

Unplasticized polyvinyl chloride (PVC-U) pipes and fittings for drainage systems inside buildings
Part 10: Fire behaviour, quality control and installation

DIN
19531-10

ICS 13.220.40; 23.040.20; 23.040.45; 91.140.80

This standard, together with DIN EN 1329-1, December 1999 edition, supersedes DIN 19531, November 1987 edition.

Rohre und Formstücke aus weichmacherfreiem Polyvinylchlorid (PVC-U) für Abwasserleitungen innerhalb von Gebäuden – Teil 10: Brandverhalten, Güteüberwachung und Verlegehinweise

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Foreword

This standard has been prepared by Technical Committee *Kunststoffrohre in der Abwassertechnik* of the *Normenausschuss Wasserwesen* (Water Practice Standards Committee). Pending publication of European Standards on the fire behaviour, quality control and installation of PVC-U pipes, the specifications set out in DIN 19531 have been adopted for this standard.

Amendments

This standard differs from the November 1987 edition of DIN 19531 as follows:

- a) Specifications given in DIN 19531 regarding fire behaviour, quality control and installation and not covered in DIN EN 1329-1 have been included in this standard.
- b) Specifications regarding quality control have been modified in accordance with DIN EN 1329-1.
- c) The scope has been extended to cover unplasticized polyvinyl chloride pipes and fittings with spigot ends and those with solvent cement sockets.
- d) Wall thickness is no longer specified.

Previous editions

DIN 19531: 1964-09, 1968-01, 1977-03, 1980-03, 1987-11.

Continued on pages 2 to 7.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

All dimensions are in millimetres.

1 Scope

This standard sets out requirements for fire behaviour, conformity assessment and installation of unplasticized polyvinyl chloride (PVC-U) pipes and fittings for draining water in applications as in DIN 1986-4. Such pipes and fittings are generally joined using push-in joints, although solvent cement joints may be used in exceptional circumstances¹⁾.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 1986-1	Site drainage systems – Principles, design and installation
DIN 1986-4	Site drainage systems – Use of sewer pipes and fittings made of different materials
DIN 4102-1	Fire behaviour of building materials and elements – Classification of building materials – Requirements and testing
DIN 4102-4	Fire behaviour of building materials and elements – Overview and design of classified building materials, elements and components
DIN 4102-11	Fire behaviour of building materials and elements – Pipe encasements, pipe sleeves, service shafts and ducts, and barriers across inspection openings – Terminology, requirements and testing
DIN EN 1329-1	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure – Unplasticized poly(vinyl chloride) (PVC-U) – Part 1: Specifications for pipes, fittings and the system
DIN EN ISO 9002	Quality systems – Model for quality assurance in production and installation (ISO 9002 : 1994)
DIN EN ISO 1628-1	Plastics – Determination of the viscosity of polymers in dilute solution using capillary viscometers – Part 1: General principles (ISO 1628-1 : 1998)
ISO 48 : 1994	Rubber, vulcanized or thermoplastic – Determination of hardness (hardness between 10 IRHD and 100 IRHD)

3 Fire behaviour

3.1 Requirements and testing

The material used for pipes and fittings shall fulfil the requirements for class B1 building materials, as specified in DIN 4102-1. Fire behaviour shall be tested as in DIN 4102-1, with the exception of pipes and fittings with wall thicknesses as in DIN 4102-4.

3.2 Marking

In addition to being marked as specified in DIN EN 1329-1, pipes shall be marked as follows in blue letters at least 3,2 mm in height:

PVC DIN 4102 – B1, for adhesive jointing
Note usage restrictions!

Fittings shall be similarly marked, either by stamping or applying an adhesive label. Pipes 150 mm to 500 mm in length may be marked in the same way as fittings. Components which have fulfilled the requirements of this standard shall also be marked as conforming to DIN 19531.

4 Conformity assessment (quality control)

4.1 General

Pipes and fittings shall be checked at each production site for conformity with DIN EN 1329-1 and with clause 3 of this standard.

¹⁾ For requirements for solvent cement, the *Bau- und Prüfgrundsätze* (Construction and Testing Specifications) of the *Deutsches Institut für Bautechnik* (DIBt), Kolonnenstr. 30, 10829 Berlin, Germany, shall apply.

Quality control for PVC-U pipes and fittings for drainage systems inside buildings shall comprise:

- type testing by an accredited body;
- factory production control (by the manufacturer), on the lines of DIN EN ISO 9002;
- third-party inspection.

Third-party inspection shall be carried out by a recognized quality assurance association (e.g. *Gütegemeinschaft Kunststoffrohre e.V.*²⁾) or by an accredited body³⁾.

4.1.1 Classification

For the purposes of this standard, pipes and fittings are classified as follows.

4.1.1.1 Size groups

Groups based on nominal sizes (DN), from which one representative size per group is to be selected (see table 1).

Table 1: Size groups

Size group	Nominal sizes
1	DN 32, DN 40, DN 50, DN 63, DN 75, DN 80, DN 90 and DN 100
2	DN 110, DN 125 and DN 160

4.1.1.2 Fitting groups

Groups of fittings of the types listed in table 2. Fittings for push-in and solvent cement joints shall be dealt with separately.

Table 2: Fitting groups

Fitting group	Fitting type
1	Bend
2	Branch
3	Other

4.2 Material

For the purposes of this standard, the material specification shall comprise a listing of the PVC types and additives. No constituent may exceed the limits given in table 3. If these limits are exceeded or a constituent type is changed, this shall be considered a change in material. The values for x shall be specified in the manufacturer's quality assurance plan.

Table 3: Material specifications

Constituent	Type	Tolerance
PVC resin (viscosity)	K-value*): ± 3 units	x_1 : 100 parts
Stabiliser system or master batch	Pb, CaZn, Sn, CaSn, or other	x_2 : ± 25 %
Lubricant	Optional	x_3 : ± 50 % where x_3 is less than or equal to 0,2 x_3 : $\pm 0,1$ parts where x_3 is greater than 0,2
Filler	1) CaCO ₃ 2) Other	x_4 : ± 3 parts x_5 : ± 25 %
Impact modifier	Optional	x_6 : 1 part
Flux	Optional	x_7 : ± 25 % where x_7 is less than or equal to 2 x_7 : $\pm 0,5$ parts where x_7 is greater than 2
Pigment	No requirements.	-
Other	To be specified by manufacturer.	$x_{8,1}$: ± 25 % ... $x_{8,n}$: ± 25 %
Recycled material	With agreed specification ¹⁾	x_9 : zero or greater ²⁾
Recycled material	Without agreed specification ²⁾	x_{10} : zero or greater ²⁾
*) As defined in DIN EN ISO 1628-1.		
1) The manufacturer shall supply the certification body with specifications.		
2) The restrictions given in Appendix A.2.2.2 of DIN EN 1392-1 shall be taken into consideration.		

²⁾ Dyroffstr. 2, 53113 Bonn, Germany

³⁾ A register of quality assurance associations and testing laboratories accredited by the building inspectorate is maintained by the *Deutsches Institut für Bautechnik*.

4.3 Type testing

Type testing shall be carried out to determine whether the requirements for the characteristics presented in tables 4 to 6 are met. Additional testing shall be carried out if changes to design, material or the manufacturing process result in any deviation from the substance of these tables.

Table 4: Type testing of pipes

Characteristic	Requirements and testing as in DIN EN 1329-1, subclause	Sampling frequency	Number of samples
PVC content	4.1	To be calculated once per material type using table 3	–
Appearance	5.1	Once per size group	1
Colour	5.2	Once per size group	1
Dimensions	6.2	Once per size	1
Impact resistance (round-the-clock method)	7.1	Once per size group	1
Vicat softening temperature	8.1	Once per material type	2
Longitudinal reversion	8.1	Once per size group	3
Resistance to dichloromethane	8.1	Once per material type	1
Marking	13.2	Once per size group	1

Table 5: Type testing of fittings

Characteristic	Requirements and testing as in DIN EN 1329-1, subclause	Sampling frequency	Number of samples
PVC content	4.1	To be calculated once per material type using table 3	–
Appearance	5.1	Once per size group and fitting	1
Colour	5.2	Once per size group and fitting	1
Dimensions	6.3	Once per size and fitting	1
Vicat softening temperature	8.2	Once per material type	2
Heat reversion	8.2	Once per fitting	3
Marking	13.3	Once per size group	2

Table 6: Type testing of joints and piping system

Characteristic	Requirements and testing as in DIN EN 1329-1, clause	Sampling frequency	Number of samples
Watertightness	9	Once per size and socket type ¹⁾³⁾ , including sealing ring	1
Airtightness		Once per size and socket type ¹⁾³⁾ , including sealing ring	1
Application area B: thermal cycling		Once per joint type ²⁾ with the smallest wall thickness and per socket type ¹⁾³⁾ , including sealing ring	1

1) Only relevant if fitting socket is different from that of pipes.

2) One item from fitting group 1 or 2 shall be tested.

3) A socket type is determined by the following: sealing ring design, groove design and dimensions, and the hardness of sealing ring material (± 5 IRHD), in accordance with ISO 48.

Further type testing shall be carried out if changes are made to the design, material or production process which exceed the scope of tables 4 to 6.

4.4 Factory production control

The scope and frequency of testing to be carried out as part of factory production control procedures shall be as specified in tables 7 and 8.

Table 7: Scope and frequency of batch testing

Component	Characteristic	Requirements and testing as in DIN EN 1392-1, subclause	Minimum sampling frequency
Pipe			At every start-up and subsequently
	Appearance	5.1	once every 8 hours per machine
	Colour	5.2	once every 8 hours per machine
	Dimensions - Outside diameter - Effective length - Chamfer ¹⁾ - Wall thickness - Socket dimensions ²⁾	6.2.1 6.2.3 6.2.4 6.2.5 6.4	once every 8 hours per machine
	Impact resistance (round-the clock method)	7.1.1	every 24 hours
	Longitudinal reversion	8.1	
	Resistance to dichloromethane	8.1	
	Marking	13.2	once every 8 hours per machine
Fitting			once per nest
	Appearance	5.1	every 8 hours
	Colour	5.2	once every 8 hours
	Dimensions - Outside diameter - Wall thickness - Socket dimensions - Spigot dimensions	6.3.1 6.3.3 6.4 6.4	
	Marking	13.3	
	1) If applicable.		
2) Only where dimensions are affected by the production process, otherwise at every start-up of production.			

4.4.1 Batch release

The manufacturer shall be responsible for specifying the size of a batch in a quality control plan. A batch shall only be released if a full cycle of tests and inspections has been carried out with the specified sampling frequency, and all requirements have been met.

If a product does not fulfil the requirements for a characteristic given in table 7, the batch shall be rejected or the product shall be retested regarding the characteristic, as follows. The last product to fulfil the requirements of this standard shall be identified, and all previous products shall be accepted, while all subsequent products shall be rejected. The procedure for dealing with rejected products shall be set out in the manufacturer's quality control plan.

4.4.2 Production control

The characteristics set out in DIN EN 1392-1 and in table 8 shall be tested as specified in table 8 to check for consistency of production conditions.

Table 8: Scope and frequency of production control

Component	Characteristic	Requirements and testing as in DIN 1329-1, clause	Minimum sampling frequency
Pipes and fittings	Vicat softening temperature	8	Once a year per material ¹⁾
	Watertightness	9	Once every two years per size group and joint type
	Airtightness		
	Resistance to thermal cycling		Once every two years per size group, joint type and material
1) Retesting of fitting material is not required if the material is the same as that already tested for pipes.			

If a product fails to conform to a specification in table 8, a repeat test shall be carried out as specified in the quality control plan, and the certification body shall be informed.

If the product fails the repeat test, the manufacturing process shall be checked as specified in the quality control plan and modified as necessary, after which testing shall be carried out again.

4.5 Third party inspection

Inspectors shall carry out type testing as specified in subclause 4.3. To confirm that the products consistently conform to the specifications of this standard, inspectors shall subject randomly selected and tested finished products to testing as specified in table 9. Third party inspection shall be carried out without notice at regular intervals, at least twice a year, and documented by applying a quality mark awarded by a recognized quality assurance body.

Table 9: Scope and frequency of third party inspection¹⁾

Component	Characteristic	Requirements and testing as in DIN EN 1329-1, subclause	Minimum sampling frequency
Pipes	PVC content	4.1	Calculate twice a year using table 3.
	Appearance	5.1	Twice a year per size group
	Colour	5.2	
	Dimensions	6.2	
	Impact resistance (round-the-clock method)	7.1.1	
	Vicat softening temperature	8.1	Calculate twice a year using table 3.
	Longitudinal reversion		Twice a year per size group
	Resistance to dichloromethane		
	Marking	13.2	
Fittings	PVC content	4.1	Calculate twice a year using table 3.
	Appearance	5.1	Twice a year per size group and fitting group
	Colour	5.2	
	Dimensions	6.3	
	Vicat softening temperature	8.2	Twice a year per material
	Marking	13.3	Twice a year per size group and fitting group
Pipes and fittings	Watertightness	9	Twice a year per size
	Airtightness		
	Resistance to thermal cycling		Twice every two years per joint type
1) Inspection of sealing rings shall be carried out as set out in the inspection agreement for sealing rings.			

NOTE: The sizes, types and groups should, if possible, be different from those previously inspected. Samples should preferably be taken from the largest production volume per group. Production control and third party inspection may be carried out at the same time.

5 Installation

Pipes and fittings shall be installed as specified in DIN 1986-1 and DIN 1986-4, and in the installation instructions provided by the *Kunststoffrohrverband* or the manufacturer. If special treatment is necessary, the manufacturer shall provide detailed instructions covering the following aspects:

- installation;
- connection to existing pipework;
- any changes in length and expansion compensation;
- contact with other materials or casing;
- penetrations at walls and ceilings;
- embedding in concrete;
- cleaning agents and procedure;
- repair and replacement of components;
- sound insulation;
- fixing of pipework (spacing of fixing points, supports, etc.);
- jointing (including compatibility of pipe material and sealing rings with solvent cement and lubricants);
- weldability and bondability;
- fitting and removing end fittings;
- shortening pipes and method of finishing cut faces;
- appropriate fire protection measures (cf. DIN 4102-11);
- suitability for painting;
- resistance to chemicals.