

WATER DISTRIBUTION OR DRAINAGE PIPES**Technical document**
08-03 Non-traditional

Heating and/or domestic distribution
and/or distribution of chilled water –
Drainage pipes

Technical document 08-03 Non-traditional rev. 02
17/04/2023

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

CSTB (Centre Scientifique et Technique du Bâtiment), a public establishment supporting innovation in construction, has four key activities—research, expertise, assessment and dissemination of knowledge—organised to meet the challenges of ecological and energy transition in the construction sector. Its fields of expertise include construction materials, buildings and their integration into districts and towns.

With over 900 employees, its subsidiaries and networks of national, European and international partners, the CSTB group works for all the stakeholders in the construction sector to advance building quality and safety.

Any reproduction or representation, in whole or in part, by whatever means, of the pages published in this technical document and executed without the authorisation of CSTB is illegal and constitutes a counterfeit. The only authorised exceptions are 1) reproductions strictly reserved for the use of the typist and not intended for any collective use or 2) analyses and short quotations required due to the scientific or informational nature of the work in which they appear (article L.122-5 of the Intellectual Property Code). This document has been drawn up under the initiative and direction of CSTB, which has brought together the opinions of all interested parties.

© CSTB

MODIFICATION HISTORY

| Revision No. | Application date | Modifications |
|--------------|------------------|---|
| 00 | 16/11/2018 | Update to the document layout and reference Content modifications: Creation of technical document following transition of the products covered by this document to traditional status |
| 01 | 25/01/2021 | Integration of stiffness test for PP-M pipes claiming application area BD Reference to the specifications and test parameters of the Technical Assessment for density tests and longitudinal hot shrinkage |
| 02 | 17/04/2023 | <ul style="list-style-type: none"> - - § 2.1 Certified Characteristics - - Part 4 Marking |

Contents

| | |
|---|-----------|
| 1. STANDARDS..... | 5 |
| 1.1. Product standards..... | 5 |
| 1.2. Test standards..... | 5 |
| 2. CERTIFIED CHARACTERISTICS AND TEST METHODS..... | 7 |
| 2.1. Certified characteristics..... | 7 |
| 2.2. Test methods..... | 9 |
| 3. VERIFICATION REGIME | 14 |
| 4. MARKING..... | 15 |
| 5. SAMPLING FOR TESTS AT CSTB..... | 18 |

The requirements and provisions specified in this Technical Document will be updated in the case of new components or products.

1. STANDARDS

1.1. Product standards

NF EN ISO 607: Eaves gutters and fittings made of PVC-U - Definitions, requirements and testing

NF EN ISO 15877-2: Plastics piping systems for hot and cold water installations - Chlorinated poly(vinyl chloride) (PVC-C) - Part 2: Pipes

NF EN ISO 15877-3: Plastics piping systems for hot and cold water installations - Chlorinated poly(vinyl chloride) (PVC-C) - Part 3: Fittings

NF EN 1329-1: Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 1: Specifications for pipes, fittings and the system

NF EN 1451-1: Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) - Part 1: specifications for pipes, fittings and the system

1.2. Test standards

NF EN ISO 580: Plastics piping and ducting systems – Injection-moulded thermoplastics fittings – Methods for visually assessing the effects of heating

NF EN ISO 1133 (November 2005): Plastics - Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics

NF EN ISO 1167-1: Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 1: General method

NF EN ISO 1167-2: Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 2: Preparation of pipe test pieces

NF EN ISO 1167-3: Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 3: Preparation of components

NF EN ISO 1183-1: Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method

NF EN ISO 2505: Thermoplastics pipes - Longitudinal reversion - Test method and parameters

NF EN ISO 3126: Plastics Piping Systems - Plastics components - Determination of dimensions

NF EN ISO 6259-1: Thermoplastics pipes - Determination of tensile properties - Part 1: General test method

ISO 6259-2: Thermoplastics pipes - Determination of tensile properties - Part 2: Pipes made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) and high-impact poly(vinyl chloride) (PVC-HI)

ISO 6259-3: Thermoplastics pipes – Determination of tensile properties – Part 3: Polyolefin pipes

NF EN 727: Plastics piping and ducting systems - Thermoplastics pipes and fittings - Determination of Vicat softening temperature (VST)

NF EN ISO 527-1 - Plastics - Determination of tensile properties - Part 1: General principles

NF EN ISO 13844: Plastics piping systems - Unplasticised poly(vinyl chloride) (PVC-U) elastomeric-sealing-ring-type socket joints for use with PVC-U pipes - Test method for leaktightness under negative pressure

NF EN ISO 9311: Adhesives for thermoplastic piping systems - Part 2: Determination of shear strength

NF EN 744: Plastics piping and ducting systems - Thermoplastics pipes - Test method for resistance to external blows by the round-the-clock method

NF EN 1452-5: Plastics piping systems for water supply - Unplasticized poly(vinyl chloride) (PVC-U) - Part 5: Fitness for purpose of the system

NF EN 12061: Plastics piping systems - Thermoplastics fittings - Test method for impact strength

NF EN 12294: Plastics piping systems - Systems for hot and cold water

NF EN ISO 9969: Tubes made of thermoplastic materials - Determination of annular stiffness.

2. CERTIFIED CHARACTERISTICS AND TEST METHODS

2.1. Certified characteristics

The characteristics listed in the tables below will comply with the specifications given in the corresponding Technical Appraisals.

| Certified characteristics | NATURE OF THE COMPONENT OR SYSTEM | | | | | | | | | | | |
|------------------------------------|-----------------------------------|---------------|-------------------|---------|--------------------|---------|---------------------------|---------|-------------------|---------|-------|-------------------|
| | PP | | PVC single chutes | | Composite PVC/PVCC | | Composite PVC/PVC | | PVC gutter system | | PVC-C | |
| | Pipe | Fitting | Pipe | Fitting | Pipe | Fitting | Pipe | Fitting | Straight element | Fitting | Pipe | Fitting |
| Dimensional characteristics* | X | X | X | X | X | X | X | X | X | X | X | X |
| Identification by thermogravimetry | | | | | | | | | | | | X on the adhesive |
| Melt mass-flow rate (MFR) | X Material and pipe | Material only | | | | | | | | | | |
| Tensile properties | X | | X | | | | | | X | | X | |
| Heat shrinkage | X | | X | | X | | X | | X | | X | |
| Density | | | X | X | X | X | X | X | X | X | X | X |
| Vicat softening temperature | | | X | X | X on both layers | X | X on int. and ext. layers | X | X | X | X | X |
| Effects of heat | | X | | X | X | X | | X | | X | | |
| Resistance to pressure | | | X** | | X** | | X** | | | | X** | X** |
| Impact resistance | | | | | | | X | | | | X | |

* these characteristics are certified based on verification of the holder's registers and recorded in the audit report

** These tests are not to be performed on drainage products with acoustic characteristics.

PP-M pipes and fittings

| Certified characteristics | PP-M | |
|-------------------------------|------|---------|
| | Pipe | Fitting |
| Dimensional characteristics * | X | X |
| MFR | X** | X** |
| Heat shrinkage | X | |
| Density | X | X |
| Effects of heat | | X |
| Impact resistance | X | |
| Ring shiftness*** | X | |

*: these characteristics are certified based on verification of the holder's registers and recorded in the audit report

** : on raw material only

***: Only for PP-M systems claiming buried application (BD Application Zone)

PP-M or PVC multi-connector

| Certified characteristics | Multiconnector | |
|-------------------------------|----------------|-----|
| | PP-M | PVC |
| Dimensional characteristics * | X | X |
| MFR | X | |
| Density | X | X |
| Vicat | | X |
| Effects of heat | X | X |

PEHD gravity flow drainage system (Acoustic claim)

| Certified characteristics | PEHD gravity flow drainage system | | |
|-------------------------------|-----------------------------------|---------|----------------|
| | Pipe | Fitting | Connection wye |
| Dimensional characteristics * | X | X | X |
| MFR | | | |
| Heat shrinkage | X | | |
| Density | X | X | X |
| Tensile strength | X | | |

| | | | |
|-------------------|---|---|---|
| Impact resistance | X | | |
| OIT | X | X | |
| Effects of heat | | X | X |

2.2. Test methods

The conditions for verification of the characteristics certified at CSTB are listed in the tables below.

These verification conditions may be supplemented by specific measures given in the Technical Appraisals.

2.2.1. Polypropylene pipes and fittings Application zone

| Certified characteristics | PP | |
|-----------------------------|---|--|
| | Pipe | Fitting |
| Dimensional characteristics | NF EN ISO 3126 | |
| Melt mass-flow rate (MFR) | NF EN ISO 1133 230°C – 2.16 kg (material and pipe) | NF EN ISO 1133 230°C – 2.16 kg (Material only) |
| Tensile properties | NF EN ISO 6259-1 - ISO 6259-3 type 2 test piece | |
| Heat shrinkage | NF EN ISO 2505 Method B ¹⁾ (in air) in air 150°C - 30 min | |
| Effects of heat | | NF EN ISO 580 150°C - 30 min |

¹⁾: The choice of method A or method B is the responsibility of the holder. However, in case of dispute, only the reversion test performed according to the liquid bath method in standard NF EN ISO 2505 will be the reference test.

2.2.2. Polypropylene pipes and fittings Application zone <BD>

In addition to the tests listed above, the following tests will be performed:

| Certified characteristics | PP |
|----------------------------|--------------|
| | Pipe/Fitting |
| Ring stiffness DN ≥ 100 | ISO 9969 |
| Leak testing | NF EN 1053 |
| Leak testing | NF EN 1054 |

2.2.3. PVC, PVCC and composite pipes and fittings

For PVC products:

| Certified characteristics | PVC single chutes | | PVC/PVC composite | |
|------------------------------------|---|---------|--|---------|
| | Pipe | Fitting | Pipe | Fitting |
| Dimensional characteristics | NF EN ISO 3126 | | | |
| Identification by thermogravimetry | | | | |
| Tensile properties | NF EN ISO 6259-1 ISO 6259-2 specimen type 2 | | | |
| Heat shrinkage | NF EN ISO 2505 Method B ¹⁾ (in air) 150°C - 15 min or in air 150°C 30 min | | NF EN ISO 2505 Method B ¹⁾ (in air) 150°C - 15 min or in air 150°C - 30 min | |
| Density | NF EN ISO 1183-1 | | | |
| Vicat softening temperature | NF EN ISO 727 <i>for composites on int.and ext.layers</i> | | | |
| Effects of heat | | | NF EN ISO 580 150°C - 15 min | |
| Resistance to pressure 1 h | | | NF EN ISO 1167-1-2-3 - at 20° According to ATEC | |
| Impact resistance | | | NF EN 1453-1 | |

¹⁾: The choice of method A or method B is the responsibility of the holder. However, in case of dispute, only the reversion test performed according to the liquid bath method in standard NF EN ISO 2505 will be the reference test.

For PVC-C products:

| Certified characteristics | PVC/PVCC composite | | PVC-C | |
|------------------------------------|--|---------------------------------|--|-------------------|
| | Pipe | Fitting | Pipe | Fitting |
| Dimensional characteristics | NF EN ISO 3126 | | | |
| Identification by thermogravimetry | | | on the adhesive CSTB protocol | |
| Tensile properties | | | NF EN ISO 6259 1-2 DN<110 non-flattened, unheated test pieces | |
| Heat shrinkage | NF EN ISO 2505 Method B ¹⁾ (in air) 150 °C - 15 min or in air 150°C 30 min | | NF EN ISO 2505 Method B ¹⁾ (in air) 150°C - 30, 60 or 120 min according to the thickness | |
| Density | NF EN ISO 1183-1 | | | |
| Vicat softening temperature | NF EN ISO 727 <i>for composites on int. and ext. layers</i> | | | |
| Effects of heat | | NF EN ISO 580 150°C - 15 min | | |
| Resistance to pressure 1 h | NF EN ISO 1167-1-2-3 - at 20° According to ATEC | | NF EN ISO 1167-1-2-3 - at 20° | |
| | | | According to ATEC | According to ATEC |
| Impact resistance | | | | |

¹⁾: The choice of method A or method B is the responsibility of the holder. However, in case of dispute, only the reversion test performed according to the liquid bath method in standard NF EN ISO 2505 will be the reference test.

2.2.4. PVC gutter system

| Certified characteristics | Straight element | Fitting | Strip |
|----------------------------------|---|---------------------------------------|--|
| Dimensional characteristics | NF EN ISO 3126 | | |
| Tensile properties | NF EN ISO 6259-1 - ISO 6259-2 type 2 test piece | | NF EN ISO 6259-1 - ISO 6259-2 type 2 test piece |
| Heat shrinkage | NF EN ISO 2505 Method B ¹⁾ (in air) in air 100°C 30 min | | NF EN ISO 2505 Method B ¹⁾ (in air) 100°C 30 min |
| Vicat softening temperature | NF EN ISO 727 | | |
| Response to heat | | NF EN 580 method A 150°C/15 min | |
| Density | NF EN ISO 1183 | | |

¹⁾: The choice of method A or method B is the responsibility of the holder. However, in case of dispute, only the reversion test performed according to the liquid bath method in standard NF EN ISO 2505 will be the reference test.

2.2.5. PP-M pipes and fittings

| Certified characteristics | PP-M | |
|---------------------------------------|--|--|
| | Pipe | Fitting |
| Dimensional characteristics | NF EN ISO 3126 | |
| Density | NF EN ISO 1183-1 Method A See specification on Avis Technique | NF EN ISO 1183-1 Method A See specification on Avis Technique |
| Melt mass-flow rate (MFR) | NF EN ISO 1133 230°C – 2.16 kg (material only) | NF EN ISO 1133 230°C – 2.16 kg (Material only) |
| Impact resistance | NF EN 744 (for parameter, see Technical Appraisal) TIR ≤ 10% | |
| Heat shrinkage | NF EN ISO 2505 Method A 1) (in air) 150 °C - 30 min or 60 min (See specification on Avis Technique) | |
| Ring Shiftness DN _≥ 100 | NF EN ISO 9969 | |

¹⁾: The choice of method A or method B is the responsibility of the holder. However, in case of dispute, only the reversion test performed according to the liquid bath method in standard NF EN ISO 2505 will be the reference test.

2.2.6. PP-M or PVC multi-connector

| Certified characteristics | Multiconnector | |
|-----------------------------|--|---|
| | PP-M | PVC |
| Dimensional characteristics | NF EN ISO 3126 | |
| Density | NF EN ISO 1183-1 Method A See specification in Technical Appraisal | NF EN ISO 1183-1 Method A See specification in Technical Appraisal |
| MFR | NF EN ISO 1133 230°C – 2.16 kg (material only) | |
| Vicat | | NF EN 727 See specification in Technical Appraisal |
| Effects of heat | NF EN ISO 580 Method B 150°C - 60 min No deterioration < 50% of thickness | NF EN ISO 580 Method A 150°C - 30 min No deterioration <50% of thickness |

2.2.7. PEHD gravity flow drainage system

| Certified characteristics | PEHD gravity flow drainage system | | |
|-----------------------------|--|---|---|
| | Pipe | Fitting | Connection wye |
| Dimensional characteristics | NF EN ISO 3126 | | |
| Density | NF EN ISO 1183-1 Method A See specification in Technical Appraisal | NF EN ISO 1183-1 Method A See specification in Technical Appraisal | NF EN ISO 1183-1 Method A See specification in Technical Appraisal |
| OIT | NF EN 728 200°C – 5 min (material and pipe) | NF EN 728 200 °C – 5 min (material and fitting) | |
| Heat shrinkage | NF EN ISO 2505 150°C - 15 min Method B 1) (in air) < 5% | | |
| Effects of heat | | NF EN ISO 580 Method A 110 °C - 60 min No deterioration <20% of thickness | NF EN ISO 580 Method A 110 °C - 60 min No deterioration <20% of thickness |
| Tensile properties | NF EN ISO 6259-1 - ISO 6259-3 type 2 test piece See specification in Technical Appraisal | | |
| Impact resistance | NF EN 744 (For parameter, see Technical Appraisal) TIR _≤ 10% | | |

¹⁾: The choice of method A or method B is the responsibility of the holder. However, in case of dispute, only the reversion test performed according to the liquid bath method in standard NF EN ISO 2505 will be the reference test.

3. VERIFICATION REGIME

For products in family c), the applicable verification regime is the half-yearly regime for the 12 months following admission, then the annual regime.

4. MARKING

4.1. Drainage pipes

4.1.1. Pipes

The tubes must be marked indelibly, at least every meter.

This marking must include at least the following elements:

- the name of the holder or the distributor (1) (name, acronym or logo, if the acronym or logo is not explicit, this must be filed with CSTB) and the commercial name of the product,
- the identification of the material,
- the dimensions (DN and e),
- the application area code,
- the reference to the standard, if applicable
- the QB logo followed by the last two parts of the certificate number
- the manufacturing marks allowing traceability comprising at least:
- the period of manufacture, at least the month and the year, in numbers or in code,

Pipes-specific requirement:

If PP tubes:

- series,

If PVC-C pipes

- the mention EVACUATION 100°C

4.1.2. Fittings

The fittings must bear, individually, at least the indelible marking described below. The following information must be marked on the fitting:

- the name of the holder or the distributor (1) (name, acronym or logo, if the acronym or logo is not explicit, this must be registered with CSTB) or the commercial name of the product,
- the nominal diameter of the associated tube,
- the angle (if necessary),
- the identification of the material,
- the reference to the standard, if applicable
- the manufacturing marks allowing traceability comprising at least:
- the period of manufacture, at least the month and the year, in numbers or in code,
- the identification of the factory when there are several manufacturing sites, by name or code.

Specific requirement for fittings1-:

If PP fittings:

- the application area code,

If Multiconnector:

- the connection diameters,

4.1.3. Labels / Fittings packaging

The following information must be marked on a label affixed to the fitting or its packaging.

- the name of the holder or the distributor (1) (name, acronym or logo, if the acronym or logo is not explicit, this must be filed with CSTB) and the commercial name of the product,
- the identification of the material,
- the nominal diameter of the associated tube,
- the QB logo followed by the last two parts of the certificate number

(1) A distributor is the beneficiary of a commercial extension.

4.2. PVC gutters and their accessories

4.2.1. Straight elements of gutters

Straight gutter elements must be marked indelibly, at least every meter.

This marking must include at least the following elements:

- the name of the holder or the distributor (1) (name, acronym or logo, if the acronym or logo is not explicit, this must be filed with CSTB) and the commercial name of the product,
- the identification of the material,
- the reference of the gutter and the width of the upper opening of the profile,
- the reference to standard NF EN 607 if applicable,
- the QB logo followed by the last two parts of the certificate number
- the manufacturing marks allowing traceability comprising at least:
 - the period of manufacture, at least the month and the year, in numbers or in code,

4.2.2. Headbands

The strips must be marked indelibly, at least every 1.5 m.

This marking must include at least the following elements:

- the name of the holder or the distributor (1) (name, acronym or logo, if the acronym or logo is not explicit, this must be filed with CSTB) and the commercial name of the product,
- the profile reference,
- the QB logo followed by the last two parts of the certificate number
- the manufacturing marks allowing traceability comprising at least:

- the period of manufacture, at least the month and the year, in numbers or in code,

4.2.3. Fittings

The fittings must bear, individually, at least the indelible marking described below.

- the name of the holder or the distributor (1) (name, acronym or logo, if the acronym or logo is not explicit, this must be filed with CSTB) and the commercial name of the product,

- the fitting reference.

4.2.4. Labels / Packaging of fittings and accessories

The following information must be marked on a label affixed to the fitting or its packaging.

- the name of the holder or the distributor (1) (name, acronym or logo, if the acronym or logo is not explicit, this must be filed with CSTB) and the commercial name of the product,
- the reference to standard NF EN 607, for gutter fittings, if applicable
- the QB logo followed by the last two parts of the certificate number
- manufacturing marks allowing traceability

(1) A distributor is the beneficiary of a commercial extension.

5. SAMPLING FOR TESTS AT CSTB

| PP | | | PVC single chutes PVC/PVC-C composite PVC/PVC composite | | PVC gutter and accessories | |
|-----------------------|----------------------|--|---|----------------------|-------------------------------------|----------------------|
| Pipes | Fittings | Virgin material | Pipes | Fittings | Straight gutter elements and strips | Fittings |
| 5 1m sections in 2 DN | 5 fittings of 1 type | 1 sachet of pipe virgin material and 1 sachet of fitting virgin material | 3 lengths in 1 DN | 5 fittings of 1 type | 3 lengths in 1 DN | 5 fittings of 1 type |

PP-M pipes and fittings

| Pipes | Fittings |
|---------------------------|----------------------|
| 5 sections of 1 m in 1 DN | 5 fittings of 1 type |

PP-M or PVC multiconnectors

| PP-M multiconnector | PVC multiconnector |
|---------------------|--------------------|
| 5 fittings | 5 fittings |

PEHD gravity flow drainage system

| Pipes | Fittings | Raw material | Connection wye |
|-------------------------------|----------------------|--|-------------------|
| 5 sections of 1 m in one pipe | 5 fittings of 1 type | 1 sachet of pipe raw material and 1 sachet of fitting raw material | 5 connection wyes |