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Certification Scheme

Plastic piping and multilayer piping systems for warm water floor heating systems and radiator connecting systems

(Edition: March 2019)

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Foreword

DIN CERTCO was founded in 1972 by DIN Deutsches Institut für Normung e. V., is now part of the TÜV Rheinland Group and is the certification body for issuing DIN marks and other certification marks for products, persons, services as well as companies based on DIN standards and similar specifications. Due to its independence, neutrality, competence and many years of experience, DIN CERTCO enjoys a high reputation both at home and abroad.

In order to prove the functionality of the system and our competence as a certification body, we have been accredited, certified or recognised by independent domestic and foreign bodies in both the voluntary and legally regulated areas. Our accreditations.

In conjunction with the General Terms and Conditions (GTC) of DIN CERTCO, this certification scheme forms the basis for suppliers of plastic piping and multilayer composite piping systems for warm water floor heating systems and radiator connecting systems to mark their products with the certification mark “DIN-Geprüft”. They thereby document that their products meet all requirements of the applicable DIN and DIN EN ISO standards for plastic piping systems.

The certification mark “DIN-Geprüft“ gives the consumer the confidence, that an independent, neutral and competent body has carefully examined and assessed the product based on the test criteria. In addition, third-party surveillance, also during the on-going production process, further ensures that the quality of the product is maintained. The customer thus receives an added value, which he may take into consideration when deciding on a purchase.

Plastic piping and multilayer piping systems for warm water floor heating systems and radiator connecting systems are granted the right to use the certification mark “DIN-Geprüft” upon meeting the requirements listed under clause 3 according to the procedure described in this certification scheme.

An list of all valid certificate holders, which is updated on a daily basis, can be accessed via the homepage of DIN CERTCO (www.dincertco.de/4726).

Start of validity

This certification scheme will be valid starting on 2019-07-01. Upon request, all valid DIN certificates for plastic piping systems can be converted to the new certification scheme before the certification expired, by 2020-06-30 at the latest.

Amendments

Compared to the certification scheme "Plastic piping and multilayer piping systems for warm water floor heating systems and radiator connecting systems" (2015-01), the following amendments were introduced:

a) Adoption of the revised requirements of DIN 4726:2017-10, DIN EN ISO 15874:2018-11, DIN EN ISO 15876:2017-06 and DIN EN ISO 9001:2015-1

b) Specification of requirements for testing, certification, surveillance, changes and factory production control according to the decision book by the experience exchange circle for testing laboratories (EK-RL) from DIN CERTCO

c) Introduction of a certification of oxygen barrier materials made from EVOH
d) Editorial changes

Previous Editions

- Certification scheme "Plastic piping and multilayer piping systems for warm water floor heating systems and radiator connecting systems" (2015-01)

- Certification scheme "Plastic piping and multilayer piping systems for warm water floor heating systems and radiator connecting systems" (2011-06)

- Certification scheme “Plastic piping and multilayer piping systems for warm water floor heating systems and radiator connecting systems" (2004-05)

- Certification scheme “Plastic piping and multilayer piping systems for warm water floor heating systems and radiator connecting systems" (2003-02)

Remark

The German version of this certification scheme shall be taken as authoritative. No guarantee can be given to the English translation.

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1 Scope

This certification scheme applies to plastic piping and multilayer piping systems for warm water floor heating systems and radiator connecting systems. In conjunction with the testing foundations listed below, it includes all requirements for the award of the certification mark “DIN-Geprüft”.

In addition, it applies to the certification of oxygen barrier materials made of plastics.

The certification scheme presented here specifies the requirements for the product itself (generally a combination of seamless plastic tubes with or without a barrier layer against oxygen diffusion, and fittings/connectors made of plastic or metal) as well as for the testing, surveillance and certification of the product.

2 Test and Certification Specifications

The following referenced documents are the basis for testing and certification. For dated references, only the referenced edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Pipes made of Polypropylene (PP)

DIN 4726	Warm water surface heating systems and radiator connecting systems – Plastics piping systems and multilayer piping systems
DIN EN ISO 15874-1	Plastics piping systems for hot and cold water installations – Polypropylene (PP) – Part 1: General
DIN EN ISO 15874-2	Plastics piping systems for hot and cold water installations – Polypropylene (PP) – Part 2: Pipes
DIN EN ISO 15874-3	Plastics piping systems for hot and cold water installations – Polypropylene (PP) – Part 3: Fittings
DIN EN ISO 15874-5	Plastics piping systems for hot and cold water installations – Polypropylene (PP) – Part 5: Fitness for purpose of the systems
DIN ISO/TS 15874-7	Plastics piping systems for hot and cold water installations – Polypropylene (PP) – Part 7: Guidance for the assessment of conformity

Pipes made of crosslinked polyethylene (PE-X)

DIN 4726	Warm water surface heating systems and radiator connecting systems – Plastics piping systems and multilayer piping systems
DIN EN ISO 15875-1	Plastics piping systems for hot and cold water installations – Crosslinked polyethylene (PE-X) – Part 1: General
DIN EN ISO 15875-2	Plastics piping systems for hot and cold water installations – Crosslinked polyethylene (PE-X) – Part 2: Pipes
DIN EN ISO 15875-3	Plastics piping systems for hot and cold water installations – Crosslinked polyethylene (PE-X) – Part 3: Fittings

DIN EN ISO 15875-5	Plastics piping systems for hot and cold water installations – Crosslinked polyethylene (PE-X) – Part 5: Fitness for purpose of the systems
DIN ISO/TS 15875-7	Plastics piping systems for hot and cold water installations – Crosslinked polyethylene (PE-X) – Part 7: Guidance for the assessment of conformity

Pipes made from Polybutylene (PB)

DIN 4726	Warm water surface heating systems and radiator connecting systems – Plastics piping systems and multilayer piping systems
DIN EN ISO 15876-1	Plastics piping systems for hot and cold water installations – Polybutylene (PB) – Part 1: General
DIN EN ISO 15876-2	Plastics piping systems for hot and cold water installations – Polybutylene (PB) – Part 2: Pipes
DIN EN ISO 15876-3	Plastics piping systems for hot and cold water installations – Polybutylene (PB) – Part 3: Fittings
DIN EN ISO 15876-5	Plastics piping systems for hot and cold water installations – Polybutylene (PB) – Part 5: Fitness for purpose of the systems
DIN ISO/TS 15876-7	Plastics piping systems for hot and cold water installations – Polybutylene (PB) – Part 7: Guidance for the assessment of conformity

Pipes made of chlorinated poly(vinyl chloride) (PVC-C)

DIN 4726	Warm water surface heating systems and radiator connecting systems – Plastics piping systems and multilayer piping systems
DIN EN ISO 15877-1	Plastics piping systems for hot and cold water installations – Chlorinated poly(vinyl chloride) (PVC-C) – Part 1: General
DIN EN ISO 15877-2	Plastics piping systems for hot and cold water installations – Chlorinated poly(vinyl chloride) (PVC-C) – Part 2: Pipes
DIN EN ISO 15877-3	Plastics piping systems for hot and cold water installations – Chlorinated poly(vinyl chloride) (PVC-C) – Part 3: Fittings
DIN EN ISO 15877-5	Plastics piping systems for hot and cold water installations – Chlorinated poly(vinyl chloride) (PVC-C) – Part 5: Fitness for purpose of the systems
DIN ISO/TS 15877-7	Plastics piping systems for hot and cold water installations – Chlorinated poly(vinyl chloride) (PVC-C) – Part 7: Guidance for the assessment of conformity

Pipes made of polyethylene of raised temperature resistance (PE-RT)

DIN 4726	Warm water surface heating systems and radiator connecting systems – Plastics piping systems and multilayer piping systems
DIN EN ISO 22391-1	Plastics piping systems for hot and cold water installations – Polyethylene of raised temperature resistance (PE-RT) – Part 1: General
DIN EN ISO 22391-2	Plastics piping systems for hot and cold water installations – Polyethylene of raised temperature resistance (PE-RT) – Part 2: Pipes
DIN EN ISO 22391-3	Plastics piping systems for hot and cold water installations – Polyethylene of raised temperature resistance (PE-RT) – Part 3: Fittings
DIN EN ISO 22391-5	Plastics piping systems for hot and cold water installations – Polyethylene of raised temperature resistance (PE-RT) – Part 5: Fitness for purpose of the systems
DIN ISO/TS 22391-7	Plastics piping systems for hot and cold water installations – Polyethylene of raised temperature resistance (PE-RT) – Part 7: Guidance for the assessment of conformity

Pipes made of crosslinked polyethylene of medium density (PE-MDX)

DIN 4724	Plastic piping systems for warm water floor heating systems and radiator pipe connecting; crosslinked polyethylene of medium density (PE-MDX)
DIN 4726	Warm water surface heating systems and radiator connecting systems – Plastics piping systems and multilayer piping systems
DIN 16894	Pipes of crosslinked medium density polyethylene (PE-MDX) – General quality requirements and testing
DIN 16895	Crosslinked medium density polyethylene (PE-MDX) pipes – Dimensions

Multilayer pipes (MLP)

DIN 4726	Warm water surface heating systems and radiator connecting systems – Plastics piping systems and multilayer piping systems
DIN EN ISO 21003-1	Multilayer piping systems for hot and cold water installations inside buildings – Part 1: General
DIN EN ISO 21003-2	Multilayer piping systems for hot and cold water installations inside buildings – Part 2: Pipes
DIN EN ISO 21003-3	Multilayer piping systems for hot and cold water installations inside buildings – Part 3: Fittings

DIN EN ISO 21003-5	Multilayer piping systems for hot and cold water installations inside buildings – Part 5: Fitness for purpose of the systems
DIN ISO/TS 21003-7	Multilayer piping systems for hot and cold water installations inside buildings – Part 7: Guidance for the assessment of conformity
DVGW W 542	Multilayer pipes for drinking water installation – Requirements and testing

Note: The multilayer composite pipes are generally DIN EN ISO 21003-compliant with the exception that the total thickness of the outer layers, including the thickness of the adhesive used, is ≤ 0.4 mm (as a rule, the nominal size=smallest dimension). If the outer layer is designed to be pressure-bearing, DIN EN ISO 21003 applies.

Oxygen barrier materials

DIN 4726	Warm water surface heating systems and radiator connecting systems – Plastics piping systems and multilayer piping systems

Additionally, for all plastic piping systems

DIN EN 15015	Plastics piping systems – Systems for hot and cold water not intended for human consumption – Performance characteristics for pipes, fittings and their joints
ISO 10508	Plastics piping systems for hot and cold water installations – Guidance for classification and design

Additionally, for all plastic piping systems and oxygen barrier materials

DIN EN ISO 9001	Quality management systems – Requirements

– This certification scheme
– The applicable DIN CERTCO decision book of the testing laboratories (EK-RL) at www.dincertco.de/4726
– The General Terms and Conditions of DIN CERTCO
– The applicable schedule of fees of DIN CERTCO

3 Product Requirements

3.1 Requirements for Pipes

The following characteristics are part of testing, certification, and surveillance for a particular type of pipes according to Annex C through Annex I if applicable:

- Hydrostatic stress properties of material
- Appearance (surface and inhomogeneities)
- Opacity (if the pipes are declared to be opaque; does not apply to multilayer M pipes according to DIN EN ISO 21001-2 clause 6.2)
- Dimensions (outside diameter, wall thicknesses and dimensional tolerances)
- Creep under internal pressure
- Longitudinal reversion
- Degree of crosslinking
- Thermal stability
- Behavior during elongation test
- Adhesion between layers

- Marking
- Homogeneity of polymer layers
- Bending radii
- Oxygen permeability
- Resistance to heating water additives
- Availability and completeness of information
- Shipment and storage

3.2 Requirements for Fittings/Connectors

The following characteristics are part of testing, certification, and surveillance for the specific plastic or metal fitting according to Annex C through Annex I if applicable:

- Hydrostatic stress properties of material
- Thermal stability
- Appearance
- Dimensions
- Creep under internal pressure
- Melt flow rate (MFR)
- Degree of crosslinking
- Marking
- Opacity
- Homogeneity

3.3 System Requirements

The following characteristics are part of testing, certification, and surveillance for a particular piping system according to Annex C through Annex I if applicable:

- Creep under internal pressure
- Leak tightness under internal pressure and bending
- Tensile strength
- Performance under thermal cycling
- Performance under pressure cycling
- Vacuum tightness

3.4 Requirements for oxygen barrier materials

Oxygen barrier materials made of plastic must be sufficiently thermally stabilized if they are used in a particular piping system as specified in Annex C through 0.

Oxygen barrier materials made of plastic are considered to be thermally stable if the continuous operating temperature (corresponding to a stress duration of 50 years) does not exceed 70 °C.

If manufacturers of plastic piping systems use oxygen barrier materials with a valid DIN certification in accordance with Annex A, it shall be considered as proof of thermal stability.

4 Testing

4.1 General

To carry out the required tests that form the basis for the assessment and certification of the products, DIN CERTCO uses testing laboratories that have been awarded DIN CERTCO recognition.

For the test samples to be selected, the following group classification applies as far as those are to be part of the DIN certification.

Table 1 Pressure groups

Pressure group	Design pressure p_D in bar						
	PP	PE-X	PB	PE-RT	PVC-C	PE-MDX	MLP
1	4; 6						
2	8; 10						

Table 2 Size groups (dimension groups)

Size group	Nominal diameter d_n in mm						
	PP	PE-X	PB	PE-RT	PE-MDX	PVC-C	MLP
0	$d_n < 10$					$d_n < 12$	$d_n < 10$
1	$10 \le d_n \le 63$					$12 \le d_n \le 63$	$10 \le d_n \le 26$
2	$63 < d_n \le 160$						$26 < d_n \le 63$
3	---						$d_n > 63$

Table 3 Fitting groups

Fitting group	Type of fitting						
	PP	PE-X	PB	PE-RT	PE-MDX	PVC-C	MLP
1	Elbow, tee, reducer, coupler, end cap						
2	Union, flanged adapter, adapter piece and/or their plastic components etc.						

4.2 Types of Test

4.2.1 Initial Test (Type Test)

The initial test is a type test (design test, type examination) that determines whether the piping system consisting of pipe and fitting meets the requirements specified in clause 3 of this certification scheme.

The applicant must describe all system components (e.g. heating water additives) and the installation system by submitting a system description and design drawings.

Within the scope of the initial type test, an inspection of the manufacturer’s testing laboratory is carried out to ensure that the prerequisite conditions for a factory production control as required under this certification scheme (see clause 6.2) are in place.

The scope of testing and the number of samples are defined in Annex C through Annex J.

Nominal diameters not included in the size classes A or C of the respective product standards must always be fully tested.

4.2.2 Supplementary Test

A supplementary test will be conducted if any additions, enhancements or modifications (see clause 5.9) have been made to the certified product that affect its conformity with the applicable requirements.

The type and scope of the supplementary test is specified on a case-by-case basis by DIN CERTCO in coordination with the testing laboratory (see also Annex C up to Annex I).

For multilayer composite M pipes according to DIN EN 21003-2, the procedure for variants as specified in DVGW worksheet W 542, clause 6, may be applied.

4.2.3 Surveillance Test (Audit Test)

The surveillance test is conducted periodically at specified intervals (twice a year) and serves to ascertain whether the certified piping system in the production phase corresponds to the type-tested product.

The test is commissioned by DIN CERTCO (based on a surveillance contract between manufacturer and testing laboratory) and proof must be furnished to DIN CERTCO by means of a positive test report in due time before the date of surveillance (in individual cases, 4 months after the receipt of the samples at the testing laboratory at the latest).

If this deadline is not met, the certificate may be suspended and after an additional period of 2 months maximum, it may be withdrawn.

The type, scope, and frequency of the surveillance tests are defined in Annex C through Annex J.

If during the surveillance test a negative test result is found, the test may be terminated with a reduced test scope after consultation with the manufacturer, and a repeat test according to clause 4.2.4 shall be conducted.

4.2.4 Repeat Test

A repeat test is carried out after a surveillance test yielded a negative test result. The certificate holder receives a written deviation report that includes the required corrective actions and the corresponding deadlines for implementation.

The type and scope are determined in accordance with the intended purpose on a case-by-case basis by DIN CERTCO in consultation with the testing laboratory.

If the deadlines specified by DIN CERTCO cannot be met by the certificate holder for technical or other reasons, the certificate holder must propose a new binding date for repeat testing stating those reasons.

If the repeat test is also not passed, the certification is initially suspended, and a special test as per clause 4.2.5 will be conducted.

4.2.5 Special Test

A special test is conducted if

– Production was suspended for a period of more than 12 months
– DIN CERTCO has a justified reason to require such test (e.g. if the second repeat test was not passed)
– It was requested in writing by third parties, if these third parties have a particular interest in maintaining an orderly market activity in a competitive or qualitative manner.

Type and scope of the special test are determined in accordance with the intended purpose on a case-by-case basis by DIN CERTCO in consultation with the testing laboratory.

Should defects be found in the course of a special test requested by a third party, the certificate holder is responsible for bearing the costs of the special test. Should the special test at the request of a third party reveal no defects, the costs shall be borne by said third party.

4.3 Scope of Testing and Test Procedure

Depending on the certificate holder (see clause 5.1), the test scope and test procedure follow Annex C to Annex I and the following table (see clause 4.4 for the sampling location).

4.3.1 Scope of testing for initial certification and surveillance

Certificate holder	**Scope of testing**			
	Pipes	Fittings	System	Inspection Pipe/Fitting
A Manufacturer				
- Initial certification	x	x	x	x/x
- Surveillance	x	x	-	x/x
B Supplier of certified (monitored) systems				
- Initial certification	o	o	-	-/-
- Surveillance	o	o	-	-/-

Certificate holder	Scope of testing			
	Pipes	Fittings	System	Inspection Pipe/Fitting
C Supplier of systems with certified (monitored) pipes and non-certified fittings				
- Initial certification	o	x	x	-/x
- Surveillance	o	x	-	-/x
D Supplier of systems with non-certified pipes and certified (monitored) fittings				
- Initial certification	x	o	x	x/-
- Surveillance	x	o	-	x/-
E Supplier of noncertified systems				
- Initial certification	x	x	x	x/x
- Surveillance	x	x	-	x/x

x = complete testing according to Annex C through Annex I column “Surveillance manufacturer AT”
o = reduced testing according to Annex C through Annex I column “Surveillance supplier/distributor AT”

4.3.2 Performance under thermal cycling

Testing shall preferably be carried out in accordance with the testing method specified in ISO 19893. Accordingly, the test setup shall be selected depending on the nominal size or the design (test setup for $d_{n.} \leq 63$ mm – flexible pipes, test setup for $d_{n.} \leq 63$ mm – rigid pipes, test setup for $d_{n.} > 63$ mm). The number of cycles and the cycle duration depend on the nominal size (5000 cycles with a duration of 30+2 min for $d_{n.} \leq 63$ mm, 2500 cycles with a duration of 60+2 min for $d_{n.} > 63$ mm).

The following versions of test loops for the thermal cycling test are acceptable when more than one type of pipe and/or connector are being tested.

Leakage on a pipe or a connector will lead to the abortion of the temperature cycling test. In this case the temperature cycling test has to be repeated with individual, separate test loops.

4.3.2.1 Two types of connectors combined with a single type of pipe

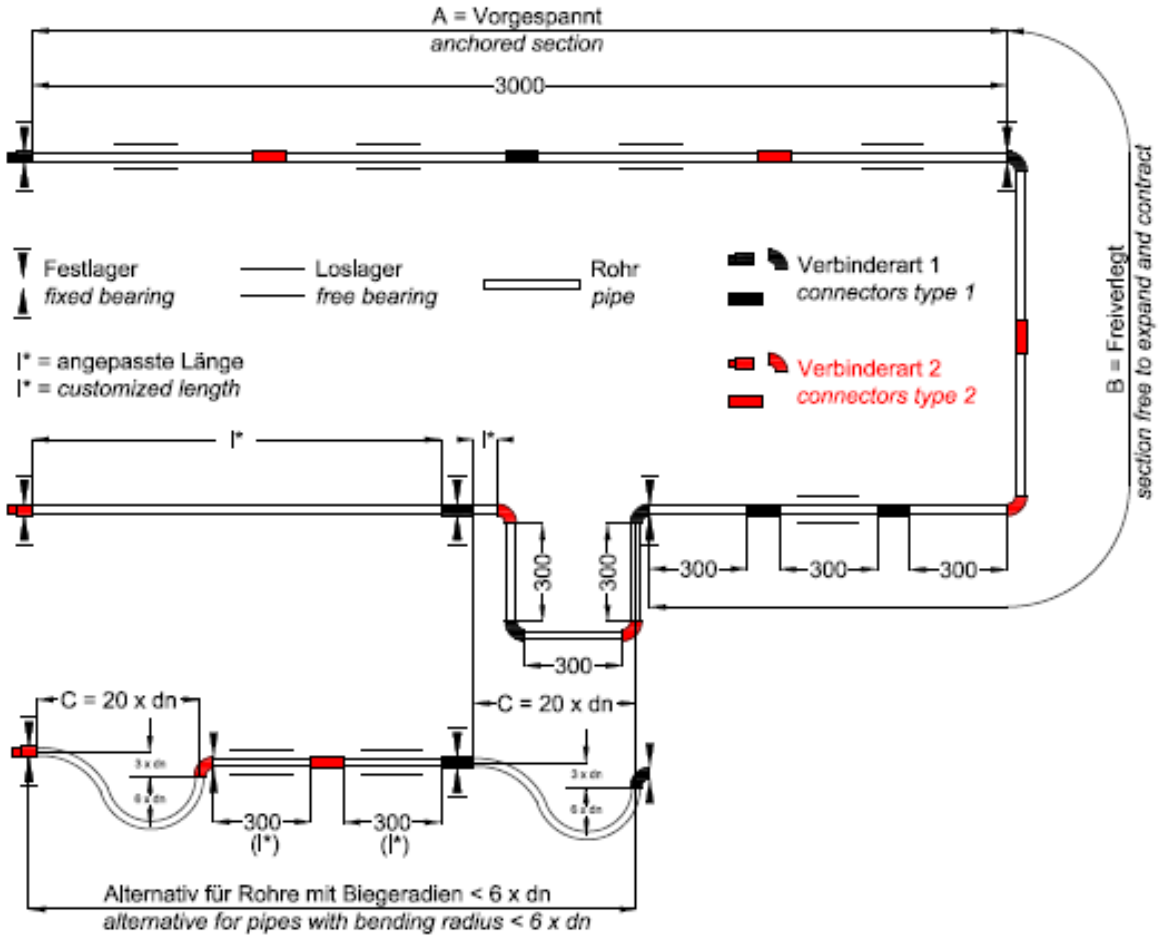

Figure 1 Temperature cycling test with two types of connectors combined with a single type of pipe

4.3.2.2 One single type of connector combined with two types of pipe

Conditions:

- Both types of pipes have the same d_n.
- Determine the pre-stressing force (section A) based on the higher pipe stress as specified in the applicable reference standard.

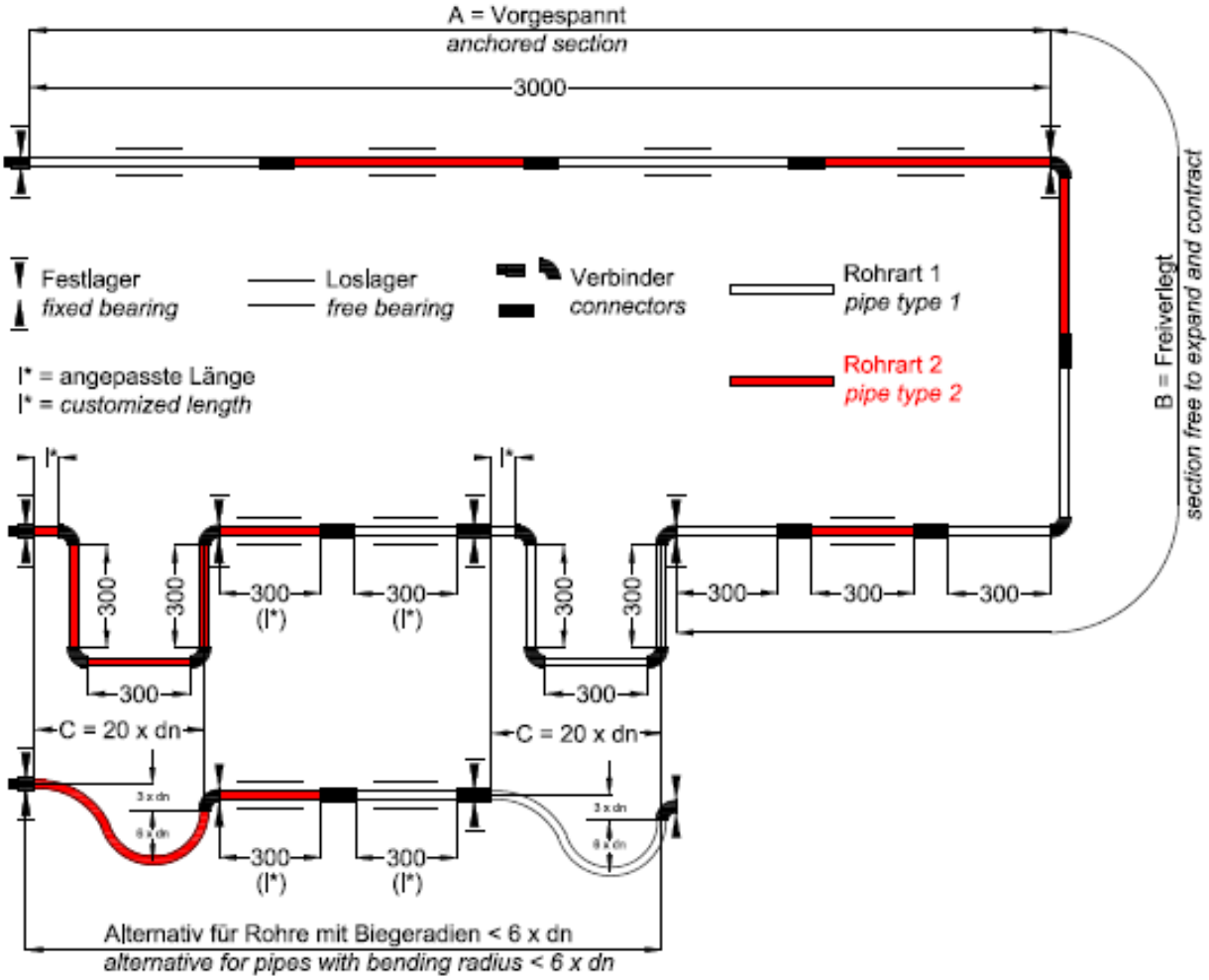

Figure 2 Temperature cycling test with one single type of connector combined with two types of pipe

4.3.3 Oxygen permeability

The oxygen permeability is measured according to DIN 4726 clause 5.4.3 following the pretreatment described therein.

The initial type test (N) is carried out at 40 °C for pipes of application class 4, at 80 °C for pipes of application class 5, and at 40 °C and 80 °C for pipes of application class 4 and 5. Third-party surveillance (AT) is carried out for both half-year periods at 40 °C for pipes of application class 4, for both half-year periods at 80 °C for pipes of application class 5, and for pipes of application class 4 and 5 in the first half-year at 40 °C and in the second half-year at 80 °C.

4.4 Withdrawal and Shipment of Samples

The samples for the different kind of tests for certificate holders of types A, D, or E are typically taken from manufacturer's ongoing production or from the certificate holder's stock (however, only after release by QA).

For certificate holders of type B or C, the withdrawal of samples of DIN-certified and monitored products is also possible at the manufacturer’s premises.

Product samples are withdrawn according to the following rules:

Type of test	**Sampling by**
- Initial type test	the manufacturer
- Supplementary test	the manufacturer
- Surveillance test	the testing laboratory commissioned to perform the tests
- Repeat test	the manufacturer upon approval by DIN CERTCO
- Special test	the testing laboratory commissioned to perform the tests

For all certificate types A to E, completely labelled pipes must be sampled and tested. A reference to labelling as per the quality manual is not sufficient.

The samples for testing oxygen permeability must be taken from the same production batch as those for the other tests and must be marked the same.

The samples must be submitted to the test laboratory 4 weeks after they were withdrawn at the latest. The costs for sample withdrawal and shipping the samples to the test laboratory are borne by the manufacturer/distributor.

If this deadline is not met, the certificate is initially suspended and will be withdrawn after an additional period of 2 weeks maximum.

4.5 Test Report

The testing laboratory informs the client of the test results by means of a test report. This test report must be submitted to DIN CERTCO as an original. A PDF-file is also acceptable, if it is submitted to DIN CERTCO directly by the testing laboratory.

As a rule, the test report may not be older than 6 months at the time of submitting the application. In individual cases, older test reports may also be accepted if the testing laboratory provides written confirmation of the current validity of the information given in the respective test report.

The test report must conform to DIN EN ISO/IEC 17025, clause 5.10 and contain at least the following information.

– Name and address of the manufacturer
– Name and address of the applicant (if different from the manufacturer)
– Test specifications (standards) including date of publication
– DIN CERTCO certification scheme including date of issue
– Type of test (e.g. type test, surveillance test, etc.)
– Surveillance period if DIN-certified (e.g. 1st half of YYYY)
– Registration number of the tested pipe if DIN-certified
– Pipe material
– Measured dimensions for the outer diameter and wall thickness of the base pipe and the entire pipe, the total number of layers, and additionally for P pipes the outer layer thickness according to DIN EN ISO 21003
– Layer construction for multilayer composite pipes
– Date and place of sample withdrawal if DIN-certified
– Testing period
– Test results
– Name and signature of the person responsible for testing

5 Certification

Certification for the purpose of this certification scheme is the assessment of conformity of a product by DIN CERTCO on the basis of test and inspection reports submitted by testing laboratories and inspection bodies recognized by DIN CERTCO. The products to be certified are inspected – and subsequently monitored – for conformity with the requirements specified in clause 3.

The right to use the certification mark “DIN-Geprüft” will be granted by issuing the corresponding certificate.

5.1 Application for Certification

Both, manufacturers according to § 4 of the Product Liability Act (ProdHaftG) or suppliers (distributors) of pipe systems who, with the written consent of the certificate holder, bring the products onto the market at their own responsibility within the meaning of the Product Liability Act, may apply for certification.

Suppliers who acquire their piping systems from manufacturers without a DIN certificate for the respective products may also apply for certification. With regard to certification and surveillance, they are treated like manufacturers. This results in the following types of certificate holders:

A Manufacturer with system certificate
B Supplier/distributor who distributes a DIN-certified system under their own trade name
C Supplier/distributor who distributes a DIN-certified and monitored pipe in combination with a non-certified fitting/connector under their own trade name
D Supplier/distributor who distributes a non-DIN-certified pipe in combination with a certified and monitored fitting/connector under their own trade name
E Supplier/distributor who distributes a non-DIN-certified system under their own trade name

The **manufacturer** (type A and E) must submit the following documents to DIN CERTCO:

– Application for certification in the original, complete with legally binding signature
– an up-to-date test report according to clause 4.4 about an initial test (see clause 4.2.1), if the test was not commissioned by DIN CERTCO
– an up-to-date inspection report about the inspection of the manufacturer’s testing laboratory
– a surveillance agreement between the testing laboratory and the applicant (this can be submitted up to 3 months after the certificate was issued at latest)

The **distributor** (type B, C, D) must submit the following documents to DIN CERTCO:

– Application for certification in the original, complete with legally binding signature
– an up-to-date test report about the measurement test of the dimensions to be certified
– a legally binding declaration by the main certificate holder according to Annex A and a legally binding declaration by the supplier/distributor according to Annex B
– a surveillance agreement between the testing laboratory and the applicant (this can be submitted up to 3 months after the certificate was issued at latest)

The following documents must be submitted to DIN CERTCO by the manufacturer or supplier/distributor of **oxygen barrier materials**:

- Application for certification in the original, complete with legally binding signature
- an up-to-date test report about the thermal stability according to Annex A

Upon receipt of his application, the applicant receives from DIN CERTCO an order confirmation with a procedure number and instructions on the further course of the procedure as well as information about missing documents, if any.

5.2 Definition of Types and Sub-Types

Plastic pipes that differ on the basis of major certification-relevant characteristics shall be defined as Type or Model. They are normally distributed under their own trade name. Certification-relevant characteristics are, for example, features that affect the usability or durability.

They include the following features:

a) same material
b) same type of crosslinking (for PE-X)
c) same layer construction (type, number, and position of layers)
d) same production facility
e) same cross-sectional form

For each type, an independent certificate shall be issued.

Sub-types are generally those products of a model/type that only differ in terms of size or performance, in formal or non-certification-relevant characteristics. Those products may be combined on one certificate.

For plastic pipes, these are generally the different dimensions of a pipe type.

Base pipe and outer protective layer must always be made from the same material.

For multilayer P pipes according to DIN EN ISO 21003, base pipe and outer layer must be made from thermally stable materials.

5.3 Conformity Assessment

On the basis of the documents submitted, DIN CERTCO conducts the conformity assessment. In particular, by means of the test and inspection report, it is assessed whether the product meets the requirements of the certification scheme and of the standard.

DIN CERTCO will notify the applicant of any deviations in writing.

5.4 The Certificate and the Right to Use the Mark

After successful testing and conformity assessment of the submitted documents, DIN CERTCO issues a certificate to the applicant and grants the right to use the certification mark “DIN-Geprüft” in conjunction with a corresponding registration number. The registration number consists of a consecutive number and the type of material.

Format of the Registration Number: **3V000 <material>**

Example for PE-Xa system: 3V000 PE-Xa
Example for oxygen barrier material: 3V000 EVOH

Plastic piping systems, which were granted the right to use the certification mark “DIN-Geprüft”, must be marked with the respective certification mark "DIN-Geprüft" and the respective registration number in addition to the minimum requirements listed in part two of the respective standard.

There are two options:

1. “DIN-Geprüft“ mark with registration No.: 3V000 PE-Xa
2. In exceptional cases, DIN-Geprüft with registration No.: DIN-Geprüft 3V000 PE-Xa

The mark and the registration number may only be used for the type for which the certificate has been issued and which corresponds to the type-tested product.

For each respective type, a registration number shall be issued. Design types (sub-types) of a type will be issued the same registration number (see clause 5.2).

In addition, the section “Use of Marks” in the General Terms and Conditions of DIN CERTCO apply.

5.5 Publications

An up-to-date list of all certificate holders can be accessed via the DIN CERTCO homepage (www.dincertco.de) under <Certificate Holders>. Manufacturers, users and consumers use this research option to obtain information on certified products.

Here, in addition to the contact details of the certificate holder (telephone, telefax, email, website), the technical data of the registered plastic piping system can also be viewed.

Specifically, at least the following data are included:

Pipe:	Example:
- Production facility (in encoded form, if applicable):	Place
- Material	PE-Xa
- Nominal outside diameter x nominal wall thickness:	18 x 2 mm
- Pipe dimension class:	A
- Application class and design pressure:	Class 5/6 bar

Fitting/Connector:	
- Manufacturer’s name:	John Doe
- Production facility (in encoded form, if applicable):	Place
- Type of fitting:	Compression fitting
- Material:	Metal
- Type name:	Sample clamp
- Nominal diameter d_n[a]:	16
- Nominal wall thickness of the corresponding pipe(s): (for compression or crimp fittings only)	2.2
- Application class and design pressure:	Class 5/6 bar

5.6 Validity of the Certificate

The certificate is valid for 5 years (the validity of distributor certificates depends on the validity of the manufacturer’s certificate). The period of validity is indicated on the certificate. Upon expiration of the certificate, the right to use the mark expires as well.

5.7 Renewal of the Certificate

If the certification is to be maintained beyond the date specified on the certificate, a current, positive test and inspection report about the surveillance test together with an application for renewal must be submitted to DIN CERTCO in due time before the expiry of the certificate. Based on the documents submitted, DIN CERTCO conducts the conformity assessment.

The test/inspection report must relate to the second to last audit or later before the expiry of the certificate and must not be older than six months.

5.8 Withdrawal of the Certificate

The certificate is withdrawn in particular if:

– the surveillance activities according to clause 6.3 are not performed on time or in their entirety,

– the certification mark "DIN-Geprüft" is misused by the certificate holder,

– the requirements specified in this certification scheme or its accompanying documents are not being fulfilled,

– the certification fees are not paid on time,

– the prerequisites for issuing the certificate no longer exist.

With the withdrawal of the certificate, the right to use the certification mark "DIN-Geprüft" expires automatically without the need for a notification from DIN CERTCO.

5.9 Alterations/Amendments

5.9.1 Alterations/Amendments to the Product

The certificate holder is under obligation to notify DIN CERTCO immediately of all alterations to the product that affect the certification-relevant features of the product. In coordination with the testing laboratory, DIN CERTCO decides whether it is a significant alteration and to what extent testing according to clause 4.2.1 (Initial Type Test) or clause 4.2.2 (Supplementary Test) is to be conducted.

The corresponding test report shall be forwarded to DIN CERTCO by the testing laboratory.

If a significant alteration is determined (e.g. a change of the production facility), the certificate with the corresponding registration number is withdrawn. For the modified product, a new application for an initial certification and for the authorization to use the certification mark "DIN-Geprüft" may be submitted.

The certificate holder remains under the obligation to report any changes to the formal information (e.g. certificate holder or his address).

The certificate holder may apply to DIN CERTCO for an extension of the existing certificate to include additional design types (sub-types) of the same type. The design types shall be entered in the certificate for the already certified product and, provided that the conditions are met, shall be regarded as an integral part of same.

5.9.2 Modification to the Test Specifications

If the test specifications for the certification change, an application for the modification of the certification shall be submitted within 6 months after receiving notification from DIN CERTCO and, as a rule, proof of conformity with the modified test specifications shall be submitted in the form of a positive test report after 12 months (see clause 4.5).

Upon a positive assessment, DIN CERTCO issues a modified certificate.

5.10 Product Defects

If defects are found on a certified product on the market, the certificate holder will be asked in writing by DIN CERTCO to rectify the defects.

In coordination with the testing laboratory, DIN CERTCO decides whether it is a serious or a minor defect.

For defects that have a direct or indirect influence on the technical safety or functionality of the product (serious defects), the manufacturer must ensure that the products are no longer marked with the certification mark "DIN-Geprüft" until the defects have been rectified.

Manufacturing defects shall be rectified immediately. Production batches already produced with identified defects may not be distributed anymore or, to the extent technically and commercially feasible, must be withdrawn from the market.

The manufacturer must submit proof to DIN CERTCO within 3 months that the defects have been rectified and that the faulty product again meets the specified requirements. This is done by submitting a test report for a special test in accordance with clause 4.2.5,

For defects that have no influence on the technical safety or functionality of the product (minor defects), the manufacturer must submit suitable proof to DIN CERTCO within 3 months that the defects in the faulty product have been rectified.

Should the manufacturer fail to observe these deadlines, the certificate will be withdrawn from him and from the distributor of the product and they will no longer be permitted to use the certification mark "DIN-Geprüft”.

If there are still grounds for complaint, DIN CERTCO shall initially suspend the certificate and at the same time issue a final deadline to rectify the defects. If the certificate holder fails to comply with that request, or fails to comply within the set time limit, or if he is again not able to prove that the defects have been rectified, the certificate shall be withdrawn.

6 Surveillance

6.1 General

The continuous surveillance of the certified pipe system during the entire duration of the certification period is an integral component of the certification.

6.2 Factory Production Control (FPC) by the Manufacturer

6.2.1 General

The manufacturer must implement appropriate quality assurance measures to ensure that the product qualities verified during certification are being maintained.

To do so, the manufacturer shall establish, document and maintain a system for the factory production control (FPC) according to DIN EN 15015, which shall consist of procedures, regular inspections and tests and/or assessments, and the application of the inspection results for raw materials and other incoming materials or components, equipment, the production process and the product.

The FPC is conducted in accordance with the corresponding requirements of Annex C to Annex J.

If the manufacturer has a component designed, manufactured, assembled, packaged, processed and labelled by a subcontracting third party, the FPC of the original manufacturer may be taken into account. However, for all subcontracting, the manufacturer shall retain the overall control of the component and must ensure that he obtains all the information necessary to fulfill his responsibilities under this certification scheme.

6.2.2 Records

All elements, requirements and regulations adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This documentation of the production control system must ensure a general understanding of the conformity assessment and must enable the achievement of the required component characteristics and allow the verification of an effective application of the production control system.

Therefore, the FPC unites operational procedures and all measures that make it possible to maintain and control the conformity of the component with its technical specifications. Its implementation may be achieved by controls and tests on raw materials and elements, processes, manufacturing equipment and finished components, including their material properties, and by applying these results.

The results of inspections, tests or assessments requiring action shall be recorded, as shall any action being taken. The corrective measures to be taken when control values or control criteria are not met shall be recorded and retained for the period specified in the manufacturer’s FPC system procedures.

The specifications of all incoming raw materials and components shall be documented, and the control plan for ensuring their conformity shall be established.

All relevant records must be provided to DIN CERTCO or its authorized representative upon request. These records must contain at least the following information:

– Name of the test object
– Date of manufacture
– Period of testing
– Result of the test and comparison with the specified requirements
– Signature of the person responsible for testing
– Date of the record

6.2.3 Personnel

Responsibilities, authorities and the relationship between personnel managing, performing or verifying work that affects product conformity, shall be clearly defined. This applies in particular to personnel that takes measures to prevent product non-conformities and, if non-conformities are found, identifies and documents the problems with the conformity of the product.

Personnel performing work that affects product conformity shall have the required and documented competence based on the appropriate education, training, skills and experience.

6.2.4 Equipment

All weighing, measuring and testing equipment needed to achieve conformity or produce evidence of conformity must be calibrated and periodically inspected according to the documented procedures, frequencies and criteria.

Control of monitoring and measuring devices shall comply with the appropriate clauses of DIN EN ISO 9001.

All equipment used in the manufacturing process shall be periodically inspected and maintained to ensure that use, wear or failure does not cause inconsistencies in the manufacturing process.

Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer’s written procedures. The records shall be retained for the time period specified in the manufacturer's FPC procedures.

6.2.5 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the surveillance scheme for ensuring their conformity.

The conformity of the raw material with the specifications shall be verified in accordance with EN ISO 9001, clause 8.4.2.

6.2.6 Production control

The production shall be planned and carried out under controlled conditions.

Compliance with EN ISO 9001, clauses 8.5.1 and 8.5.5 shall be deemed to satisfy the requirements of this sub-clause.

6.2.7 Traceability and marking

It must be possible to identify and trace individual products and product batches with regard to their production origin. The manufacturer shall have written procedures ensuring that the processes related to affixing traceability codes and/or markings are inspected on a regular basis.

Compliance with EN ISO 9001, clause 8.5.2 shall be deemed to satisfy the requirements of this sub-clause.

6.2.8 Non-conforming products

The manufacturer shall have written procedures that specify the handling of non-conforming products. Any such events shall be recorded as they occur and these records shall be kept for the period specified in the manufacturer’s written procedures.

Compliance with EN ISO 9001, clause 8.7 shall be deemed to satisfy the requirements of this sub-clause.

6.2.9 Corrective action

The manufacturer shall have documented procedures that specify measures to eliminate the cause of non-conformities in order to prevent recurrence.

Compliance with EN ISO 9001, clause 10.2 shall be deemed to satisfy the requirements of this sub-clause.

6.2.10 Handling, storage and packaging

The manufacturer shall have procedures in place for handling the products and shall provide suitable storage facilities to prevent damage or impairments.

6.2.11 Quality Management System

DIN CERTCO recommends the establishment and certification of a quality management system in accordance with the standard series DIN EN ISO 9000 et seq.

6.3 Surveillance by DIN CERTCO

By means of surveillance tests, DIN CERTCO regularly controls the conformity of the product with the requirements specified in the certification scheme and, during inspections, verifies the effectiveness of the factory production control according to clause 6.2.

Scope and frequency of the surveillance are defined in Annex C through J.

6.3.1 Factory Inspections

Within the framework of a factory inspection, DIN CERTCO, or one of its authorized representatives, inspects the manufacturer’s factory production control according to clause 6.2 to assess whether it is suited for proper production.

The factory inspection also determines whether the right technical manufacturing conditions are in place to ensure the continuous conformity of the products with the requirements specified in clause 3.

The results of the inspection are being communicated to the client in a special inspection report. This report must be submitted to DIN CERTCO in the original and must fulfill the requirements of DIN EN ISO/IEC 17020, clause 13.

Should the results of the factory inspection not be sufficient, the production facility and the applicant shall be informed immediately. In this case, the scope of additional corrective measures needed to meet all requirements shall be determined between the certification

body and the applicant. If the applicant is unable to implement the necessary measures, the procedure shall be terminated.

6.3.2 Surveillance Tests (Audit Tests)

In type and scope, the surveillance tests are conducted in accordance with clause 4.2.3.

Annex A Declaration by the Manufacturer

DIN CERTCO Gesellschaft
für Konformitätsbewertung mbH
Alboinstraße 56
D-12103 Berlin

DECLARATION BY THE MANUFACTURER

We,

Company: _____
Street: _____
Postal code/city: _____

hereby agree to the use of our certified plastic piping systems with the

Type designation: _____
Registration No.: _____

for the certification of the following supplier/distributor:

Company: _____
Street: _____
Postal code/city: _____

under the following

Type designation: _____

We furthermore agree that the supplier/distributor mentioned above shall be permitted to apply for their own certificate with a separate registration number on the basis of our valid DIN-certification.

DIN CERTCO may use test reports available to us and any additional certification-relevant documents for the conformity assessment.

We furthermore confirm that we will only supply products to the applicant that are identical in construction to those which are certified by us with DIN CERTCO under the registration number listed above.

Any certification-relevant changes under the current valid certification scheme will be immediately reported in writing by us to DIN CERTCO and to the supplier/distributor.

Date _____ Company stamp and legally binding signature _____

Annex B Declaration by the Supplier/Distributor

DIN CERTCO Gesellschaft
für Konformitätsbewertung mbH
Alboinstraße 56
D-12103 Berlin

DECLARATION BY THE SUPPLIER/DISTRIBUTOR

We, the supplier/distributor,

Company: _____
Street: _____
Postal code/city: _____

hereby declare that the plastic piping systems distributed by us under the following

Type designation: _____

produced by the manufacturer/certificate holder

Company: _____
Street: _____
Postal code/city: _____

and the registration No.: _____

for which we have applied for DIN-certification, are identical in construction to the products certified by the manufacturer/certificate holder under the registration number listed above.

We furthermore confirm that we will not introduce any changes to those products supplied by the manufacturer and that we will not acquire any other products with the same registration number.

Date Company stamp and legally binding signature

Annex C Scope of testing, FPC and third-party surveillance for PP piping systems

Characteristics	Requirements and tests according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Pipes	**DIN EN ISO 15874-2**									
Stress properties of material	Clause 4.2	x	x	x[8]	-	-	1 x per material	-	-	-
Appearance	Clause 5.1	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Opacity, if declared	Clause 5.2	x	x	x	-	-	1 x with the smallest wall thickness produced	-	-	-
Dimensions	Table 7 (preferable) and table 8	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Creep under internal pressure	Table 9	x	x	x	x	-	3 x on one d_n per size group	x	x (95 °C/ 1000 h)	-
Longitudinal reversion	Table 10	x	x	x	x	-	3 x on one d_n per size group	x	x	-
Melt flow rate (MFR)	Table 10	x	x	x	x	-	1 x on one d_n per size group	x	x	-
Thermal stability	Table 10	x	x	x	-	-	3 x on one d_n per material at 110 °C / 8,760 h.	-	-	-

[1] N: Initial type test in case of new system
[2] M1: Change of polymer (change of supplier, change of polymerization procedure, change of chemical properties of co-monomers)
[3] M2: Change of additives (amount of individual additive greater than X ± 30 %; chemical properties or nature of additive)
[4] E: Expansion of the product range
[5] D: Change in design (dimensions, geometry of the pipe component, jointing system)
[6] FPC: Factory Production Control (frequency, number of samples and test requirements according to DIN ISO/TS 15874-7, table 8)
[7] AT: Audit Test (twice a year control test as part of third-party surveillance, scope of testing for pipes: 3 samples per size group, scope of testing for fittings: 3 fittings per size group and fitting group)
[8] In order to assess the effect of a change of additives (M2) on the hydrostatic stress properties specified in DIN EN ISO 15874-2, three test pieces must be tested at two different stress levels at 95 °C. The lowest stress level shall give downtimes of approximately 2500 h. All failure points shall be on or above the relevant reference curve of Figure 1, 2, or 3 of DIN EN ISO 15874-2 for the appropriate material.

Characteristics	**Requirements and tests according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]	**M1[2]**	**M2[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Impact resistance	Table 10 (alternatively falling ball test according to DIN EN 1411)	X	x	x	x	-	1 x on one e_n per size group	x	x	-
Marking[9]	Clause 10, DIN 4726, clause 6.1 CS, clause 5.4	x	-	-	x	-	1 x per d_n and pressure group	x	x	x
Homogeneity	DIN 4726, clause 4.2	x	x	x	x	-	1 x per d_n and pressure group	x	x	-
Bending radii	DIN 4726, clause 4.3	x	x	x	x	-	1 x per d_n and pressure group	x	-	-
Oxygen permeability[10]	DIN 4726, clause 4.4	x	x	x	x	x	1 x on one d_n per size group and design (same number and position of layers, same base pipe material, adhesive material, and same barrier layer material). For pipes with a 3- or 5-layer wall structure with the same materials (base pipe, adhesive and barrier) and the same barrier thickness (minimum dimension and dimensional tolerances), it is sufficient to conduct the oxygen permeability test on the pipe with an external barrier.	-	x	-
Resistance to heating water additives	DIN 4726, clause 4.6	x	x	x	x	-	1 x on one d_n and pressure group	-	-	-
Information	DIN 4726, clause 6.2	x	-	-	x	-	1 x per piping system	x	x	x

9 The marking of dimensions shall be done as follows: nominal outside diameter x nominal wall thickness and the production or product dimensions. Example: 16 x 2.0 mm (real 15.6 x 1.8 mm)

10 See certification scheme clause 4.3.3

Characteristics	Requirements and tests according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Connectors/Fittings	**DIN EN ISO 15874-3**									
Stress properties of material	Clause 4.1	x	x	x	-	-	1 x per material	-	-	-
Thermal stability (not required if same material as pipe)	Clause 4.1.2.2	x	x	x	-	-	3 x per material at 110 °C / 8,760 h.	-	-	-
Appearance	Clause 5.1	x	x	x	x	-	1 x per d_n and fitting group	x	x	x
Opacity if declared (not required for metal fittings or if same material as pipe)	Clause 5.2	x	x	x	-	-	1 x p with smallest wall thickness produced	-	-	-
Dimensions	Clause 6	x	x	x	x	x	1 x per d_n and fitting group	x	x	x
Creep under internal pressure (not required for metal fittings or if same material as pipe)	Clause 7	x	x	x	x	x	3 x per size group and fitting group for the relevant design pressure and appropriate class of application	x	x	-
Melt flow rate MFR (not required for metal fittings or if same material as pipe)	Table 8	x	x	x	x	-	1 x on one d_n per size group and fitting group	x	x	-
Marking	Clause 11	x	-	-	x	-	1 x per d_n and fitting group	x	x	x
System	**DIN EN ISO 15874-5**									
Creep under internal pressure [11]	Clause 4.2	x	-	-	x	x	3 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-

[11] The type test for creep under internal pressure and for thermal stability should be conducted using the connectors that are part of the system. The external surveillance (AT) of the creep under internal pressure is done while using the connectors that are part of the system. If different connectors are included in the certification scope, those must be alternately included in the continuous external surveillance.

Characteristics	Requirements and tests according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Leaktightness under internal pressure and bending[12]	Clause 4.3	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Tensile strength	Clause 4.4	x	-	-	x	x	1 x for the smallest and largest d_n per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Performance under thermal cycling[13]	Clause 4.5	x	-	-	x	x	Every d_n for the relevant permissible operating pressure and the appropriate application class. Alternative test setups according to section 4.3.2 of the certification scheme may be used. Note: For crimp fittings, each press contour represents its own type of connector. Testing using the test parameters according to application class 5 covers testing according to application class 4 at the same or lower permissible operating pressures.	-	-	-
Performance under pressure cycling	Clause 4.6	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure	-	-	-
Vacuum tightness	Clause 4.7	x	-	-	x	x	1 x per size group and jointing system and per pressure group	-	-	-

12 According to the DVGW worksheet W534:2015-07, testing shall be conducted only on pipes with a nominal outer diameter of $d_n \leq 63$ mm.

13 See certification scheme section 4.3.2

Annex D Scope of testing, FPC and third-party surveillance for PE-X piping systems

Characteristics	Requirements and tests according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Pipes	**DIN EN ISO 15875-2**									
Stress properties of material	Clause 4.2	x	x	x[8]	-	-	1 x per material	-	-	-
Appearance	Clause 5.1	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Opacity, if declared	Clause 5.2	x	x	x	-	-	1 x with the smallest wall thickness produced	-	-	-
Dimensions	Table 5 (preferable) and Table 6	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Creep under internal pressure	Table 7	x	x	x	x	-	3 x on one d_n per size group	x	x (95 °C/ 1000 h)	-
Longitudinal reversion	Table 8	x	x	x	x	-	3 x on one d_n per size group	x	x	-
Degree of crosslinking	Table 8	x	x	x	x	-	2 x on one d_n per size group	x	x	-
Thermal stability	Table 8	x	x	x	-	-	3 x on one d_n per material at 110 °C / 8,760 h.	-	-	-
Marking[9]	Clause 10, DIN 4726, clause 6.1 CS, clause 5.4	x	-	-	x	-	1 x per d_n and pressure group	x	x	x

[1] N: Initial type test in case of new system
[2] M1: Change of polymer (change of supplier, change of polymerization procedure, change of chemical properties of co-monomers)
[3] M2: Change of additives (amount of individual additive greater than $X \pm 30$ %, chemical properties or nature additive)
[4] E: Expansion of the product range
[5] D: Change in design (dimensions, geometry of the pipe component, jointing system)
[6] FPC: Factory Production Control (frequency, number of samples and test requirements according to DIN ISO/TS 15875-7 Table 8)
[7] AT: Audit Test (twice a year control test as part of third-party surveillance, scope of testing for pipes: 3 samples per size group, scope of testing for fittings: 3 fittings per size group and fitting group)
[8] In order to assess the effect of a change of additives (M2) on the hydrostatic stress properties specified in DIN EN ISO 15875-2, three test pieces must be tested at two different stress levels at 95° C. The lowest stress level shall give downtimes of approximately 2500 h. All failure points shall be on or above the relevant reference curve of Figure 1, 2 or 3 of DIN EN ISO 15875-2 for the appropriate material.

Characteristics	**Requirements and tests according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]	**M1[2]**	**M2[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Homogeneity	DIN 4726, clause 4.2	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Bending radii	DIN 4726, clause 4.3	x	x	x	x	-	1 x per d_n and pressure group	x	-	-
Oxygen permeability[10]	DIN 4726, clause 4.4	x	x	x	x	x	1 x on one d_n per size group and design (same number and position of layers, same base pipe material, same adhesive material, and same barrier layer material). For pipes with a 3- or 5-layer wall structure with the same materials (base pipe, adhesive and barrier) and the same barrier thickness (minimum dimension and dimensional tolerances), it is sufficient to conduct the oxygen permeability test on the pipe with an external barrier.	-	x	-
Resistance to heating water additives	DIN 4726, clause 4.6	x	x	x	x	-	1 x per d_n and pressure group	-	-	-
Information	DIN 4726, clause 6.2	x	-	-	x	-	1 x per piping system	x	x	x
Connectors/Fittings	**DIN EN ISO 15875-3**									
Stress properties of material	Clause 4.1	x	x	x	-	-	1 x per material	-	-	-
Thermal stability (not required if same material as pipe)	Clause 4.1.2.2	x	x	x	-	-	3 x per material at 110 °C / 8,760 h.	-	-	-
Appearance	Clause 5.1	x	x	x	x	-	1 x per d_n and fitting group	x	x	x
Opacity if declared (not required for metal fittings or if same material as pipe)	Clause 5.2	x	x	x	-	-	1 x with smallest wall thickness produced	-	-	-

[9] The marking of dimensions shall be done as follows: nominal outside diameter x nominal wall thickness and the production or product dimensions. Example: 16 x 2.0 mm (real 15.6 x 1.8 mm)

[10] See certification scheme clause 4.3.3

Characteristics	**Requirements and tests according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]	**M1[2]**	**M2[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Dimensions	Clause 6	x	x	x	x	x	1 x per d_n and fitting group	x	x	x
Creep under internal pressure (not required for metal fittings or if same material as pipe)	Clause 7	x	x	x	x	x	3 x per size group and fitting group for the relevant design pressure and appropriate class of application	x	x	-
Degree of crosslinking (not required for metal fittings)	Clause 8	x	x	x	x	x	2 x on one d_n per size group and fitting group	x	x	-
Marking	Clause 11	x	-	-	x	-	1 x per d_n and fitting group	x	x	x
System	**DIN EN ISO 15875-5**									
Creep under internal pressure[11]	Clause 4.2	x	-	-	x	x	3 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Leaktightness under internal pressure and bending[12]	Clause 4.3	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Tensile strength	Clause 4.4	x	-	-	x	x	1 x for the smallest and largest d_n per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-

11 The type test for creep under internal pressure and for thermal stability should be conducted using the connectors that are part of the system. The external surveillance (AT) of the creep under internal pressure is done while using the connectors that are part of the system. If different connectors are included in the certification scope, those must be alternately included in the continuous external surveillance.

12 According to the DVGW worksheet W534:2015-07, testing shall be conducted only on pipes with a nominal outer diameter of $d_n \leq 63$ mm.

Characteristics	Requirements and tests according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Performance under thermal cycling[13]	Clause 4.5	x	-	-	x	x	Every d_n for the relevant permissible operating pressure and the appropriate application class. Alternative test setups according to section 4.3.2 of the certification scheme may be used. Note: For crimp fittings, each press contour represents its own type of connector. Testing using the test parameters according to application class 5 covers testing according to application class 4 at the same or lower permissible operating pressures.	-	-	-
Performance under pressure cycling	Clause 4.6	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure	-	-	-
Vacuum tightness	Clause 4.7	x	-	-	x	x	1 x per size group and jointing system and per pressure group	-	-	-

[13] See certification scheme clause 4.3.2

Annex E Scope of testing, FPC and third-party surveillance for PB piping systems

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Pipes	**DIN EN ISO 15876-2**									
Stress properties of material	Clause 4.2	x	x	x[8]	-	-	1 x per material	-	-	-
Appearance	Clause 5.1	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Opacity, if declared	Clause 5.2	x	x	x	-	-	1 x with the smallest wall thickness produced	-	-	-
Dimensions	Clause 6 (preferable) and Table 7	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Creep under internal pressure	Clause 8	x	x	x	x	-	3 x on one d_n per size group	x	x (95 °C/ 1000 h)	-
Longitudinal reversion	Clause 9	x	x	x	x	-	3 x on one d_n per size group	x	x	-
Melt flow rate MFR	Clause 9	x	x	x	x	-	1 x on one d_n per size group	x	x	-
Thermal stability	Clause 9	x	x	x	-	-	3 x on one per material at 110 °C / 8,760 h.	-	-	-
Marking[9]	Clause 10, DIN 4726, clause 6.1 CS, clause 5.4	x	-	-	x	-	1 x on one d_n per size group	x	x	x

[1] N: Initial type test in case of new system
[2] M1: Change of polymer (change of supplier, change of polymerization procedure, change of chemical properties of co-monomers)
[3] M2: Change of additives (amount of individual additive greater than $X \pm 30$ %; chemical properties or nature of additive)
[4] E: Expansion of the product range
[5] D: Change in design (dimensions, geometry of the pipe component, jointing system)
[6] FPC: Factory Production Control (frequency, number of samples and test requirements according to DIN ISO/TS 15876-7 Table 8)
[7] AT: Audit Test (twice a year control test as part of third-party surveillance, scope of testing for pipes: 3 samples per size group, scope for testing for fittings: 3 fittings per size group and fitting group)
[8] In order to assess the effect of a change of additives (M2) on the hydrostatic stress properties specified in DIN EN ISO 15876-2, three test pieces must be tested at two different stress levels at 95° C. The lowest stress level shall give downtimes of approximately 2500 h. All failure points shall be on or above the relevant reference curve of Figure 1, 2 or 3 of DIN EN ISO 15876-2 for the appropriate material.

Characteristics	**Requirements according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]	**M1[2]**	**M2[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Homogeneity	DIN 4726, clause 4.2	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Bending radii	DIN 4726, clause 4.3	x	x	x	x	-	1 x per d_n and pressure group	x	-	-
Oxygen permeability[10]	DIN 4726, clause 4.4	x	x	x	x	x	1 x on one d_n per size group and design (same number and position of layers, same base pipe material, same adhesive material, and same barrier layer material). For pipes with a 3- or 5-layer wall structure with the same materials (base pipe, adhesive and barrier) and the same barrier thickness (minimum dimension and dimensional tolerances), it is sufficient to conduct the oxygen permeability test on the pipe with an external barrier.	-	x	-
Resistance to heating water additives	DIN 4726, clause 4.6	x	x	x	x	-	1 x per d_n and pressure group	-	-	-
Information	DIN 4726, clause 6.2	x	-	-	x	-	1 x per piping system	x	x	x
Connectors/Fittings	**DIN EN ISO 15876-3**									
Stress properties of material	Clause 4.1	x	x	x	-	-	1 x per material	-	-	-
Thermal stability (not required if same material as pipe)	Clause 4.1.2.2	x	x	x	-	-	3 x per material at 110 °C / 8,760 h.	-	-	-
Appearance	Clause 5.1	x	x	x	x	-	1 x per d_n and fitting group	x	x	x
Opacity, if declared (not required for metal fittings or if same material as pipe)	Clause 5.2	x	x	x	-	-	1 x with smallest wall thickness produced	-	-	-

9 The marking of dimensions shall be done as follows: nominal outside diameter x nominal wall thickness and the production or product dimensions. Example: 16 x 2.0 mm (real 15.6 x 1.8 mm)

10 See certification scheme clause 4.3.3

Characteristics	**Requirements according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]	**M1[2]**	**M2[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Dimensions	Clause 6	x	x	x	x	x	1 x per d_n and fitting group	x	x	x
Creep under internal pressure (not required for metal fittings or if same material as pipe)	Clause 7	x	x	x	x	x	3 x per size group and fitting group for the relevant design pressure and appropriate class of application	x	x	-
Melt flow rate MFR (not required for metal fittings or if same material as pipe)	Clause 8	x	x	x	x	-	1 x on one d_n per size group and fitting group	x	x	-
Marking	Clause 11	x	-	-	x	-	1 x per d_n and fitting group	x	x	x
System	**DIN EN ISO 15876-5**									
Creep under internal pressure[11]	Clause 4.2	x	-	-	x	x	3 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Leaktightness under internal pressure and bending[12]	Clause 4.3	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Tensile strength	Clause 4.4	x	-	-	x	x	1 x for the smallest and largest d_n per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-

11 The type test for creep under internal pressure and for thermal stability should be conducted using the connectors that are part of the system. The external surveillance (AT) of the creep under internal pressure is done while using the connectors that are part of the system. If different connectors are included in the certification scope, those must be alternately included in the continuous external surveillance.

12 According to the DVGW worksheet W534:2015-07, testing shall be conducted only on pipes with a nominal outer diameter of dn ≤ 63 mm.

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Performance under thermal cycling[13]	Clause 4.5	x	-	-	x	x	Every d_n for the relevant permissible operating pressure and the appropriate application class. Alternative test setups according to section 4.3.2 of the certification scheme may be used. Note: For crimp fittings, each press contour represents its own type of connector. Testing using the test parameters according to application class 5 covers testing according to application class 4 at the same or lower permissible operating pressures.	-	-	-
Performance under pressure cycling	Clause 4.6	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure	-	-	-
Vacuum tightness	Clause 4.7	x	-	-	x	x	1 x per size group and jointing system and per pressure group	-	-	-

[13] See certification scheme clause 4.3.2

Annex F Scope of testing, FPC and third-party surveillance for PVC-C piping systems

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M[2]	P[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Pipes	**DIN EN ISO 15877-2**									
Density	DIN EN ISO 15877-1, clause 5.2	x	x	-	-	-	1 x per material	-	-	-
Chlorine content	DIN EN ISO 15877-1, clause 5.3	x	x	-	-	-	1 x per material	-	-	-
Proof of T_{mal} (95 °C, 100 h)	DIN EN ISO 15877-1, clause 5.4	x	x	-	-	-	1 x per material	-	-	-
Stress properties of material	Clause 4.3	x	x	-	-	-	1 x per material	-	-	-
Appearance	Clause 5.1	x	x	-	x	-	1 x per d_n and pressure group	x	x	x
Opacity, if declared	Clause 5.3	x	x	-	-	-	1 x per smallest wall thickness produced	-	-	-
Dimensions	Table 2 and Table 3	x	-	-	x	x	1 x per d_n and pressure group	x	x	x
Creep under internal pressure	Table 4	x	x	-	x	x	3 x on one d_n per size group	x	x (95 °C/ 1000 h)	-
Resistance to impact load	Table 5	x	x	x	x	-	1 x per size group and per pressure group	x	x	-
Tensile strength	Table 7	x	x	-	-	-	1 x per size group and per pressure group	-	x	-

[1] N: Initial type test in case of new system
[2] M: Change of material (change in chlorine content of resin X ± 0.5 %, change in dosing of additives (e.g. pigments) X ± 20 %)
[3] P: Change in manufacturing process
[4] E: Expansion of the product range
[5] D: Change in design (dimensions, geometry of the pipe component, jointing system)
[6] FPC: Factory Production Control (frequency, number of samples and test requirements according to DIN ISO/TS 15877-7 Table 8)
[7] AT: Audit Test (twice a year control test as part of third-party surveillance, scope of testing for pipes: 3 samples per size group, scope of testing for fittings: 3 fittings per size group and fitting group)

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M[2]	P[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Vicat softening temperature (VST)	Table 8	x	x	-	-	-	1 x per material	-	x	-
Longitudinal reversion	Table 8	x	x	x	x	-	3 x on one d_n per size group	x	x	-
Thermal stability	Table 8	x	x	-	-	-	3 x per material at 110 °C / 8,760 h.	-	-	-
Marking[8]	Clause 10, DIN 4726, clause 6.1 CS, clause 5.4	x	-	x	x	-	1 x on one d_n per size group	x	x	x
Homogeneity	DIN 4726, clause 4.2	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Bending radii	DIN 4726, clause 4.3	x	x	x	x	-	1 x per d_n and pressure group	x	-	-
Oxygen permeability[9]	DIN 4726, clause 4.4	x	x	x	x	x	1 x on one d_n per size group and design (same number and position of layers, same base pipe material, same adhesive material, and same barrier layer material). For pipes with a 3- or 5-layer wall structure with the same materials (base pipe, adhesive and barrier) and the same barrier thickness (minimum dimension and dimensional tolerances), it is sufficient to conduct the oxygen permeability test on the pipe with an external barrier.	-	x	-
Resistance to heating water additives	DIN 4726, clause 4.6	x	x	x	x	-	1 x on one d_n and pressure group	-	-	-
Information	DIN 4726, clause 6.2	x	-	-	x	-	1 x per material	x	x	x

[8] The marking of dimensions shall be done as follows: nominal outside diameter x nominal wall thickness and the production or product dimensions. Example: 16 x 2.0 mm (real 15.6 x 1.8 mm)

[9] See certification scheme clause 4.3.3

Characteristics	**Requirements according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]	**M[2]**	**P[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Connectors/Fittings	**DIN EN ISO 15877-3**									
Density	DIN EN ISO 15877-1, clause 5.2	x	x	-	-	-	1 x per material	-	-	-
Chlorine content	DIN EN ISO 15877-1, clause 5.3	x	x	-	-	-	1 x per material	-	-	-
Proof of T_{mal} (95 °C, 100 h)	DIN EN ISO 15877-1, clause 5.4	x	x	-	-	-	1 x per material	-	-	-
Stress properties of material	Clause 4.3	x	x	-	-	-	1 x per material	-	-	-
Appearance	Clause 5.1	x	x	-	x	-	1 x per d_n and fitting group	x	x	x
Opacity, if declared (not required for metal fittings or if same material as pipe)	Clause 5.2	x	x	-	-	-	1 x with the smallest wall thickness produced	-	-	-
Dimensions	Clause 6	x	x	-	x	x	1 x per d_n and fitting group	x	x	x
Creep under internal pressure (not required for metal fittings or if same material as pipe)	Clause 7	x	x	-	x	x	3 x on one d_n per size group and fitting group	x	x	-
Vicat softening temperature (VST)	Table 15	x	x	-	-	-	1 x per material	-	x	-
Behavior after heat exposure	Table 15	x	x	x	x	-	3 x on one d_n per size group and fitting group	x	x	-
Thermal stability	Table 15	x	x	-	-	-	3 x per material at 110 °C / 8,760 h.	-	-	-
Marking	Clause 11	x	-	x	x	-	1 x per d_n and fitting group	x	x	x

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M[2]	P[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
System	**DIN EN ISO 15877-5**									
Creep under internal pressure[10]	Clause 4.2	x	-	-	x	x	3 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Tensile strength	Clause 4.3	x	-	-	x	x	1 x for the smallest and largest d_n per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Performance under thermal cycling[11]	Clause 4.4	x	-	-	x	x	Every d_n for the relevant permissible operating pressure and the appropriate application class. Alternative test setups according to section 4.3.2 of the certification scheme may be used. Note: For crimp fittings, each press contour represents its own type of connector. Testing using the test parameters according to application class 5 covers testing according to application class 4 at the same or lower permissible operating pressures.	-	-	-
Performance under pressure cycling	Clause 4.5	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure	-	-	-

10 The type test for creep under internal pressure and for thermal stability should be conducted using the connectors that are part of the system. The external surveillance (AT) of the creep under internal pressure is done while using the connectors that are part of the system. If different connectors are included in the certification scope, those must be alternately included in the continuous external surveillance.

11 See certification scheme clause 4.3.2

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M[2]	P[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Vacuum tightness	Clause 4.6	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure	-	-	-

Annex G Scope of testing, FPC and third-party surveillance for PE-RT piping systems

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Pipes	**DIN EN ISO 22391-2**									
Stress properties of material	Clause 4.2	x	x	x	-	-	1 x per material	-	-	-
Appearance	Clause 5.1	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Opacity, if declared	Clause 5.2	x	x	-	-	-	1 x with the smallest wall thickness produced	-	-	-
Dimensions	Table 6 (preferable) and Table 7	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Creep under internal pressure	Type 1: Table 8 Type 2: Table 9	x	x	x	x	-	1 x per size group	x	x (95 °C/ 1000 h)	-
Longitudinal reversion	Table 10	x	x	x	x	-	3 x on one d_n per size group	x	x	-
Melt flow rate MFR	Table 10	x	x	x	x	-	1 x on one d_n per size group	x	x	-
Thermal stability	Table 10	x	x	x	-	-	3 x on one d_n per material at 110 °C / 8,760 h.	-	-	-
Marking[8]	Clause 10 DIN 4726, Clause 6.1 CS, Clause 5.4	x	-	-	x	-	1 x per d_n and pressure group	x	x	x

[1] N: Initial type test in case of new system
[2] M1: Change of polymer (change of supplier, change of polymerization procedure, change of chemical properties of co-monomers)
[3] M2: Change of additives (amount of individual additive greater than X ± 30 %, chemical properties or nature of additive)
[4] E: Expansion of the product range (dimension, geometry of the pipe component, jointing system)
[5] D: Change in design (e.g. barrier layer, adhesion promoter, dimensions/form of fitting etc.)
[6] FPC: Factory Production Control (frequency, number of samples and test requirements according to DIN ISO/TS 15875-7 Table 8)
[7] AT: Audit Test (twice a year control test as part of third-party surveillance, scope of testing for pipes: 3 samples per size group, scope of testing for fittings: 3 fittings per size group and fitting group)
[8] The marking of dimensions shall be done as follows: nominal outside diameter x nominal wall thickness and the production or product dimensions. Example: 16 x 2.0 mm (real 15.6 x 1.8 mm)

Characteristics	**Requirements according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]	**M1[2]**	**M2[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Homogeneity	DIN 4726, clause 4.2	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Bending radii	DIN 4726, clause 4.3	x	x	x	x	-	1 x per d_n and pressure group	x	-	-
Oxygen permeability[9]	DIN 4726, clause 4.4	x	x	x	x	x	1 x on one d_n per size group and design (same number and position of layers, same base pipe material, same adhesive material, and same barrier layer material). For pipes with a 3- or 5-layer wall structure with the same materials (base pipe, adhesive and barrier) and the same barrier thickness (minimum dimension and dimensional tolerances), it is sufficient to conduct the oxygen permeability test on the pipe with an external barrier.	-	x	-
Resistance to heating water additives	DIN 4726, clause 4.6	x	x	x	x	-	1 x per d_n and pressure group	-	-	-
Information	DIN 4726, clause 6.2	x	-	-	x	-	1 x per piping system	x	x	x
Connectors/Fittings	**DIN EN ISO 22391-3**									
Stress properties of material	Clause 4.1	x	x	x	-	-	1 x per material	-	-	-
Thermal stability (not required if same material as pipe)	Clause 4.1.2.2	x	x	x	-	-	3 x per material at 110 °C / 8,760 h.	-	-	-
Appearance	Clause 5.1	x	x	x	x	-	1 x per d_n and fitting group	x	x	x
Opacity, if declared (not required for metal fitting of same material as pipe)	Clause 5.2	x	x	-	-	-	1 x with smallest wall thickness produced	-	-	-
Dimensions	Clause 6	x	x	x	x	x	1 x per d_n and fitting group	x	x	x

[9] See certification scheme clause 4.3.3

Characteristics	**Requirements according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]	**M1[2]**	**M2[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Creep under internal pressure (not required for metal fittings or if same material as pipe)	Clause 7	x	x	x	x	x	3 x per size group and fitting group for the relevant design pressure and appropriate application class	x	x	-
Melt mass-flow MFR (not required for metal fittings or if same material as pipe)	Clause 8	x	x	x	x	x	1 x per d_n per size group and fitting group	x	x	-
Marking	Clause 11	x	-	-	x	-	1 x per d_n and fitting group	x	x	x
System	**DIN EN ISO 22391-5**									
Creep under internal pressure[10]	Clause 4.2	x	-	-	x	x	3 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Leaktightness under internal pressure and bending[11]	Clause 4.3	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Tensile strength	Clause 4.4	x	-	-	x	x	1 x for the smallest and largest d_n per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-

10 The type test for creep under internal pressure and for thermal stability should be conducted using the connectors that are part of the system. The external surveillance (AT) of the creep under internal pressure is done while using the connectors that are part of the system. If different connectors are included in the certification scope, those must be alternately included in the continuous external surveillance.

11 According to the DVGW worksheet W534:2015-07, testing shall be conducted only on pipes with a nominal outer diameter of dn ≤ 63 mm.

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier/ Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Performance under thermal cycling[12]	Clause 4.5	x	-	-	x	x	Every d_n for the relevant permissible operating pressure and the appropriate application class. Alternative test setups according to section 4.3.2 of the certification scheme may be used. Note: For crimp fittings, each press contour represents its own type of connector. Testing using the test parameters according to application class 5 covers testing according to application class 4 at the same or lower permissible operating pressures.	-	-	-
Performance under pressure cycling	Clause 4.6	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure	-	-	-
Vacuum tightness	Clause 4.7	x	-	-	x	x	1 x per size group and jointing system and per pressure group	-	-	-

[12] See certification scheme clause 4.3.2

Annex H Scope of testing, FPC and third-party surveillance for PE-MDX piping systems

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier / Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Pipes	**DIN 4724**									
Stress properties of material	Clause 5.1	x	x	x	-	-	1 x per material	-	-	-
Appearance	Clause 5.2	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Dimensions	Table 4 and 5	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Creep under internal pressure	Table 6	x	x	x	x	-	3 x on one d_n per size group	x	x (95 °C/ 1000 h)	-
Longitudinal reversion	Table 7	x	x	x	x	-	3 x on one d_n per size group	x	x	-
Degree of crosslinking	Table 7	x	x	x	x	-	2 x on one d_n per size group	x	x	-
Thermal stability	Table 7	x	x	x	-	-	3 x on one d_n per material at 110 °C / 8,760 h.	-	-	-
Marking[8]	Clause 5.6, DIN 4726, Clause 6.1 CS, clause 5.4	x	-	-	x	-	1 x per d_n and pressure group	x	x	x
Homogeneity	DIN 4726, clause 4.2	x	x	x	x	-	1 x per d_n and pressure group	x	x	x
Bending radii	DIN 4726, clause 4.3	x	x	x	x	-	1 x per d_n and pressure group	x	-	-

[1] N: Initial type test in case of new system
[2] M1: Change of polymer (change of supplier, change of polymerization procedure, change of chemical properties of co-monomers)
[3] M2: Change of additives (amount of individual additive greater than $X \pm 30$ %, chemical properties or nature of additive)
[4] E: Expansion of product range (dimensions, geometry of the pipe component, jointing system)
[5] D: Change in design (e.g. barrier layer, adhesion promoter, dimensions/form of fitting etc.)
[6] FPC: Factory production control (frequency, number of samples and test requirements according to DIN ISO/TS 15875-7 Table 8)
[7] AT: Audit Test (twice a year control test as part of third-party surveillance, scope of testing for pipes: 3 samples per size group, scope of testing for fittings: 3 fittings per size group and fitting group)
[8] The marking of dimensions shall be done as follows: nominal outside diameter x nominal wall thickness and the production or product dimensions. Example: 16 x 2.0 mm (real 15.6 x 1.8 mm)

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier / Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Oxygen permeability[9]	DIN 4726, clause 4.4	x	x	x	x	x	1 x on one d_n per size group and design (same number and position of layers, same base pipe material, same adhesive material, and same barrier layer material). For pipes with a 3- or 5-layer wall structure with the same materials (base pipe, adhesive and barrier) and the same barrier thickness (minimum dimension and dimensional tolerances), it is sufficient to conduct the oxygen permeability test on the pipe with an external barrier.	-	x	-
Resistance to heating water additives	DIN 4726, clause 4.6	x	x	x	x	-	1 x per d_n and pressure group	-	-	-
Information	DIN 4726, clause 6.2	x	-	-	x	-	1 x per piping system	x	x	x
Connectors/Fittings	**DIN 4724**									
Stress properties of material	Clause 5.1	x	x	x	-	-	1 x per material	-	-	-
Thermal stability (not required if same material as pipe)	Table 7	x	x	x	-	-	3 x per material at 110 °C / 8,760 h.	-	-	-
Appearance	Clause 6.1	x	x	x	x	-	1 x per d_n and fitting group	x	x	x
Dimensions	Clause 6.3 bis 6.5	x	x	x	x	x	1 x per d_n and fitting group	x	x	x
Creep under internal pressure (not required for metal fittings or if same material as pipe)	Clause 7	x	x	x	x	x	3 x per size group and fitting group for the relevant design pressure and appropriate application class	x	x	-
Degree of crosslinking (not required for metal fittings)	Clause 8	x	x	x	x	x	2 x per d_n per size group and fitting group	x	x	-

[9] See certification scheme clause 4.3.3

Characteristics	**Requirements according to**	**Scope of type testing**						**Third party surveillance**		
		Test to be carried out					**Number of samples**	**Manufacturer**		**Supplier / Distributor**
		N[1]	**M1[2]**	**M2[3]**	**E[4]**	**D[5]**		**FPC[6]**	**AT[7]**	**AT[7]**
Marking	DIN 4726, clause 6	x	-	-	x	-	1 x per d_n and fitting group	x	x	x
System	**DIN 4724**									
Creep under internal pressure[10]	Clause 8.1.2	x	-	-	x	x	3 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Leaktightness under internal pressure and bending[11]	Clause 8.3.1	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Tensile strength	Clause 8.3.2	x	-	-	x	x	1 x for the smallest and largest d_n per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-

10 The type test for creep under internal pressure and for thermal stability should be conducted using the connectors that are part of the system. The external surveillance (AT) of the creep under internal pressure is done while using the connectors that are part of the system. If different connectors are included in the certification scope, those must be alternately included in the continuous external surveillance.

11 According to the DVGW worksheet W534:2015-07, testing shall be conducted only on pipes with a nominal outer diameter of dn ≤ 63 mm.

Characteristics	Requirements according to	Scope of type testing						Third party surveillance		
		Test to be carried out					Number of samples	Manufacturer		Supplier / Distributor
		N[1]	M1[2]	M2[3]	E[4]	D[5]		FPC[6]	AT[7]	AT[7]
Performance under thermal cycling[12]	Clause 8.3.3	x	-	-	x	x	Every d_n for the relevant permissible operating pressure and the appropriate application class. Alternative test setups according to section 4.3.2 of the certification scheme may be used. Note: For crimp fittings, each press contour represents its own type of connector. Testing using the test parameters according to application class 5 covers testing according to application class 4 at the same or lower permissible operating pressures.	-	-	-
Performance under pressure cycling	Clause 4.6	x	-	-	x	x	1 x per size group and jointing system for the relevant design pressure	-	-	-
Vacuum tightness	Clause 4.7	x	-	-	x	x	1 x per size group and jointing system and per pressure group	-	-	-

[12] See certification scheme clause 4.3.2

Annex I Scope of testing, FPC and third-party surveillance for multilayer piping systems (MLP)

Characteristics	Requirements according to	Scope of type testing														Surveillance		
		Test to be carried out													Number of samples	Manufacturer		Supplier/ Distributor
		N[1]			D[2]			M1[3]	M2[4]	M3[5]	M4[6]	M5[7]	E[8]					
		SC[9]	M[10]	F[11]	SC	M	F						SC	M	F	FPC[12]	AT[13]	AT
M-Pipes (polymer and metal layers)[14],[15]	**DIN EN ISO 21003-2**																	
Appearance	Clause 6.1	x			-			x	x	x	x	x	x			1 x per d_n and pressure group	x	x	x
Opacity, if declared	Clause 6.2	x			-			x	x	-	x	x	-			1 x per smallest wall thickness produced	-	-	-

[1] N: Initial type test in case of new system
[2] D: Change in design (dimensions, geometry of the pipe component, jointing system)
[3] M1: Change of pressurized material (polymer or additive according to the relevant reference product standard)
[4] M2: Change of non-pressurized material (change of supplier of raw materials, change of formulation and/or additives, change of polymer type)
[5] M3: Change of metal (change of supplier of raw materials, change of alloy/composition, change of welding system)
[6] M4: Change of construction type (dimensions, geometry of the pipe component, jointing system)
[7] M5: Change of adhesive (change of supplier of raw materials, change of formulation, change of chemical nature)
[8] E: Expansion of the product range
[9] SC: Solvent-cemented fittings
[10] M: Mechanical fittings
[11] F: Fusion fittings
[12] FPC: Factory Production Control (frequency, number of samples and test requirements according to DIN ISO/TS 21003-7 Table 9)
[13] AT: Audit Test (twice a year control test as part of third-party surveillance, scope of testing for pipes: 3 samples per size group, scope of testing for fittings: 3 fittings per size group and fitting group)
[14] The manufacturer must indicate whether the outer layer is merely a protective layer or whether it is a pressure-bearing layer. If it is pressure-bearing, the variant procedure according to M1 applies. If not, the variant procedure according to M2 applies.
[15] Variant procedures for modifications of already certified constructions of multilayer composite M pipes: The competent German standardization bodies are planning the addition of a variant procedure in DIN EN ISO 21003-7 and the adoption of the immersion thermal cycling test in DIN EN ISO 21003-2. Until this amendment is implemented, the variant procedure specified in the DVGW worksheet W542 can be used. Accordingly, if applicable, the immersion thermal cycling test and the delamination test after immersion thermal cycling shall be performed to qualify a pipe when using the variant procedure.

Characteristics	Requirements according to	Scope of type testing														Surveillance		
		Test to be carried out													Number of samples	Manufacturer		Supplier/ Distributor
		N[1]			D[2]			M1[3]	M2[4]	M3[5]	M4[6]	M5[7]	E[8]					
		SC[9]	M[10]	F[11]	SC	M	F						SC	M	F	FPC[12]	AT[13]	AT
Dimensions	Clause 8.2	x			-			x	x	x	x	x	x			1 x per d_n and pressure group	x	x	x
Creep under internal pressure	Clause 9.1	x			-			x	-	x	x	x	x			3 x on one d_n per dimension groups and per construction type[16]	x	x (95 °C/ 1000 h)	-
Thermal stability, inner layer	Clause 10.2.1	x			-			x	-	-	x[17]	-	-			3 x on one d_n per material at 110 °C / 8,760 h	-	-	-
Thermal stability, outer layer	Clause 10.2.2	x			-			x	x	-	x	-	-			3 x on one d_n per material at 110 °C / 8,760 h	-	-	-

Note 1: When defining the necessary test scope, it should be taken into account that, according to the current state of discussion in contrast to a variant procedure within the scope of the DVGW worksheet W542, a variant procedure within the scope of DIN EN ISO 21003-7 will likely require testing of all cross-combinations intended for production.

Note 2: Performing the immersion thermal cycling test does not make testing the performance under thermal cycling according to DIN EN ISO 21003-5 obsolete. To meet the current requirements of DIN EN ISO 21003-2, the resistance to delamination after testing the performance under thermal cycling according to DIN EN ISO 21003-5 must be tested in addition.

16 The test must be conducted according to DIN EN ISO 21003-2 clause 9.1 by means of an internal pressure creep test according to ISO 17456 clause 6.2 (procedure II) as follows:

- Complete test for one d_n per dimension group and per construction type. For the definition of the term “construction type“, the provisions in ISO 17456 clause 3.5 apply.
- Verification test for all other d_n not covered by the complete test, preferably at 95 °C, at least 6 ruptures each must occur in the time spans between 10 to 100 h, 100 to 1,000 h and 1,000 to 10,000 h, whereby those must include at least 3 ruptures ≥ 4,000 h.
- Check point tests at 95 °C with the 95 % value of p_{LPL} of the completely tested d_n over 22 h and 165 h and 1,000 h for each not completely tested d_n.

17 Based on a relatively low wall thickness.

Characteristics	Requirements according to	Scope of type testing													Surveillance		
		Test to be carried out												Number of samples	Manufacturer		Supplier/ Distributor
		N[1]			D[2]			M1[3]	M2[4]	M3[5]	M4[6]	M5[7]	E[8]				
		SC[9]	M[10]	F[11]	SC	M	F						SC	M	F		FPC[12]	AT[13]	AT
Strength of weld line	Clause 11	x			-			-	-	x	x	-	-			1 x per similar construction type	-		
Delamination	Clause 12.2	x			-			-	-	x	x[18]	x	-			1 x per similar construction type	x	x	-
Oxygen permeability[19]	Clause 13	x						x	x	-	x[20]	-	-			1 x on one d_n per size group and construction type.	-	x	-
Physical and chemical properties	Clause 14	x			-			x	x	x	-	x	-			1 x per similar construction type	-	x	-
Marking[21]	Clause 16 DIN 4726, clause 6.1 CS, clause 5.4	x			-			x	x	x	x	x	x			1 x per d_n and pressure group	x	x	x
Homogeneity	DIN 4726, clause 4.2	x			-			x	x	x	x	x	x			1 x per d_n and pressure group	x	x	x

18 Thickness of adhesive layer

19 Multilayer composite pipes with a pipe construction of a homogenously sealed and longitudinally welded aluminum layer with a layer thickness of ≥ 100 µm are considered fundamentally “oxygen-tight“ according to the requirements DIN 4726. A separate test for these types of pipes is not required. At a temperature of 40 °C, these pipes have an oxygen tightness of ≤ 0.10 g/(m^3 x d) in any event. Multilayer composite pipes with a pipe construction of a perforated aluminum layer, a longitudinally glued (not welded) aluminum layer or a non-welded aluminum winding, respectively, must demonstrate oxygen tightness (see certification scheme, clause 4.3.3)

20 Thickness of barrier layer

21 The marking of dimensions shall be done as follows: nominal outside diameter x nominal wall thickness and the production or product dimensions. Example: 16 x 2.0 mm (real 15.6 x 1.8 mm). For multilayer composite pipes, a pipe dimension class is not relevant.

Characteristics	**Requirements according to**	**Scope of type testing**													**Surveillance**		
		Test to be carried out													**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]			**D[2]**			**M1[3]**	**M2[4]**	**M3[5]**	**M4[6]**	**M5[7]**	**E[8]**					
		SC[9]	**M[10]**	**F[11]**	**SC**	**M**	**F**						**SC**	**M**	**F**		**FPC[12]**	**AT[13]**	**AT**
Bending radii	DIN 4726, clause 4.3	x			-			x	x	x	x	x	x			1 x per d_n and pressure group	x	-	-
Resistance to heating water additives	DIN 4726, clause 4.6	x			-			x	x	x	x	x	x			1 x on one d_n and pressure group	-	-	-
Information	DIN 4726, clause 6.2	x			-			-	-	-	-	-	x			1 x per piping system	x	x	x
P-Pipes[22] (polymer layers only)	**DIN EN ISO 21003-2**																		
Appearance	Clause 6.1	x			-			x	x	-	x	x	x			1 x per d_n and pressure group	x	x	x
Opacity, if declared	Clause 6.2	x			-			x	x	-	x	x	-			1 x per smallest wall thickness produced	-	-	-
Dimensions[23]	Clause 8.2	x			-			x	x	-	x	x	x			1 x per d_n and pressure group	x	x	x

22 Multilayer composite pipes always belong in DIN EN ISO 21003 with the exception that the total thickness of the outer layers including the thickness of the adhesive layer is ≤ 0.4 mm (nominal size = minimal dimension). If the outer layer was designed to be pressure-bearing, DIN EN ISO 21003 applies

23 The tolerances on dimensions for all layers including wall thicknesses of the adhesive and barrier layer must comply with Level V of ISO 11922-1 and are determined according to the following formula: 0.1 x $e_{y,min}$ + 0.1 mm, rounding up to the next 0.1 mm.

Characteristics	Requirements according to	Scope of type testing														Surveillance		
		Test to be carried out													Number of samples	Manufacturer		Supplier/ Distributor
		N[1]			D[2]			M1[3]	M2[4]	M3[5]	M4[6]	M5[7]	E[8]					
		SC[9]	M[10]	F[11]	SC	M	F						SC	M	F	FPC[12]	AT[13]	AT
Creep under internal pressure[24],[25]	Clause 9.1	x			-			x	-	-	x	x	x			3 x per pressure group and same construction type	x	x (20 °C / 1 h and 95 °C / 1,000 h acc. to ISO 17456 Annex Annex B for each d_n)	-
Thermal stability[26]	Clause 10.1	x			-			x	-	-	x	-	-			1 x per same material at 110 °C / 8,760 h.	-	x	-
Delamination	Clause 12.1	x			-			x	x	-	x[15]	x	-			1 x per similar construction type	x	x	-

24 Type approval can be conducted according to DIN EN ISO 21003-2 Section 9.1 using the calculation method according to ISO 17456 section 6.1 (Procedure I), as follows:
- Computation of internal pressure creep strength according to ISO 17456 Annex A for each d_n
- Validation testing preferably at a minimum of 110 ° C/8,760 hours, or alternatively T_{max} depending on the application class for a d_n for each dimension group and each construction type. The term “construction type” is defined according to ISO 17456 section 3.4 (SDR of each pressure-bearing layer is computed on the basis on the nominal outer diameter and wall thickness) and Section 5.

25 In case of a modification to the pressure-bearing layer within the same material class, the internal pressure creep test must be conducted according to the procedure in ISO 17456, clause 6.1.3.
Check point tests at 95 °C over 22 h and 165 h and 1,000 h for each SCT.
Note: Proof of the thermal stability according to DIN EN ISO 21003-2, clause 10.1 must be provided regardless.

26 According to DIN EN ISO 21003-2 clause 10.1, the thermal stability does not need to be tested, if corresponding evidence has already been provided for a homogeneous pipe of the same material and from the same production facility. If thermal stability was demonstrated for an uncolored pipe, thermal stability of multilayer composite P pipes with colored outer layers may be demonstrated during a type test by means of a heating cabinet test according to DIN EN ISO 21003-2 as an alternative.

Oxygen permeability[27]	Clause 13	x	-	-	x	-	x16	-	-	1 x on one d_n per size group and design (same number and position of layers, same basic pipe material, same adhesive material, and same barrier layer material). For pipes with a 3- or 5-layer wall structure with the same materials (base pipe, adhesive and barrier) and the same barrier thickness (minimum dimension and dimensional tolerances), it is sufficient to conduct the oxygen permeability test on the pipe with an external barrier.	-	x	-

Characteristics	**Requirements according to**	**Scope of type testing**													**Surveillance**		
		Test to be carried out													**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]			**D[2]**			**M1[3]**	**M2[4]**	**M3[5]**	**M4[6]**	**M5[7]**	**E[8]**					
		SC[9]	**M[10]**	**F[11]**	**SC**	**M**	**F**						**SC**	**M**	**F**		**FPC[12]**	**AT[13]**	**AT**
Physical and chemical properties	Clause 14	x			-			-	x	-	-	x	-			1 x per same construction type	-	x	-
Marking[28]	Clause 16 DIN 4726, Clause 6.1 CS, Clause 5.4	x			-			x	x	-	x	x	x			1 x per d_n and pressure group	x	x	x
Homogeneity	DIN 4726, clause 4.2	x			-			x	x	x	x	x	x			1 x per d_n and pressure group	x	x	x
Bending radii	DIN 4726, clause 4.3	x			-			x	x	x	x	x	x			1 x per d_n and pressure group	x	-	-
Resistance to heating water additives	DIN 4726, clause 4.6	x			-			x	x	x	x	x	x			1 x on one d_n and pressure group	-	-	-
Information	DIN 4726, clause 6.2	x			-			-	-	-	-	-	x			1 x per piping system	x	x	x
Connectors/Fittings	**DIN EN ISO 21003-3**																		
Stress properties of material	Clause 5.1 und 5.2	x			-			x	x	-	-	-				1 x per material	-	-	-
Thermal stability	Clause 5.1 und 5.2	x			-			x	x	-	-	-				3 x per material at 110 °C / 8,760 h.	-	-	-

27 See certification scheme clause 4.3.3

28 The marking of dimensions shall be done as follows: nominal outside diameter x nominal wall thickness and the production or product dimensions. Example: 16 x 2.0 mm (real 15.6 x 1.8 mm). For multilayer composite pipes, a pipe dimension class is not relevant.

Characteristics	**Requirements according to**	**Scope of type testing**													**Surveillance**		
		Test to be carried out												**Number of samples**	**Manufacturer**		**Supplier/ Distributor**
		N[1]			**D[2]**			**M1[3]**	**M2[4]**	**M3[5]**	**M4[6]**	**M5[7]**	**E[8]**				
		SC[9]	**M[10]**	**F[11]**	**SC**	**M**	**F**						**SC**	**M**	**F**		**FPC[12]**	**AT[13]**	**AT**
Appearance	Clause 6.1	x			-			x	x	-	-	-	x			1 x per d_n and fitting group	x	x	x
Opacity, if declared (not required for metal fittings or if same material as pipe)	Clause 6.2	x			-			x	x	-	-	-	-			1 x per smallest wall thickness produced	-	-	-
Geometrical characteristics	Clause 7	x			x			x	x	-	-	-	x			1 x per d_n and fitting group	x	x	x
Creep under internal pressure (not required for metal fittings)	Clause 8	x			x			x	x	-	-	-	x			3 x per size group and fitting group for the relevant design pressure and appropriate application class	x	x	-
Physical and chemical properties	Clause 9	x			-			x	x	-	-	-	x			1 x per size group and fitting group	-	x	-
Marking	Clause 11 CS clause 5.4	x			-			x	-	-	-	-	x			1 x per d_n and fitting group	x	x	x
System	**DIN EN ISO 21003-5**																		

Characteristics	Requirements according to	Scope of type testing															Surveillance		
		Test to be carried out														Number of samples	Manufacturer		Supplier/ Distributor
		N[1]			D[2]			M1[3]	M2[4]	M3[5]	M4[6]	M5[7]	E[8]						
		SC[9]	M[10]	F[11]	SC	M	F						SC	M	F		FPC[12]	AT[13]	AT
Creep under internal pressure[29]	Clause 5.2	x	x	x	x	x	x	-	-	-	-	-	x	x	x	3 x per size group and jointing system for the relevant design pressure and appropriate application class	-	-	-
Leaktightness under internal pressure and bending[30]	Clause 5.3	x	x	x	x	x	x	-	-	-	-	-	x	x	x	1 x per d_n and pressure group	-	-	-
Tensile strength	Clause 5.4	x	x	x	x	x	x	-	-	-	-	-	x	x	x	1 x per smallest wall thickness produced	-	-	-

29 The type test for creep under internal pressure and for thermal stability should be conducted using the connectors that are part of the system. The external surveillance (AT) of the creep under internal pressure is done while using the connectors that are part of the system. If different connectors are included in the certification scope, those must be alternately included in the continuous external surveillance.

30 According to the DVGW worksheet W534:2015-07, testing shall be conducted only on pipes with a nominal outer diameter of dn ≤ 63 mm.

Performance under thermal cycling[31]	Clause 5.5	x	x	x	x	x	x	-	-	-	-	-	x	x	x	Every d_n for the relevant permissible operating pressure and the appropriate application class. Alternative test setups according to section 4.3.2 of the certification scheme may be used. Note: For crimp fittings, each press contour represents its own type of connector. Testing using the test parameters according to application class 5 covers testing according to application class 4 at the same or lower permissible operating pressures.	-	-	-

Characteristics	Requirements according to	Scope of type testing															Surveillance		
		Test to be carried out														Number of samples	Manufacturer		Supplier/ Distributor
		N[1]			D[2]			M1[3]	M2[4]	M3[5]	M4[6]	M5[7]	E[8]						
		SC[9]	M[10]	F[11]	SC	M	F						SC	M	F		FPC[12]	AT[13]	AT
Performance under pressure cycling	Clause 5.6	x	x	x	x	x	x	-	-	-	-	-	x	x	x	1 x per pressure group and same design	-	-	-
Vacuum tightness	Clause 5.7	x	x	x	x	x	x	-	-	-	-	-	x	x	x	1 x per pressure group and same design	-	-	-

[31] See certification scheme clause 4.3.2

Annex J Testing and Certification of Oxygen Barriers

Characteristics	Requirements and testing according to	Scope of type testing	Third party surveillance		
		Number of test samples	Manufacturer		Supplier/ Distributor
			FPC[1]	AT[2]	AT[2]
Oxygen barrier material	**DIN 4726**				
Thermal Stability	Annex B	1 x per material	-	o	-
Density		1 x per material	x	x	-
Melt index		1 x per material	x	x	-
Loss on drying (water content)		1 x per material	x	x	-

To ensure the oxygen-tightness of plastic pipes, oxygen barrier materials made of plastic (EVOH) or metal (aluminum) may be used. Oxygen barrier materials made of plastic must be sufficiently thermally stabilized. Oxygen barrier materials made of metal are considered to be thermally stable and therefore will not need to be tested.

To demonstrate the thermal stability according to DIN 4726 for oxygen barrier materials used in the plastic pipes, DIN CERTCO offers manufacturers a separate DIN certification according to this certification scheme.

[1] FPC: Factory Production Control (frequency, number of samples and test requirements according to DIN ISO/TS 15874-7, table 8)
[2] AT: Audit Test (extension test as part of third-party surveillance after 5 years (check point test), scope of testing: 1 sample per type)