

WATER DISTRIBUTION OR DRAINAGE PIPES**Technical document****08-03 Traditional**

Heating and/or domestic distribution
and/or distribution of chilled water –
Fittings for PEX/PB pipes

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

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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

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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 15875-3: Plastics piping systems for hot and cold water installations - Crosslinked polyethylene (PE-X) - Part 3: Fittings

NF EN ISO 15876-3: Plastics piping systems for hot and cold water installations - Polybutene (PB) - Part 3: Fittings

NF EN 1254-3: Copper and copper alloys - Plumbing fittings - Part 3: Fittings with compression ends for use with plastics pipes

NF EN 1254-6: Copper and copper alloys - Plumbing fittings - Part 6: Fittings with push-fit ends

NF EN 1254-8: Copper and copper alloys - Plumbing fittings - Part 8: Fittings with press ends for use with plastics and multilayer pipes

1.2. Test standards

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

NF T 54 094: Plastics piping systems made of unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) for conveyance under pressure of non gaseous fluids - Fittings - Determination of resistance to alternate pressure stress

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

ISO 17454: Plastics piping systems - Multilayer pipes - Test method for the adhesion of the different layers using a pulling rig

EN 712: Thermoplastics piping systems - End-load bearing mechanical joints between pressure pipes and fittings - Test method for resistance to pull-out under constant longitudinal force.

EN 713: Plastics piping systems - Mechanical joints between fittings and polyolefin pressure pipes - Test method for leaktightness under internal pressure of assemblies subjected to bending.

NF EN 12293: Plastics piping systems - Thermoplastics pipes and fittings for hot and cold water - Test method for the resistance of mounted assemblies to temperature cycling

NF EN 12294: Plastics piping systems - Systems for hot and cold water - Test method for leaktightness under vacuum

NF EN 12295: Plastics piping systems - Thermoplastics pipes and associated fittings for hot and cold water - Test method for resistance of joints to pressure cycling

ISO 6957-1988: Copper alloys. Ammonia test for stress corrosion resistance

Test method for analysis of the chemical composition of metal fittings, all types of pipe: CSTB protocol

1.3. Associated implementation documents

Implementation must be carried out:

- For class 4 (heated floors): in accordance with DTU 65.14 “Implementation of heated floors with hot water”.
- For classes 2 and 5: in accordance with the “Technical Specifications (CPT) for the implementation of pipe systems based on synthetic pipes - Semi-rigid LWC pipes” (CSTB specification 2808_V2 – November 2011).

2. FIELDS OF APPLICATION

This Technical Document covers the applications indicated in the table below. These applications are drawn from the ISO 10508 standard.

Applications classes 2, 4 and 5 comply with the ISO 10508 standard. According to this standard, the reader is reminded that regardless of the application class selected, the system must also comply with conveyance of cold water at 20 °C for 50 years and a service pressure of 10 bar.

It also covers the “Chilled water” application class corresponding to air conditioning and cooling systems with a minimum temperature of 5 °C.

Classes	Service conditions	Maximum conditions	Accidental conditions	Typical application
Class 2	70 °C 49 years	80 °C 1 year	95 °C 100 hours	Domestic hot and cold water supply
Class 4	20 °C - 2.5 years and 40 °C - 20 years and 60 °C - 25 years	70 °C 2.5 years	100 °C 100 hours	Low temperature radiators, underfloor heating
Class 5	20 °C - 14 years and 60 °C - 25 years and 80 °C - 10 years	90 °C 1 year	100 °C 100 hours	High temperature radiators

For a system that is not intended for class 2, the marking shall be supplemented by the phrase ‘heating only’.

For a system that is intended only for underfloor heating within class 4, the marking shall be supplemented by the phrase ‘underfloor heating only’.

The dimension groups are defined in §4.2.1.2. of Standard XP CEN ISO/TS 15875-7:

Dimension group	Nominal diameter, dn
1	10 < dn < 63
2	63 ≤ dn < 160

The holder shall produce at least once in each dimension group in a 2-year cycle.

Contact with potable water

The pipes, fittings and components (particularly seals) must comply with French regulations currently in force for products designed to come into contact with potable water. In particular, they must have a currently valid ACS certification (or a self-declaration, if applicable). These documents must be presented during audits.

Additional requirements for pipes and fittings

The holder must make its installation instructions public in French, on its commercial documents, on its website or when delivering products (optional).

Specific implementation instructions

Prerequisite: crimp fittings must be associated with at least one crimper brand / crimp profile pair.

If special tools are required (crimping) to install the pipes and fittings, the holder shall indicate the specific crimper(s) used and the corresponding crimp profiles, as well as the crimping force to be applied, for which they shall have provided evidence of suitability for use in installing the fittings.

These instructions shall be defined in a manual associated to the holder's commercial documents or in the technical data sheets, as well as on its website.

These documents shall be provided to CSTB upon admission and whenever they are modified.

This requirement will be verified annually at each audit in order to ensure that the tests performed at the Mark laboratory are aligned with the holder's instructions.

In the holder's technical documents, the following points shall be precisely defined:

- Product reference for the crimper and associated crimp profiles (jaw references)
- The maintenance associated with this equipment

3. CERTIFIED CHARACTERISTICS AND TEST METHODS

3.1. Certified and optional characteristics

The characteristics listed in the table below will comply with the specifications given in paragraph 3.3.

Optional certified characteristics

The certification of the additional FUNCTIONALITY characteristics “QB F” guarantees the compliance of QB-certified products with the requirements of the CSTB Technical Guide (Specification 3597_V2). These options are based on a more detailed analysis of the durability and suitability for use of these products by means of the following tests and specifications:

“QB F” option:

- Experimental heating circuits at 110°C (functionality)

Certified characteristics	Nature of the component or system	
	Metal fittings	Synthetic fittings
Dimensional characteristics	X	X
Melt mass-flow rate (MFR)		X
Analysis of chemical composition	X	
Resistance to internal pressure	X	X

Fittings

Suitability for use		
Internal pressure	X	X
Bending under internal pressure	X	X
Pull-out	X	X
Thermal cycle	X	X
Cyclic pressure	X	X
Leaktightness under vacuum	X	X
Experimental heating circuits at 110°C (if QB F option)	X	X

3.2. Other certified characteristics

3.2.1. Fittings with compression ends (NF EN 1254-3)

Certified characteristics	
Resistance to corrosion under stress	X

3.2.2. Crimp fittings (NF EN 1254-8)

Certified characteristics	
Resistance to corrosion under stress	X

3.2.3. Push-fit fittings (NF EN 1254-6)

Certified characteristics	
Resistance to corrosion under stress	X
Disconnection and reuse (if applicable)	X
Rotation of fitting	X

3.3. Test methods

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

3.3.1. Fittings

Certified characteristics	Metal fittings	Synthetic fittings
Dimensional characteristics	EN ISO 3126	EN ISO 3126
Melt mass-flow rate (MFR)		NF EN ISO 1133
Analysis of chemical composition	CSTB test protocol	
Resistance to internal pressure	EN ISO 1167-1-2-3	EN ISO 1167-1-2-3

Suitability for use	
Internal pressure	NF EN ISO 1167 1-2-3
Bending under internal pressure	NF EN ISO 3503
Pull-out	NF EN ISO 3501
Thermal cycle	NF EN 12293
Cyclic pressure	NF EN 12295
Leaktightness under vacuum	NF EN 12294
Experimental heating circuits at 110°C <i>(if QB F option)</i>	<p>Experimental circuits are made up of pipes and fittings of different diameters representing the range proposed by the applicant.</p> <p>For crimp fittings, the full range of proposed tools must be represented.</p> <p style="text-align: center;">Specialised Technical Guide</p> <p style="text-align: center;">Specification 3597-2</p>

3.3.2. Fittings with compression ends (NF EN 1254-3)

Additional specifications

Tests	Test Methods
Resistance to corrosion under stress	§5.2 of NF EN 1254-8 and Appendix A

3.3.3. Crimp fittings (NF EN 1254-8)

Additional specifications and tools (crimping tools, crimp profile, etc.)

Tests	Test Methods
Resistance to corrosion under stress	§5.2 of NF EN 1254-8 and Appendix A

3.3.4. Push-fit fittings (NF EN 1254-6)

Additional specifications and tools

Tests	Test Methods
Resistance to corrosion under stress	§5.1.14 of NF EN 1254-6 and ISO 6957:1988, appendix J
Disconnection and reuse (if applicable)	§5.1.12 of NF EN 1254-6 and Appendix H followed by Appendix A
Rotation of fitting	§5.1.13 of NF EN 1254-6 and Appendix I followed by Appendix A

3.4. Specifications

3.4.1. Fittings

Measurements or tests	Specifications	
	Metal fittings	Synthetic fittings
Dimensional characteristics	Compliant with product standards of the class under consideration	Compliant with product standards of the class under consideration
Melt mass-flow rate (MFR)		Compliant with product standards under consideration
Analysis of chemical composition	Compliant with grade declared to CSTB at admission	Compliant with grade declared to CSTB at admission
Resistance to internal pressure	95°C - t > 1000 h: Same test pressure as the associated pipe	95°C - t > 1000 h: Same test pressure as the associated pipe

Suitability for use	
Tests	Specifications
Internal pressure	No leaks in assembly
bending under internal pressure	No leaks in assembly
Pull-out	No separation of assembly
Thermal cycle	No leaks in assemblies
Cyclic pressure	No leaks in assembly
Leaktightness under vacuum	Pressure variation under vacuum \leq 0.05 bar
Experimental heating circuits at 110°C (if QB F option)	No leaks 110°C – 4 bar

3.4.2. Fittings with compression ends (NF EN 1254-3)

Additional specifications

Tests	Test Methods
Resistance to corrosion under stress	No cracking

3.4.3. Crimp fittings (NF EN 1254-8)

Additional specifications and tools (crimping tools, crimp profile, etc.)

Tests	Test Methods
Resistance to corrosion under stress	No cracking

3.4.4. Push-fit fittings (NF EN 1254-6)

Additional specifications and tools

Tests	Test Methods
Resistance to corrosion under stress	No cracking
Disconnection and reuse (if applicable)	No leaks
Rotation of fitting	No leaks

4. VERIFICATION REGIME

	12 months following admission	After the 12 months following admission
Fittings	Half-yearly	Annual

5. MARKING

5.1. Fittings

5.1.1. Synthetic fittings

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


- the name of the holder or the distributor (1) (name or logo) and/or the commercial name of the product,
- the nominal diameter of the related pipe,
- the nominal thickness of wall of the related pipe for fittings with an insert (not mandatory),
- identification of the material (if the fitting is to be welded or glued),
- the QB logo or “QB F” logo if claimed, or else the “QB” indication or “QB F” indication if claimed, alone and in full (by derogation from the QB mark usage guide),
- 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.

5.1.2. Metal fittings

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

- the name of the holder or the distributor (1) (name or logo) and/or the commercial name of the product,
- the nominal diameter of the related pipe,
- the nominal thickness of wall of the related pipe for fittings with an insert (not mandatory),
- the QB logo or “QB F” logo if claimed, followed by the last two parts of the certificate number, or else the “QB” indication or “QB F” indication if claimed, alone and in full (by derogation from the QB mark usage guide),
- 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.

Example (*metal fitting for synthetic pipe “QB F” option*)

XXX - 20x1,9 -  F aa-xyz - manufacturing references
or
XXX - 20 – QB – manufacturing references

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

5.2. Labelling/Packaging of fittings

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 or logo) and the commercial name of the product,
- the nominal diameter of the related pipe,
- the nominal thickness of the wall of the related pipe (except for fittings for welding or gluing),
- the application Classes (e.g. 2, 4, 5) completed by their operating pressures (2) and their corresponding maximum operating temperatures (optional), (e.g. “[Class 2 – 6 bar] [Class 4 – 6 bar] [Class 5 – 6 bar]”),
- The operating temperatures according to the usage classes which may be marked on synthetic pipes and multilayer metal core pipes are as follows:

Classification of operating conditions (Classes)	Maximum operating temperatures (TD)	Scope of classes
2	70°C	Hot water supply
4	60°C	Underfloor heating Low temperature radiators
5	80°C	High temperature radiators

- the QB logo or “QB F” logo if claimed, 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,

Example (packaging or labels for fittings referred to in §4.1.2 “QB F” option)

XXX – EN ISO 15875 - 20x1.9 - [Class 2 – 6 bar] [Class 4 – 6 bar]

[Class 5 – 6 bar]  F aa-xyz - Manufacturing references

*: Not mandatory if the traceability is marked on the fittings

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

(2) For pipes and fittings intended only for the “Chilled Water” application class, the marking on the pipe will include the statement “Chilled Water”, the corresponding operating pressure and the minimum and maximum temperatures of the fluid conveyed.

6. CHECKS PERFORMED BY THE MANUFACTURER

The checks performed by the manufacturer and the measurements of the various characteristics are carried out in accordance with the inspection plan and the operating procedures defined in the reference standards cited in paragraph 1.1 of this technical document no. 08-03 Traditional, and at least complying with the frequencies defined in the tables below:

6.1. For raw materials

Measurements or tests	Minimum sampling frequency
Supplier analysis certificate	At each delivery
Melt flow rate (EN ISO 1133) (1)	once per week and per line

(1) If applicable

6.2. Fittings

Measurements or tests	Specifications	Minimum sampling frequency	
		Metal fittings	Synthetic fittings
Dimensional characteristics	EN ISO 3126	Once every 8 hours per machine	Once every 8 hours per machine
Melt mass-flow rate (MFR)	Compliant with product standards under consideration		Once a week
Resistance to internal pressure 95°C – 1000 h	EN ISO 1167	1 specimen per year per dimension group	1 specimen per year per dimension group

7. MONITORING ARRANGEMENTS BY CSTB

7.1. Tests performed for admission and extension at CSTB

For the ranges of pipes and fittings covered under the QB 08 certification application, the applicant must provide a type test report in accordance with the EN 15875 or NF EN 15876 standard, established by a laboratory with ISO 17025 accreditation (from an EA member accreditation body) for carrying out tests.

7.1.1. Fittings

Measurement or test	Metal fittings	Synthetic fittings
Dimensional characteristics	All the types submitted for admission	All the types submitted for admission
Melt mass-flow rate (MFR)		1 test / material
Analysis of chemical composition	1 test / material	
Resistance to internal pressure	1 test per dimension group	1 test per dimension group

7.1.2. Suitability for use (Pipes and fittings)

PRODUCTS/TESTS	
Internal pressure	1 test per dimension group or a test report from an EN ISO 17025 accredited body
Bending under internal pressure	1 test per DN or a test report from an EN ISO 17025 accredited body
Pull-out	1 test per dimension group or a test report from an EN ISO 17025 accredited body
Thermal cycle	1 test per DN or a test report from an EN ISO 17025 accredited body
Cyclic pressure	1 test per dimension group or a test report from an EN ISO 17025 accredited body
Leaktightness under vacuum	1 test per dimension group or a test report from an EN ISO 17025 accredited body
Experimental heating circuits at 110°C 1000 h 6 bar (if QB F option)	1 assembly as defined below

7.1.3. Fittings with compression ends (NF EN 1254-3)

Certified characteristics	
Resistance to corrosion under stress	1 test per DN or a test report from an EN ISO 17025 accredited body

7.1.4. Crimp fittings (NF EN 1254-8)

Certified characteristics	
Resistance to corrosion under stress	1 test per DN or a test report from an EN ISO 17025 accredited body

7.1.5. Push-fit fittings (NF EN 1254-6)

Certified characteristics	
Resistance to corrosion under stress	1 test per DN or a test report from an EN ISO 17025 accredited body
Disconnection and reuse (if applicable)	1 test per DN or a test report from an EN ISO 17025 accredited body
Rotation of fitting	1 test per DN or a test report from an EN ISO 17025 accredited body

7.2. Tests performed during follow-up at CSTB

Tests performed half-yearly

Measurement or test	Metal fittings	Synthetic fittings
Dimensional characteristics*	All the types submitted for admission	All the types submitted for admission
Melt mass-flow rate (MFR)		1 test / material
Analysis of chemical composition	1 test / material	
Resistance to internal pressure	1 DN	1 DN

*: dimensional characteristics can be verified during the factory audit.

8. SAMPLING FOR TESTS AT CSTB

8.1. Sampling for admission or extension applications to the CSTB

Collection of samples in cases of admission or extension is left to CSTB's discretion.

8.2. Sampling for follow-up at CSTB

Synthetic fittings		Metal fittings
Fittings	Virgin material	
10 to 20 straight fittings necessary for the performance of pressure tests	1 sachet of fitting virgin material	10 to 20 ** straight threaded fittings per DN

** quantity to be adjusted according to the needs of the laboratory in building the test circuits