)		+ 0.4 0		0.280
	11	12.5	3.0(*)				0.280
	11	10	3.0(*)				0.280
40	7.4	25	5.5	0.4	+ 0.7 0	1.4	0.610
	9	20	4.5		+ 0.6 0		0.510
	11	16	3.7		+ 0.5 0		0.431
	13.6	12.5	3.0				0.365
	13.6	10	3.0(*)				0.365
50	7.4	25	6.9	0.4	+ 0.8 0	1.4	0.948
	9	20	5.6		+ 0.7 0		0.790
	11	16	4.6		+ 0.6 0		0.670
	13.6	12.5	3.7		+ 0.5 0		0.555
	17	10	3.0		+ 0.4 0		0.462

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PE 100 and PE 100-RC PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
63	7.4	25	8.6	0.4	+ 1.0 0	1.5	1.500
	9	20	7.1		+ 0.9 0		1.260
	11	16	5.8		+ 0.7 0		1.060
	13.6	12.5	4.7		+ 0.6 0		0.885
	17	10	3.8		+ 0.5 0		0.730
75	7.4	25	10.3	0.5	+ 1.2 0	1.6	2.120
	9	20	8.4		+ 1.0 0		1.770
	11	16	6.8		+ 0.8 0		1.480
	13.6	12.5	5.6		+ 0.7 0		1.250
	17	10	4.5		+ 0.6 0		1.040
90	7.4	25	12.3	0.6	+ 1.4 0	1.8	3.040
	9	20	10.1		+ 1.2 0		2.570
	11	16	8.2		+ 1.0 0		2.150
	13.6	12.5	6.7		+ 0.8 0		1.770
	17	10	5.4		+ 0.7 0		1.470
110	7.4	25	15.1	0.7	+ 1.7 0	2.2	4.550
	9	20	12.3		+ 1.4 0		3.820
	11	16	10.0		+ 1.1 0		3.190
	13.6	12.5	8.1		+ 1.0 0		2.650
	17	10	6.6		+ 0.8 0		2.190
125	7.4	25	17.1	0.8	+ 1.9 0	2.5	5.830
	9	20	14.0		+ 1.6 0		4.940
	11	16	11.4		+ 1.3 0		4.130
	13.6	12.5	9.2		+ 1.1 0		3.410
	17	10	7.4		+ 0.9 0		2.790

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PE 100 and PE 100-RC PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
140	7.4	25	19.2	0.9	+ 2.1 0	2.8	7.350
	9	20	15.7		+ 1.7 0		6.200
	11	16	12.7		+ 1.4 0		5.150
	13.6	12.5	10.3		+ 1.2 0		4.270
	17	10	8.3		+ 1.0 0		3.500
160	7.4	25	21.9	1.0	+ 2.3 0	3.2	9.580
	9	20	17.9		+ 1.9 0		8.070
	11	16	14.6		+ 1.6 0		6.750
	13.6	12.5	11.8		+ 1.3 0		5.600
	17	10	9.5		+ 1.1 0		4.570
180	7.4	25	24.6	1.1	+ 2.6 0	3.6	12.100
	9	20	20.1		+ 2.2 0		10.200
	11	16	16.4		+ 1.8 0		8.550
	13.6	12.5	13.3		+ 1.5 0		7.100
	17	10	10.7		+ 1.2 0		5.800
200	7.4	25	27.4	1.2	+ 2.9 0	4.0	15.000
	9	20	22.4		+ 2.4 0		12.650
	11	16	18.2		+ 2.0 0		10.600
	13.6	12.5	14.7		+ 1.6 0		8.700
	17	10	11.9		+ 1.3 0		7.150
225	7.4	25	30.8	1.4	+ 3.2 0	4.5	18.950
	9	20	25.2		+ 2.7 0		16.000
	11	16	20.5		+ 2.2 0		13.300
	13.6	12.5	16.6		+ 1.8 0		11.000
	17	10	13.4		+ 1.5 0		9.050

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PE 100 and PE 100-RC PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
250	7.4	25	34.2	1.5	+ 3.6 0	5.0	23.400
	9	20	27.9		+ 2.9 0		19.650
	11	16	22.7		+ 2.4 0		16.400
	13.6	12.5	18.4		+ 2.0 0		13.600
	17	10	14.8		+ 1.6 0		11.100
280	7.4	25	38.3	1.7	+ 4.0 0	9.8	29.300
	9	20	31.3		+ 3.3 0		24.700
	11	16	25.4		+ 2.7 0		20.600
	13.6	12.5	20.6		+ 2.2 0		17.000
	17	10	16.6		+ 1.8 0		14.000
315	7.4	25	43.1	1.9	+ 4.5 0	11.1	37.100
	9	20	35.2		+ 3.7 0		31.200
	11	16	28.6		+ 3.0 0		26.000
	13.6	12.5	23.2		+ 2.5 0		21.600
	17	10	18.7		+ 2.0 0		17.700
355	7.4	25	48.5	2.2	+ 5.0 0	12.5	47.000
	9	20	39.7		+ 4.1 0		39.700
	11	16	32.2		+ 3.4 0		33.000
	13.6	12.5	26.1		+ 2.8 0		27.300
	17	10	21.1		+ 2.3 0		22.500
400	7.4	25	54.7	2.4	+ 5.6 0	14.0	59.700
	9	20	44.7		+ 4.6 0		50.300
	11	16	36.3		+ 3.8 0		42.000
	13.6	12.5	29.4		+ 3.1 0		34.600
	17	10	23.7		+ 2.5 0		28.400

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PE 100 and PE 100-RC PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
450	7.4	25	61.5	2.7	+ 6.3 0	15.6	75.600
	9	20	50.3		+ 5.2 0		63.700
	11	16	40.9		+ 4.2 0		53.100
	13.6	12.5	33.1		+ 3.5 0		43.900
	17	10	26.7		+ 2.8 0		35.900
500	9	20	55.8	3.0	+ 5.7 0	17.5	78.500
	11	16	45.4		+ 4.7 0		65.500
	13.6	12.5	36.8		+ 3.8 0		54.500
	17	10	29.7		+ 3.1 0		44.500
560	11	16	50.8	3.4	+ 5.2 0	19.6	82.500
	13.6	12.5	41.2		+ 4.3 0		68.000
	17	10	33.2		+ 3.5 0		55.500
630	11	16	57.2	3.8	+ 5.9 0	22.1	104.000
	13.6	12.5	46.3		+ 4.8 0		86.000
	17	10	37.4		+ 3.9 0		70.500
710	13.6	12.5	52.2	6.4	+ 5.4 0	-	109.000
	17	10	42.1		+ 4.4 0		89.000
800	13.6	12.5	58.8	7.2	+ 6.0 0	-	139.000
	17	10	47.4		+ 4.9 0		113.000
900	17	10	53.3	8.1	+ 5.5 0	-	144.000
1000	17	10	59.3	9.0	+ 6.1 0	-	177.000

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PIPE DIMENSIONS - GROUP 4 INDUSTRY, NON-DRINKING WATER AND PRESSURISED SEWERAGE (continued)

PRESSURE SERIES - PE 80 PIPES

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e) (3) (mm)	Tolerance in relation to nominal values (mm)		Maximum absolute ovalisation (mm) (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	on thickness		
20	9	16	3.0	+ 0.3 0	+ 0.4 0	1.2	0.162
25	9	16	3.0	+ 0.3 0	+ 0.4 0	1.2	0.210
32	13.6	10	3.0	+ 0.3 0	+ 0.4 0	1.3	0.277
	9	16	3.6		+ 0.5 0		0.326
40	13.6	10	3.0	+ 0.4 0	+ 0.5 0	1.4	0.361
	9	16	4.5		+ 0.6 0		0.510
50	13.6	10	3.7	+ 0.4 0	+ 0.5 0	1.4	0.550
	9	16	5.6		+ 0.7 0		0.790
63	13.6	10	4.7	+ 0.4 0	+ 0.6 0	1.5	0.870
	9	16	7.1		+ 0.9 0		1.260
75	13.6	10	5.6	+ 0.5 0	+ 0.7 0	1.6	1.220
	9	16	8.4		+ 1.0 0		1.770
90	13.6	10	6.7	+ 0.6 0	+ 0.8 0	1.8	1.750
110	13.6	10	8.1	+ 0.7 0	+ 1.0 0	2.2	2.620
125	13.6	10	9.2	+ 0.8 0	+ 1.1 0	2.5	3.370
140	13.6	10	10.3	+ 0.9 0	+ 1.2 0	2.8	4.240
160	13.6	10	11.8	+ 1.0 0	+ 1.3 0	3.2	5.550

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PIPE DIMENSIONS - GROUP 4 INDUSTRY, NON-DRINKING WATER AND PRESSURISED SEWERAGE

LOW PRESSURE SERIES - PE 100 PIPES

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e) (3) (mm)	Tolerance in relation to nominal values (mm)		Maximum absolute ovalisation (mm) (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	on thickness		
180	26	6	6.9	+ 1.1 0	+ 0.8 0	3.6	3.820
200	26	6	7.7	+ 1.2 0	+0.9 0	4.0	4.740
225	26	6	8.6	+ 1.4 0	+ 1.0 0	4.5	5.950
250	26	6	9.6	+ 1.5 0	+ 1.1 0	5.0	7.400
280	26	6	10.7	+ 1.7 0	+ 1.2 0	9.8	9.200
315	26	6	12.1	+ 1.9 0	+ 1.4 0	11.1	11.800
355	26	6	13.6	+ 2.2 0	+ 1.5 0	12.5	14.800
400	26	6	15.3	+ 2.4 0	+ 1.7 0	14.0	18.800
450	26	6	17.2	+ 2.7 0	+ 1.9 0	15.6	23.800
500	26	6	19.1	+ 3.0 0	+ 2.1 0	17.5	29.300
560	26	6	21.4	+ 3.4 0	+ 2.3 0	19.6	36.700
630	26	6	24.1	+ 3.8 0	+ 2.6 0	22.1	46.500
710	26	6	27.4	+ 4.0 0	+ 2.9 0	-	59.500
800	26	6	30.6	+ 4.0 0	+ 3.2 0	-	75.000

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PIPE DIMENSIONS - GROUP 4 INDUSTRY, NON-DRINKING WATER AND PRESSURISED SEWERAGE (continued)

LOW PRESSURE SERIES - PE 80 PIPES

Nominal outside diameter ND (1) (mm)	S.D.R(2)	Nominal pressure (bar)	Nominal thickness (e) (3) (mm)	Tolerance in relation to nominal values (mm)		Maximum absolute ovalisation (mm) (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	on thickness		
110	21	6	5.3	+ 0.7 0	+ 0.7 0	2.2	1.780
125	21	6	6.0	+ 0.8 0	+ 0.7 0	2.5	2.270
140	21	6	6.7	+ 0.9 0	+ 0.8 0	2.8	2.850
160	21	6	7.7	+ 1.0 0	+ 0.9 0	3.2	3.730
180	21	6	8.6	+ 1.1 0	+ 1.0 0	3.6	4.690
200	21	6	9.6	+ 1.2 0	+ 1.1 0	4.0	5.800
225	21	6	10.8	+ 1.4 0	+ 1.2 0	4.5	7.350
250	21	6	11.9	+ 1.5 0	+ 1.3 0	5.0	9.000
280	21	6	13.4	+ 1.7 0	+ 1.5 0	9.8	11.400
315	21	6	15.0	+ 1.9 0	+ 1.6 0	11.1	14.300
355	21	6	16.9	+ 2.2 0	+ 1.8 0	12.5	18.100
400	21	6	19.1	+ 2.4 0	+ 2.1 0	14.0	23.100
450	21	6	21.5	+ 2.7 0	+ 2.3 0	15.6	29.200
500	21	6	23.9	+ 3.0 0	+ 2.5 0	17.5	36.000
560	21	6	26.7	+ 3.4 0	+ 2.8 0	19.6	45.000
630	21	6	30.0	+ 3.8 0	+ 3.1 0	22.1	57.000
710	21	6	33.9	+ 4.0 0	+ 3.5 0	-	72.500
800	21	6	38.1	+ 4.0 0	+ 4.0 0	-	92.000

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

TABLE VI - SPECIFICATIONS FOR PIPES

GROUP 5 - APPLICATION IN CONTAINMENT OF ELECTRIC POWER TRANSMISSION

Characteristics and test methods (1)		PE 100	PE 100-HT	PE 100-RC (type 1)
Appearance		(2)		
Dimensions		tables on following pages		
Melt-flow index at 190°C - 5 kg (g/10 min.) (NF EN ISO 1133-1)		producer reference value ± 30%		
Dispersion of carbon black (ISO 18553 + § 2.1.2.)		score ≤ 3		
Oxidation stability at 210°C (NF EN ISO 11357-6) + § 2.1.2.		t ≥ 10 min	t ≥ 15 min	t ≥ 10 min
Heat shrinkage (NF EN ISO 2505 + § 2.1.2.)		≤ 3% appearance preserved		
Tensile strength (ISO 6259-1-3 + § 2.1.2.)	yield strength	≥ 19 MPa manufacturer value ± 10%		
	elongation at break (%)	≥ 350 %		
Resistance to hydraulic pressure (NF EN ISO 1167-1 and 1167-2 + § 2.1.2.)	20°C	≥ 100 h 12.0 MPa		
	80°C	≥ 165 h 5.4 MPa		
		≥ 1000 h 5.0 MPa		
Resistance to slow crack growth pipe e > 5 mm: notch test at 80°c (NF EN ISO 13479)		≥ 500 h Test pressures defined in the NF EN ISO 13479 standard, appendix B, based on the SDRs		
Thermal durability at 110 ° c (NF EN ISO 21003-2) Δ elongation at tensile break (NF EN ISO 527-2) after 18 months Or High Pressure Autoclave Test (HPAT) (EN ISO 13438 method C, NF EN ISO 6259 and §2.1.2.13) - Oxidation under oxygen pressure + § 2.1.2.)			≥ 25% of elongation after exposure (as experimental) Lifetime > 50 years at 70°C	
Resistance to rapid crack growth: Test S4 (NF EN ISO 13477): critical pressure (Pcs4) at 0°C		Pc ≥ 10 bar (according NF EN 12201-1)		
Resistance to slow crack propagation Strain-hardening test (SHT) for pipes in size group d n < 75 mm (ISO 18488 + § 2.1.2.)				< Gp > ≥ 50,0 MPa

(1) The versions of the standards cited are those which are current on the date of review of these rules (see update page), unless otherwise stated by the LNE.
(2) The pipes shall have clean and smooth outside and inner surfaces and shall be free from defects which may be detrimental to their quality (e.g. scratches, pits, bubbles, grains, cracks and pores).

GROUP 5 - APPLICATION IN CONTAINMENT OF ELECTRIC POWER TRANSMISSION (CONTINUED)

Characteristics and test methods (1)	PE 100	PE 100-HT	PE 100-RC (type 1)
Resistance to slow crack propagation Accelerated notched pipe test (ANPT) for tubes in size group 75 ≤ d n < 250 (NF EN ISO 13479 + § 2.1.2.) On 110 mm SDR 11 pipe			≥ 300 h - 80°C - 9,2 bar
Resistance to slow crack propagation Cracked round bar test (CRB) (ISO 18489 + § 2.1.2.) for pipes of size group 250 ≤ d n < 710 or 710 ≤ d n ≤ 1000 over an interpolated stress range (Δσ0) of 12.5 Mpa Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm			≥ 1,5 × 10^6 cycles

(1) The versions of the standards cited are those which are current on the date of review of these rules (see update page), unless otherwise stated by the LNE.
(2) The pipes shall have clean and smooth outside and inner surfaces and shall be free from defects which may be detrimental to their quality (e.g. scratches, pits, bubbles, grains, cracks and pores).

PIPE DIMENSIONS – GROUP 5 CONTAINMENT OF ELECTRIC POWER TRANSMISSION

PE 100, PE 100-RC and PE 100-HT PIPES

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
40	11	16	3.7	0.4	+ 0.5 0	1.4	0.431
50	11	16	4.6	0.4	+ 0.6 0	1.4	0.670
63	11	16	5.8	0.4	+ 0.7 0	1.5	1.060
75	11	16	6.8	0.5	+ 0.8 0	1.6	1.480
	13.6	12.5	5.6		+ 0.7 0		1.250
90	7.4	25	12.3	0.6	+ 1.4 0	1.8	3.040
	9	20	10.1		+ 1.2 0		2.570
	11	16	8.2		+ 1.0 0		2.150
	13.6	12.5	6.7		+ 0.8 0		1.770
	17	10	5.4		+ 0.7 0		1.470
	21	8	4.3		+ 0.6 0		1.180
	26	6	3.5		+ 0.5 0		0.970
110	7.4	25	15.1	0.7	+ 1.7 0	2.2	4.550
	9	20	12.3		+ 1.4 0		3.820
	11	16	10.0		+ 1.1 0		3.190
	13.6	12.5	8.1		+ 1.0 0		2.650
	17	10	6.6		+ 0.8 0		2.190
	21	8	5.3		+ 0.7 0		1.780
	26	6	4.2		+ 0.6 0		1.430
125	7.4	25	17.1	0.8	+ 1.9 0	2.5	5.830
	9	20	14.0		+ 1.6 0		4.940
	11	16	11.4		+ 1.3 0		4.130
	13.6	12.5	9.2		+ 1.1 0		3.410
	17	10	7.4		+ 0.9 0		2.790
	21	8	6.0		+ 0.7 0		2.270
	26	6	4.8		+ 0.6 0		1.840

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅min)

PE 100, PE 100-RC and PE100-HT PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
140	7.4	25	19.2	0.9	+ 2.1 0	2.8	7.350
	9	20	15.7		+ 1.7 0		6.200
	11	16	12.7		+ 1.4 0		5.150
	13.6	12.5	10.3		+ 1.2 0		4.270
	17	10	8.3		+ 1.0 0		3.500
	21	8	6.7		+ 0.8 0		2.840
	26	6	5.4		+ 0.7 0		2.330
160	7.4	25	21.9	1.0	+ 2.3 0	3.2	9.580
	9	20	17.9		+ 1.9 0		8.070
	11	16	14.6		+ 1.6 0		6.750
	13.6	12.5	11.8		+ 1.3 0		5.600
	17	10	9.5		+ 1.1 0		4.570
	21	8	7.7		+ 0.9 0		3.730
	26	6	6.2		+ 0.8 0		3.050
180	7.4	25	24.6	1.1	+ 2.6 0	3.6	12.100
	9	20	20.1		+ 2.2 0		10.200
	11	16	16.4		+ 1.8 0		8.550
	13.6	12.5	13.3		+ 1.5 0		7.100
	17	10	10.7		+ 1.2 0		5.800
	21	8	8.6		+ 1.0 0		4.690
	26	6	6.9		+ 0.8 0		3.820
200	7.4	25	27.4	1.2	+ 2.9 0	4.0	15.000
	9	20	22.4		+ 2.4 0		12.650
	11	16	18.2		+ 2.0 0		10.600
	13.6	12.5	14.7		+ 1.6 0		8.700
	17	10	11.9		+ 1.3 0		7.150
	21	8	9.6		+ 1.1 0		5.810
	26	6	7.7		+ 0.9 0		4.740

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e (3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PE 100, PE 100-RC and PE 100-HT PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
225	7.4	25	30.8	1.4	+ 3.2 0	4.5	18.950
	9	20	25.2		+ 2.7 0		16.000
	11	16	20.5		+ 2.2 0		13.300
	13.6	12.5	16.6		+ 1.8 0		11.000
	17	10	13.4		+ 1.5 0		9.050
	21	8	10.8		+ 1.2 0		7.340
	26	6	8.6		+ 1.0 0		5.950
250	7.4	25	34.2	1.5	+ 3.6 0	5.0	23.400
	9	20	27.9		+ 2.9 0		19.650
	11	16	22.7		+ 2.4 0		16.400
	13.6	12.5	18.4		+ 2.0 0		13.600
	17	10	14.8		+ 1.6 0		11.100
	21	8	11.9		+ 1.3 0		8.980
	26	6	9.6		+ 1.1 0		7.400
280	7.4	25	38.3	1.7	+ 4.0 0	9.8	29.300
	9	20	31.3		+ 3.3 0		24.700
	11	16	25.4		+ 2.7 0		20.600
	13.6	12.5	20.6		+ 2.2 0		17.000
	17	10	16.6		+ 1.8 0		14.000
	21	8	13.4		+ 1.5 0		11.330
	26	6	10.7		+ 1.2 0		9.200
315	9	20	35.2	1.9	+ 3.7 0	11.1	31.200
	11	16	28.6		+ 3.0 0		26.000
	13.6	12.5	23.2		+ 2.5 0		21.600
	17	10	18,7		+ 2,0 0		17,700

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

PE 100, PE 100-RC and PE 100-HT PIPES (continued)

Nominal outside diameter ND (1) (mm)	S.D.R (2)	Nominal pressure (bar)	Nominal thickness (e)(3) (mm)	Tolerances in relation to nominal values (mm)		Maximum absolute ovalisation (4) on straight pipes	Mass per metre (kg/m)
				on average outside diameter	On thickness		
355	9	20	39.7	2.2	+ 4.1 0	12.5	39.700
	11	16	32.2		+ 3.4 0		33.000
	13.6	12.5	26.1		+ 2.8 0		27.300
	17	10	21,1		+ 2,3 0		22,500
400	9	20	44.7	2.4	+ 4.6 0	14.0	50.300
	11	16	36.3		+ 3.8 0		42.000
	13.6	12.5	29.4		+ 3.1 0		34.600
	17	10	23,7		+ 2,5 0		28,400
450	9	20	50.3	2.7	+ 5.2 0	15.6	63.700
	11	16	40.9		+ 4.2 0		53.100
	13.6	12.5	33.1		+ 3.5 0		43.900
	17	10	26.7		+ 2,8 0		35.900
500	9	20	55.8	3.0	+ 5.7 0	17.5	78.500
	11	16	45.4		+ 4.7 0		65.500
	13.6	12.5	36.8		+ 3.8 0		54.500
	17	10	29,7		+ 3,1 0		44,000
560	11	16	50.8	3.4	+ 5.2 0	19.6	82.500
	13.6	12.5	41.2		+ 4.3 0		68.000
	17	10	33,2		+ 3,5 0		55,500
630	11	16	57.2	3.8	+ 5.9 0	22.1	104.000
	13.6	12.5	46.3		+ 4.8 0		86.000
	17	10	37,4		+ 3,9 0		70,500
710	13.6	12.5	52.2	6.4	+ 5.4 0	-	109.000
800	13.6	12.5	58.8	7.2	+ 6.0 0	-	139.000

(1) Represents the minimum average outside diameter, expressed in millimetres
(2) S.D.R. = Standard Dimension Ratio = ND/e
(3) Represents the minimum thickness, expressed in millimetres
(4) Values obtained at the manufacturing site (absolute value defined by ∅ max - ∅ min)

2.1.2. ADDITIONAL TEST METHODS

2.1.2.1. Density

The results are given using the average of 3 measurements.

2.1.2.2. Dispersion of carbon black

Tests carried out in accordance with ISO 18553 with the following specifications:

Preparation of test specimens by compression or microtome: in the event of non-conforming result by compression, the microtome method is the reference method.

The scorecard in ISO 18 553 Appendix A is completed for scores above 7 by the following table:

Scores	Dimensions (µm)									
	111 to 120	121 to 130	131 to 140	141 to 150	151 to 160	161 to 170	171 to 180	181 to 190	191 to 200	201 to 210
	Maximum number of particles and masses									
7,5	12	6	3	1						
8		12	6	3	1					
8.5			12	6	3	1				
9				12	6	3	1			
9.5					12	6	3	1		
10						12	6	3	1	
10.5							12	6	3	1
11								12	6	3
11.5									12	6

If the test results do not comply, 30 determining measurements are taken.
The decision on whether or not the test results comply is determined by the average of these 30 measurements, with no individual value permitted to be higher than 4.5.
In the event of a mass with a dimension exceeding 210 µm, the score recorded is 11.5 and the test is declared non-compliant (no average).

2.1.2.3. Carbon black content

Tests carried out to ISO 6964 using one of the A, B1/B2 or C methods.

The necessary precautions for particles evacuation during testing must be in place.

However, another test method is accepted, subject to correlation with the reference standard.

A minimum nitrogen flow rate of 30 l / hour is recommended to prevent reflux of gases and particles.

2.1.2.4. Oxidation stability

For the pipes, the test is conducted in accordance with NF EN ISO 11357-6, at 210 ° C, on 3 specimens (inner wall, middle and outer wall). It is accepted that the test is carried out at 200°C. In this case the specification is :
$t \geq 20$ min for group 1, 2, 3, 4 and 5 pipes in PE80 and PE100
$t \geq 30$ min for group 5 pipes in PE100-HT.

For the compositions, the test is conducted in accordance with NF EN ISO 11357-6 at 210°C on 3 specimens prepared using a plate for type tests, or on 1 specimen for batch release tests.
It is accepted that the test is carried out at 200°C. In this case the specification is :
t $\geq$ 40 min for group 1, 2, 3, 4 and 5 compositions in PE80 and PE100
t $\geq$ 60 min for group 5 compositions in PE100-HT

Specimens can be prepared en masse (parallel, flat and burr-free faces) on condition of proven correlation between the required thickness of 650±100 µm and the density of the PE types for a known and constant specimen diameter.

2.1.2.5. Tensile strength:

Tests performed in accordance with NF EN ISO 6259-1 with the following specifications:

- Samples:
. Form defined in ISO 6259-3 type 2 or NF EN ISO 527-3: type 5
. Number: 3 for pipes of diameter ≤ 63 mm; 5 for pipes of diameter ≥ 75 mm
. Specimen cutting: using a cutting-punch (or via machining, the latter method being used in the event of litigation about a result or for thicknesses > 10 mm).
. Section measurement:
For thicknesses, it is recommended to use a screw-type micrometer with one hemispherical and one flat key or two hemispherical keys.
For widths, it is recommended to use a screw-type micrometer with two flat cylindrical keys with a diameter of 2 mm or two hemispherical keys if the cutting method results in a more rounded appearance towards the inside.

Test speed:
. 100 mm/min ± 10 mm/min for specimens of thickness < 13 mm
. 25 mm/min ± 2.5 mm/min for specimens of thickness ≥ 13 mm

Note: a speed of 100 mm/min is permitted in all cases. However, in the event of non-compliant results, a new test must be conducted at a speed of 25 mm/min ± 2.5 mm/min, for thicknesses ≥ 13 mm.

- Measuring of elongation:
. An appropriate device shall be used to determine the length between marks on the tubes at any time during the test (e.g. extensometer).

2.1.2.6. Retraction:

Test in accordance with NF EN ISO 2505 with the following specifications:

Method by immersion in a liquid or in air
Exposure time:
- method by immersion in a liquid: 30 min irrespective of thickness
- method in air: 60 min irrespective of thickness

2.1.2.7. Determination of organoleptic properties

Tests conducted in accordance with NF T 54-951:
However, another test method is accepted subject to correlation with the reference standard.

It is permissible to enter a codification other than SF in the analysis certificate of the composition in the event of computer incompatibility.

Tasting jury

The tasting jury must consist of an odd number of people (at least 5), selected based on NF ISO 3972 or another correlated method and trained in this type of assessment.
This jury must be re-evaluated at a set frequency.

For a correlated test method allowing fewer than 5 tasters or if it is difficult to gather the resources available for the test, the number of tasters may be reduced to 3.
In the event of litigation about the result with 3 tasters, the test must be repeated with 5 tasters.

2.1.2.8. Resistance to slow crack growth (cone test)

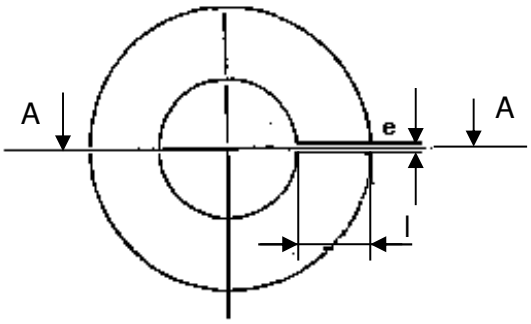
The test is conducted on a specimen (for a non-compliant result, a counter-test on 3 specimens is required, all specimens must be conform) in accordance with ISO 13480 with the following specifications or supplements:

- Surfactant medium:

Teepol is used as a surfactant liquid (brand name TEEPOL only) at a concentration of 5% by weight.

- Dimensions of the cones

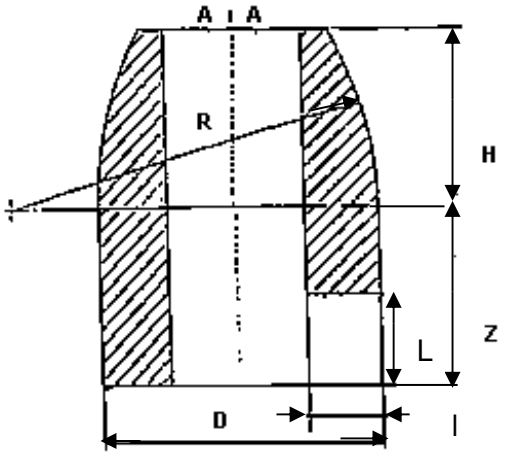
H = D for pipes of ND ≤ 40 mm and = D/2 for pipes of NdD >40 mm
Z = Length of the calibrated area = 100 mm ± 1 mm



Dimensions of the longitudinal groove

. length	L = 15 mm ± 3 mm
. width	e = 2 mm ± 1 mm
. depth	l = thickness of the ferrule wall

(“through" cut to ensure the passage of the cutting device blade for all pipe thicknesses)



Specimens

Length of pipe sections:

. 150 mm ± 5 mm for a pipe with nominal outside diameter ND ≤ 40 mm
. 180 mm ± 5 mm for a pipe with nominal outside diameter 40 < ND ≤ 75 mm
. 200 mm ± 5 mm for a pipe with nominal outside diameter 75 < ND ≤ 200 mm

Operating procedure
Repeat the operation until three successive non-zero values (A_i - A_o) are not obtained

If this condition has not been met after 168 hours (7 days),

The number of specific cones to the following PE 100-RC ≤ 200 mm pipe types must be available as a minimum:
Group 1 pipes: SDR 11 (20 to 160 mm) and SDR 17.6 (200 mm).
Group 2 pipes: SDR 11 (20 to 200 mm). Tests on pipes from other SDR may be carried out at the discretion of the applicant/holder, in order to increase the representativeness of the tests.

2.1.2.9. Resistance to slow crack growth (notch pipe test)

The test is conducted on a specimen (in the event of a non-compliant result, a counter-test on 3 specimens is required, all specimens must be conform) in accordance with NF EN ISO 13479 with the following supplements for tests conducted to inspect the compositions: the pipes tested are as follows: diameters 110 - 125 or 160 mm SDR 11.

2.1.2.10. Hydraulic pressure tests

Each pressure test is conducted on a specimen in accordance with NF EN ISO 1167-1 and 1167-2 with the following specifications:

. Cap: type A or B. However, in the event of non-compliant results with Type B caps, a new test with type A caps (reference method) must be conducted.

. Test in water at 20°C or 80°C at $^{+3}_{-1}$ °C:

. Positioning of the specimens (vertical or horizontal): to be specified by the manufacturer in their operating procedure

2.1.2.11. Dimensional inspection

The dimensional measuring instruments must meet the requirements of NF EN ISO 3126, § 4.2.

Thickness inspection
Measured in accordance with NF EN 3126, §5.2.1 and §5.2.2.

Inspection of average outside diameter
Measured on the pipe in accordance with NF EN ISO 3126, §5.3.1 and §5.3.3.

Inspection of ovalisation (false roundness)
Measured on the pipe in accordance with NF EN ISO 3126, §5.4.

Inspection of length (only on right bar)
Measured on the pipe in accordance with NF EN ISO 3126, §5.5.

2.1.2.12 Resistance to chlorinated disinfectants

This test is carried out only for Group 2 PE 100-RD compositions claiming improved resistance to chlorinated disinfectants (ClO2).
The test involves passing an aqueous chlorine dioxide solution with a concentration of 1 ppm ± 0.05 ppm through a pipe at a pressure of 6 bar ± 0.1 bar and a temperature of 40 ± 1°C. The pipe should be installed in a semi-open loop with a flow rate of 200 l/h ± 20 l/h. The water should be changed every 4 hours.

Detailed test specifications :

- Pipe dimension: Ø 25 mm x 2.3 mm (preferred) or Ø 32 mm x 3 mm

- Temperature: 40 ± 1°C
- Pressure: 6 ± 0.1 bar,
- ClO2] = 1 ± 0.05 mg/L
- Flow rate: 200 ± 20 L/h,
- Water alkalinity: 160 mg/L CaCO3
- pH = 7.2 ± 0.05,
- Dechlorinated water supply
- Water changed every 4 hours
- **Minimum test duration: 18 months**

For PE 80, PE 100 and PE 100-RD pipes, the number of ferrules available must cover all types with thickness e ≤ 5 mm.

2.1.2.13. Resistance to slow crack propagation - Strain Hardening Test (SHT)

The test carried out in accordance with ISO18488 applies to :

- PE 100-RC compositions,
- PE 100-RC pipes with d n < 75 mm (dimension group 1 as defined in CEN/TS 1555-7 and CEN/TS 12201-7),

Test parameters in accordance with NF EN 1555-1 / NF EN 1555-2 and NF EN 12201-1 / NF EN 12201-2 are as follows:

- Test temperature: 80°c
- Thickness: 300µm
- Number of specimens: 5
  - from a compression-molded plate for the compositions,
  - from regrind pipes for type 1 and 3 pipes, as well as for type 2 pipes when the layer thickness is < 1 mm (mixing of layers).
  - from regrind pipes from each layer for type 2 pipes when the layer thickness is ≥ 1 mm.

2.1.2.14. Resistance to slow crack propagation - Cracked Round Bar test (CRB)

The test carried out in accordance with ISO18489 applies to :

- PE 100-RC compositions,
- PE 100-RC pipes 250 ≤ d n < 710 or 710 ≤ d n < 1000 mm (size groups 3 or 4 as defined in CEN/TS 1555-7 and CEN/TS 12201-7),

Test parameters in accordance with NF EN 1555-1 / NF EN 1555-2 and NF EN 12201-1 / NF EN 12201-2 are as follows:

- Test temperature: 23°c
- Test specimen diameter: 14 mm
- Reference stress level: 12.5 MPa
- Waveform/frequency: Sinusoidal/10 Hz
- Number of test specimens: 4
  - from compression-molded plate for compositions,
  - from tubes > 16 mm thick,
  - Value to be converted and normalized to 14 mm diameter and initial crack length of 1.40 mm

The initial crack length must comply with the test standard (a_{ini}* = 1.5 mm) over an interpolated stress range Δσ = 12.5 MPa
The final result should be reported as the converted value for a 14 mm diameter specimen with an initial crack length of 1.40 mm (via Appendix A of the test standard) for the target stress of Δσ = 12.5 MPa.

The recommended stresses to be applied to frame the target stress are defined as 13.5 MPa, 12.75 MPa, 12.25 MPa and 11.5 MPa.

2.1.2.15. Resistance to slow crack propagation - Accelerated Notched Pipe Test (ANPT)

The test carried out in accordance with NF EN ISO 13479 applies to :

- PE 100-RC compositions,
- PE 100-RC pipes with 75 ≤ d n < 250 (size group 2 as defined in CEN/TS 1555-7 and CEN/TS 12201-7),

Test parameters in accordance with NF EN 1555-1 / NF EN 1555-2 and NF EN 12201-1 / NF EN 12201-2 are as follows:

- Test temperature: 80°c
- Test pressure: 9.2 bar
- Test duration: 300 h
- Environment: Water in an aqueous solution of nonylphenol ethoxylate (trade name Arkopal N100) at 2% concentration.
- Number of test specimens: 1 (in the event of non-compliant results, a counter-test on 3 specimens is required) from tube d n = 110 mm SDR11 for compositions and tubes,

Note: as Arkopal N100 detergent is not available in some markets, it will be replaced by lauramine oxide, available under the trade name Dehyton PL. Requirements for ANPT using lauramine oxide are being defined at the time of publication of this document.

2.1.2.16. Resistance to slow crack propagation - Accelerated Full Notch Creep Test (AFNCT)

The test carried out in accordance with ISO 16770 applies to PE 100-RC compositions (not applicable to pipes),

Test parameters in accordance with NF EN 1555-1 and NF EN 12201-1 are as follows:

- Test temperature: 90°c
- Environment: lauramine oxide (trade name Dehyton PL) at 2% concentration
- Test tube dimensions: 10X10 mm
- Number of test specimens: 4,
- Crack depth: 1.6 mm
- Interpolated reference tensile stress: 4 MPa for 550h test duration (note: recommended stress levels 3.7 - 3.9 - 4.2 - 4.5 MPa) or 5 MPa for 300h test duration (note: recommended stress levels 4.7 - 4.9 - 5.2 - 5.5 MPa)
- Brittle failure mode
- Tests on specimens at a reference tensile stress ≥ 4 MPa (or ≥ 5 MPa) can be stopped once the minimum failure duration of 550 h (or 300 h) has been reached, in which case there is no failure mode. Tests on specimens at a reference tensile stress < 4 MPa (or < 5 MPa) can be stopped once the interpolated failure time of 550 h (or 300 h) has been reached, taking into account any scatter in the actual tensile stress.

2.1.2.17 High Pressure Autoclave Test (HPAT)

This accelerated thermo-oxidative aging test consists of exposing polyethylene specimens to different levels of oxygen pressure in the aqueous phase, and to different levels of pressure, in order to estimate its service life when exposed to continuous high temperature at atmospheric pressure.

The aging methodology is to be carried out in accordance with EN ISO 13438:2005, method C.

Aging is to be carried out using specimens prepared in accordance with NF EN ISO 6259-3, type 2. These specimens are exposed to different pressure levels (between 10 and 51 bar) and temperature levels (between 85° and 95°C) in a high-pressure autoclave (Figure 1).

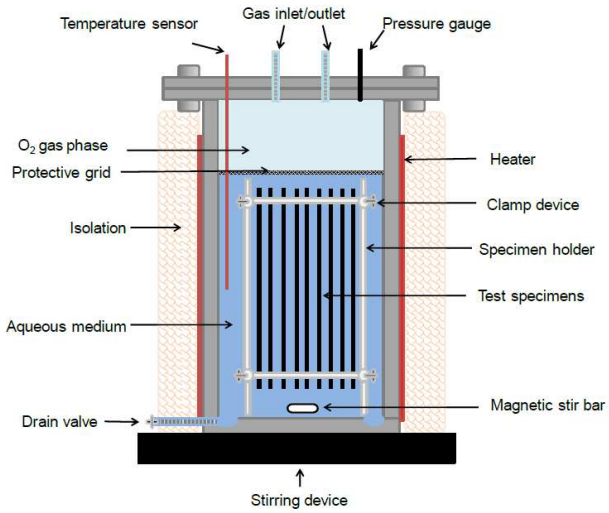


Figure 1: Equipment diagram

A tensile test in accordance with NF EN ISO 6259 at a speed of 100 mm/min must be carried out before and after each aging. The elongation value after ageing must not be less than 50% of the value before ageing.

To establish the curves needed to extrapolate service life, an initial series of tests is carried out at constant pressure and varying temperature. The results are used to draw up an initial temperature/time graph (figure 2).

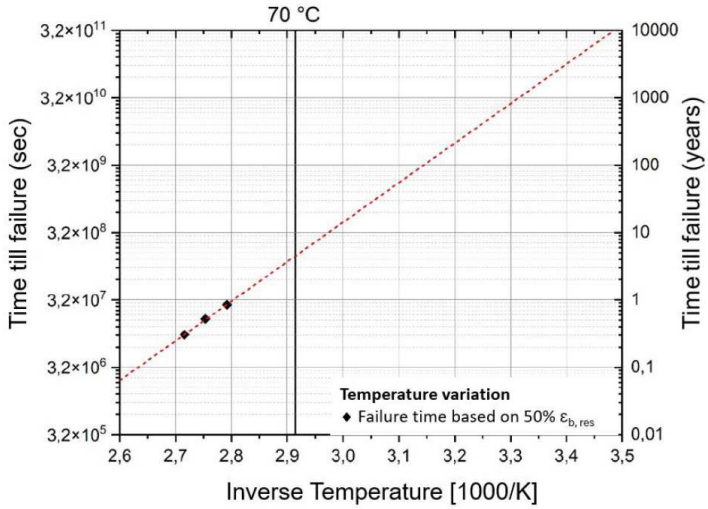


Figure 2: Temperature/time relationship at a constant pressure of 51 bar

A second series of tests is then carried out at a fixed temperature, this time varying the oxygen pressure.
Nb: The amount of dissolved oxygen in the medium, which depends directly on oxygen pressure at a given temperature, can also be used.
The results are represented in a second graph, O2 Pressure (or dissolved oxygen concentration) / Time (Figure 3).

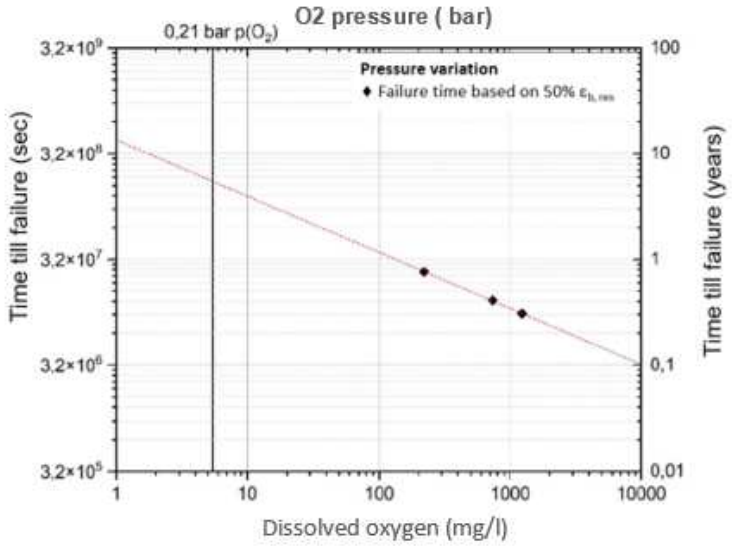


Figure 3: Oxygen pressure (or dissolved O2 conc.) / time relationship

These two graphs are then combined to obtain a 3-dimensional representation (Time / O2 Pressure / Temperature) which can be extrapolated to the desired operating conditions - figure 4.

For PE100-HT, the minimum requirement is 70°C / 50 years / 0.21 bar*.

*0.21 bar = partial pressure of oxygen in the atmosphere

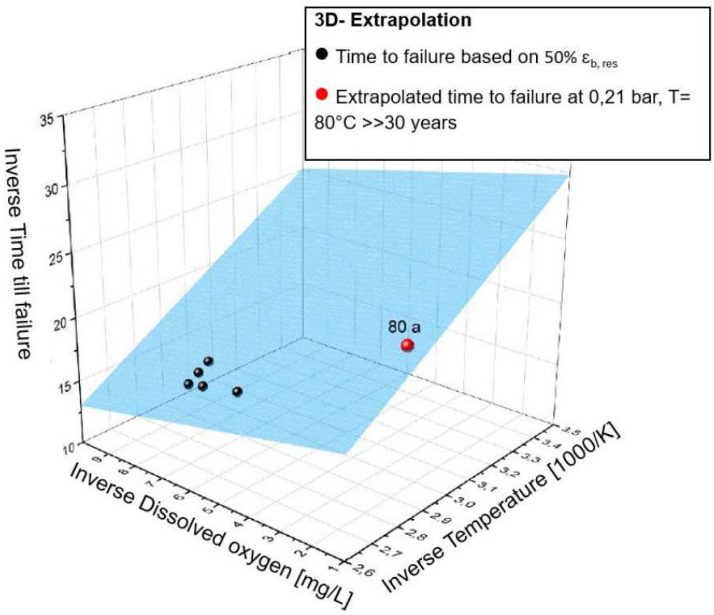


Figure 4: 3D representation and extrapolation example: here, 80°C, 0.21 bar

2.2. QUALITY MANAGEMENT SYSTEM REQUIREMENTS

2.2.1. GENERAL REQUIREMENTS

For products covered by the application of the mark, the manufacturer's quality management system must comply with the ISO 9001: 2015 standard: Quality Management Systems - Requirements, the only npn-applicability allowed regarding §8.3 of the standard (Design and development).

2.2.2. SPECIFIC QUALITY REQUIREMENTS FOR THE PRODUCTION OF COMPOSITIONS

2.2.2.1. Operational planning and control - ISO 9001, § 8.1

When planning the manufacture of the product, the manufacturer must take account of points -a, -b, -c, -d and -e of § 8.1. of the standard.

2.2.2.2. Requirements for products and service, ISO 9001, §5.1.2 and 8.2

The technical specifications or general conditions established in the framework of the contract with the extruders must include the specifications, the test methods and any correlations with reference to these rules.

Certificates of analysis must be sent to the extruders for each delivery. They must include at least the results of the density, melt-flow index, carbon black content and dispersion measurements, and the results of organoleptic properties for the composition batch delivered.
They must make it possible to define the batch's conformity with the certification rules (information about the specifications, test methods and possible correlations or reference to the general conditions).

The producer must deliver for the NF market only batches recognised as conforming to the specifications (see § 2.1.) for all groups of applications for which the composition carries the NF mark.

2.2.2.3. Identification and traceability - § 8.5.2 of standard ISO 9001

In the context of the NF Mark, batches are defined as follows for all producers:

a composition batch is a defined quantity of a specified homogeneous product, manufactured or produced under uniform and consistent conditions. The batch is defined and identified by the producer.

For the end of a batch in a silo between two truck loads, if the silo is not an exact multiple of the load trucks or of the batches repackaged in bags and if the silo is not completely emptied between two batches, it is accepted that the batch awarded on the certificate is that of the larger batch.
For example, for a 25 tonne truck filled with the remainder of batch A representing 4 tonnes and the consecutive batch B representing 21 tonnes, the certificate issued is for batch B. For a remaining batch A of 18 tonnes and a consecutive batch B of 7 tonnes, the certificate issued is for batch A.

This provision is authorised subject to controlled of traceability:

- the associated batches must have characteristics which guarantee product uniformity,
- the principle of batch association must be clearly defined in the producer's quality documentation.

2.2.2.4. Type and extent of control of externally provided processes, products and services - ISO 9001, § 8.4.2. - § 8.4.3 and 8.6

The producer must ensure the quality standard of the raw materials involved in the manufacture of products for which they hold the right to use the NF mark:

For example, defined and regular inspections on receipt and/or an analysis certificate issued by the supplier.

Tests carried out must be recorded, along with acceptance criteria, and any decisions taken in the case of non-conformance.

2.2.2.5. Release of products and services, ISO 9001, § 8.6

Quality plans must specify the frequency with which the following tests are to be carried out, and the measures taken by the producer to ensure the suitability of all compositions for use, in particular :

- choice of extrusion conditions used for regression curves,
- identification of the laboratory that conducted the pressure tests and the tests of resistance to fast and slow crack growth
- the means implemented to ensure the consistency of the characteristics of the material, the following checks in particular must at least be taken into account:
  - . verification of the constancy of the regression curves: pressure resistance tests at 20°C for 2 stress levels (3 test specimens for each stress level) chosen either on the original regression curve so that the break times are equal to 100 and 2,500 hours or for the two stress levels defined for PE80 and PE100 by the Compliance Assessment Guides CEN/TS 1555-7 and CEN/TS 12201-7; the compositions tested in this way must have higher break times.
  - . verification of resistance to rapid crack growth (S4 test)). ;
  - . verification of resistance to slow crack growth: test on cut pipes.
- In addition, for PE100-RC compositions :
  - . Strain-Hardening Test (SHT)
  - . Cracked Round Bar test (CRB)
  - . Accelerated Full Notch Creep Test (AFNCT).
  - . Accelerated Notched Pipe Test (ANPT) or alternatively (given that nonylphenol ethoxylate, Arkopal N100 detergent, is not available on some markets): verification of resistance to slow crack propagation: notched pipe test (NPT 8760 h) at least once every 3 years on 110 mm diameter pipe, SDR 11 compliant with NF EN ISO 13479 at 9.2 bar pressure level, 80°C, water-in-water, without rupture.

2.2.2.6. Resources for monitoring and measurement - ISO 9001, § 7.1.5

Requirements of the standard must be taken into account for the inspection and test equipment likely to have an influence on the tests conducted for the purpose of the NF mark.
Inspection, measurement and testing equipment must be used to ensure that the measurement uncertainty is known and compatible with the required measurement capability.

2.2.2.7. Preservation - § 8.5.4. of standard ISO 9001

The documented information (e.g. Quality plans) must specify the arrangements made to ensure that the handling, storage and delivery operations of the compositions are performed so that there is no deterioration of the compositions.

2.2.2.8. Non-conformity and corrective actions - ISO 9001, § 10.2.

Records of any complaints made regarding certified products, and their remedy must be made and kept.

2.2.3. SPECIFIC QUALITY REQUIREMENTS FOR THE MANUFACTURE OF PIPES

2.2.3.1. Operational planning and control - ISO 9001, § 8.1

When planning the manufacture of the product, the manufacturer must take account the requirements of the standard.

2.2.3.2. Identification and traceability - § 8.5.2 of standard ISO 9001

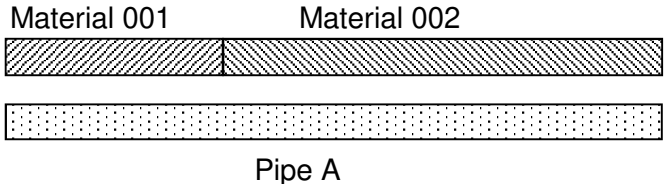
The procedures relating to identification and traceability must provide for marking in accordance with the requirements of § 2.3. below.

Where a coding system for pipe traceability is requested by users, it must meet the requirements of ISO 12176-4.

The trademarks of all types of pipes produced by a manufacturer (with and without the NF mark) must be filed with the LNE.

Within the scope of the mark, batches are defined as follows for all manufacturers: a batch of pipes is a set of pipes with the same nominal diameter, same thickness and same marking, extruded on the same machine, from the same batch of raw material.
It is accepted that for the transition of one batch of materials to another during pipe production, the batch number of the material that will be kept corresponds to that of the main batch used.

E.g.:



The batch number of material to be used for pipe batch A is 002

2.2.3.3. Type and extent of control of externally provided processes, products and services - ISO 9001, § 8.4.2. - § 8.4.3 and 8.6

The manufacturer must ensure the quality standard of the raw materials involved in the manufacture of and packaging of products for which they hold the right to use the NF mark:

Defined, regular inspections on receipt (minimum melt-flow index in accordance with the inspection plan set out in § 2.2.3.4) and an analysis certificate issued by the supplier are requested.
Tests carried out must be recorded, along with acceptance criteria, and any decisions taken in the case of non-conformance.

2.2.3.4. Release of products and services, ISO 9001, § 8.6

The inspection plan put in place must make it possible to ensure that the products comply with the specifications stipulated in § 2.1. Accordingly, the manufacturer must conduct or commission the required tests, which must be at the specified regularity; pressure tests at 20°C, pressure tests at 80°C - 165 h may be deemed “type” tests (e.g. for the implementation of new equipment, or the use of new material).

Certain tests may be outsourced, provided that this does not affect the manufacturing process (for example, due to turnaround time.)

Sub-contractors must be evaluated in accordance with the quality assurance specifications of the ISO 9001: 2015 standard. The sub-contractor may be audited by the LNE.

The maximum ovalisation rate of pipes coiled in reels or cable drums obtained at the manufacturing site must comply with the following table.

SDR	ND 20 to 63 mm	ND 75 mm	ND 90 to 160 mm
≤ 11	6 %	8 %	10 %
≥ 13.6	10 %	10 %	10 %

Example of a method for measuring the ovality of coiled pipes:

For coils with a diameter of DN20 to DN75 mm (Note: the maximum diameter may be lower depending on the case):

The ovality of a coiled pipe can be measured on the first inner coil between two hoops. The first horizontal measurement is taken by slightly spreading the pipe of the first coil, between two hoops, in order to pass the caliper gauge. The other vertical measurement is easily taken as both generatrices are accessible.

For reels or crowns with a diameter above a certain threshold, beyond which the above method is considered difficult to implement:

Ovalization on coiled pipe can be measured during production when the first coil is being wound. At this stage, the pipe is free to take horizontal and vertical measurements with the caliper.

The inspection plan must include at least the following aspects:

Tests	**Groups of applications concerned**	**Type of PE**	**Minimum frequencies**	
			Receipt inspection Raw material	**Inspection of pipes**
Appearance and marking	1-2-3-4-5	All		At the launch of each pipe campaign
Dimensions (diameter, thickness, ovalisation of straight pipe)	1-2-3-4-5	All		
Ovalisation of coiled pipe	1-2-3-4-5	All		
Melt-flow index	1-2-3-4-5	All	For each batch of material - compliance with the nominal value declared by the producer (in accordance with table I of § 2.1.1)	Once per line/material/quarter (1)
Dispersion of carbon black	1-2-3-4-5	All		Once per line/material/quarter (1)
Oxidation stability	1-2-3-4-5	All		Once per line/material/quarter (1)
Heat shrinkage	1-2-3-4-5	All		Once per line/material/quarter (1)
Tensile strength (stress + elongation)	1-2-3-4-5	All		Once per line/material/quarter (1)
Resistance to hydraulic pressure at 20°C	1-2-3-4-5	All		Type test (IT)
Resistance to hydraulic pressure at 80°C	1-2-3-4-5	All		Type test (IT)

Resistance to hydraulic pressure at 80°C	1-2-3-4-5	All		Once per line/material/quarter (1)
Organoleptic properties	2	All except PE 100-HT		Once per line/material/quarter (1)
Resistance to slow crack growth: pipe e ≤ 5 mm: cone test	1-2	All except PE 100-HT and PE 100-RC		Once per line/material/quarter (1)
Resistance to slow crack growth: pipe dn ≤ 200 mm: cone test	1 -2	PE 100-RC only		1 fois par ligne/matière/trimestre (1)
Resistance to slow crack growth: pipe e > 5 mm - notch test	1-2-4-5	All		Once per line/material/quarter (1)
Structural integrity after deformation - ring stiffness test	2	PE 100-RC type 2 only		Once per line/material/quarter (1)
Certificate of sanitary conformity	2	All except PE 100-HT		Once per year
Resistance to slow crack propagation Strain-hardening test (SHT) on pipe d n < 75 mm	1-2-3-4-5	PE 100-RC only		Once every 2 years
Resistance to slow crack propagation Accelerated notched pipe test (ANPT) for tubes on pipe 75 ≤ d n < 250 (2)	1-2-3-4-5	PE 100-RC only		Once every 2 years On 110 mm SDR11 pipe
Resistance to slow crack propagation – Cracked round bar test (CRB) on pipes 250 ≤ d n < 710 ou 710 ≤ d n < 1000	1-2-3-4-5	PE 100-RC only		Once every 2 years on one of the two size dimension groups

Note (1): if a material and/or extrusion line is not used for one calendar quarter, this frequency provision does not apply.
Note (2): as nonylphenol ethoxylate (trade name Arkopal N100) is not available in some markets, the SHT test can be used for size group 2 (tube 75 ≤ d n < 250) as an alternative test until a requirement for the use of a new detergent, lauramine oxide (trade name Dehyton PL) for the ANPT test has been defined.
Note (3): A requirement applicable to PE 100-RC also applies to PE 100-RC, which is also designated PE 100-RD.

2.2.3.5. Resources for monitoring and measurement - ISO 9001, § 7.1.5

Requirements a, b, c, d and e of the standard must be taken into account for the inspection and test equipment likely to have an influence on the tests conducted for the purpose of the NF mark.

Inspection, measurement and testing equipment must be used to ensure that the measurement uncertainty is known and compatible with the required measurement capability.

2.2.3.6. Preservation - § 8.5.4. of standard ISO 9001

Group 1:

The provisions to be applied for packaging, handling and storage of group 1 pipes are defined in NF T 54-965.

Groups 2 and 4:

The provisions to be applied for packaging, handling and storage of group 2 pipes are defined in NF T 54-951 and apply in the same way to group 4, except for the caps at the ends of the pipes which are not mandatory. The following additional provisions apply to these two groups:

- The widths of the cable drums do not need to comply with the requirements of NF T 54-951; they must be specified in the manufacturer's quality documents.

- individual packaging is not required.

- Packaging in reels for pipes with diameters of 50 to 75 mm (with the length limits defined in NF T 54-951) and in cable drums for pipes with diameters of 40 to 160 mm, with an SDR exceeding 13.6, is permitted subject to compliance with the coiled pipe ovalisation rate of § 2.2.3.4.

- Packaging in cable drums for pipes with diameters of 180 mm is permitted for an SDR less than or equal to 17 subject to compliance with a coiled pipe ovalisation rate of 10% and compliance with the wire tie requirements defined in NF T 54-951 for a 160 mm diameter.

- The winding diameter of pipes on cable drums may be less than 18D subject to compliance with the ovalisation requirements of § 2.2.3.4.

- A winding diameter of 17D is authorised for 25 mm diameter pipes packaged on reels and cable drums subject to compliance with the coiled pipe ovalisation rate (see the ovalisation requirements of § 2.2.3.4.)

Groups 3 (feed and reels) and 5:

The provisions to be applied for the packaging, handling and storage of groups 3 and 5 pipes must be specified in the manufacturer's quality documents, subject to compliance with the coiled pipe ovalisation rate (see ovalisation requirements of § 2.2.3.4).

Packaging in cable drums for pipes with diameters of 180 mm is permitted for an SDR less than or equal to 17 subject to compliance with a coiled pipe ovalisation rate of 10% and compliance with the wire tie requirements defined in NF T 54-951 for a 160 mm diameter.

For staff safety reasons, packaging in reels is not authorised for pipes with a nominal outside diameter greater than or equal to 90 mm.

The maximum length of the coils must be 100 m for 40 mm and 50 mm diameter pipes.

The maximum length of the coils must be 50 m for 63 mm and 75 mm diameter pipes.

Group 3 for Watering:

The provisions to be applied for the packaging, handling and storage of the tubes shall be specified in the manufacturer's quality documents.

- The winding diameter of 20D is allowed for tubes packed in coils provided the 10% ovalisation rate is respected.

The maximum length of the coils must be 100 m up to and including the diameter 75 mm and 50 m from 90 to 110 mm inclusive.

Storage of the pipes (at the manufacturer's site)

The pipes must be stored in such a way that any mechanical or thermal degradation is avoided. The storage duration must not exceed two years, except for group 3, 4 and 5 which can be stored for three years.

2.2.3.7. Non-conformity and corrective actions - ISO 9001, § 10.2.

Records of any complaints made regarding certified products, and their remedy must be made and kept.

2.2.3.8. Manufacturing conditions

Subcontracting operations (pipe extrusion carried out by a different production unit from the production unit managing the commercial contract - the subcontracting unit) are governed by the following principles:

- they are only authorised between production units holding the mark and the subcontracting manufacturer must be approved for the types of pipes involved (same dimensions, same materials),
- the mark-holding subcontracting entity is responsible for the compliance of NF-certified products in accordance with the provisions of these rules.

The pipes will be identified by the order number of the production unit of the subcontracted references and by the trading name of the subcontracting entity.

These subcontracting operations must be approved in advance by the LNE. They must be clearly recorded, both by the manufacturer and by the subcontracting entity (in particular, batch number and identification of the subcontracting manufacturer, tests carried out).

This does not apply to commercial distribution operations.

2.2.3.9. Flow analysis

The manufacturer must be able to submit a report on the flow of raw materials approved by PE designation (PE 80 and different types of PE 100) and for groups 1 and 2.

2.2.4. SPECIFIC QUALITY REQUIREMENTS FOR THE MANUFACTURE OF COATED PIPES IN PE 100-RC OR PE 100-RC-RD (RCD) type 3 (PEELABLE LAYER)

2.2.4.1. Type and extent of control of externally provided processes, products and services - ISO 9001, § 8.4.2. - § 8.4.3 and 8.6

The manufacturer must ensure the quality standard of raw materials involved in the manufacture of the coating.

Defined, regular inspections on receipt (minimum melt-flow index in accordance with the inspection plan set out on p.34) and an analysis certificate issued by the supplier are requested.
Tests carried out must be recorded, along with acceptance criteria, and any decisions taken in the case of non-conformance.

2.2.4.2. Release of products and services, ISO 9001, § 8.6

The coating must be made of thermoplastic (e.g. polypropylene) with mineral reinforcement.
This coating cannot be subcontracted to a non-certified site.
The thickness must be at least 0.8 mm and must be easily peelable: it must be possible to manually remove with simple tools.

The coating must have no adverse effect on the pipe or vice versa. The dimensional, physical and mechanical characteristics of the pipe, once the coating is removed, shall comply with the requirements of paragraph 2.1.1 and the coating's presence shall not affect the ability of the pipe to meet these requirements.
These rules do not provide performance evaluation of the peelable layer.

The inspection plan put in place must make it possible to ensure that the products comply with the specifications stipulated in § 2.1. Accordingly, the manufacturer must conduct or commission the required tests on a pipe once the coating has been removed, which must be at the specified regularity; pressure tests at 20°C, pressure tests at 80°C - 165 h may be deemed “type” tests.

Furthermore, a rapid crack growth resistance test (RCP S4) shall be conducted on a type-test pipe.

In the event of a change in the composition of the peelable layer, the above tests must be repeated.

2.2.4.3. Preservation - § 8.5.4. of standard ISO 9001

The coating must be resistant to being stripped during storage.

2.3. MARKING REQUIREMENTS

Marking makes up an integral part of the certification of a product.

As well as allowing for identification and traceability of a certified product, marking a product with the NF logo ensures that users will receive better protection and protects holders from improper use and counterfeiting.

Without prejudice to the sanctions listed in the NF mark’s General Rules, any wrongful advertisement of the certified items, or any fraudulent use of the NF logo, leaves holder liable to be pursued for fraud and/or false advertising.

It is strictly forbidden to reproduce or affix the AFNOR, AFNOR Certification or LNE logos without prior authorisation from those institutions.

The holder undertakes to respect the NF mark’s graphic charter.

NF certified products have a different designation and identification to non-NF certified products. The holder must only use the NF logo to identify NF certified products. They may only do this if there is no risk of confusion with other products, especially those which are not NF certified.

The holder is advised to submit all documentation making reference to the NF mark to the LNE before use.
REMINDER:
Article R 433-2 of the French Consumer Code states that:
“When reference is made to certification in advertising, labelling or in the presentation of any product or service or in any associated commercial documents, the following information must always be brought to the consumer’s or user’s attention:

- *The name or corporate name of the certifying body or the guarantee mark.*
- *The denomination of the certificate reference standard used.*
- *Methods to consult or obtain the certification reference standard.”*

2.3.1. PIPE MARKING

Each certified pipe must permanently and visibly display the NF logo in line with the requirements of the graphic charter and in accordance with the specific standards and regulations in force.

Pipe marking is in accordance with the following list, in the specified order:

(1) manufacturer’s trade name or logo
(2) The identification code of the extruder in accordance with § 2.3.1.1.
(3) the NF logo followed by the application number: 114

(4) the PE 80, PE 100, PE 100-RC, PE 100-RD or PE 100-HT plastic identification symbol
(5) the intended application
(6) the nominal pressure value or the maximum operating pressure (GAS MOP 5 bar or GAS MOP 10 bar) for group 1.
(7) the pipe sizes
- nominal outside diameter
- nominal thickness
- SDR

(8) the date of manufacture: year (last two digits of the year) and two-week period (letter)
(9) the manufacturing batch number (see definition in § 2.2 of this current section of the rules)
(10) the source of the raw material: code defined as per the instruction of § 2.3.1.1 or MX in case of internal recycled materials for group 3 pipes for watering
(11) Metric marking for all groups and all packaging. For reels, resetting at the start of the reel is authorized subject to proof of the manufacturing order of the reels.
For the packaging in bars of Group 5 pipes with a DN greater than 140 mm, this metric marking must be continuous for a given batch. However, when the cumulative length manufactured for the same batch exceeds the maximum capacities of the marking digits (999 m or 9999 m), resetting is authorized subject to proof of the manufacturing order of the pallets.
(12) the wording “peelable layer for removal before assembly” in the case of coated pipes.

This marking on coated or uncoated pipes must be visible and legible to the naked eye along one generatrix of the pipe, and repeated at least once per meter:

Either by hot stamping supplemented by colored printing.

Either by laser engraving, with the following requirements:

- The laser must be fiber-reinforced
- The height of the characters must be at least 8 mm up to and including DN 40 mm and at least 10 mm above DN 40 mm.- Traceability information (brand name, factory code, batch number and material code) must be in bold type.
- Marking must not be located on the coextruded marking band, unless legibility is demonstrated
- Marking must provide color contrast
- Marking must be rub-resistant
- The manufacturer must provide LNE with a validation file including :
  - laser data sheet
  - 1000h pressure test report per material pipe with laser engraving
  - an abrasive test report per material pipe (e.g. sandpaper or wire brush)
  - one sample per pipe material with engraving

In the absence of coloured printing of the hot stamped or laser engraved marking, parallel marking by inkjet of the same sequences is possible.

*The manufacturer must provide proof of management of the process (depth, repeatability).

For all groups, an NF additional logo, ≥ 5 mm high, between the series of information, but clearly separate from them.
Additional markings such as specific information supplementing traceability or markings referring to other certifications are permitted, provided that these additional markings are completely separate from the rest of the NF information and that there is no confusion between the two sets of markings.

2.3.1.1. Extruder and composition coding

Each extruder and composition is identified by a code managed through http://www.traccoding.com in accordance with ISO 12176-4.

For the specific case of the same composition being produced at several different sites, each approved composition must have a separate traccoding code so as to identify the origin of the manufacturing site.

2.3.1.2. Examples of pipe marking (the application names must be in French)

Group 1 - Combustible gases

XXX	- ISO Code NF 114	- PE 100	- GAZ	MOP 10 bar-	160 x 14.6 SDR 11	24 X	XXX	ISO Code		XXX
1	2	3	4	5	6	7	8	9	10	11

XXX	- Code ISO NF 114	- PE 100-RC	- GAZ	MOP 10 bar-	160 x 14,6 SDR 11	24 X	XXX	Code ISO		XXX
1	2	3	4	5	6	7	8	9	10	11

Group 2 - Drinking water

XXX	- Code ISO NF 114	- PE 10	EAU POTABLE	16	110 x 10.0 SDR 11	24 X	XXX	ISO Code		XXX
1	2	3	4	5	6	7	8	9	10	11

XXX	- Code ISO NF 114	- PE 100-RC	- EAU POTABLE	16-	110 x 10,0 SDR 11	24 X	XXX	Code ISO		XXX
1	2	3	4	5	6	7	8	9	10	11

XXX	- Code ISO NF 114	- PE 100-RD	- EAU POTABLE	16-	110 x 10,0 SDR 11	24 X	XXX	Code ISO		XXX
1	2	3	4	5	6	7	8	9	10	11

Groupe 3 – Irrigation for feed and reels

XXX	- Code ISO NF 114	- PE 80	- IRRIGATION	8 -	40 x 2,4 SDR 17	24 X	XXX	Code ISO		XX
1	2	3	4	5	6	7	8	9	10	11

Groupe 3 – Irrigation for watering (with and without internal recycled materials)

XXX	- Code ISO NF 114	- PE 100	- ARROSAGE	10 -	40 x 2,4 SDR 17	24 X	XXX	Code ISO		XX
1	2	3	4	5	6	7	8	9	10	11

XXX	- Code ISO NF 114	- PE 100	- ARROSAGE	10,0 -	40 x 2,4 SDR 17	24 X	XXX	MX		XX
1	2	3	4	5	6	7	8	9	10	11

Group 4 - Industry & non-drinking water

XX	- Code ISO NF 114	- PE 100	- INDUSTRIE & EAU NON POTABLE	10-	180 x 10.7 SDR 17	24	XXX	ISO Code		XX
1	2	3	4	5	6	7	8	9	10	11

Group 4 - Pressurised sewerage

XXX	- Code ISO NF 114	- PE 100	- ASSAINISSEMENT	16-	225 x 20.5 SDR 11	24	XXX	ISO Code		XX
1	2	3	4	5	6	7	8	9	10	11

Group 5 - Containment of electric power transmission

XXX	- Code ISO	NF 114	- PE 100	- CONFINEMENT ELECTRIQUE	16	160 x 14.6 SDR 11	2 X	XX	ISO Code XX
1	2	3	4	5	6	7	8	9	10	11

Group 5 - Containment of electric power transmission with composition of better high temperatures resistance

XXX	- Code ISO	NF 114	PE 100-HT	CONFINEMENT ELECTRIQUE	16	160 x 14,6 SDR 11	24 X	XXX	code ISO XX
1	2	3	4	5	6	7	8	9	10	11

The wording “coextruded pipe” must be added in sequence 11 in the case of a pipe from group 2 made of coextruded PE 100-RC-RD (type 2).

The wording “peelable layer” is to be added in sequence 11 for coated pipes in all groups concerned.

For Group 2 and 4 pipes of the same thickness, the same SDR and different nominal pressures, it is acceptable to mark the nominal pressures simultaneously.
Example of a group 2, 25 mm pipe, with SDR of 9 in PE100, with NP of 12.5, 16 and 20. The marking of the sequence 6 will be as follows:

Group 2 - Drinking water

XXX	Code ISO	NF 114	- PE 100	EAU POTABLE	12.5 -16 -20	25 x 3.0 SDR 9	22 X	XXX	ISO Code	XXX
1	2	3	4	5	6	7	8	9	10	11

For pipes extruded with a PE 100 composition claiming several improved resistance (PE100-RC, PE100-RD, PE100-HT), it is permissible to mark the relevant characteristics simultaneously.
Example of a Group 2 pipe in PE 100-RC and PE 100-RD. Marking for sequence 4 could be as follows:

Group 2 - Drinking water

XXX	- Code ISO	NF 114	- PE 100-RCD	- EAU POTABLE	16-	110 x 10,0 SDR 11	24 X	XXX	Code ISO	XXX
1	2	3	4	5	6	7	8	9	10	11

2.3.2. PIPE COLORS AND IDENTIFICATION BANDS

The pipes are black and may be marked by including coloured threads depending on the application.

<u>Group 1 - Combustible gases applications</u>
The pipes are black with yellow identification stripes extruded with approved compositions (color of the identification band composition), evenly distributed over the circumference of the pipe, with a minimum of 3. This number must be set so as to ensure the visibility of the identification stripe regardless of viewing angle and irrespective of pipe diameter:

- For pipes intended for use at 4 bar (“Gas 4” marking for ND ≥ 200 pipes (SDR 17.6) and "Gas MOP10 bar" for ND <200 (SDR 11)): identification stripes with a single thread.
- - For pipes intended for use at 8 bar (“Gas MOP 10 bar” marking): identification stripe with 2 threads, such as:

. distance between the 2 threads ≤ 5 ± 2 mm,
. total width of the double thread ≤ 30 mm,
at least 4 identification stripes on the circumference of the 160 mm diameter pipe

Group 2 - Drinking Water Applications
The pipes are black with blue identification stripes extruded with approved compositions (color of the identification stripe composition), with a single thread evenly distributed over the circumference of the pipe, with a minimum of 3. This number must be set so as to ensure the visibility of the identification stripe regardless of viewing angle and irrespective of pipe diameter.
The wording “drinking water” and/or the use of blue stripes are strictly reserved for group 2 pipes approved for the NF mark.

Coextruded pipes (type 2) have a blue outer layer made of PE 100-RC and a black inner layer made of PE 100-RC with the additional designation PE 100-RD (RCD) based on approved compositions for both layers.

Group 3 - Irrigation Application
The colour of the pipes is black without identification stripe for feeder and reel pipe applications and black with purple stripes for watering application with only 1 thread evenly distributed around the circumference of the pipe and a minimum number of 3. This number must be defined in such a way that the identification stripe can be seen from any angle of vision and regardless of the diameter of the pipe.

Purple identification stripes should be made from either:
- approved compositions,
- a mixture of purple pigment and natural base compositions for the production of NF-approved compositions. The applicant will have to provide proof of the UV resistance of the purple pigment.

The compositions can be from different producers for the same MRS.

Group 4 - Applications in industry, non-drinking water and pressurised sewerage
The pipes are black without an identification stripe for industrial applications and non-drinking water and black with brown stripes for sewerage applications with only 1 thread evenly distributed around the circumference of the pipe and a minimum number of 3. This number must be defined in such a way that the identification stripe can be seen from any angle of vision and regardless of the diameter of the pipe.

The brown identification stripes must be produced using either:
- approved compositions,
- a mixture of brown pigment and natural base compositions for the production of NF-approved compositions. The applicant will have to provide proof of the UV resistance of the purple pigment.

The compositions can be from different producers for the same MRS.

Group 5 - Application in containment of electric power transmission
The pipes are black with red identification stripes with only 1 thread evenly distributed around the circumference of the pipe and a minimum number of 3. This number must be defined in such a way that the identification stripe can be seen from any angle of vision and regardless of the diameter of the pipe.

These must be made from approved compositions.
The compositions can be from different producers for the same MRS.

- For group 5 pipes in PE100-HT: identification stripes with 2 threads, such as:
  . distance between the 2 threads ≤ 5 ± 2 mm,

. total width of the double thread ≤ 30 mm,
. The number of stripes is defined so that the identification stripe can be seen at any angle of view and regardless of the diameter of the pipe,

Pipe with peelable layer:

Once the coating is removed the pipe must have the identification stripes provided above, based on the application group.

The peelable layer must be yellow for Group 1 pipes, blue for Group 2 pipes and brown for Group 4 pipes.

The coating must also carry marking to inform the user of the need to remove the coating before any arc welding, butt welding and mechanical assembly.

2.3.3. MARKING ON THE PACKAGING UNIT OF THE PIPE OR ON THE ACCOMPANYING PRODUCT DOCUMENTATION (INCLUDING LABELS)

CERTIFIÉ PAR LNE
NF
POLYETHYLENE PIPES

The NF logo must be included on the packaging unit (reel, set of straight bars or cable drum) or on the accompanying product documentation with the following information:

- The commercial name of the product given on the certificate
- The identification code of the extruder in accordance with instruction § 2.3.1.1. or a mark enabling the NF-mark holder and the producing factory to be identified
- coding to ensure the traceability of the product (for all groups) and the date of manufacture for group 1 (at least “Week - Year”)- the application name of the NF mark
- website www.lne.fr
- the main characteristics certified (pressure, dimensions)
- Name and address of the certifying body: LNE, 1 rue Gaston Boissier, 75015 Paris

The design of the layout and format of the accompanying document is left to the holder’s preference. As a guide, a model is provided below (**the document shall be preferably in French, see French NF rules**):

For Group 1 pipes, the label must be white with black characters and the maximum operating pressure of the pipes must be mentioned.

POLYETHYLENE PIPES
Commercial reference: **Extruder identification code:** **LNE** 1 rue Gaston Boissier 75015 PARIS www.lne.fr
CERTIFIED **COMPLIANT WITH THE SPECIFICATIONS DEFINED BY** **THE CERTIFICATION RULES OF NF MARK 114** Nominal pressure at 20°C: Type (outside diameter and thickness): Application: Date of manufacture: Batch No.: Nominal length:

For group 1 pipes, the maximum operating pressure (MOP) should be indicated instead of the nominal pressure at 20°C.
For Group 5 pipes, the line “Nominal pressure at 20°C:” is not to be filled in and can be removed.

2.3.4. MARKING ON DOCUMENTATION (TECHNICAL AND COMMERCIAL DOCUMENTS, POSTERS, ADVERTISEMENTS, WEBSITES, ETC ...)

References to the NF mark in the documentation must be made in such a way that there is no risk of confusion between the certified products and other products.

Reproduction of the NF mark on documentation and advertising must comply with the marking illustrated in paragraph 2.3.3.

It is recommended that the holder submit to LNE beforehand all commercial documents where the mark is mentioned, including during modification of these documents.

The holder must communicate, at the request of LNE, any document in which reference is made, directly or indirectly, to the NF mark.

2.4. APPLICANT/HOLDER COMMITMENTS

The applicant/holder agrees to provide LNE with the means to carry out any necessary tasks for the evaluation and follow-up of their case. In particular, they agree to:

- comply at all times with the requirements defined by these certification rules, and to implement the necessary changes within the deadlines prescribed by LNE in the event of changes in the certification rules,
- communicate the information and working documents necessary for a proper evaluation procedure to representatives authorised by LNE;
- only communicate information that the applicant/holder knows is fair and sincere;
- appoint a responsible individual as an LNE interlocutor;
- designate recipients within the company who will receive LNE test and audit reports and inform LNE of changes to be made in case of a change of recipient within the company or e-mail address;
- present the staff assigned to the various tasks to the authorised LNE representatives;
- instruct staff to work with authorised LNE representatives, and to agree to participate in any interviews;
- provide authorised LNE representatives with a way to access and move around the sites and work areas, including the subcontractors' sites, as the case may be;
- inform the authorised LNE representatives about the safety and hygiene provisions and instructions applicable to the sites and work areas and the staff there, and make any equipment necessary available to them for this purpose;
- pay LNE the sums due for the evaluation, in accordance with the financial conditions defined and accepted by the applicant/holder
- Authorise the presence of an observer who is required to respect confidentiality. This observer can be imposed on LNE by the standards or agreements of which they are a signatory. Information regarding the presence of this observer is always communicated to the applicant/holder by LNE prior to the audit.
- take the necessary measures in the event of non-compliance, within the deadlines specified by LNE,
- return the duly completed non-compliance sheets to the lead auditor within 3 weeks of the last day of the audit,
- implement the necessary actions to enable the certificate to be issued within a maximum of 11 months after the initial audit. After this period, a new initial audit will have to take place before certification,
- send the samples taken under the conditions defined in Parts 3 and 4 to the mark's laboratory.

It is also the responsibility of the certificate holder to:

- display the NF mark only on the products covered by the certificates issued by LNE and in

accordance with the applicable requirements;

- not use the certification of its products in a manner that could damage the certification body nor make a declaration regarding the certification of its products that the certification body may consider misleading or unauthorised;

- communicate to LNE beforehand any modification of the product or any information likely to affect conformity with the requirements of the present rules, the methods of evaluation being defined in part 4,
- make available to LNE any data or information necessary to establish and maintain the certificate;

- keep a record of all claims of which the holder is aware of the conformity of the product(s) with the certification requirements and make these records available to LNE upon request, and
    - take any appropriate action with respect to these claims and imperfections in the products that affect their compliance with the requirements of the certification,
    - document the actions taken.

- in the event of suspension, reduction, withdrawal or refusal of renewal of the certificate, stop using any references to the certification of the products concerned and stop using all the means of communication that make reference to this,

- authorise follow-up evaluations during the period of validity of the certificate, on the basis of the frequency specified in Part 4 and any duly justified additional assessment.

- make statements about certification consistent with the content of the certificate,

- not use the certification issued by LNE in a manner that could damage LNE, nor make a declaration regarding the certification of its products that LNE may consider misleading or unauthorised;

- reproduce the certificates in their entirety, including the appendices in case of supply to a third party.

LABORATOIRE NATIONAL DE MÉTROLOGIE ET D'ESSAIS

Organisme certificateur mandaté par
AFNOR Certification

CERTIFICATION RULES

NF MARK
Polyethylene pipes for gaseous fuel distribution networks, drinking water distribution networks, irrigation and industrial applications, not drinkable water and pressurised sewerage, electrical transmission confinement

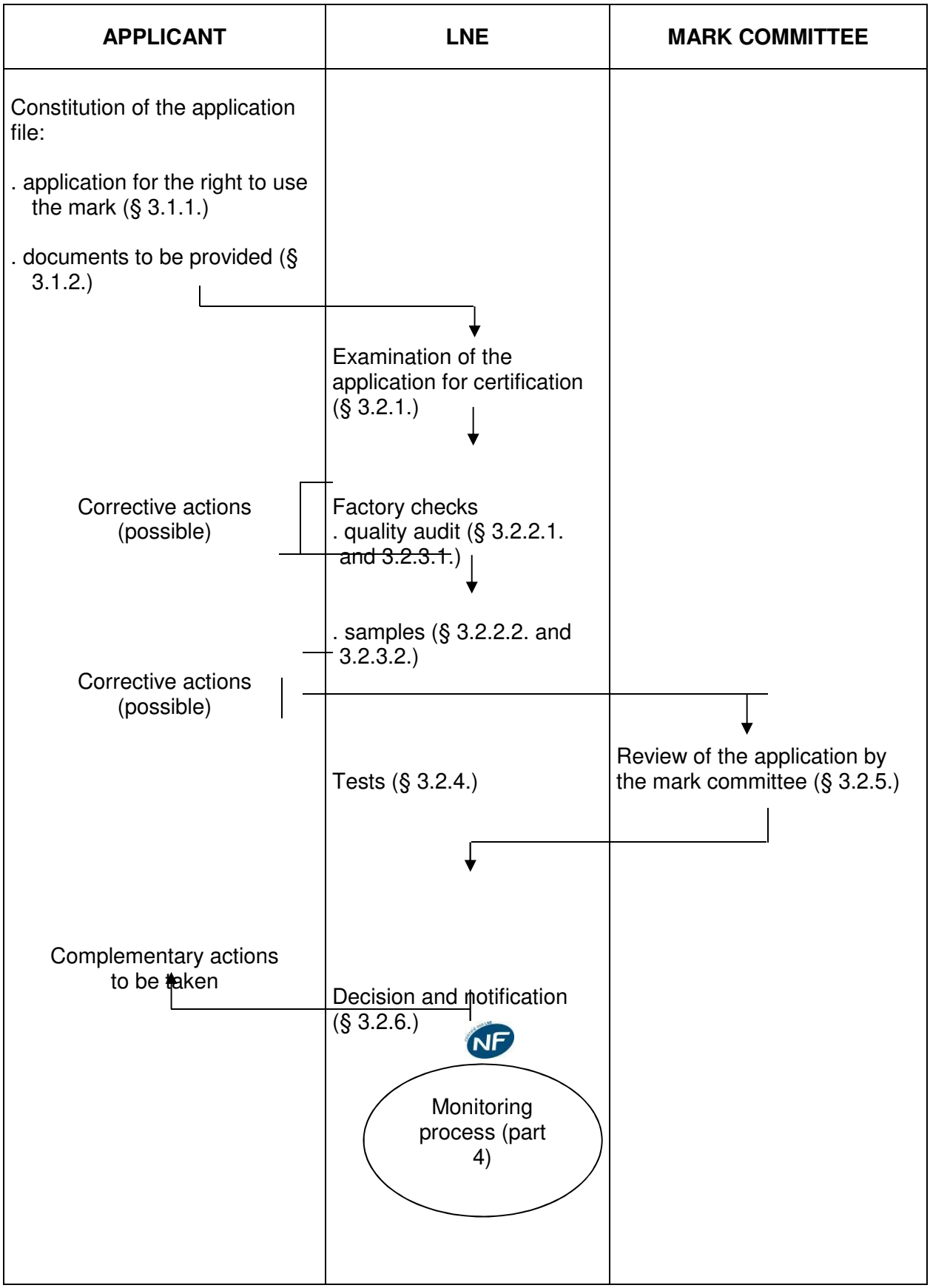
PART 3

OBTAINING CERTIFICATION

SUMMARY

Rev. 40 - July 2025

PROCESS FOR OBTAINING CERTIFICATION



Before making an application, the applicant must ensure that (at the time of the application) they fulfil all the requirements stated in these certification rules, especially section 2, which concern their products and sites.

They must commit to respecting the same conditions throughout the period of use of the NF mark.

Failing compliance with these rules, the applicant/holder is liable to the interruption or suspension of the investigation of his file. Specifically, it is never possible to make reference to the NF mark before obtaining the right to use the NF mark, or to present the certification of counterfeit products.

3.1. CONSTITUTION OF THE APPLICATION FILE

Any company manufacturing one or more products covered by this application for the NF mark may apply for the right to use the mark. Such an request is hereinafter referred to as an "application", the person making the request being named the "applicant".

3.1.1. REQUEST FOR THE RIGHT TO USE THE MARK

Any manufacturer wishing to submit a product they have manufactured for NF certification must first read the certification rules of the mark and declare that they agree to them.

The application is written on the manufacturer's letterheaded paper, in accordance with the example below (§ 3.1.2.) and is to be sent to the LNE.

It specifies the products subject to certification.

3.1.1.1. For applications for certification of compositions,

The application specifies the references of the associated base and labelling compositions submitted for certification and the pipe application(s) for which the certification will be issued.

. group 1: combustible gas applications
. group 2: drinking water applications
. group 3: irrigation application
. group 4: applications in industry, non-drinking water and pressurised sewerage
. group 5 - application in containment of electric power transmission

This application may be combined with a request to extend the pipe certification formulated by an extruder already holding the NF-mark.

3.1.1.2. For applications for certification of pipes

Only tubes extruded from compositions accepted for the group concerned may be submitted for certification. Tube certification is requested based on their application, for

a) group 1: combustible gas applications

pipes extruded with composition PE 80, PE 100 or PE 100-RC that may have an additional contiguous thermoplastic layer peelable on the outer surface (“coated pipe”).

. certification for the whole - a composition, an extrusion line, pipe dimensions (diameter - thickness)

b) <u>group 2: drinking water applications</u>

pipes extruded with composition PE 80,PE 100, PE 100-RC or PE 100-RD that may have an additional contiguous thermoplastic layer peelable on the outer surface (“coated pipe”).

. certification for the whole - a composition, an extrusion line, pipe dimensions (diameter - thickness)

c) <u>group 3: irrigation applications</u>

pipes extruded with PE 80, PE 100 or PE 100-RC composition which may have an additional contiguous thermoplastic layer peelable on the outer surface ("coated pipe"):

certification issued for pipe dimensions (diameter - thickness)

d) <u>group 4: applications in industry, non-drinking water and pressurised sewerage</u>

pipes extruded with PE 80, PE 100 or PE 100-RC composition which may have an additional contiguous thermoplastic layer peelable on the outer surface ("coated pipe"):

- certification issued for pipe dimensions (diameter - thickness) that may have an additional peelable thermoplastic layer on the outer surface (“coated pipe”).

e) <u>group 5: application in containment of electric power transmission</u>

pipes extruded with PE 80, PE 100, PE 100-RC or PE 100-HT composition which may have an additional contiguous thermoplastic layer peelable on the outer surface ("coated pipe"):

certification issued for pipe dimensions (diameter - thickness)

To support their application, the applicant must submit a file containing the documents or information specified below (§ 3.1.2.1. for compositions and § 3.1.2.2 for pipes) for each of the factories that are to produce products for which the certification is sought.

All documents must be written in French or English.

The application must be accompanied by the applicable fees for reviewing the application and the initial audit.

When the applicant is from a country outside the European Economic Area, they must submit their application jointly with a representative who is established in the European Economic Area. The representative shall be duly accredited and responsible for the production of goods for which the NF mark is requested and which are to be sold in France.

They are designated as an "agent".

Before using the NF mark, LNE must be informed about all modifications made to the range of products submitted for certification purposes. LNE will decide if extra testing needs to be carried out on those products.

3.1.2. DOCUMENTS TO PROVIDE

3.1.2.1. Document to be provided by the composition producer (producer file)

- A certification application template letter (form 1a), written on the manufacturer's letterheaded paper, as per the attached template (with the appendix and associated mandate co-signed (as per form 3a) if the application is made from outside the European Economic Area).
- if applicable, designation of extruders applying for a certification extension combined with certification of the composition (form 1b)
- General information form (form 1c).
- Data sheet of the base composition(s) with **Technical file** (form 1d),
- If applicable, data sheet of the labelling composition(s) (form 1e)
- **Description of quality management arrangements in place:**
    - Quality manual and/or plan(s) (if these documents may not be taken off-site, they must be given to the auditors during the audit).
    - Organisational chart of the site,
    - Description of the manufacturing process and associated inspection plan (detailing the measures and tests conducted as well as their frequency).
    - Description of the different processes with definition of inputs, outputs, activities taken into account in each process (with reference to ISO 9001: 2015),
    - Certificate of conformance of the quality management system (where appropriate).
    - If applicable, definition of the characters of the coding of the batch number to be used so as to be able to ensure encoding with a maximum of 10 digits, in the case of the use of traceability coding by bar code, in accordance with ISO 12176- 4.

All documents must be written in French or English.

3.1.2.2. Document to be provided by pipe extruders (extruder file)

DOCUMENTS TO BE PRODUCED FOR ALL APPLICATION GROUPS

- A certification application template letter (form 2a), written on the manufacturer's letterheaded paper, as per the attached template (with the appendix and associated mandate co-signed (as per form 3a) if the application is made from outside the European Economic Area).
- General information form (form 2b).
- Tables by group specifying the types of pipes submitted for certification (forms 2-c/d/e/f/g) with the references of the base and labelling compositions used

- Description of quality management arrangements in place:

- Quality manual and/or plan(s) (if these documents may not be taken off-site, they must be given to the auditors during the audit).
- Organisational chart of the site,
- Description of the manufacturing process and associated quality control plans (detailing the measures and tests carried out as well as their frequency).
- Description of the different processes with definition of inputs, outputs, activities taken into account in each process (with reference to ISO 9001: 2015),
- Certificate of conformance of the quality management system (where appropriate).

- Technical file:

- Technical specifications drawn up under the contract with the producers for the compositions used,
- Copy of the analysis certificate for the base compositions,
- the results of the complete tests (in accordance with table § 3.2.4.2) conducted in the manufacturer's laboratory or any other laboratory accepted by the LNE following the opinion of the mark committee (if applicable) (see details In accordance with the groups in § 3.2.4.2)
- For a peelable layer: the type of coating, the references and specifications of the composition concerned for the peelable layer,

- Additional technical file for Group 1 or Group 2 certification:

- The description of the extrusion line,
- Manufacturing parameters for each type subject to certification,
- A test report of resistance to rapid crack growth drafted by the composition producer, less than 2 years old,
- Declaration highlighting suitability for use based on the tests and specifications defined respectively by NF EN 1555-5 and NF EN 12201-5,
- For group 1: commitment to comply with the environmental code covering gas networks and indoor gas installations, supplemented respectively by the decrees of July 13, 2000 and February 23, 2018, as well as the 5 CNPG guides
- For group 2: the health compliance certificate for the extruded pipes with each composition covered by the application.

All documents must be written in French or English.

1 - PRODUCER FILE

FORM 1a

APPLICATION FOR CERTIFICATION OF A COMPOSITION

(To be prepared in duplicate, on manufacturer's letterhead)

The General Director of
LABORATOIRE NATIONAL DE METROLOGIE ET D'ESSAIS
(NATIONAL LABORATORY OF METROLOGY AND TESTING)
Pôle Certification
1, rue Gaston Boissier
75724 PARIS CEDEX 15

RE: Application for the right to use the polyethylene pipes NF mark

Dear General Director,

I, the undersigned (name and job-title) .....
representing the company (company name - headquarters) .....
hereby ask the LNE for the right to use the PE Pipes NF Mark for the compositions described below:
Polyethylene type (1):
Commercial reference of the basic composition(s):
Commercial reference of the labelling composition(s)
intended for the extrusion of pipes of the group (2):

These products are manufactured in the factory owned by (company identification and full address of the factory):

……..

……..

I declare that I have read the reference standards, the general rules of the NF mark and the PE Pipes certification rules and I undertake to respect them throughout the period of use of the NF Mark.
I certify that these products satisfy the applicable regulatory requirements and I undertake to refrain from submitting counterfeit goods for certification.

Date
Stamp and signature
of the applicant

APPENDIX TO THE APPLICATION FOR CERTIFICATION (3)

I also authorise the company (4) ....
represented by Mr./Ms. (name and position). .....

who accepts the conditions listed in the attached mandate, to act on my behalf in France for any questions regarding use of the NF mark.

I therefore request that any expenses for which I am liable be invoiced directly to him/her. (S)he hereby undertakes to pay the invoices upon receipt.

I undertake to notify LNE immediately if the above agent is replaced.

Yours sincerely,

Date
Stamp and signature
of the agent's representative (5)

Stamp and signature
of the applicant's representative (5)

---

(1) Specify the type: PE 80, PE 100, PE 100-RC or PE 100-RD
(2) Specify the application groups for which the composition may be used:
Group 1 - Combustible gases applications
Group 2 - Drinking Water Applications
Group 3 - Irrigation applications
Group 4: Applications in industry, non-drinking water and pressurised sewerage
Group 5 - Application in containment of electric power transmission
(3) This appendix is to be completed only for applicants located outside the European Economic Area. It must be accompanied by a co-signed authorisation (see example, form 3a)
(4) Designation of the agent company includes: company name, type of company, registered office, trade register number.
(5) The signatures of the applicant and their representative must be preceded by the handwritten words "Authorisation" and "Authorisation acceptance", respectively.

1 - PRODUCER FILE

FORM 1b

DESIGNATION OF EXTRUDERS APPLYING FOR A PIPES CERTIFICATION EXTENSION COMBINED WITH CERTIFICATION OF THE COMPOSITION

Composition reference:

APPLICATION GROUP	**NAME OF EXTRUDER**	ADDRESSES
GROUP 1 Combustible gas applications		
GROUP 2 Drinking water applications		

Name of the producer
Date
Stamp and signature

1 - PRODUCER FILE

FORM 1c

GENERAL INFORMATION FORM

Applicant's corporate name:

Applicant's address:
Contact person:
Phone number:
Fax number:
E-mail:
Website:

Staff dealing with certification:

Site has ISO 9001 certification: Yes ☐ No ☐
Subsidiary of a group: Yes ☐ No ☐
If yes, please state which:

Address of the person/people to e-mail LNE test and audit reports to:

Contact person name	Job title	E-mail	Audit report	Test report

NB: LNE keeps an authenticated copy of the document which was sent, for a period of 30 years.
LNE has security procedures for its internal computer network. However, you hereby recognise that LNE cannot be held liable for any problems which occur due to sending an electronic copy of the document, especially with regards to confidentiality and the integrity of the document.

Billing address (if different to the address given along with the applicant's corporate name), and involvement if it is different to the applicant's.

_____

_____

Location of the different stages in the manufacturing process

	Address of the site responsible for each stage*
Design	
Manufacturing (1)	
Assembly	
Final checks	
Marking	
Packaging	
Stock	

Any act not carried out by the applicant is subject to a contract which defines the responsibilities undertaken, along with their provider.

(1) Details (if necessary) of the manufacturing stages or of outsourced manufacturing.

Trademark:

Owner of the commercial brand name*:

List of distributors responsible for marketing the product, whose name appears on the packaging*:

Signed in:

On:

Signature

*** Give the corporate name, address, contact name, telephone number and e-mail address, if different to the applicant's.**

1 - PRODUCER FILE

FORM 1d

Base composition data sheet

Composition reference:

Application group(s)

Reference values of the characteristics of the composition verified by the mark laboratories

These values must be accompanied by a commitment by the producer to the manufacturing tolerances of the different composition batches.

Conventional density at 23°C (kg/m3) (NF EN ISO 1183) (sample prepared in accordance with NF EN ISO 17855-1) (*):

. natural resin:

. coloured resin:

Melt-flow index (g/10 min.)(*) NF EN ISO 1133-1 at 190°C

. under 21.6 kg (for the traceability code in accordance with ISO 12176-4):

. under 5 kg:

. under 2.16 kg:

Carbon black reference with mention of the supplier(s) (name and address):

Carbon black content (%) ISO 6964:

Dispersion of carbon black (score) ISO 18553:

Volatile materials content in accordance with NF EN 12099:

Organoleptic properties in accordance with § 2.1.2. part 2 for group 2:

Oxidation stability in accordance with ISO 11357-6 (*)

Name of the producer

Date

Stamp and signature

(*) or any other value approved by the user, in which case specify the test method and the correlations with the results obtained with the standardised method.

TECHNICAL FILE FOR THE BASE COMPOSITION

A) Characteristics of the composition not subject to verification by the mark laboratories

The following characteristics must be communicated (for compositions intended for the extrusion of groups 1 to 5 pipes) :

- regression curves established in accordance with NF EN ISO 9080: for each temperature (20 - 60 - 80°C) (for compositions intended for the extrusion of pipes from groups 1 to 5) and for each temperature 20 - 70 - 95 and 110 ° c (for compositions intended for the extrusion of pipes from group 5 in PE100-HT), at least 25 tests distributed over a minimum of 5 pressure levels)

with:

. specification of the extrusion conditions used to manufacture the pipes required for the pressure tests (see attached table)

. identification of the laboratory that conducted the pressure tests.

. long-term hydrostatic stress value (lower confidence limit) with calculation method

. specification of the arrangements ensuring the consistency of these regression curves and suitability for use under industrial conditions

- characteristics of resistance to gas components in accordance with NF EN 1555-1 (for the compositions intended for the extrusion of group 1 pipes)

- thermal durability characteristics at 110°c according to NF EN ISO 21003-2 after 18 months (for compositions intended for the extrusion of group 5 pipes in PE100-HT).

- resistance to chlorinated disinfectants as per § 2.1.2.12 after 18 months (for compositions intended for extrusion of group 2 pipes in PE100-RD).

- characteristics of resistance to slow crack propagation for compositions intended for the extrusion of group 1 to 5 pipes in PE 100-RC:

Test reports less than one year old must be provided; tests must be carried out by a laboratory accredited to ISO 17025 by a member body of the European co-operation for Accreditation (EA) having signed the multilateral agreements (MLA) "Testing" and "Calibration" (or to be accredited within 18 months) :

. Strain-Hardening Test according ISO 18488 (SHT)

. Cracked Round Bar test according ISO 18489 (CRB)

. Accelerated Full Notch Creep Test according ISO 16770 (AFNCT)

. verification of resistance to slow crack propagation: Accelerated Notched Pipe Test according NF EN ISO 13479 (ANPT) or alternatively Notched Pipe Test (NPT 8760 h), given that Arkopal N100 is not available on certain markets.

- characteristics of resistance to fast crack growth: S 4 test in accordance with ISO 13477 (for compositions intended for the extrusion of groups 1 to 5 pipes).

A test report less than 2 years old must be submitted; the tests must have been conducted by a laboratory with ISO 17025 accreditation by a member organization of the European Co-operation for Accreditation (EA) which has signed the “Testing” and “Calibration” Multilateral Agreements (MLA) (or to be accredited within 18 months).

The data must include:

. full identification of the tested pipe: manufacturer, material, nominal dimensions, SDR and batch identification: the test must be conducted on tubes with thickness of ≥ 15 mm,

. duration of packaging,

. diagram of length a of the crack at its end based on pressure p,

. the value obtained for critical pressure, P_{cS4}, with specification of the maximum pressure used

. any factor that may have affected the results, i.e. any unspecified incident or operational detail

. test date

- certificate of compliance with the fraud control lists for products in contact with foodstuffs (for compositions intended for the extrusion of tubes of group 2)
- test reports and certificate of compliance with the provisions of the Ministerial Order of 29 May 1997 on materials and items used in fixed installations for the production, treatment and distribution of water intended for human consumption and its appendices (OJ, 1 June 1997) supplemented by circular DGS/VS4 No. 2000 -232 dated 27/04/2000 (for compositions intended for the extrusion of group 2 pipes). Note: in accordance with the circular, the Health Compliance Certificate for compositions intended or the extrusion of group 2 pipes is valid for 10 years if there is no formulation change.
- welding compatibility: tensile strength for butt welding in accordance with NF EN 1555-1 and NF EN 12201-1 (for compositions intended for the extrusion of groups 1 to 5 pipes).

B) Information relating to:

- rheological behaviour: viscosity, suitability for extrusion
- resistance to stress cracking: hydraulic pressure, cracking in a surfactant medium, etc.
- fast cracking behaviour
- adjuvants: content, composition, effectiveness, etc.

and more generally, any element likely to characterise the quality of the product.

EXTRUSION CONDITIONS FOR THE PRODUCTION OF PIPES USED FOR REGRESSION CURVES

- Type of pipe:
- Reported parameters must include at least the following:

Extruder type and head	
Moulds: - screw diameter - punch diameter - die diameter - calibrator diameter	

Extrusion parameters	Conditions
Mass flow (kg/h)	
Screw rotation speed (rpm)	
Pull speed (m/min)	
Mass pressure (bar)	
Mass temperature (°C)	
Temperature of the different zones (°C) - Body temperature - zone No. - zone No. - zone No. - zone No. - zone No. - zone No. - zone No. - Mould temperature - zone No. - zone No. - zone No. - zone No. - zone No. - zone No. - zone No.	 _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
Cooling temperature (°C)	

1 - PRODUCER FILE

FORM 1e

Data sheet for identification band compositions.

Composition reference:

Application group(s)

Associated base composition

- reference
- density of the natural resin
- melt-flow index of the natural resin

Oxidation stability in accordance with ISO 11357-6:

Optionally, for information purposes:

- density of the coloured resin:
- melt-flow index of the coloured resin:

Name of the producer

Date

Stamp and signature

2 - EXTRUDER FILE

FORM 2a

APPLICATION FORM FOR CERTIFICATION OF EXTRUDED PIPES WITH A DEFINED COMPOSITION

(To be written on the extruder's letterheaded paper)

complete one application per base composition or labelling composition used.

Mr. Director General of the
LABORATOIRE NATIONAL DE METROLOGIE ET D'ESSAIS
(NATIONAL LABORATORY OF METROLOGY AND TESTING)
Pôle Certification
1, rue Gaston Boissier
75724 PARIS CEDEX 15

RE: Application for the right to use the polyethylene pipes NF mark

Dear General Director,

I the undersigned (name and position): ……..

as a representative of the company (identification of the company - registered office)……..

hereby apply for the right to use the PE pipes NF mark

The application is for pipes manufactured in the factory owned by (company identification and full address of the factory): ……..
……

for pipes covered by the attached file and for the following application groups (1):

and extruded with the following composition (2):

I declare that I have read the reference standards, the general rules of the NF mark and the PE Pipes certification rules and I undertake to respect them throughout the period of use of the NF Mark.

I certify that these products satisfy the applicable regulatory requirements and I undertake to refrain from submitting counterfeit goods for certification.

This application for certification is combined with that of the above-mentioned composition (3)

Date
Stamp and signature
of the applicant

APPENDIX TO THE APPLICATION FOR CERTIFICATION (4)

I also authorise the company (5)……..
represented by Mr/Ms (name and position)……

who accepts the conditions listed in the attached mandate, to act on my behalf in France for any questions regarding use of the NF mark.

I therefore request that any expenses for which I am liable be invoiced directly to him/her. (S)he hereby undertakes to pay the invoices upon receipt.

I undertake to notify LNE immediately if the above agent is replaced.

Yours sincerely,

Date
Stamp and signature
of the agent's representative (5)

Stamp and signature
of the applicant's representative (5)

---

(1) Specify the application groups for which the composition may be used:
Group 1 - Combustible gases applications
Group 2 - Drinking Water Applications
Group 3 - Irrigation applications
Group 4 - Applications in industry, non-drinking water and pressurised sewerage
Group 5 - Application in containment of electric power transmission
(2) Specify the reference of the composition, the name and address of the producer
(3) To be completed only for combined certification application (pipe and composition)
(4) This appendix is to be completed only for applicants located outside the European Economic Area. It must be accompanied by a co-signed authorisation (see example, form 3a)
(5) Designation of the agent company includes: company name, type of company, registered office, trade register number.
(6) The signatures of the applicant and its representative must be preceded by the handwritten words "Authorisation" and "Authorisation acceptance", respectively.

EXTRUDER FILE
FORM 2b

GENERAL INFORMATION FORM

Applicant's corporate name:

Applicant's address:
Contact person:
Phone number:
Fax number:
E-mail:
Website:

Staff dealing with certification:

Site has ISO 9001 certification: Yes ☐ No ☐
Subsidiary of a group: Yes ☐ No ☐
If yes, please state which:

Address of the person/people to e-mail LNE test and audit reports to:

Contact person name	Job title	E-mail	Audit report	Test report

NB: LNE keeps an authenticated copy of the document which was sent, for a period of 30 years.
LNE has security procedures for its internal computer network. However, you hereby recognise that LNE cannot be held liable for any problems which occur due to sending an electronic copy of the document, especially with regards to confidentiality and the integrity of the document.

Billing address (if different to the address given along with the applicant's corporate name), and involvement if it is different to the applicant's.

_____

_____

Location of the different stages in the manufacturing process

	Address of the site responsible for each stage*
Design	
Manufacturing (1)	
Assembly	
Final checks	
Marking	
Packaging	
Stock	

Any act not carried out by the applicant is subject to a contract which defines the responsibilities undertaken, along with their provider.

(1) Details (if necessary) of the manufacturing stages or of outsourced manufacturing.

Trademark:

Owner of the commercial brand name*:

List of distributors responsible for marketing the product, whose name appears on the packaging*:

Signed in:

On:

Signature

*** Give the corporate name, address, contact name, telephone number and e-mail address, if different to the applicant's.**

EXTRUDER FILE
FORM 2c

TYPES OF PIPES SUBMITTED FOR CERTIFICATION

GROUP 1 - COMBUSTIBLE GAS APPLICATIONS

Name of pipe extruder:

Pipe trademark(s):

Designation and composition reference (1) :

For peelable layers, reference of the composition of the peelable layer:

Nominal outside diameter Dn (mm)	SDR	Working pressure (2)	Nominal thickness WT (mm)	Identification of the extrusion line

For Group 1, a pipe type is characterised by a nominal outside diameter, a nominal thickness, a composition and an extrusion line Therefore, enter the pipe dimensions for each extrusion line for the composition concerned in the table above.

NOTE: A technical file must be provided for each extrusion line, specifying the extrusion line, the moulds and the manufacturing parameters. Enter the identification of the extruder indicated in the table above in each technical file.

(1) Specify designation (PE80, PE100, PE100-RC, PE100-RD) and commercial reference
(2) Operating pressure: specify Gas MOP 5 bar or Gas MOP 10 bar.

Date:
Stamp and signature

EXTRUDER FILE
FORM 2d

TYPES OF PIPES SUBMITTED FOR CERTIFICATION

GROUP 2 - DRINKING WATER APPLICATIONS

Name of pipe extruder:

Pipe trademark(s):

Designation and composition reference (1) :

For peelable layers, reference of the composition of the peelable layer:

Nominal outside diameter Dn (mm)	SDR	Nominal pressure NP (bar)	Nominal thickness WT (mm)	Identification of the extrusion line

(1) Specify designation (PE80, PE100, PE100-RC, PE100-RD) and commercial reference

For Group 2, a pipe type is characterised by a nominal outside diameter, a nominal thickness and a nominal pressure, a composition and an extrusion line Therefore, enter the pipe dimensions and the nominal pressure for each extrusion line for the composition concerned in the table above.

NOTE: A technical file must be provided for each extrusion line, specifying the extrusion line, the moulds and the manufacturing parameters.
Enter the identification of the extruder indicated in the table above in each technical file.

Date:

Stamp and signature

EXTRUDER FILE
FORM 2e

TYPES OF PIPES SUBMITTED FOR CERTIFICATION

GROUP 3 - IRRIGATION APPLICATIONS

Feed pipes ☐
Reels pipes ☐
Watering pipes ☐

Name of pipe extruder:

Pipe trademark(s):

Designation and composition reference (1) :

Nominal outside diameter Dn (mm)	SDR	Nominal pressure NP (bar)	Nominal thickness WT (mm)	Identification of the extrusion line

(1) Specify designation (PE80, PE100, PE100-RC, PE100-RD) and commercial reference

For Group 3, a pipe type is defined by a nominal outside diameter, a nominal thickness and a nominal pressure.

Date:

Stamp and signature

EXTRUDER FILE
FORM 2f

TYPES OF PIPES SUBMITTED FOR CERTIFICATION

GROUP 4 - APPLICATIONS IN INDUSTRY, NON-DRINKING WATER AND PRESSURISED SEWERAGE

Name of pipe extruder:

Pipe trademark(s):

Designation and composition reference (1) :

For peelable layers, reference of the composition of the peelable layer:

Nominal outside diameter Dn (mm)	SDR	Nominal pressure NP (bar)	Nominal thickness WT (mm)	Identification of the extrusion line

(1) Specify designation (PE80, PE100, PE100-RC, PE100-RD) and commercial reference

For Group 4, a pipe type is defined by a nominal outside diameter, a nominal thickness and a nominal pressure.

Date:

Stamp and signature

EXTRUDER FILE
FORM 2g

TYPES OF PIPES SUBMITTED FOR CERTIFICATION

GROUP 5 - APPLICATION IN CONTAINMENT OF ELECTRIC POWER TRANSMISSION

Name of pipe extruder:

Pipe trademark(s):

Designation and composition reference (1) :

Nominal outside diameter Dn (mm)	SDR	Nominal thickness WT (mm)	Identification of the extrusion line

(1) Specify designation (PE80, PE100, PE100-RC, PE100-RD) and commercial reference

For Group 5, a pipe type is defined by a nominal outside diameter and a nominal thickness.

Date:

Stamp and signature

FORM NO. 3a

EXAMPLE OF A MANDATE

(To be written on the applicant/holder's headed notepaper)

Information which needs to be provided:

- Corporate name: _____
- Address: _____
- Country: _____
- Phone number: _____ Fax number: _____
- SIRET number: _____ NAF code number: _____
- Name and position of legal representative: _____
- Name and position of contact person (if different): _____
- VAT number: _____
- Contact person's email address: _____
- Company's email address: _____
- Website: _____

Tasks to be carried out by the agent to be stated in the mandate between the applicant/holder and the agent

Applicant/Holder: .....

Agent: .....

Minimum requirements which need to appear in the mandate:

- tasks and associated responsibilities
- financial considerations (NF mark invoices)
- complaints
- certifying body contact person

Mandate:

The mandate must be recorded in the applicant/holder's quality system.

A copy of the authorisation in French or in English must be included with the co-signed certification.

Adherence to the requirements of the mandate is verified during the audits.

Date of initial mandate

Co-signature of the agent's and applicant's representatives

3.2. INITIAL EVALUATION PROCEDURE

3.2.1. REVIEW OF THE APPLICATION FOR CERTIFICATION

The attached application and file, addressed to the LNE, are reviewed before the factory checks and testing.

Upon receipt of the application, LNE will verify that:
- All requested documents (listed in paragraph 3.1.2) are included
- the items included in the file adhere to the certification rules.
- fees are paid.

LNE will also ensure that it has all it requires to respond to the application. It may request more information for the file if it is incomplete.

Once the application is accepted, LNE will organise inspections and will inform the applicant of the process (auditor, length of the audit, sites to be audited, laboratories, samples etc.). If appropriate, it will inform the applicant of the deadline for submitting extra information.

The inspections carried out for NF certification are as follows
- Audits, which aim to cover all those involved in design, manufacturing, assembly, quality control, marking and packaging of products (see paragraph 3.2.2).
- Product testing (see § 3.2.4),

Test samples are taken during the initial audit and sent by the applicant to the designated mark laboratory.

3.2.2. AUDIT: APPLICATION FOR CERTIFICATION OF COMPOSITIONS

The investigation of the application involves an initial audit of the factory where the compositions presented in the file are manufactured. If appropriate, it also involves an audit, based on the same benchmarks, of any other sites which are involved and described in the Application for Certification. The audit is conducted by auditors, qualified by the LNE, who are bound to confidentiality.

The audit will be carried out in either French or English. If required, the company being audited has the responsibility for providing the auditor with an interpreter. In that case, the length of the audit may be increased (prior agreement with the company).

Every mean (documents, sites, installations, equipment) which will help the NF auditor to carry out their job, must be placed at their disposal, as must competent staff to carry out the work.

3.2.2.1. Quality audit

This audit is carried out as per the general principles for quality audits defined in the ISO 19011 standard. In particular, the scope of the audit, and how it will be carried out, will be detailed in an audit plan which will be sent to the company beforehand.
Auditors:

- Conduct a quality audit aimed at verifying the existence and implementation of a quality management system. They will also check the system's adherence to the quality requirements detailed in part 2 of these rules.
- Take the samples required for the certification tests.

- Have tests carried out on the compositions submitted for certification (batches sampled) in their presence in order to verify the conditions of the tests carried out by the producer.

NB: The results of tests obtained during the audit will not influence the results obtained in the standard's laboratory.

- If appropriate, examine the scope of the contract with the agent and/or with the different sites involved and described in the application for certification.

The auditors may, with the company's permission, take a copy of all documents which they think are necessary.

The duration of the audit is 2.5 days x 2 on-site auditors (including on-site report writing).

The duration of the audit can be modified to suit the sites to be audited, in particular for subcontracting or outsourcing of activities and the number of products to be audited (prior agreement of the applicant).

The audit leader will write up a report, which will be provided to the applicant during the closing meeting specifying the efficiency of the quality system in place, the strong points, the conform points to monitor and give an explicit statement of non-conformities. It will also contain a report detailing the tests carried out during the audit, and the sample sheet.

A non-conformity is classified as major when, on the basis of objective evidence:

- there is a significant risk for the product's compliance with specified requirements (requirements formulated by the standard, by the company or by its customers),
- or there is the presence of a significant risk for the ability of the management system to control the product's compliance with a specified requirement,
- or there is systematic or repeated non-compliance with a specified requirement.

In other cases, a non-conformity is classified as minor.

Any notified non-conformity is the subject of a response with analysis of the causes, corrections and corrective actions proposed by the applicant. An action plan to respond to a major or minor non-compliance is sent to the Audit Manager for evaluation within 3 weeks of the end of the audit.

In the context of a major non-conformity:

- The tangible evidence guaranteeing the implementation of the correction to eliminate this non-compliance must be transmitted with the action plan.
- Tangible evidence guaranteeing the implementation of the corrective action associated with this non-compliance is sent to LNE within the time limits requested by LNE.

In the context of a minor non-conformity, the tangible evidence guaranteeing the implementation of the correction making it possible to eliminate this non-conformity and the associated corrective action is sent to LNE at the latest during the following audit. in order to be verified on site, unless specifically requested by LNE.

The completed report is sent by e-mail, by LNE to the contact person(s) designated by the applicant. If applicable, a copy shall be sent to the agent.

3.2.2.2. Sampling

The manufacturer must make all compositions submitted for certification available to the lead auditor for the required sampling.

The auditors will take the samples necessary, which have been validated as per the manufacturer's quality control system, for testing.

The samples must be taken in the producer's workshops or store, on an industrial manufacturing scale.

They consist of ~ 1 kg of the composition concerned and, where appropriate, 1 kg of the labelling composition(s).

Moreover, around 5 m x 1 m of pipes with ∅ ≥ 63 mm must be made available by the producer.

These pipes must be extruded under conditions accepted by the producer and the extruder and reported to the LNE.

The samples taken will be given a distinctive mark by the auditors so that the sample can be identified at a later time, and they must be accompanied by instructions for identification of the manufacturing batch.

The samples are sent within two weeks by, and under the responsibility of, the manufacturer to the mark laboratory (see part 5 of these certification rules) tasked with conducting the tests, accompanied by the sample sheet, unless the auditors decide to take responsibility for them.

A control sample (~ 10 kg), fully identified in the presence of the auditor, must be kept by the producer for a minimum of one year.

3.2.3. AUDIT: APPLICATION FOR CERTIFICATION OF PIPES

The investigation of the application involves an initial audit of the factory where the pipes presented in the file are manufactured. If appropriate, it also involves an audit, based on the same benchmarks, of any other sites which are involved and described in the Application for Certification.

It is carried out by auditors, qualified at LNE, who are bound to confidentiality.

The audit will be carried out in either French or English. If required, the company being audited has the responsibility for providing the auditor with an interpreter. In that case, the length of the audit may be increased (prior agreement with the company).

Every mean (documents, sites, installations, equipment) which will help the NF auditor to carry out their job, must be placed at their disposal, as must competent staff to carry out the work.

3.2.3.1. Quality audit

This audit is carried out as per the general principles for quality audits defined in the ISO 19011 standard. In particular, the scope of the audit, and how it will be carried out, will be detailed in an audit plan which will be sent to the company beforehand.

Auditors:

- Conduct a quality audit aimed at verifying the existence and implementation of a quality management system. They will also check the system's adherence to the quality requirements detailed in part 2 of these rules.
- Conduct a dimensional inspection: (average outside diameter, thickness, ovalisation on straight and coiled pipes) on all types of pipes covered by the application, including pipes with coating removed in the case of peelable pipes.

The measurements are taken on 4 reels, cable drums or straight bars (samples):
- If at least two samples are unsatisfactory, the type is declared non-compliant for the characteristic in question.
- If one of the samples is unsatisfactory, three new samples of the same batch are randomly re-tested: these new measurements must be satisfactory for the characteristic to be confirmed as compliant

In the event of repeated tests, measures must be taken after the samples are packaged in the reference atmosphere (18 to 25°C) for at least 30 minutes.

NOTE: for checks using reels and cable drums, straight pipe ovalisation may be measured at the straight end of these packaged items. In the event of litigation, straight pipe ovalisation must be confirmed on the straight bar to confirm the absence of any stress effect resulting from tightening of the straight end.

- Witness the extrusion of the type of pipes that will be sampled; for groups 1 and 2, the manufacturing parameters of all types of pipes submitted for certification, with their tolerance, must be communicated by the extruder
- Take the samples required for the certification tests.
- Have tests carried out on the sampled pipes in their presence, both uncoated and coated (once the peelable layer is removed in the case of peelable pipes), in order to check the conditions under which the tests are run by the manufacturer.
- If appropriate, examine the scope of the contract with the agent and/or with the different sites involved and described in the application for certification.

The auditors may, with the manufacturer’s agreement, take a copy of all documents they deem necessary.

The duration of the audit is 2.5 days x 2 auditors (including on-site report writing).

The duration of the audit can be modified to suit the sites to be audited, in particular for subcontracting or outsourcing of activities and the number of products to be audited (prior agreement of the applicant).

The audit leader will write up a report, which will be provided to the applicant during the closing meeting specifying the efficiency of the quality system in place, the strong points, the conform points to monitor and give an explicit statement of non-conformities. It will also contain a report detailing the tests carried out during the audit, and the sample sheet.

A non-conformity is classified as major when, on the basis of objective evidence:
- there is a significant risk for the product's compliance with specified requirements (requirements formulated by the standard, by the company or by its customers),
- or there is the presence of a significant risk for the ability of the management system to control the product's compliance with a specified requirement,
- or there is systematic or repeated non-compliance with a specified requirement.

In other cases, a non-conformity is classified as minor.

Any notified non-conformity is the subject of a response with analysis of the causes, corrections and corrective actions proposed by the applicant. An action plan to respond to a major or minor non-compliance is sent to the Audit Manager for evaluation within 3 weeks of the end of the audit.

In the context of a major non-conformity:

- The tangible evidence guaranteeing the implementation of the correction to eliminate this non-compliance must be transmitted with the action plan.
- Tangible evidence guaranteeing the implementation of the corrective action associated with this non-compliance is sent to LNE within the time limits requested by LNE.

In the context of a minor non-conformity, the tangible evidence guaranteeing the implementation of the correction making it possible to eliminate this non-conformity and the associated corrective action is sent to LNE at the latest during the following audit. in order to be verified on site, unless specifically requested by LNE.

The completed report is sent by e-mail, by LNE to the contact person(s) designated by the applicant. If applicable, a copy shall be sent to the agent.

3.2.3.2. Samples

The manufacturer must make all types of pipes submitted for certification available to the lead auditor for the required sampling.

The auditors will take the samples necessary, which have been validated as per the manufacturer's quality control system, for testing.

- Sampling of granules:

1 kg of granules of base composition and labelling compositions from the same batch as that used for the extrusion of the sampled pipes,

- Sampling of pipes:

The samples taken must have been extruded in the manufacturer's workshops, under industrial manufacturing conditions.

Pipes submitted for certification	Samples required for certification of all pipes
Group 1 and/or group 2 + potentially groups 3 and 4	1 sample consisting of 30 m of uncoated pipes and 30 m of coated pipes in the case of peelable pipes (samples ≥ 1 m long) . produced with each composition defined in the certification application . sampled at the beginning, middle and end of extrusion (~ 10 m each time) . diameter defined depending on types (composition, extrusion line, diameter) submitted for certification and chosen by mutual agreement between the extruder and the LNE
group 3 and/or group 4 and/or group 5	1 sample consisting of 30 m of group 3 or 4 pipes: . produced with each composition defined in the certification application . sampled at the beginning, middle and end of extrusion (~ 10 m each time) . diameter left to the choice of the extruder

The samples (pipes and granules) must be accompanied by instructions for the identification of the batches of composition and pipe (manufacturing batch number - date of manufacture, etc.).

They are marked by the auditor with a distinctive sign so that they can be authenticated later and sent by and under the responsibility of the manufacturer to the mark laboratory responsible for running the tests, accompanied by the sampling sheet, unless the auditor decides to take responsibility for them.

Control samples, fully identified in the presence of the auditor, must be kept by the extruder for a minimum of one year.

3.2.4. CERTIFICATION TESTS

3.2.4.1. Application for certification of compositions

Certification of compositions is based on the results of the tests defined in tables 1 and 2 below; tests run on granules and pipes:

. by the mark laboratory upon receipt of the samples taken during the certification audit, for completion no later than 4 months from receipt of the samples.

. by the producer: results reported in the certification application file. Regarding regression curves, the conditions used for the extrusion of the pipes undergoing the pressure tests will be presented to the mark committee with the results obtained.

A report on the tests carried out on the samples is sent by e-mail, by LNE to the contact person or people designated by the applicant. If applicable, a copy shall be sent to the agent.

In the event of non-compliance, the producer reports its analysis of the causes to the LNE and the corrective actions adopted with a specification of the time frame.
In addition to the provisions defined by the Terms and Conditions of Sale and Performance of the Services of the LNE, the producer may take further samples, prepared or unprepared, within 30 days of the test report being issued.

TABLE 1 - INITIAL CERTIFICATION TESTS FOR BASE COMPOSITION TESTS

Tests method described in part 2		Use involved (pipe group number)	Initial certification tests	
			Observations	number of tests
SURGRANULES	Density	1-2-3-4-5	1) The result are to be compared with the values obtained by the Producer	1
	Melt-flow index	1-2-3-4-5		1
	Oxidation stability	1-2-3-4-5		1
	Carbon black content	1-2-3-4-5		1
	Dispersion of carbon black	1-2-3-4-5		1
	Volatile materials content	1-2-3-4-5		1
	Organoleptic properties	2		1
	Food compatibility	2	The certificate of compliance with the fraud control lists for products in contact with foodstuffs must be provided by the producers.	
	Resistance to slow crack propagation of PE 100-RC whether or not it has the PE 100-RD characteristic: Strain-hardening test (SHT)	1-2-3-4-5	Results given in the composition technical file (cf. § 3.1.2.1.)	
	Resistance to slow crack propagation of PE 100-RC whether or not it has the PE 100-RD characteristic: Cracked round bar test (CRB)	1-2-3-4-5	Results given in the composition technical file (cf. § 3.1.2.1.)	
	Resistance to slow crack propagation of PE 100-RC whether or not it has the PE 100-RD characteristic: Accelerated full notch creep test (AFNCT)	1-2-3-4-5	Results given in the composition technical file (cf. § 3.1.2.1.)	
SURTUBES	Health compliance	2	Certificate of compliance with Ministerial Order dated 29.05.97 provided in the composition technical file (cf. § 3.1.2.)	
	Resistance to gas components	1	Results provided in the composition technical file (see § 3.1.2.1.)	
	Long-term stress	1-2-3-4-5	The results, accompanied by the calculation formula, shall be provided by the producer in the technical file (see 3.1.2.1.) together with the extrusion conditions used for the manufacture of the pipes undergoing testing and the identification of the laboratory that ran the tests	
	Resistance to rapid crack growth (test S 4)	1-2-4-5	Results provided in the composition technical file (see § 3.1.2.1.)	
	Resistance to slow crack propagation of PE 100-RC notched pipe test 8760 h (2)	1-2-3-4-5	Results given in the composition technical file (cf. § 3.1.2.1.)	1 test on 3 specimens

TABLE 1 - INITIAL CERTIFICATION TESTS FOR BASE COMPOSITION TESTS (CONTINUED)

Tests method described in part 2		Use involved (pipe group number)	Initial certification tests	
			Observations	number of tests
	Resistance to slow crack propagation of PE 100-RC: Accelerated notched pipe test (ANPT) (2)	1-2-3-4-5	Results given in the composition technical file (cf. § 3.1.2.1.)	
	Resistance to slow crack growth of PE 80, PE 100, PE 100-RD and PE 100-HT: notch pipe test 500h	1-2-4-5	In the case of certifications combined with a pipe extension: consideration of tests run on pipes sampled at the beginning, middle and end of extrusion	1 test on 3 specimens
	Resistance to chlorinated disinfectants of PE 100-RD	2	Results given in the composition technical file (cf. § 3.1.2.1.)	1 test on 1 specimen
	Thermal durability at 110°c of PE 100-HT	5	For compositions in PE100-HT. Result to be given in the technical file (cf. § 3.1.2.1)	1 test on 5 specimens
	Resistance to pressure at 80°C PE 80: 165 h - 4.5 MPa PE 80: 1,000 h - 4.0 MPa PE 100 – PE 100-RC – PE 100-RD – PE 100-HT: 165 h - 5.4 MPa PE 100 – PE 100-RC – PE 100-RD – PE 100-HT: 1,000 h – 5.0 MPa	1-2-3-4-5	In the case of certifications combined with a pipe extension: consideration of tests run on pipes sampled at the beginning, middle and end of extrusion	1 test on 1 specimen
	Welding compatibility	1-2-4-5	Results provided in the composition technical file (see § 3.1.2.1.)	

(1) test methods indicated in part 2
(2) as long as nonylphenol ethoxylate (trade name Arkopal N100) is not available on certain markets (a new lauramine oxide detergent (trade name Dehyton PL) is being developed as an alternative), the result of the NPT 8760 h test only is given in the technical file.

TABLE 2 - CERTIFICATION TESTS FOR IDENTIFICATION BAND COMPOSITIONS

	Observations	Certification
Evaluation of the technical file	The technical file provided by the producer must specify the characteristics of the identification band compositions and certify that they are made from a PE base polymer that is used for one of the pipe compositions for which welding compatibility has been established. they are made from the same resin as the base composition or other compositions with demonstrated welding compatibility for the same MRS and producer except for brown Group 4 pressure sewage identification bands and red Group 5 identification bands (other permitted base resins are accepted taking into account welding compatibilities) The identification bands of groups 1, 2, 3, 4 (sanitation) and 5 are yellow, blue, violet, brown and red respectively. All these compositions must be cadmium free. In the case of group 2 identification band compositions, the file must include a certificate of compliance with the Fraud Control lists for products in contact with foodstuffs	X
Tests (test methods in accordance with part 2)	Determination of oxidation stability	X

3.2.4.2. Application for certification of pipes

The certification tests for uncoated pipes and coated pipes, once the peelable layer is removed in the case of peelable pipes, are defined in the table below. They will be conducted by the mark laboratory as soon as the samples taken during the certification audit have been received, for completion no later than 4 months from the date of receipt of the samples.
A report on the tests carried out on the samples is sent by e-mail, by LNE to the contact person or people designated by the applicant. If applicable, a copy shall be sent to the agent.

In the event of non-compliance, the manufacturer reports its analysis of the causes to the LNE and the corrective actions adopted with a specification of the time frame.

In addition to the provisions defined by the Terms and Conditions of Sale and Performance of the Services of the LNE, the manufacturer may take further samples, prepared or unprepared, within 30 days of the test report being issued.

These tests will also be carried out by the manufacturer (in its laboratory or potentially any other laboratory that the LNE is informed of), with the results being communicated to the LNE.

The following certification requirements are specific to group 1 and 2 pipes

The certification is based on:

- the results of the complete tests (in accordance with the table below) conducted in the manufacturer's laboratory or any other laboratory accepted by the LNE following the opinion of the mark committee (if applicable), on:
  . pipes produced with each material and on each extrusion line defined in the certification application; the diameters submitted for testing are selected by mutual agreement between the extruder and the LNE on the following bases:
    - for group 1: 1 nominal diameter out of 2 in the presented range, up to a diameter of 125 mm and all larger diameters
    - for group 2: 1 nominal diameter out of 3 in the presented range
    - for groups 3, 4 and 5: 1 nominal diameter out of 6 in the presented range
  . the samples taken during the certification audit,

Note: all the results of these tests are to be reported to the LNE.

- the results of a full series of tests conducted by the mark laboratory on the samples taken during the certification audit (used to validate the results obtained by the manufacturer)

TABLE 3 - INITIAL PIPE CERTIFICATION TESTS

Tests (1)	Groups of applications concerned	Initial certification tests	
		Number of samples(2)	Observations
Appearance and marking (absence of logo NF)	1-2-3-4-5		Checks on pipes intended for the tests below
Dimensions	1-2-3-4-5		
Conventional density	1-2-3-4-5		Measurement to be taken on the extrudates of the melt flow index measurement on granules (batch used for the manufacture of the pipe)
Melt-flow index	1-2-3-4-5	1(b)	Measurement to be carried out on pipe and on granules (batch used for the manufacture of the pipe)
Carbon black content	1-2-3-4-5		Measurement to be carried out on granules (batch used for the manufacture of the pipe)
Dispersion of carbon black	1-2-3-4	1(b)	
Oxidation stability	1-2-3-4-5	1(b)	
Heat shrinkage	1-2-3-4-5	3(a)	
Tensile strength:	1-2-3-4-5	3(a)	
Resistance to hydraulic pressure at 20°C for: PE 80: 100 h - 10.0 MPa PE 100– PE 100-RC – PE 100-RD : 100 h - 12.0 MPa	1-2-3-4-5	1(b)	
Resistance to hydraulic pressure at 80°C for: PE 80: 165 h - 4.5 MPa PE 100– PE 100-RC – PE 100-RD : 165 h - 5.4 MPa PE 80: 1,000 h - 4.0 MPa PE 100– PE 100-RC – PE 100-RD : 1,000 h – 5.0 MPa (3)	1-2-3-4-5	1(b) 3(a)	(3)
Organoleptic properties	2	1(b)	
Resistance to slow crack growth : pipe e ≤ 5 mm: cone test PE 80, PE100, PE 100-RD	1-2	3(a)	
Resistance to slow crack growth : pipe diameter ≤ 200 mm - cone test PE 100-RC	1-2	3(a)	
Resistance to slow crack growth PE 80, PE100, PE 100-RD et PE 100-HT : pipe e > 5 mm - notch test	1-2-5	3 (a)	
Circumferential shrinkage (for ND ≥ 250 pipes	1	1b	
Resistance to slow crack propagation PE 100-RC: Strain-hardening test (SHT) for pipes in the d n < 75 mm size group	1-2-3-4-5	1(b)	
Resistance to the slow crack propagation PE 100-RC: Cracked round bar test (CRB) for pipes in the 250 ≤ d n < 710 or 710 ≤ d n ≤ 1000 size group on pipes >16 mm thickness	1-2-3-4-5	1(b)	
Resistance to slow crack propagation PE 100-RC : Accelerated Notched Pipe Test (ANPT)) for pipes in size group 75 ≤ d n < 250 on 110 mm pipe SDR11 (4)	1-2-3-4-5	1(b)	
Thermal durability at 110°c for PE 100-HT	5		Test report drafted by the producer to be reported in the technical file for compositions in PE100-HT

TABLE 3 - INITIAL PIPE CERTIFICATION TESTS (CONTINUED)

Tests (1)	Groups of applications concerned	Initial certification tests	
		Number of samples(2)	Observations
Resistance to rapid crack growth: test S4	1 - 2		Test report drafted by the producer to be reported in the technical file (cf. § 3.1.2.2.)
Fitness for purpose	1 - 2		Declaration to be included in the technical file (see § 3.1.2.2.)
Health compliance	2		Certificate to be provided in the technical file (see § 3.1.2.2.)

(1) Test methods indicated in Part 2
(2) Corresponds to a sample from a pipe about 1 m long
(a) sample to be taken at the beginning, middle and end of extrusion
(b) sample to be taken at the middle of extrusion
(c) sample to be taken from stock declared compliant by the manufacturer
(3) When the test at 80°C – 1,000 h is not satisfactory, an investigation test shall be conducted in collaboration with the extruder and at its expense under the following conditions:
(a) brittle fracture: 1 single repeat test on 5 test pipes, all specimens must be conform
(b) ductile fracture: repeat test on 1 specimen per non-compliant specimen
Repetitions are conducted on pipes of the same manufacturing batch as the failed pipe for verification and determination of the possible causes of the defect (potential continuation of the test on a specimen until fracture)
(4) As nonylphenol ethoxylate (trade name Arkopal N100) is not available in some markets, the SHT test may be used for size group 2 (tube $75 \leq d_n < 250$) as an alternative test until a requirement for the use of a new detergent, lauramine oxide (trade name Dehyton PL) for the ANPT test has been defined.

3.2.5. REVIEW OF THE APPLICATION BY THE STANDARD COMMITTEE

LNE will carry out a review of the file and, if appropriate, it will perform extra verifications prior to presenting it to the Standard Committee.

A summary of the audit and test findings will be presented anonymously to the Standard Committee.

If applicable, the summary needs to state clearly the areas in which the products presented or the inspections put in place by the manufacturer do not comply rigorously with the requirements set forth in part 2 of these certification rules.

After examining the different sections of the file, the Standard Committee will suggest to either grant or refuse certification.

3.2.6. DECISION AND NOTIFICATION

Based on the results obtained while processing the application and the mark committee's recommendations, the LNE will notify the applicant of one of the following decisions:

a) Certification agreed

b) Certification refused

Pursuant to the LNE's decision to authorise certification, AFNOR Certification will grant the applicant the right to use the NF mark.

A decision may be deferred for the purpose of completing further investigation of the application.

The certification decision must be made no later than one year after the initial audit.

Once the right to use the NF mark has been agreed, the beneficiary will be known as the "holder". The continuance of this right is subject to the results of verifications described in section 4.

The right to use the NF mark is strictly limited to those products for which it has been agreed - i.e. the products defined as having come from duly defined factories and which have been manufactured under the conditions set out in the current certification rules.

3.2.7. APPEALING A DECISION

The applicant may appeal a decision made under Article 11 of the NF mark's general rules. The appeal is filed by registered letter with acknowledgement of receipt within 15 working days.

LNE will initially re-examine the file in light of the facts giving rise to the appeal. It notifies the applicant as to whether this decision is upheld or if there has been a new decision, within 15 working days of receipt of the appeal.

If the applicant wishes to maintain their challenge, they (or the beneficiary of the certification) may appeal against LNE's decision.

The appeal, which is non-suspensive, must have grounds. They are notified by registered letter with acknowledgement of receipt within 30 working days.

It will be examined by LNE within 30 working days of receipt and, where it relates to a certification decision or certification rules, will be examined by the standard committee. LNE will inform the appellant whether or not its decision has been upheld, within this time frame.
In the event that the appeal is upheld following examination and submission to the standard committee for their opinion, the appeal will be presented to LNE's Certification and Impartiality Committee, which presents its conclusions following examination of the case.

This last appeal is subject to a lump-sum payment by the applicant.

The Company is informed of the final decision by the LNE.

LABORATOIRE NATIONAL DE MÉTROLOGIE ET D'ESSAIS

Organisme certificateur mandaté par
AFNOR Certification

CERTIFICATION RULES

NF MARK
Polyethylene pipes for gaseous fuel distribution networks, drinking water distribution networks, irrigation and industrial applications, not drinkable water and pressurised sewerage, electrical transmission confinement

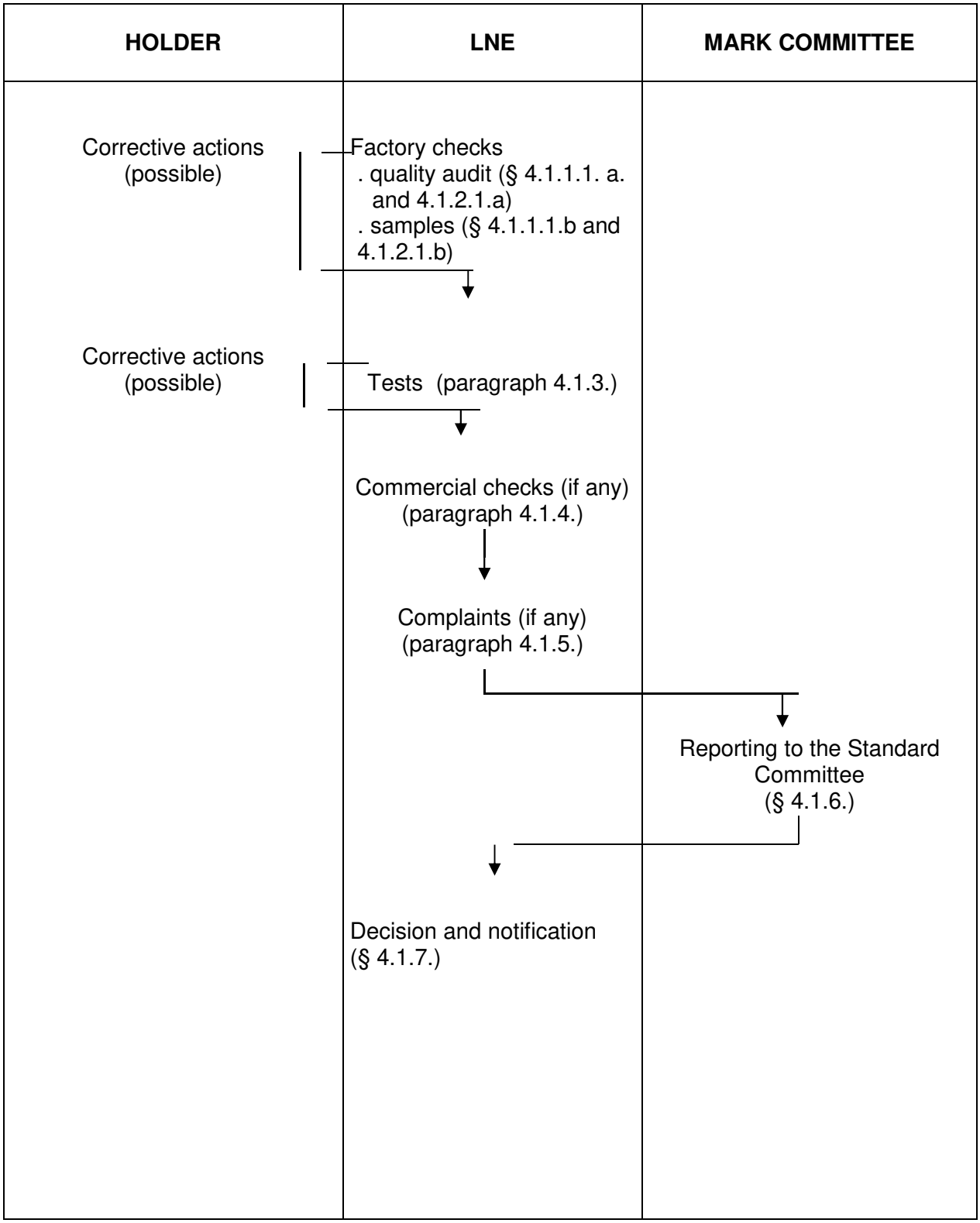
PART 4

MONITORING OF CERTIFIED PRODUCTS, MODIFICATIONS AND DEVELOPMENTS

SUMMARY

Rev. 40 - July 2025

MONITORING PROCEDURE



For the entire certification period, the holder must:

- Comply with the regulations and marking methods described in section 2.
- Systematically inform LNE of any changes to the characteristics of the certified products and/or of the company's structure which may affect certification:
- Changes concerning the holder (paragraph 4.2.1.)
- Change in the location of production (paragraph 4.2.2.).
- Change to the certified product, new products (paragraph 4.2.3.)
- Temporary cessation of production (paragraph 4.2.4.)
- Permanent cessation of production or surrender of the right of use (paragraph 4.2.5.)

Furthermore, LNE reserves the right to carry out any inspections which it deems necessary following:

- Modifications which concern the certified product or the quality organisation of sites involved and which are described in the initial certification application file.
- Complaints, disputes and litigation which it knows about and relating to the use of the NF Mark.

4.1. MONITORING OF CERTIFIED PRODUCTS

LNE organises the monitoring of certified products.

This aims to monitor whether or not the manufacturer is adhering to the requirements described in the certification rules.

The monitoring methods used also depend on the decisions made after the prior checks.

4.1.1. FOR COMPOSITIONS

4.1.1.1. Audit

The first follow-up audit will take place within 1 year of the decision regarding certification.

At least one audit per year is conducted at the main manufacturing site and at the site responsible for the final checks on the certified products.

LNE decides which other site(s) to visit and the frequency of these visits on a case by case basis. It chooses which sites to visit from those involved and which are described in the original application for certification.

The duration of the audit can be modified:

- depending on the sites to be audited in accordance with the requirements listed in paragraph §3.2.1 (with the holder's prior permission).
- if a holder has several agents,
- if several holders use the same subcontractor.

Additional audits may be carried out at the suggestion of the mark committee or at the LNE's initiative.

The checks carried out are mainly aimed at verifying the modifications carried out, if appropriate, from the time of the last audit. These apply to: manufacturing, verification methods and any modifications to the organisation of the quality management system.

This quality audit is carried out as per the general principles defined in the ISO 19011 standard, for quality audits. In particular, the scope of the audit, and how it will be carried out, will be detailed in an audit plan which will be sent to the company beforehand.

The following steps are carried out during each audit:

- sampling of compositions for testing at the mark's laboratory (§ 4.1.1.2.b).

During the audit, the auditor will ask for compliance checks to be carried out on the accepted compositions in their presence, to verify the conditions under which the manufacturer carries out inspections. The tests are preferably run on the sample taken for the mark's laboratory tests.

NB: The results of tests obtained during the audit will not influence the results obtained in the standard's laboratory.

Also during each audit, the auditor verifies the results of the pressure tests conducted to check the constancy of the regression curves, the results of the crack growth resistance tests run by the producer and in one out of two audits, the results of S4 tests.

The auditor may, with the manufacturer's agreement, take a copy of all documents they deem necessary.

a. Quality audit

The audit must include verification of the specific requirements of the NF mark (see § 2.2.2. part 2).

The general requirements (§ 2.2.1, part 2) are verified during the follow-up audits in alternating years.

The duration of the audit is 2 days x 2 on-site auditors or 3 days x 1 on-site auditor following the previous described dispositions (cf. 4.1.1.1).

The audit leader will write up a report, which will be provided to the applicant during the closing meeting specifying the efficiency of the quality system in place, the strong points, the conform points to monitor and give an explicit statement of non-conformities. It will also contain a report detailing the tests carried out during the audit, and the sample sheet.

A non-conformity is classified as major when, on the basis of objective evidence:

- there is a significant risk for the product's compliance with specified requirements (requirements formulated by the standard, by the company or by its customers),
- or there is the presence of a significant risk for the ability of the management system to control the product's compliance with a specified requirement,
- or there is systematic or repeated non-compliance with a specified requirement.

In other cases, a non-conformity is classified as minor.

Any notified non-conformity is the subject of a response with analysis of the causes, corrections and corrective actions proposed by the applicant. An action plan to respond to a major or minor non-compliance is sent to the Audit Manager for evaluation within 3 weeks of the end of the audit.

In the context of a major non-conformity:

- The tangible evidence guaranteeing the implementation of the correction to eliminate this non-compliance must be transmitted with the action plan.
- Tangible evidence guaranteeing the implementation of the corrective action associated with this non-compliance is sent to LNE within the time limits requested by LNE.

In the context of a minor non-conformity, the tangible evidence guaranteeing the implementation of the correction making it possible to eliminate this non-conformity and the associated corrective action

is sent to LNE at the latest during the following audit. in order to be verified on site, unless specifically requested by LNE.

The completed report is sent by e-mail, by LNE to the contact person or people designated by the holder. If applicable, a copy shall be sent to the agent.

b. Samples

The samples are taken randomly from each accepted composition.
The auditors will take the samples necessary for the tests, which have been validated as per the manufacturer's inspection plan (~ 1 kg of granules of the base composition and labelling compositions). A sampling sheet is completed by the auditors and attached to the audit report.

The samples obtained must be accompanied by instructions enabling their manufacturing batch to be identified.

The samples taken will be given a distinctive mark by the auditors, allowing them to identify them at a later time. They will be sent to the mark's laboratory tasked with carrying out the tests within two weeks by/under the responsibility of the manufacturer, unless the auditor decides to take responsibility for them.

A control sample (10 kg), fully identified and sealed in the presence of the LNE representative, must be kept by the producer for a minimum of one year.
NOTE: in the event of a particular context (health or security for example), which may result in travel restrictions, alternative arrangements for remote audits based on the international recommendations of the International Accreditation Forum (IAF ID3 and IAF MD4) may be organized.
LNE maintains a guide for preparing remote audits and defines the procedures in consultation with the auditor and the contractor regarding the impact on the organization, preparation and performance of the audit and samples. .
In the event of a difficulty observed and / or in the event of the persistence of this particular context, LNE may study the necessary additional measures on a case-by-case basis with the brand committee.

4.1.2. FOR PIPES

4.1.2.1. Audits

The first follow-up audit will take place within 6 months of the decision regarding certification.

Two audits are conducted per year at the main manufacturing site and at the site responsible for the final checks on the certified products, one of which is unannounced.

LNE decides which other site(s) to visit and the frequency of these visits on a case by case basis. It chooses which sites to visit from those involved and which are described in the original application for certification.

The duration of the audit can be modified:

- depending on the sites to be audited in accordance with the requirements listed in paragraph § 3.2.1 (with the holder's prior agreement).
- if a holder has several agents,
- if several holders use the same subcontractor.

Additional audits may be carried out at the suggestion of the mark committee or at the LNE's initiative.

The checks carried out are mainly aimed at verifying the modifications carried out, if appropriate, from the time of the last audit. These apply to: manufacturing, verification methods and any modifications to the organisation of the quality management system.

This quality audit is carried out as per the general principles defined in the ISO 19011 standard, for quality audits. In particular, the scope of the audit, and how it will be carried out, will be detailed in an audit plan which will be sent to the company beforehand.

The checks include:

- sampling of uncoated and coated pipes in the case of peelable pipes (once a year during the unannounced audit) for tests at the mark's laboratory to ensure the validity of the results obtained by the manufacturer (§ 4.1.2.2 b). The coated pipe tests are conducted on bare pipe once the peelable layer is removed.
- verification of assessment of material flows (see section 2.2),
- at least once a year, a dimensional inspection (average outside diameter, thickness, ovalisation on a straight and coiled pipe) on at least 10 types of uncoated pipes and/or coated pipes for peelable pipes in stock, distributed across all groups, for comparison with the results recorded by the manufacturer.

  The measurements are taken on 4 reels, cable drums or straight bars (samples):
  . If at least two samples are unsatisfactory, the type is declared non-compliant for the characteristic in question.
  . If one of the samples is unsatisfactory, three new samples of the same batch are randomly re-tested: these new measurements must be satisfactory for the characteristic to be confirmed as compliant

NOTE: for checks using reels and cable drums, straight pipe ovalisation may be measured at the straight end of these packaged items. In the event of litigation, straight pipe ovalisation must be confirmed on the straight bar to confirm the absence of any stress effect resulting from tightening of the straight end.

In the event of repeated tests, measures must be taken after the samples are packaged in the reference atmosphere (18 to 25°C) for at least 30 minutes.

During the audit, the auditor will ask for compliance checks to be carried out on the accepted pipes in their presence, to verify the conditions under which the manufacturer carries out inspections. The tests are preferably run on the sample taken for the mark's laboratory tests.

NB: The results of tests obtained during the audit will not influence the results obtained in the standard's laboratory.

In addition, to verify the specific requirements indicated in § 4.2.4. on potential manufacture cessations, a check of the groups manufactured and the compositions used is performed.

The auditor may, with the manufacturer's agreement, take a copy of all documents they deem necessary.

a. Quality audit

The audit must include verification of the specific requirements of the NF Mark (see § 2.2.3, part 2); for the latter, the auditor verifies in particular the marking of all the NF or non-NF pipes (requirements § 2.2.3.2.).

During the audit, the production of an NF pipe must take place at least once a year in the presence of the auditor.

The general requirements (§ 2.2.1, part 2) are verified during the follow-up audits in alternating years.

The duration of the audit is 2.5 days x 1 on-site auditor for an unannounced audit, and 2 days x 1 on-site auditor for the other audits.

The audit leader will write up a report, which will be provided to the applicant during the closing meeting specifying the efficiency of the quality system in place, the strong points, the conform points to monitor and give an explicit statement of non-conformities. It will also contain a report detailing the tests carried out during the audit, and the sample sheet.

A non-conformity is classified as major when, on the basis of objective evidence:
- there is a significant risk for the product's compliance with specified requirements (requirements formulated by the standard, by the company or by its customers),
- or there is the presence of a significant risk for the ability of the management system to control the product's compliance with a specified requirement,
- or there is systematic or repeated non-compliance with a specified requirement.

In other cases, a non-conformity is classified as minor.

Any notified non-conformity is the subject of a response with analysis of the causes, corrections and corrective actions proposed by the applicant. An action plan to respond to a major or minor non-compliance is sent to the Audit Manager for evaluation within 3 weeks of the end of the audit.

In the context of a major non-conformity:
- The tangible evidence guaranteeing the implementation of the correction to eliminate this non-compliance must be transmitted with the action plan.
- Tangible evidence guaranteeing the implementation of the corrective action associated with this non-compliance is sent to LNE within the time limits requested by LNE.

In the context of a minor non-conformity, the tangible evidence guaranteeing the implementation of the correction making it possible to eliminate this non-conformity and the associated corrective action is sent to LNE at the latest during the following audit. in order to be verified on site, unless specifically requested by LNE.

The completed report is sent by e-mail, by LNE to the contact person or people designated by the holder. If applicable, a copy shall be sent to the agent.

b. Samples

During the unannounced audit, the auditors will take the samples necessary for testing coated and uncoated pipes, in the case of peelable pipes, that have been validated in accordance with the manufacturer's inspection plan, for testing at the mark’s laboratory. A sampling sheet is completed by the auditors and attached to the audit report.
The samples obtained must be accompanied by instructions which will allow their manufacturing lot number to be identified.

. sampling in the workshop:
- ~ 5 x 1 m of pipe, sampled from an extrusion line,
- ~ 500 g of base composition of the batch used to extrude the pipe (sampling from the hopper)

If manufacturing is not underway on the day of the unannounced audit, the pipe samples are taken from stocks, but a manufacturing campaign must be organised for the following announced audit so that the management arrangements for production on extrusion lines can be audited.

In addition, representative samples of batches of received base compositions must be retained in the laboratory for at least 1 year to compensate for the removal from the hopper.

. sampling from stock:

The choice is made so as to alternate between different types of pipes (group, diameter, material, extrusion line) and so as to scan all the characteristics of the mark's laboratory tests based on the accepted types.

- ~ 8 x 1 m (gr. 1-2-3-4 or 5)
  + possibly (depending on the group sampled) additional sampling in stock or workshop of 1 x 1 m of group 2 pipe for organoleptic tests
  + 1 x 1 m of group 1 or 2 pipe with a thickness of ≤ 5 mm or 1 x 1 m of group 1 or 2 pipe with a thickness > 5 mm (depending on the thickness of the main sample pipe)

The samples must be accompanied by instructions for the identification of the composition and pipe batch (manufacturing batch number - date of manufacture, etc.).

The samples taken will be given a distinctive mark by the auditors, allowing them to identify them at a later time. They will be sent to the mark's laboratory tasked with carrying out the tests within 10 days by/under the responsibility of the manufacturer, accompanied by the sampling sheet, unless the auditor decides to take responsibility for them.
A control sample (20 m of pipes of each sample taken from stock and from manufacture and 10 kg of granules taken during manufacture) properly identified in the presence of the LNE representative, must be kept by the extruder until the test report is received or discrepancies are remedied in the event of non-compliance.

NOTE: in the event of a particular context (health or security for example), which may result in travel restrictions, alternative arrangements for remote audits based on the international recommendations of the International Accreditation Forum (IAF ID3 and IAF MD4) may be organized.
LNE maintains a guide for preparing remote audits and defines the procedures in consultation with the auditor and the contractor regarding the impact on the organization, preparation and performance of the audit and samples. .
In the event of a difficulty observed and / or in the event of the persistence of this particular context, LNE may study the necessary additional measures on a case-by-case basis with the brand committee.

4.1.3. TESTS

4.1.3.1. Compositions

The tests run by the mark's laboratory on the samples taken during the follow-up audits are defined in the following tables.

A report on the tests carried out on the samples is sent by e-mail, by LNE to the contact person or people designated by the applicant. If applicable, a copy shall be sent to the agent.

The holder will inform LNE about any corrective actions taken after the discovery of a non-conformity.

- on granules

Tests (1)	Use involved (pipe group number)	Base composition:	Identification band compositions
Density	1-2-3-4-5	X	
Melt-flow index	1-2-3-4-5	X	
Oxidation stability	1- 2 -3- 4-5	X	X
Carbon black content	1-2-3-4-5	X	

Dispersion of carbon black	1-2-3-4-5	X	
Organoleptic properties	2	X	

(1) methods and specifications indicated in part 2

IMPORTANT NOTE: If LNE detects any non-conforming results, the manufacturer must implement the provisions described in section 2, paragraph 2.2.2. (Control of non-compliant product) for customer information and product recall.

In addition to the provisions defined by the Terms and Conditions of Sale and Performance of the Services of the LNE, the holder may take further samples, prepared or unprepared, within 30 days of the test report being issued.

4.1.3.2. Pipes

The tests run by the mark's laboratory on the samples taken during the follow-up audits are defined in the following table.

A report on the tests carried out on the samples is sent by e-mail, by LNE to the contact person or people designated by the applicant. If applicable, a copy shall be sent to the agent.

The holder will inform LNE about any corrective actions taken after the discovery of a non-conformity.

Tests (1)	Groups of applications concerned	Number of samples (2)	Observations
Appearance and marking	1-2-3-4-5		Checks on pipes intended for the tests below
Dimensions	1-2-3-4-5		
Density Conventional density	1-2-3-4-5		Measurement to be taken on the extrudates of the melt flow index measurement on granules (batch used for the manufacture of the pipe)
Melt-flow index	1-2-3-4-5	1	Measurement to be carried out on pipe and on granules (batch used for the manufacture of the pipe)
Carbon black content	1-2-3-4-5		Measurement to be carried out on granules (batch used for the manufacture of the pipe)
Dispersion of carbon black	1-2-3-4-5	1	
Oxidation stability	1-2-3-4-5	1	
Tensile strength:	1-2-3-4-5	1	
Heat shrinkage	1-2-3-4-5	1	In-process sampling during the audit
Resistance to hydraulic Resistance to hydraulic pressure at 80°C - 1,000 h 4.0 MPa (PE 80) 5.0 MPa (PE 100, PE 100-RC, PE 100-RD and PE 100-HT)	1-2-3-4-5	1	(3)
Organoleptic properties	2	1	

Resistance to slow crack growth: cone test (PE80, PE 100 and PE 100-RD)	1-2	1	Test run on pipe with thickness ≤ 5 mm
Resistance to slow crack growth: cone test (PE 100-RC with or without PE 100-RD characteristics)			Test run on pipe with diameter pipe ≤ 200 mm
Resistance to slow crack growth (PE 80, PE 100 and PE 100-HT) : notch test	1-2-4-5	1	Test run on pipe with thickness > 5 mm
Circumferential shrinkage (for ND ≥ 250 pipes)	1	1	
Resistance to slow crack propagation – Strain Hardening test (SHT) on pipe d n < 75 mm or 75 ≤ d n < 250 (PE 100-RC) (4)	1-2-3-4-5	1	

(1) Test methods indicated in Part 2
(2) Corresponds to a sample from a pipe about 1 m long
(3) When the test at 80°C – 1,000 h is not satisfactory, an investigation test shall be conducted in collaboration with the extruder and at its expense under the following conditions:
a) brittle fracture: 1 single repeat test on 3 test pipes, all specimens must be conform
b) ductile fracture: repeat test on 1 specimen per non-compliant specimen
Repetitions are conducted on pipes of the same manufacturing batch as the failed pipe for verification and determination of the possible causes of the defect (potential continuation of the test on a specimen until fracture)
(4) Since nonylphenol ethoxylate (trade name Arkopal N100) is not available in certain markets, the SHT test may also be used for size group 2 (tube 75 ≤ d n < 250) as an alternative test until a requirement for the use of a new detergent, lauramine oxide (trade name Dehyton PL), for the ANPT test has been defined.

IMPORTANT NOTE:

If LNE detects any non-conforming results, the manufacturer must implement the provisions described in section 2, paragraph 2.2.2. (Control of non-compliant product) for customer information and product recall.

In addition to the provisions defined by the Terms and Conditions of Sale and Performance of the Services of the LNE, the holder may take further samples, prepared or unprepared, within 30 days of the test report being issued.

4.1.4. COMMERCIAL CHECKS

In addition to the above provisions, verifications are carried out on samples taken from the distribution circuit or from construction sites (for diameters > 110 mm in particular). The results will be sent to the holder.

One sampling per year is performed by the LNE for each manufacturer, on one diameter, from each group if possible, for which the extruder holds the right to use the mark (manufactured for less than 2 years).
Samples may be sent directly to the LNE by a distributor, or by another customer.
The tests carried out on these samples relate to the identification characteristics of the material, the appearance and dimensions (marking, thickness, average diameter, ovalisation, density, melt-flow index, carbon black content, carbon black dispersion and oxidation induction time only for group 5 pipes extruded with PE100-HT composition). The results are compared with the specifications of the corresponding material and the results obtained by the manufacturer on the sampled pipe or otherwise on the batch of material used (with producer's analysis certificate) for the manufacture of the pipe.

These documents will be requested by LNE after the sample has been taken.

In case of non-conformity, additional tests may be carried out, if appropriate, in order to try to determine the cause.

The cost of the pipes and the expenses incurred as a result of the time spent sampling (journeys) and the testing expenses shall be borne by the manufacturer of the sampled pipes.
An invoice, with a copy of the pipe marking, should be sent to LNE by the distributor.

In the event of a discrepancy from the requirements of the NF mark, the LNE will be informed of the problem by the Chairman of the Mark Committee for further analyses and definition of the causes of the non-compliances encountered. To do this, the sample concerned is sent to the LNE; it must be properly identified (full marking on the pipe) and accompanied by information relating to:

. the sampling place (sampling sheet, copy of the invoice issued by the distributor with a reminder of the pipe marking),

. the tests (methods used, results)

The costs of the additional analyses are borne by the manufacturer of the sampled pipes if the discrepancy is confirmed. Otherwise, the bill will be met by the group of NF mark holders.

4.1.5. COMPLAINTS

If users complain to the LNE, checks may involve sampling or tests on the sites where the product is sold or used (in this case, the holder is asked to be represented when the samples are obtained and during testing).

If there is a suspicion that the NF mark is being used improperly, the evidence shall be sent to LNE. They will write a summary for AFNOR's legal department, which may take any legal action it deems fit, in accordance with article 13 of the general rules of the NF mark.

4.1.6. REPORTING TO THE STANDARD COMMITTEE

A summary of the tests carried out will be sent to the LNE's mark committee at least once a year.

The documents examined during each session of the mark committee must be presented anonymously.

If applicable, sanctions may be proposed by the mark committee.

4.1.7. DECISION AND NOTIFICATION

Based on the results of the tests carried out, aforementioned provisions and any proposals made by the mark committee, the LNE will notify the holder of the decision, which will be one of the following:

a) Renewal of the certificate, possibly with a request to carry out corrective actions.

b) Renewal of the certificate with formal notification to cease the infractions identified within a given time period. This may or may not be accompanied by an increase in the number of checks, tests and audits carried out (which may be unannounced).

c) Suspension of certification (a suspension can last for a maximum of 6 months, and may be renewed once. After this time, certification will be withdrawn).

It is specified in particular that an extruder holder who has received two non-conformities affecting the integrity of the composition that are not attributable to the material producer over the last three years will be automatically suspended for a minimum of six months.

List of non-compliances affecting the integrity of the composition:

- Use of a composition (base and/or identification stripe) not included in the list of approved compositions
- Non-compliant melt flow rate test
- Non-compliant oxidation induction time test
- Non-compliant tensile test
- Non-compliant slow crack propagation test on notched pipe
- Non-compliant 1000-hour hydrostatic pressure test

d) Withdrawal of certification.

In the case of b), c) and d) the costs of the extra verifications are payable by the holder, regardless of the results. The decisions are enforceable from the time of their notification.

If a serious infraction has been carried out, LNE may, after ensuring that the infraction has taken place, make any of the decisions listed above as a precautionary measure. It will be informed of the decisions made by the standard committee.

Certificates are renewed every 3 years.
When the decision is made before the certificate expires, the renewed certificate has a duration of more than 3 years.

4.1.8. APPEALING A DECISION

The holder may appeal a decision made under Article 11 of the NF mark's general rules. The appeal is filed by registered letter with acknowledgement of receipt within 15 working days.

LNE will initially re-examine the file in light of the facts giving rise to the appeal. It notifies the applicant as to whether this decision is upheld or if there has been a new decision, within 15 working days of receipt of the appeal.

If the applicant wishes to maintain their challenge, they (or the beneficiary of the certification) may appeal against LNE's decision.

The appeal, which is non-suspensive, must have grounds. They are notified by registered letter with acknowledgement of receipt within 30 working days.

It will be examined by LNE within 30 working days of receipt and, where it relates to a certification decision or certification rules, will be examined by the standard committee. LNE will inform the appellant whether or not its decision has been upheld, within this time frame.
In the event that the appeal is upheld following examination and submission to the standard committee for their opinion, the appeal will be presented to LNE's Certification and Impartiality Committee, which presents its conclusions following examination of the case.

This last appeal is subject to a lump-sum payment by the applicant.

The Company is informed of the final decision by the LNE.

4.2. MODIFICATIONS AND DEVELOPMENTS CONCERNING THE COMPANY STRUCTURE OR THE CERTIFIED PRODUCT

4.2.1. CHANGES CONCERNING THE HOLDER

In case of merger, liquidation or acquisition involving the holder, all rights of usage of the standard come to an automatic end (see article 4 of the general rules of the NF mark). The holder must inform LNE immediately of any decisions likely to lead to either a legal modification to the company or a change in its corporate name.

Failure to comply with this rule may lead to a suspension or withdrawal of the right to use the NF mark.

The LNE maintains the right to examine, in consultation with the mark committee if appropriate, the terms and conditions for renewed certification, if requested.

If the merger or acquisition results in nothing more than a change in the company's corporate name, without any modifications being made to the product, manufacturing process, material and human resources used, quality organisation and verification methods, the NF certificate can be updated upon receipt of a notification letter on the new company's headed notepaper.

4.2.2. MODIFICATIONS OF THE SITES COVERED BY CERTIFICATION

Before any partial or complete change of location of the activities described in the certification file, the holder must inform the LNE in writing of the planned changes. Counting from the date of the change of location, they must stop using the standard until they have been notified of LNE's decision.

The LNE's decision will be made after they have audited the new site and, if applicable, made a presentation to the mark committee (renewal of the certification or review of a new application with full or partial testing).

4.2.3. CHANGE TO THE CERTIFIED PRODUCT – NEW PRODUCTS

NF certified products must comply with the technical file included in the certification application, along with any observations which may have been made when certification was granted.

Accordingly, any change (including changes to the means of production and control and the quality assurance system put in place that may have a decisive influence on production compliance) that the holder wishes to make to the certified products must be reported in writing to the LNE.

The request for a new type and/or model will be the subject of a certification extension request for the right to use the NF Mark.

The modification will be provided as shown in the table below. It cannot be carried out until the LNE has agreed. The LNE must inform the holder of the method of investigation (acceptance, prior testing or referral to the mark committee) within 15 days.

The samples necessary to carry out testing will be sent by/under the responsibility of the applicant to the mark laboratory tasked with carrying out the tests. They must be marked so that they can be identified at a later time and they must be accompanied by instructions to identify the lot numbers of the materials used in their manufacture.

4.2.3.1. For compositions

The following modifications made to compositions already permitted to use the NF mark require a certification extension request. This application must be filed with the LNE (forms 1a and 1d, defined in part 3.1) accompanied by the updated technical file taking account of the new characteristics of the products. It leads to an audit and tests in accordance with the instructions hereafter.
The results of audits obtained for one or more certification(s) already issued for a producer may be totally or partially repeated.

a) Change of base polymer: change of polymer manufacturer, polymerisation process or chemical nature of the comonomer: considered as a new composition: extension treated as certification: cf part 3

b) Changes in the characteristics of the composition: see table below

Any other change will be analysed on a case-by-case basis

Any modification concerning already accepted labelling compositions must be reported to the mandated body.

TYPE OF CHANGE		CERTIFICATION CONDITIONS							
		audit	Physical characteristics (1) (3)	Resistance to slow crack growth (3)	Resistance to rapid crack growth (4)	Welding compatibility (4)	Resistance to hydraulic pressure at 20°C (2) (4)	Resistance to hydrostatic pressure at 80°C (2) (4)	Resistance to chlorinated disinfectants (3)
1	. ***Variation*** in the melt-flow index > 20 % or 0.1 g/10 min (the highest value)		X	X	X	X	X	X	X
2	. ***Variation*** in the melt-flow index ≤ 20 % or 0.1 g/10 min (the highest value)			X	X		X	X	
3	. ***Variation*** in density > 3 kg/m3		X	X	X	X	X	X	X
4	. ***Variation*** in density ≤ 3 kg/m3			X	X		X	X	
5	Production of the same base polymer on a different site	X	X	X	X		X	X	X
6	Production of the same base polymer with a new production line on the same site		X	X	X		X	X	X
7	Change of additives other than pigments Change of the chemical nature, addition or removal of an additive		X	X	X	X	X	X	X
8	Change in additive concentration (other than UV stabilisers) of at least 30%		X	X		X		X	X

(1) density, melt-flow index, oxidation stability, carbon black content and dispersion, volatile content, organoleptic properties
(2) running pressure resistance tests at 20 and 80°C: the tests are run on 3 specimens, at 2 stress levels, these being chosen on the original regression curve so that the break times are equal at 100 and 2,500 hours; the compositions thus tested must have superior break times
(3) LNE and manufacturer tests
(4) Manufacturer tests (submission of a results file)

4.2.3.2. For pipes

When an extruder is already admitted for use of the NF mark, any changes to the admitted products are treated as indicated in Table I below.

Any other changes must be reported to the LNE, which will study the procedures to be followed.

The request for possible extension of certification is to be addressed to the LNE (forms 2a, 2b, 2c, 2d, 2e, 2f, as appropriate) defined in part 3.1., accompanied by the update of the technical file for the group 1 and 2 pipes. It may lead to all or some of the scheduled tests being run.

The results of tests and audits obtained for one or more certifications already issued for the same extruder can be totally or partially repeated.

When tests carried out by the LNE are not requested, the type of pipe concerned will be sampled as part of the annual follow-up during subsequent audits. The quality management provisions relating to manufacturing changes are examined as a priority (work instructions, inspection plan, registration, etc.) during this audit.

TABLE I – Change request processing conditions

Type of change	Request to be sent to the mandated body	Requirements to be respected for agreement with the right to use the mark (notified by the LNE following examination of the file, except specific details)
Use of a new composition	Certification extension request (part 3) (which may be combined with a composition certification request)	- Complete file in accordance with part 3 § 3.1.2.2 - Results of all the tests run by the manufacturer (in accordance with the table in § 3.2.4.2) on pipes defined for each new composition and each extrusion line concerned; the diameters tested by the manufacturer are selected by mutual agreement between the extruder and the LNE on the following bases: . 1 nominal diameter out of 2 in the presented range, up to a diameter of 125 mm and all larger diameters for group 1 . 1 nominal diameter out of 3 in the presented range for group 2 . 1 nominal diameter out of 6 in the presented range for group 3, 4 and 5 - Results of all the tests carried out by the mark laboratory and the manufacturer on 1 type of pipe chosen, by mutual agreement between the extruder and the LNE, per composition requested.
Use of a composition that has undergone a change described in the table in § 4.2.3.1 for change types 2-4-5-6-8	Certification Extension Request (Part 3)	- Complete file in accordance with part 3 § 3.1.2.2 - Results of all the tests carried out by the manufacturer (based on the table in § 3.2.4.2) on pipes of the first manufacture run with the composition concerned (on a single sample) The certificate is issued upon receipt of the application
Use of a composition that has undergone a change described in the table in § 4.2.3.1 for change types 1-3-7	Certification Extension Request (Part 3)	- Complete file in accordance with part 3 § 3.1.2.2 - Results of all the tests run by the manufacturer (in accordance with the table in § 3.2.4.2) on pipes defined for each new composition and each extrusion line concerned; the diameters tested by the manufacturer are selected by mutual agreement between the extruder and the LNE on the following bases: . 1 nominal diameter per already admitted line in the presented range for gr.1 and gr. 2

TABLE I – Conditions for processing extension requests (continued)

Type of change	Request to be sent to the mandated body	Requirements to be respected for authorisation of the right to use the mark (notified by the LNE following examination of the file, except specific details)
Commissioning of a new extrusion line including a new extruder or Change of extruder of an already admitted line	Certification Extension Request (Part 3)	- File including: application letter, list of pipes submitted for certification, technical file update (see part 3 § 3.1.2.2., except for information specific to the composition (crack growth resistance tests), S4, Health Compliance Certificate, etc.) - Results of all the tests run by the manufacturer for each approved composition (in accordance with the table in § 3.2.4.2) on the defined pipes; the diameters tested by the manufacturer are selected by mutual agreement between the extruder and the LNE on the following bases: 1 nominal diameter out of 2 in the presented range, up to a diameter of 125 mm and all larger diameters for group 1 . 1 nominal diameter out of 3 in the presented range for group 2 . 1 nominal diameter out of 6 in the range shown for gr. 3, 4 and 5 - Results of all the tests run by the mark laboratory and the manufacturer on 1 type of pipe per type of PE concerned (PE 80 and PE 100 / PE 100-RC / PE 100-RD / PE 100-HT). The certificate is issued on the basis of the manufacturer's test results and the results of tests carried out in the marks's laboratory. As a provisional measure, however, the certificate will be issued without waiting for the results of the 500h notch pipe slow crack propagation resistance tests or the 1000h pressure resistance tests. The provisional certificate will be confirmed if all the validation tests carried out by LNE and the tests carried out by the manufacturer are satisfactory.
Work performed on an extrusion line modifying the characteristics provided in the file submitted during certification or that may influence the quality of the pipes obtained (moving to the same site for example)	Briefing note with details of the work carried out: based on its importance, it may lead to a certification extension request (agreement between the LNE and the extruder)	If an extension request was necessary: - results of all the tests run by the manufacturer on pipes after work on the line in question (agreement between the LNE and the manufacturer on the tests to be run)
New application groups: Group 1; extruder already admitted for group 2 with the same compositions, on the same extrusion lines	Certification extension request (Part 3)	- File including: application letter, list of pipes submitted for certification, technical file update (see section 3 § 3.1.2.2.), - any supplementary test results provided by the manufacturer if the dimensional range requested is different from that already admitted for group 2 (pipes defined upon agreement between the LNE and the extruder: 1 diameter out of 2 up to a diameter of 125 and all larger diameters)
Group 1; extruder already admitted for groups 3, 4	Certification application (part 3)	- File including: application letter, list of pipes submitted for certification, technical file update (see section 3 § 3.1.2.2.). - Results of all tests run by the manufacturer (in accordance with the table in § 3.2.4.2) on the defined pipes; the diameters tested by the manufacturer are selected for each new composition and each line concerned by mutual agreement between the extruder and the LNE on the basis of one nominal diameter out of 2 up to 125 mm and all larger diameters. - Results of all the tests run by the mark laboratory and the manufacturer on one type of pipe per type of PE concerned (PE 80 and / or PE 100 / PE 100-RC / PE 100-RD / PE 100-HT).

TABLE I – Conditions for processing extension requests (continued)

Type of change	Request to be sent to the mandated body	Requirements to be respected for authorisation of the right to use the mark (notified by the LNE following examination of the file, except specific details)
Group 2 (extruder already admitted for group 1 (same composition(s) and same line(s))	Certification Extension Request (Part 3)	- File including: application letter, list of pipes submitted for certification, technical file update (see 3 § 3.1.2.2.). - Supplementary test results provided by the manufacturer if the dimensional range requested is different from that already admitted for group 1 (1 diameter out of 3 from the presented range). - Results of tests run by the mark laboratory and by the manufacturer to ascertain the organoleptic properties on a sample sent by the manufacturer on pipes defined (diameters, materials) by the LNE in agreement with the extruder.
Group 3, 4 or 5: extruder already admitted for groups 1 or 2 (same composition(s), same line(s), same diameter(s))	Certification Extension Request (Part 3)	- File including: application letter, list of pipes submitted for certification, technical file update (see 3 § 3.1.2.2.). Note: For a request for a composition, diameter or line not already admitted in group 1 or 2, this will be treated as an extension of dimensional range.
Dimensional range	Certification Extension Request (Part 3)	- File including: application letter, list of pipes submitted for certification, technical file update (see 3 § 3.1.2.2.). - Results of all the tests run by the manufacturer for each composition and line concerned (in accordance with the table in § 3.2.4.2) on the defined pipes; the diameters tested by the manufacturer are selected by mutual agreement between the extruder and the LNE on the following bases: . 1 nominal diameter out of 2 in the presented range, up to a diameter of 125 mm and all larger diameters for group 1; . 1 nominal diameter out of 3 in the presented range for group 2. . :1 nominal diameter out of 6 in the presented range for group 3, 4 or 5.
New NP for diameters already admitted with the same material on the same extrusion line	Certification Extension Request (Part 3)	No additional tests - File including: application letter, list of pipes submitted for certification, manufacturing parameters, for each type submitted for certification.

4.2.4. TEMPORARY CESSATION OF PRODUCTION

The admitted products must be manufactured regularly.

The holder must keep the LNE informed of any temporary cessation of production or certified product inspection if the cessation lasts at least 6 months.

The holder must request a provisional suspension to the right of use of the standard (maximum length: 1 year) if they do not have any more products bearing the NF mark in stock. After this time, the right of use will be removed.

Before the expiry of the suspension, the holder must inform the LNE if manufacturing is resumed. Marketing of NF marked products is then carried out based on the performance of audits and/or tests (defined by the LNE).

For pipes:

The manufactured products are verified during annual monitoring audits (see § 4 - part 4):

- a statement of non-manufacture of a given group during 3 successive audits results in a suspension.
- a statement of non-manufacture with a given composition for a given group for 2 years results in a suspension.

The restoration of the right to use the mark is conditional, based on the submission of a complete file to the LNE in accordance with § 3.1.2.2 (test results in accordance with the table in § 3.2.4.2 at the manufacturer's premises with extrusion parameter sheets) and potentially an audit and tests at the LNE (to be defined by the LNE).

4.2.5. PERMANENT CESSATION OF PRODUCTION OR SURRENDER OF THE RIGHT OF USE

If the holder ceases manufacturing the certified product definitively, or if they surrender the right of use of the standard, they must inform LNE, stating how long they think it will take for the stock which bears the standard to be exhausted. The LNE will put forth the conditions under which the stock may be exhausted, after, if necessary, consulting with the mark committee.

The certificate emitted by LNE will remain valid for as long as the holder has a stock of NF certified products, as long as the tests keep being carried out on them.

LABORATOIRE NATIONAL DE MÉTROLOGIE ET D'ESSAIS

Organisme certificateur mandaté par
AFNOR Certification

CERTIFICATION RULES

NF MARK
Polyethylene pipes for gaseous fuel distribution networks, drinking water distribution networks, irrigation and industrial applications, not drinkable water and pressurised sewerage, electrical transmission confinement

PART 5

PARTICIPATING ORGANISATIONS

SUMMARY

Rev. 40 – July 2025

5.1. AFNOR CERTIFICATION

AFNOR is the owner of the NF mark and has granted an exclusive operating licence to AFNOR CERTIFICATION. AFNOR CERTIFICATION manages and oversees the NF certification system, which defines, in particular, the governance rules and operating procedures of the NF mark.

5.2. MANDATED BODY

AFNOR Certification entrusts management of the application of the Mark to the LNE.

Under this mandate, the LNE is accountable to AFNOR Certification for the management operations entrusted to it, as set out in the General Rules of the NF Mark.

Under Article 8 of the general rules of the NF Mark, all parties involved in the NF mark process are bound by professional secrecy. If necessary, at the request of the manufacturers, an agreement may be signed between the LNE and the manufacturer.

5.3. AUDITING BODIES

The LNE entrusts audits to the following organisations:

LABORATOIRE NATIONAL DE METROLOGIE ET D'ESSAIS (LNE)
1, rue Gaston Boissier
75724 PARIS CEDEX 15
Tel. 01 40 43 37 00

It may, however, call upon duly qualified external auditors in accordance with the LNE's procedures. This outsourcing of audits is formalised in a contract (due to independence and confidentiality requirements)

The holder or applicant must facilitate the operations that officers in charge of audits and inspections must perform as part of their assigned duties.

The LNE must be informed of any objection concerning the membership of an audit team within 10 days of receipt of the audit team's notification in order to be considered.

5.4. TEST BODIES

The LNE entrusts tests to the mark laboratories named below:

LABORATOIRE NATIONAL DE METROLOGIE ET D'ESSAIS (LNE)
Direction Essais et Certification (DEC) – Département Propriétés Physico-Chimiques des Matériaux
Direction de la Métrologie Scientifique et Industrielle (DMSI) – Département matériaux
29 Avenue Roger Hennequin
78197 TRAPPES
Tél. 01 30.69.10.00.

CEIS
Cra Móstoles a Villaviciosa de Odón Km 1,5
28935 Móstoles (Madrid) - SPAIN

Test laboratories wishing to perform tests must submit an application to the mandated body. The application is forwarded to the Mark Committee for an opinion.

Participating laboratories must meet the criteria defined by NF EN ISO/IEC 17025 and must have been accredited by COFRAC (French Accreditation Committee) or by a recognised European body within the previous 18 months.

On the proposal of the Mark Committee, the tests may be performed in the manufacturer's laboratory if the latter has a testing quality assurance system previously recognised by the LNE**.**

5.5. MARK COMMITTEE

5.5.1. FORMATION OF THE COMMITTEE

A mark committee is formed and assigned duties as set out in the general rules of the NF mark. Its members are appointed by the LNE, following approval by the LNE.

The duties of the Mark Committee are to:
- give an opinion on the certification rules and their development
- provide an opinion on potential communication or promotion activities relating to the mark. A special budget, to be decided each year by consultation with the committee, is earmarked for promotional activities.
- give an opinion on files presented for certification and in the event of an appeal against a decision

The committee must issue these opinions in accordance with the principles of impartiality.

It can be consulted by the LNE on any file as part of its monitoring activities.

The LNE convenes the members of the committee or informs them in writing at least once a year to present a summary of all the inspections carried out.
-
- All committee members undertake to:
- contribute their expertise to the operation of the NF mark,
- maintain confidentiality in respect of all the information of an individual nature divulged to them, until its publication by AFNOR Certification or the LNE,
- attend meetings regularly and, if necessary, regularly inform their proxies and send them the relevant documents,
- contribute to the development of the NF mark, i.e. to promote products or services certified under the mark.
-

Members mandate is renewable by tacit agreement.

In order to uphold the credibility and efficiency of the Committee's work, the LNE reserves the right to terminate a member's mandate in the following cases:
- failure to comply with the commitment to confidentiality,
- repeated unjustified absences from Committee meetings,
- general failure to comply with the above commitments.

The chair of the mark committee is appointed under the same conditions, following consultation with the mark committee. The rule is alternation between the colleges. However, the term of the chair may be extended for one or more years, if there is no candidate representing another college.

Performance of the duties of members of the mark committee is strictly personal. However, if a member is absent, a proxy is appointed and named under the same conditions as the actual members.

The LNE drafts the minutes of the comments and proposals put forward in the committee meetings. The minutes are sent to all Mark Committee members.

If necessary, the LNE invites AFNOR Certification to participate in the committee meetings.

Within the context of the revision of these certification rules, the LNE organizes the consultation and validation of the certification reference standard (in particular by consultation with AFNOR Certification as a stakeholder) .

5.5.2. COMMITTEE STRUCTURE

1 Chair (to be appointed by the members of the Mark Committee)
Vice-Chair:

- 1 representative of the Mandated Body: LNE - Pôle Certification Environnement Sécurité et Performance

<u>Representatives of manufacturers, unions and other industries</u>

3 mark-holding extruders and 1 representative of the Syndicat des Tubes et Raccords en polyéthylène (Polyethylene Pipe and Fittings Union) (representatives of the extruders' college are appointed on basis on one nomination and one vote by holders)
3 producers of compositions holding the mark, including 1 representative of PlasticsEurope (representatives of the producers are appointed by PlasticsEurope, with annual rotation of holders and substitutes members)

<u>Representatives of Users/Prescribers</u>

7 representatives of users, including:

- 1 representative of the French Gas Association (AFGAZ)
- 1 representative of gas distribution (GRDF)
- 1 representative of the Electricity Transmission Network (RTE)
- 2 representatives of drinking water companies
- 1 representative of building distribution

<u>Scientific and technical bodies,Government</u>

1 representative of AFNOR Certification
1 representative of the Bureau de Normalisation des Plastiques et de la Plasturgie (BNPP – Plastics and plastics processing standardisation bureau)
1 representative of auditors and testing laboratories
1 representative of CERTIGAZ
1 representative of ministry of environment

5.6. GUIDANCE COMMITTEE

A guidance committee is created in the context of this mark. It meets once a year. On this occasion, the LNE presents a general assessment of the mark's activity and general updates to the mark certification rules defined by the mark committee.

The committee issues an opinion on general developments but has no right to look at individual files.

The structure of the guidance committee is as follows:

1 Chair (to be appointed by the members of the Mark Committee)
Vice-Chair:

- 1 representative of the Mandated Body: LNE – Pôle Certification Environnement Sécurité et Performance

Representatives of manufacturers, unions and other industries

All pipe manufacturers holding the mark
All manufacturers of approved compositions
1 representative of PlasticsEurope
1 representative of the Syndicat des Tubes et Raccords en Polyéthylène (Union of Polyethylene Pipes and Fittings)
1 representative of fittings manufacturers

Representatives of end user and prescribing industries and administrations

1 representative of GRDF 1 representative of the French Gas Association (AFG)
2 representatives of drinking water companies
1 representative of the Electricity Transmission Network (RTE)
1 representative for distributors

Scientific and technical bodies
1 representative of the Bureau de Normalisation des Plastiques et de la Plasturgie (BNPP – Plastics and plastics processing standardisation bureau)
1 representative for auditors
1 representative for each testing laboratory
1 representative of CERTIGAZ

Government
1 representative of AFNOR Certification
1 representative of the Ministry of Economy, Finance and Budget - Directorate General of Competition, Consumption and Fraud Control
1 representative of the Ministry of Health - Directorate General of Health
1 representative of the Ministry of Ecological and Inclusive Transition

5.7. BUREAU

For efficiency reasons, the Mark Committee may delegate its powers to a bureau whose members are personally appointed and are chosen from members of the Mark Committee

The bureau's members are the Chair of the Mark Committee, a representative for manufacturers, a user representative, the LNE representative, the representative for the laboratories and the representative for the qualified auditors.

The bureau meets as and when required.

A report of the work undertaken by the board is presented at Mark Committee meetings.

5.8. SUB-COMMITTEES OR WORKING GROUPS

For certain non-recurring tasks of a technical nature not requiring all members of the Mark Committee to meet, a sub-committee may be formed, its members being personally appointed Mark Committee members. Outside professionals or other individuals may be invited to participate.

The tasks of this sub-committee will be specified by the Mark Committee; its duties will generally be limited to the preparation of projects and proposals or the provision of additional information on a particular subject on behalf of the Mark Committee.

"Certification rules review" working group:

The "certification rules review" working group meets annually to review and update certification rules. Its members are members of the committee plus all representatives of producers of compositions and pipe extruders holding the NF mark.

LABORATOIRE NATIONAL DE MÉTROLOGIE ET D'ESSAIS

Organisme certificateur mandaté par
AFNOR Certification

CERTIFICATION RULES

NF MARK
Polyethylene pipes for gaseous fuel distribution networks, drinking water distribution networks, irrigation and industrial applications, not drinkable water and pressurised sewerage, electrical transmission confinement

PART 6

APPLICABLE RATE – BILLING CONDITIONS

SUMMARY

Rev. 40 - July 2025

6.1. APPLICABLE RATE

The amounts charged for the services relating to certification and the supervision of the certified products are subject to an annually revised rate. The current year's rate is sent to all mark holders and is available for free consultation on the LNE website (www.lne.fr) or on request from the LNE.

A special budget is decided upon in consultation with the committee and earmarked for promotional activities.

Rates are in euros, excluding taxes. For test rates, samples must be delivered to the mark's laboratory, postage paid and cleared through customs where necessary.

6.1.2. BILLING OF ACCOMMODATION AND TRAVEL EXPENSES

Accommodation and travel expenses are met by the applicant or holder as defined in the schedule of rates.

6.1.3. CANCELLATION OF AN AUDIT

Any cancellation of an audit whose date has been agreed upon by the LNE and the company to be audited shall be billed on the following basis:

- cancellation 15 to 8 days before the scheduled date: 50% of the audit fee
- cancellation 7 to 3 days before the scheduled date: 75% of the audit fee
- cancellation from 2 days before the scheduled day: 100% of the audit fee.

Up to 100% of transport costs may be billed if they are not refundable or subject to withholding/penalties.

6.2. BILLING CONDITIONS

6.2.1. COLLECTION OF PAYMENT

The LABORATOIRE NATIONAL DE METROLOGIE ET D'ESSAIS (NATIONAL LABORATORY OF METROLOGY AND TESTING), the mandated body, is authorised to collect all payments due.

Bills issued by the LNE are payable within 45 days.

The applicant or holder must pay these bills under the set conditions: any non-payment on the part of the holder in fact impedes the LNE in the exercise of its inspection and intervention responsibilities under these rules.

If an initial formal notice served by registered letter with acknowledgement of receipt does not result in full payment of all amounts due within one month, the LNE may adopt precautionary measures in respect of certifications issued under the NF Mark, for all the approved products of the holder.

6.2.2. OBTAINING CERTIFICATION

For each request, the services provided are the investigation of the files, audits and tests.

The charge for the investigation of the file is paid in a single sum when the file is submitted and covers the investigation of the file, the presentation to the Committee and participation in the general operation of the mark.

All sums paid for the investigation of the file are non-returnable, irrespective of the outcome of the investigation.

6.2.3. MONITORING OF CERTIFIED PRODUCTS

Sums charged correspond to NF mark usage rights paid to **AFNOR Certification**, file monitoring, audits and tests.

In the event of approval during the year, billed amounts correspond to the services provided; file monitoring (technical investigation of the file) is billed pro rata.

Following product certification, the holder is billed **by the LNE** for an annual right to use the NF mark, paid to **AFNOR Certification**.

This usage right is intended to cover:

- the general operation of the NF mark (monitoring of organisations in the NF network, management of the NF Mark Committee)
- defence of the NF mark: filing and protection of the mark, legal advice, processing of abuses of the NF Mark, court fees,
- contributions to the general promotion of the NF mark.

The charge for file monitoring (technical investigation of the file) is non-refundable even if the certification is withdrawn or suspended following LNE decision or at the request of the holder.

As long as the holder still has stocks of NF-marked products, inspections continue and their expenses are billed, while file monitoring (technical investigation of the file) is charged pro rata.

6.2.4. ADDITIONAL CHECKS

The costs of additional checks following an LNE decision are borne by the applicant/holder, irrespective of the outcomes of the checks.