

Polypropylene (PP) pipes and fittings for hot water resistant waste and soil discharge systems inside buildings
Part 10: Fire behaviour, quality control and installation

DIN
19560-10

ICS 23.040.20; 23.040.45; 91.140.80

Rohre und Formstücke aus Polypropylen (PP) für heißwasserbeständige Abwasserleitungen (HT) innerhalb von Gebäuden – Teil 10: Brandverhalten, Güteüberwachung und Verlegehinweise

This standard, together with DIN EN 1451-1, March 1999 edition, supersedes DIN V 19560, September 1992 edition.

Foreword

This standard has been prepared by Technical Committee *Kunststoffrohre in der Abwassertechnik* of the *Normenausschuss Wasserwesen* (Water Practice Standards Committee).

It should be noted that DIN V 19560 continues to be valid in Germany for a period ending on 16 December 2000, until when polypropylene pipes and fittings for use inside buildings may be manufactured to conform either to DIN V 19560 or to the present standard, in conjunction with DIN EN 1451-1.

Amendments

This standard differs from the September 1992 edition of DIN V 19560 in that specifications regarding fire behaviour, quality control and installation not included in DIN EN 1451-1 have been adopted from DIN V 19560.

Previous editions

DIN 19560: 1977-03, 1980-03; DIN V 19560: 1992-09.

All dimensions are in millimetres.

1 Scope

This standard specifies requirements regarding fire behaviour, quality control and installation of hot water resistant pipes and fittings made of polypropylene (PP)¹⁾ as in DIN EN 1451-1, for use in drainage systems as specified in DIN 1986-4, and the relevant test methods.

¹⁾ Polypropylene pipes and fittings conforming to this standard are suitable for use in site drainage systems as covered by DIN 1986-1, DIN 1986-2 and DIN 1986-4.

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.

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 1986-2	Site drainage systems – Pipe sizing
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 4102-11	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 4102-16	Fire behaviour of building materials and elements – ‘Brandschacht’ test
DIN EN 1451-1	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure – Polypropylene (PP) – Part 1: Specifications for pipes, fittings and the systems
DIN EN ISO 9002	Quality systems – Model for quality assurance in production and installation (ISO 9002 : 1994)
ISO 48 : 1994	Rubber, vulcanized or thermoplastic – Determination of hardness (Hardness between 10 IRHD and 100 IHRD)

Prüfgrundsätze für prüfzeichenpflichtige Baustoffe der Baustoffklasse DIN 4102-B1 (Test specifications for class B1 building materials to DIN 4102 which require a test mark), June 1989 edition²⁾

KRV-Arbeitsblatt (KRV Instruction sheet) A 2.4.10, June 1987³⁾

KRV-Arbeitsblatt (KRV Instruction sheet) A 2.6.10, March 1984³⁾

3 Fire behaviour

3.1 Material

The material used for pipes and fittings shall permanently fulfil the requirements for building material class B1 as in DIN 4102-1.

3.2 Pipes and fittings

3.2.1 Behaviour in ‘Brandschacht’ test

When tested in accordance with DIN 4102-16, pipes shall fulfil the requirements for building material class B1 as in DIN 4102-1.

3.2.2 Afterflame time

The afterflame time for pipes tested as in subclause 3.2.1 shall be determined, and the arithmetical mean used as the basis for the internal control of pipes and fittings.

3.3 Fire testing

3.3.1 Material

The requirements for building material class B1 shall be considered met if the material, having being subjected to thermal cycling using 37 500 cycles (as specified in *KRV-Arbeitsblatt* A 2.6.10 or the *Prüfgrundsätze für prüfzeichenpflichtige Baustoffe der Baustoffklasse DIN 4102-B1*), passes the test for building material class B1 as specified in DIN 4102-1.

3.3.2 Pipes

The fire behaviour of pipes shall be tested in accordance with DIN 4102-16 for compliance with the requirements for building material class B1 as specified in DIN 4102-1.

²⁾ Obtainable from *Deutsches Institut für Bautechnik*, Kolonnenstr. 30, 10829 Berlin, Germany.

³⁾ Issued by and obtainable from *Kunststoffrohrverband e.V.*, Dyroffstr. 2, 53113 Bonn, Germany.

3.3.3 Afterflame time

The afterflame time shall be determined as specified in the *Prüfgrundsätze für prüfzeichenpflichtige Baustoffe der Bau-stoffklasse DIN 4102-B1* or *KRV-Arbeitsblatt A 2.4.10*.

3.4 Marking

In addition to the marking specified in DIN EN 1451-1, pipes shall be marked as follows (preferably in red, with a type height of at least 3,2 mm):

PP DIN 4102 – B1

Fittings shall be similarly marked, either by stamping or by means of an adhesive label. Socket pipes 150 mm to 500 mm in length may be marked in the same way as fittings.

4 Conformity assessment (quality control)

4.1 General

Pipes and fittings shall be checked at each production site for conformity with the requirements of DIN EN 1451-1 and clause 3 of this standard.

Quality control of polypropylene pipes and fittings is to comprise:

- type testing by an accredited body;
- internal control by the manufacturer, as specified in 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.*) or by a body accredited for testing waste and soil discharge systems.⁴⁾

4.1.1 Group classification

For the purposes of this standard, the following group classifications apply.

4.1.1.1 Size groups

A size group based on nominal sizes (DN), from which one representative nominal size shall be selected. The size groups are given in table 1.

Table 1: Size groups

Size group	Nominal size
1	DN 32, DN 34, DN 40, DN 41, DN 50, DN 54, DN 63, DN 75, DN 80, DN 90 and DN 100
2	DN 110, DN 125, DN 160 and DN 200
3	DN 250 and DN 315

4.1.1.2 Fitting groups

Groups of fittings of similar form as set out in table 2. Fittings for plug-in joints and those for welded joints shall be dealt with separately.

Table 2: Fitting groups

Fitting group	Fitting type
1	Bend
2	Branch
3	Other

4.2 Type testing

Type testing shall be carried out to determine whether the requirements regarding the characteristics given in tables 3, 4 and 5 are met. Additional tests are to be carried out if changes regarding design, material or the manufacturing process result in any deviation from the substance of these tables.

⁴⁾ A register of quality assurance associations and testing laboratories accredited by the building inspectorate, including their inspection marks, is kept at the *Deutsches Institut für Bautechnik* and published in its *Mitteilungen* (Proceedings), obtainable from *Verlag Wilhelm Ernst & Sohn, Bühringstr. 10, 13086 Berlin, Germany*.

Table 3: Type testing of pipes

Characteristic	Requirements and testing as in DIN EN 1451-1, subclause	Frequency of sampling
Melt mass-flow rate	4.3	Once per material type
Thermal stability ¹⁾	4.4	Once per material type
Appearance	5.1	Once per size group
Colour	5.2	Once per size group
Dimensions	6.2	Once per size
Impact resistance (round-the-clock method)	7.1 and table 9	Once per size group and material type
		Once per material type
Longitudinal reversion	8.1 and table 13	Once per size group
Marking	12.2 and table 19	Once per size group

¹⁾ Only for fusion-welded butt joints.

Table 4: Type testing of fittings

Characteristic	Requirements and testing as in DIN EN 1451-1, subclause	Frequency of sampling
Melt mass-flow rate ²⁾	4.3	Once per material type
Thermal stability ¹⁾²⁾	4.4	Once per material type
Appearance	5.1	Once per size group
Colour	5.2	Once per size group
Dimensions	6.3	Once per size
Effects of heating	8.2 and table 14	Once per size group
Watertightness ³⁾	8.2 and table 15	Once per size group
Marking	12.3 and table 20	Once per size group

¹⁾ Only for fusion-welded butt joints.
²⁾ Tests need not be repeated if the material used for fittings is the same as that already tested for pipes.
³⁾ Only for handmade fittings made from more than one component.

Table 5: Type testing of joints and piping system

Characteristic	Requirements and testing as in DIN EN 1451-1, clause	Frequency of sampling
Watertightness ¹⁾	9 and table 16	Once per size and type of socket ²⁾⁴⁾ , including sealing ring
Airtightness ¹⁾	9 and table 16	Once per size and type of socket ²⁾⁴⁾ , including sealing ring
Application area 'B': thermal cycling	9 and table 16	Once per joint type ³⁾ with the smallest wall thickness and per socket type ²⁾⁴⁾ , including sealing ring

¹⁾ Not required for fusion-welded butt joints.
²⁾ The fitting shall only be tested if its socket is different from that of the pipe.
³⁾ A component from fitting group 1 or 2 shall be tested.
⁴⁾ A type of socket is determined by the following: sealing ring design, groove design and dimensions and hardness of sealing ring material (± 5 IRHD), in accordance with ISO 48.

Additional type testing shall be carried out if changes regarding design, material or the manufacturing process result in any deviation from the substance of tables 3, 4 and 5.

4.3 Internal production control

The type, scope and frequency of testing to be carried out as part of the internal control procedures shall be as specified in tables 6 and 7.

Compliance of products with the requirements regarding afterflame time as in subclause 3.2.2 shall be checked once a week (cf. subclause 3.3.3).

Table 6: Scope and frequency of batch testing

Component	Characteristic	Requirements and testing as in DIN EN 1451-1, subclause	Minimum sampling frequency
Pipe	Appearance	5.1	Once every 8 hours per machine
	Colour	5.2	Once every 8 hours per machine
	Dimensions - Outside diameter - Effective length - Wall thickness - Socket dimensions	6.2.1, table 1 or 2 6.2.2 6.2.4 6.4	Once every 8 hours per machine, and at every start-up
	Impact resistance (round-the-clock method)	7.1 and table 9	Once a week per machine, and at every start-up
	Longitudinal reversion	8.1 and table 13	Once a week per machine, and at every start-up
	Marking	12.2 and table 19	Once every 8 hours per machine
	Fitting	Appearance	5.1
Colour		5.2	Once every 8 hours per machine group
Dimensions - Outside diameter - Wall thickness - Socket dimensions		6.3.1 6.3.3 6.4	Once every 8 hours per machine group, and at every start-up
Marking		12.3 and table 20	Once per production run and machine group

4.3.1 Batch release

It shall be the manufacturer's responsibility to specify the size of a batch or lot in a quality control plan.

A batch or lot shall only be released if a full cycle of tests and inspections has been carried out with the required sampling frequency, and all requirements have been fulfilled.

If the product fails with regard to any characteristic listed in table 6, the batch shall be rejected, or a repeat test for the failed characteristic shall be carried out as follows: The last product to fulfil the requirements of this standard shall be identified. All preceding products shall be accepted, and all products subsequently manufactured shall be rejected. The procedure for dealing with rejected products shall be set out in the manufacturer's quality control plan.

4.3.2 Production control

The characteristics given in DIN EN 1451-1 and in table 7 of this standard shall be tested as specified in table 7 to check that production conditions are maintained.

If a product fails to conform to any specification in table 7, a repeat test shall be carried out as specified in the manufacturer's quality control plan, and the certification body shall be informed.

If the product fails the repeat test, the manufacturing process shall be inspected as specified in the manufacturer's quality control plan and corrected as necessary, after which testing shall be carried out again.

Table 7: Scope and frequency of production control

Component	Characteristic	Requirements and testing as in DIN EN 1451-1, subclause	Minimum sampling frequency
Pipe	Thermal stability ¹⁾	4.4	Twice per year and material
	Melt mass-flow rate ¹⁾	8.1. and table 13	Once a year
Fitting	Melt mass-flow rate ¹⁾²⁾	4.3	Once a year
	Thermal stability ¹⁾²⁾	4.4	Twice per year and material

1) Only for fusion-welded butt joints.
2) Tests need not be repeated if the material of the fitting is the same as that of the pipe which has already been tested.

4.4 Third-party inspection

Inspectors shall carry out type testing as specified in subclause 4.2. To confirm that the products consistently conform to the specifications of this standard, inspectors shall subject randomly chosen and tested end products to testing as specified in table 8.

The requirements specified in subclause 3.2 regarding fire behaviour shall be checked twice a year on a nominal size as in subclause 3.3.

Third party inspection shall be carried out without notice at regular intervals, at least twice a year.

Third party inspection shall be documented by a quality mark awarded by a recognized quality assurance association.

Table 8: Scope and frequency of third-party inspection¹⁾

Component	Characteristic	Requirements and testing as in DIN EN 1451-1, subclause	Minimum sampling frequency
Pipe	Melt mass-flow rate	4.3	Twice a year
	Appearance	5.1	Twice a year per size group
	Colour	5.2	Twice a year per size group
	Dimensions	6.2	Twice a year per size group
	Impact resistance (round-the-clock method)	7.1. and table 9	Twice a year per size group
	Longitudinal reversion	8.1 and table 13	Twice a year per size group
	Marking	12.2 and table 19	Twice a year per size group
Fitting	Melt mass-flow rate ²⁾	4.3	Twice a year
	Appearance	5.1	Twice a year per size group and fitting group
	Colour	5.2	Twice a year per size group and fitting group
	Dimensions	6.3	Twice a year per size group and fitting group
	Marking	12.3 and table 20	Twice a year per size group

1) Inspection of sealing rings shall be carried out as set out in the inspection agreement for sealing rings.

2) Tests need not be repeated if the material used for fittings is the same as that already tested for pipes.

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, casing or cladding;
- penetrations at walls and ceilings;
- embedding of pipes or fittings in concrete;
- cleaning agents and cleaning 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 adhesives and lubricants);
- weldability and adhesive properties;
- 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.