TECHNICAL DOCUMENT

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. 01
25/01/2021

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

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le futur en construction

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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 the ring stiffness test for PP-M pipes claiming the BD application area Reference to the specifications and test parameters of the Technical Assessment for density tests and heat reversion

Contents

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 pyknometer 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 : Thermoplastics pipes - Determination of ring 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	Materia 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 n 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 stiffness***	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 that claim the buried application (BD Application Area)

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

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 <B>

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 *for composites on int.and ext.layers*			
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:

<table>
<tr><th rowspan="2">Certified characteristics</th><th colspan="2">PVC/PVCC composite</th><th colspan="2">PVC-C</th></tr>
<tr><th>Pipe</th><th>Fitting</th><th>Pipe</th><th>Fitting</th></tr>
<tr><td>Dimensional characteristics</td><td colspan="4">NF EN ISO 3126</td></tr>
<tr><td>Identification by thermogravimetry</td><td></td><td></td><td colspan="2">on the adhesive
CSTB protocol</td></tr>
<tr><td>Tensile properties</td><td></td><td></td><td>NF EN ISO 6259 1-2
DN<110 non-flattened, unheated test pieces</td><td></td></tr>
<tr><td>Heat shrinkage</td><td>NF EN ISO 2505
Method B [1)]
(in air)
150 °C -
15 min or in air
150°C 30 min</td><td></td><td>NF EN ISO 2505
Method B [1)]
(in air)
150°C - 30, 60 or 120 min according to the thickness</td><td></td></tr>
<tr><td>Density</td><td colspan="4">NF EN ISO 1183-1</td></tr>
<tr><td>Vicat softening temperature</td><td colspan="4">NF EN ISO 727
for composites on int.and ext.layers</td></tr>
<tr><td>Effects of heat</td><td></td><td>NF EN ISO 580
150°C - 15 min</td><td></td><td></td></tr>
<tr><td rowspan="2">Resistance to pressure 1 h</td><td rowspan="2">NF EN ISO 1167-1-2-3 - at 20°
According to ATEC</td><td rowspan="2"></td><td colspan="2">NF EN ISO 1167-1-2-3 - at 20°</td></tr>
<tr><td>According to ATEC</td><td>According to ATEC</td></tr>
<tr><td>Impact resistance</td><td></td><td></td><td></td><td></td></tr>
</table>

[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 Technical Assessment)	NF EN ISO 1183-1 Method A (See specification on Technical Assessment)
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 Assessment) TIR ≤ 10%	
Heat shrinkage	NF EN ISO 2505 Method A 1) (in air) 150 °C - 30 min or 60min (see Technical Assessment)	
Effects of heat		NF EN ISO 580 150°C - 30 min No defect
Ring stifftness 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. Water drainage pipes

4.1.1. Pipes

The pipes must be indelibly marked at least every metre.

This marking must include at least the following elements:

- the name of the holder, the manufacturer (name or logo) and/or the commercial name of the product,
- identification of the material,
- the dimensions (DN and th),
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number,
- the manufacturing references allowing traceability, including at least:
  - the production period, at least the month and year, in numbers or in code,
  - identification of the factory if there are several production sites, by name or code,

For polypropylene pipes, the marking will also include:

- the series,
- the application zone code,
- the reference to the NF EN 1451-1 standard if applicable

For PVC-C pipes, the marking will also include:

- the statement DRAINAGE 100°C – NO PRESSURE

4.1.2. Fittings

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

- the name of the manufacturer holder (name or logo) and/or the commercial name of the product,
- the nominal diameter of the related pipe,
- the angle (if necessary),

For polypropylene fittings, the marking will also include:

- the application zone code,
- the reference to the NF EN 1451-1 standard if applicable.

4.1.3. Labelling/Packaging of fittings

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

- the name of the manufacturer (name or logo) and/or the commercial name of the product,
- identification of the material if the material is not marked on the fitting,
- the nominal diameter of the related pipe,
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number.

4.2. PVC gutters and their accessories

4.2.1. Straight gutter elements

Straight guttering elements must be indelibly marked at least every metre.

This marking must include at least the following elements:

- the name of the manufacturer (name or logo) and/or the commercial name of the product,
- identification of the material,
- the reference of the gutter and the width of the upper opening of the profile,
- the reference to the NF EN 607 standard,
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number,
- the manufacturing references allowing traceability, including at least:
  - the production period, at least the month and year, in numbers or in code,
  - identification of the factory if there are several production sites, by name or code.

E.g. *(straight guttering element)*

XXX - PVC - G25/115 - NF EN 607 - 14/06-xyz –- QB aa-xyz - manufacturing references

4.2.2. Strips

Strips must be indelibly marked at least every 1.5 metres.

This marking must include at least the following elements:

- the name of the manufacturer (name or logo) and/or the commercial name of the product,
- the reference of the profile,
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number,
- the manufacturing references allowing traceability, including at least:
  - tooling number and extruder number,
  - the production period, at least the month and year, in numbers or in code,
  - identification of the factory if there are several production sites, by name or code.

4.2.3. Fittings and accessories

Individual fittings must bear at least the marking described below, marked indelibly.

- the name of the manufacturer (name or logo) and/or the commercial name of the product,
- the reference of the fitting.

4.2.4. Labelling/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 manufacturer (name or logo) and/or the commercial name of the product,
- the reference of the NF EN 607 standard, for gutter fittings,
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number.

4.3. PP-M pipes and fittings

4.3.1. Pipes

The pipes must be indelibly marked at least every metre.
This marking must include at least the following elements:

- the name of the holder, the manufacturer (name or logo) and/or the commercial name of the product,
- identification of the material,
- the reference to the NF EN 1451-1 standard if applicable
- the dimensions (DN and th),
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number,
- the manufacturing references allowing traceability, including at least:
  - the production period, at least the month and year, in numbers or in code,
  - identification of the factory if there are several production sites, by name or code.

4.3.2. Fittings

Individual fittings must bear at least the marking described below, marked indelibly.

- the name of the manufacturer holder (name or logo) and/or the commercial name of the product,
- the reference to the NF EN 1451-1 standard if applicable,
- identification of the material,
- the nominal diameter of the related pipe,
- the angle (if necessary),
- the manufacturing references allowing traceability, including at least:
  - the production period, at least the month and year, in numbers or in code,
  - identification of the factory if there are several production sites, by name or code.

4.3.3. Labelling/Packaging of fittings

The following information must be marked on a label or on the packaging of the fittings:

- the name of the manufacturer (name or logo) and/or the commercial name of the product,
- identification of the material if the material is not marked on the fitting,
- the nominal diameter of the related pipe,
- the angle (if necessary),
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number.

4.4. PP-M or PVC multiconnectors

4.4.1. Multiconnectors

Multiconnectors must bear at least the marking described below, marked indelibly:

- the name of the manufacturer holder (name or logo) and/or the commercial name of the product,
- the reference to the NF EN 1451-1 standard if applicable,
- identification of the material,
- the nominal diameter of the related pipe,
- the connection diameters,
- the manufacturing references allowing traceability, including at least:
  - the production period, at least the month and year, in numbers or in code,
  - identification of the factory if there are several production sites, by name or code.

4.4.2. Labelling/Packaging of multiconnectors

The following information must be marked on a label or on the packaging of the fittings.

- the name of the manufacturer (name or logo) and/or the commercial name of the product,
- identification of the material if the material is not marked on the multiconnector,
- the nominal diameter of the related pipe,
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number.

4.5. PEHD gravity flow drainage system

4.5.1. Pipes

The pipes must be indelibly marked at least every metre.
This marking must include at least the following elements:

- the name of the holder, the manufacturer (name or logo) and/or the commercial name of the product,
- identification of the material,
- the dimensions (DN and th),
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number,
- the manufacturing references allowing traceability, including at least:
  - the production period, at least the month and year, in numbers or in code,
  - identification of the factory if there are several production sites, by name or code.

4.5.2. Fittings

Individual fittings must bear at least the marking described below, marked indelibly.

- the name of the manufacturer holder (name or logo) and/or the commercial name of the product,
- identification of the material,
- the nominal diameter of the related pipe,
- the angle (if necessary),
- the manufacturing references allowing traceability, including at least:
  - the production period, at least the month and year, in numbers or in code,
  - identification of the factory if there are several production sites, by name or code.

4.5.3. Labelling/Packaging of fittings

The following information must be marked on a label or on the packaging of the fittings.

- the name of the manufacturer (name or logo) and/or the commercial name of the product,
- identification of the material if the material is not marked on the fitting,
- the nominal diameter of the related pipe,
- the angle (if necessary),
- the number of the Technical Appraisal,
- the QB logo followed by the two last parts of the certificate number.

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