

HYP Kunststoff	Polypropylene (PP) pipes Dimensions	DIN 8077
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Rohre aus Polypropylen (PP); Maße

Supersedes February 1974 edition.

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.

See Explanatory notes for connection with International Standard ISO 161/1 – 1978 published by the International Organization for Standardization (ISO).

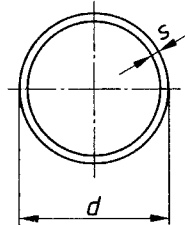
Dimensions in mm

The pressures given are gauge pressures, in bar.

1 Field of application

This standard applies to pipes made of type 1 and type 2 polypropylene (PP).
Pipes as specified in this standard shall meet the requirements given in DIN 8078.

2 Dimensions, designation



Designation of a pipe with an outside diameter, d , of 50 mm and a wall thickness, s , of 2,9 mm, made of type 2 PP:

Pipe DIN 8077 – 50 × 2,9 – PP 2

Designation of a pipe with an outside diameter, d , of 50 mm and a wall thickness, s , of 1,8 mm for socket joints (S), made of type 1 PP:

Pipe DIN 8077 – 50 × 1,8 S – PP 1

Table 1. **Pipe series** (see tables 2 to 4 for limit deviations)

<i>d</i>	Series											
	1		2		3		4		5		6	
	Pressure rating											
	PN 2,5		PN 4		PN 6		PN 10		PN 16		PN 20	
	<i>S</i> ¹⁾											
20		12,5		8,333		5		3,125		2,5		
<i>SDR</i> ²⁾												
41		26		17,666		11		7,25		6		
<i>s</i> ³⁾	Mass ⁴⁾ , in kg/m ≈	<i>s</i> ³⁾	Mass ⁴⁾ , in kg/m ≈	<i>s</i> ³⁾	Mass ⁴⁾ , in kg/m ≈	<i>s</i> ³⁾	Mass ⁴⁾ , in kg/m ≈	<i>s</i> ³⁾	Mass ⁴⁾ , in kg/m ≈	<i>s</i> ³⁾	Mass ⁴⁾ , in kg/m ≈	
10	—	—	—	—	—	—	—	—	—	—	1,8	0,046
12	—	—	—	—	—	—	—	—	1,8	0,057	2	0,062
16	—	—	—	—	—	—	1,8	0,080	2,3	0,098	2,7	0,110
20	—	—	—	—	1,8	0,103	1,9	0,107	2,8	0,148	3,4	0,172
25	—	—	—	—	1,8	0,132	2,3	0,164	3,5	0,230	4,2	0,266
32	—	—	—	—	1,9	0,18	3	0,267	4,5	0,376	5,4	0,434
40	—	—	1,8	0,217	2,3	0,273	3,7	0,412	5,6	0,583	6,7	0,671
50	1,8	0,274	2	0,301	2,9	0,422	4,6	0,638	6,9	0,896	8,4	1,05
63	1,8	0,349	2,5	0,474	3,6	0,659	5,8	1,01	8,7	1,42	10,5	1,65
75	1,9	0,438	2,9	0,647	4,3	0,935	6,9	1,42	10,4	2,02	12,5	2,34
90	2,2	0,613	3,5	0,936	5,1	1,33	8,2	2,03	12,5	2,91	15	3,36
110	2,7	0,903	4,3	1,4	6,3	1,99	10	3,01	15,2	4,32	18,4	5,04
125	3,1	1,18	4,9	1,8	7,1	2,55	11,4	3,91	17,3	5,58	20,9	6,49
140	3,5	1,48	5,4	2,23	8	3,2	12,8	4,9	19,4	7	23,4	8,14
160	3,9	1,87	6,2	2,92	9,1	4,17	14,6	6,39	22,1	9,12	26,7	10,6
180	4,4	2,38	7	3,68	10,2	5,25	16,4	8,07	24,9	11,5	30	13,4
200	4,9	2,92	7,7	4,5	11,4	6,5	18,2	9,95	27,6	14,2	33,4	16,6
225	5,5	3,7	8,7	5,7	12,8	8,19	20,5	12,6	31,1	18	37,5	20,9
250	6,1	4,56	9,7	7,06	14,2	10,1	22,8	15,5	34,5	22,2	—	—
280	6,9	5,73	10,8	8,79	15,9	12,6	25,5	19,5	38,7	27,9	—	—
315	7,7	7,19	12,2	11,2	17,9	16	28,7	24,6	—	—	—	—
355	8,7	9,14	13,7	14,1	20,1	20,3	32,3	31,2	—	—	—	—
400	9,8	11,6	15,4	17,9	22,7	25,7	36,4	39,7	—	—	—	—
450	11	14,7	17,4	22,7	25,7	32,5	41	50,2	—	—	—	—
500	12,2	18	19,3	28	28,3	40,1	—	—	—	—	—	—
560	13,7	22,6	21,6	35	31,7	50,3	—	—	—	—	—	—
630	15,4	28,6	24,3	44,3	35,7	63,7	—	—	—	—	—	—
710	17,4	36,4	27,4	56,3	40,2	80,8	—	—	—	—	—	—
800	19,6	46,1	30,8	71,2	—	—	—	—	—	—	—	—
900	22	58,1	34,7	90,2	—	—	—	—	—	—	—	—
1000	24,4	71,7	38,5	111,2	—	—	—	—	—	—	—	—

$$1) S = \frac{\sigma_{v,zul}}{p_{e,zul}} \approx \frac{1}{2} \left(\frac{d}{s} - 1 \right)$$

$$2) \text{ Standard Dimension Ratio, } SDR = 2S + 1 \approx \frac{d}{s}$$

3) The pipe wall thickness, *s*, has been calculated (in line with the specifications given in ISO 161/1) on the basis of the equation:

$$s = \frac{p_{c,zul} \cdot d}{2\sigma_{v,zul} + p_{e,zul}}$$

where

$\sigma_{v,zul}$ is the permissible induced stress;

$p_{e,zul}$ is the permissible working pressure at 20 °C.

Numerical values have been given to the nearest 0,1mm; values less than 0,005 mm are not to be rounded.

The smallest wall thickness has been specified as $s = 1,8$ mm.

4) Calculated on the basis of an average density of 0,91 g/cm³, which is approximately equal to 0,95 g/cm³ in the case of non-readily ignitable polypropylene, half the limit deviation for the wall thickness then being added to the nominal value. The numerical values have been given to three decimal places.

Table 2. Limit deviations for mean outside diameter

d	Limit deviations ⁵⁾	d	Limit deviations ⁵⁾	d	Limit deviations ⁵⁾
10 to 32	+0,3 0	140	+1,3 0	355	+3,2 0
40	+0,4 0	160	+1,5 0	400	+3,6 0
50	+0,5 0	180	+1,7 0	450	+3,8 0
63	+0,6 0	200	+1,8 0	500	+4 0
75	+0,7 0	225	+2,1 0	560	+4,3 0
90	+0,9 0	250	+2,3 0	630	+4,6 0
110	+1 0	280	+2,6 0	710	+4,9 0
125	+1,2 0	315	+2,9 0	800 to 1000	+5 0

⁵⁾ The values specified here have been calculated on the following basis:

for $d \leq 400$ mm: $+0,009d$, with a minimum of $+0,3$ mm, given to the nearest $0,1$ mm;

for $d = 450$ to 710 mm: $+0,004d + 2$ mm, given to the nearest $0,1$ mm;

for $d = 800$ to 1000 mm: $+5$ mm.

The mean outside diameter is obtained by circumferential measurement, and in special cases, as the arithmetical mean of two or more pairs of outside diameter measurements taken at right angles to each other.

Table 3. Limit deviations for mean outside diameter of pipes for socket joints (S)

d	Limit deviations ⁶⁾
40 to 63	+0,3 0
75 to 125	+0,4 0
140 to 200	+0,5 0

⁶⁾ The values specified here have been calculated on the following basis: limit deviation = $+0,0015d + 0,2$ mm, given to the nearest $0,1$ mm.

The mean outside diameter is obtained by circumferential measurement, and in special cases, as the arithmetical mean of two or more pairs of outside diameter measurements taken at right angles to each other.

Table 4. Limit deviations for wall thickness

s	Limit deviations 7)	s	Limit deviations 7)	s	Limit deviations 7)
Up to 2	+0,4 0	Over 14 up to 15	+1,7 0	Over 27 up to 28	+3 0
Over 2 up to 3	+0,5 0	Over 15 up to 16	+1,8 0	Over 28 up to 29	+3,1 0
Over 3 up to 4	+0,6 0	Over 16 up to 17	+1,9 0	Over 29 up to 30	+3,2 0
Over 4 up to 5	+0,7 0	Over 17 up to 18	+2 0	Over 30 up to 31	+3,3 0
Over 5 up to 6	+0,8 0	Over 18 up to 19	+2,1 0	Over 31 up to 32	+3,4 0
Over 6 up to 7	+0,9 0	Over 19 up to 20	+2,2 0	Over 32 up to 33	+3,5 0
Over 7 up to 8	+1 0	Over 20 up to 21	+2,3 0	Over 33 up to 34	+3,6 0
Over 8 up to 9	+1,1 0	Over 21 up to 22	+2,4 0	Over 34 up to 35	+3,7 0
Over 9 up to 10	+1,2 0	Over 22 up to 23	+2,5 0	Over 35 up to 36	+3,8 0
Over 10 up to 11	+1,3 0	Over 23 up to 24	+2,6 0	Over 36 up to 37	+3,9 0
Over 11 up to 12	+1,4 0	Over 24 up to 25	+2,7 0	Over 37 up to 38	+4 0
Over 12 up to 13	+1,5 0	Over 25 up to 26	+2,8 0	Over 38 up to 39	+4,1 0
Over 13 up to 14	+1,6 0	Over 26 up to 27	+2,9 0	Over 39 up to 40	+4,2 0
				Over 40 up to 41	+4,3 0

7) The values specified here have been calculated on the following basis: limit deviation = $0,1s + 0,2$ mm, given to the nearest 0,1 mm.
For s not greater than 10 mm, a local increase in wall thickness of up to $+0,2s$, and for s greater than 10 mm, of up to $+0,15s$ is permitted. The mean from the measurements shall, however, still lie within the given limit deviations.

3 Form supplied

The pipes are to be supplied in specified lengths with limit deviations as specified in table 5.

Table 5. Limit deviations for pipe lengths

	Limit deviations 8)	
Coils, developed length	+1 0 %	
Straight lengths	Up to 12 m long	± 10 mm
	Over 12 m long	By agreement.

8) At a temperature of (23 ± 2) °C.

The pipe ends shall be cut as square as possible to the pipe axis.

The permissible percentage deficiency in the mass of pipes due to variations in density and utilization of the limit deviations shall be 9% in the case of individual pipes, and 6% for coils and batches of 100 pipes.

4 Marking

Pipes that comply with this standard may be marked as follows:

- | | |
|---------------------------------|-------------------|
| a) manufacturer's trade mark | Example XYZ |
| b) quality or inspection mark | |
| c) material (moulding material) | type 1 PP |
| d) DIN number | DIN 8077/DIN 8078 |
| e) pressure rating | PN10 |
| f) outside diameter | 32 |
| g) wall thickness | 3 |
| h) date of manufacture | 231088 |
| i) machine no. | 7 |

It is recommended that the marking be applied at intervals of 1 m.

Standards referred to

DIN 8078	Type 1 and type 2 polypropylene (PP) pipes; general quality requirements, testing
ISO 161/1-1978	Thermoplastics pipes for the transport of fluids; nominal outside diameters and nominal pressures; metric series

Other relevant standards and documents

DIN 2401 Part 1	Components subject to internal or external pressure; pressure and temperature data; terminology, pressure ratings
DIN 7728 Part 1	Plastics; letter codes and symbols for polymers and their specific properties
DIN 16962 Part 1	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; bends produced by segment inserts for butt welding; dimensions
DIN 16962 Part 2	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; tees and branches produced by segment inserts and necking for butt welding; dimensions
DIN 16962 Part 3	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; bends formed from pipes for butt welding; dimensions
DIN 16962 Part 4	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; adaptors for fusion jointing, flanges and sealing elements; dimensions
DIN 16962 Part 5	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; general quality requirements, testing
DIN 16962 Part 6	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; injection moulded elbows for socket welding; dimensions
DIN 16962 Part 7	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; injection moulded tees for socket welding; dimensions
DIN 16962 Part 8	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; injection moulded sockets and caps for socket welding; dimensions
DIN 16962 Part 9	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; injection moulded reducers and nipples for socket welding; dimensions
DIN 16962 Part 10	(at present at the stage of draft) Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; injection moulded fittings for butt welding; dimensions
DIN 16962 Part 11	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; turned and compression-moulded reducers for butt welding; dimensions
DIN 16962 Part 12	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; bushes, flanges and seals for socket welding; dimensions
DIN 16962 Part 13	Pipe joint assemblies and fittings for types 1 and 2 polypropylene (PP) pressure pipes; pipe couplings; dimensions
DIN 19560	Polypropylene (PP) pipes and fittings with socket joint for hot water resistant drainage systems (HT) inside buildings; dimensions, technical delivery conditions
Supplement 1 to DIN 8078	Polypropylene (PP) pipes; chemical resistance of pipes and fittings

Previous edition

DIN 8077: 02.74.

Amendments

The following amendments have been made to the February 1974 edition:

- pipe series 5 (pressure rating PN 16) and 6 (pressure rating PN 20) have been included;
- permissible working pressures have been specified for different operating temperatures and periods;
- a minimum of 1,8 mm has been specified for the wall thickness, s ;
- the standard designation has been amended without this adversely affecting interchangeability.

Explanatory notes

This standard has been prepared by FNK Subcommittee 504.1 *Außendurchmesser und Betriebsüberdrücke*. In content, it is in substantial agreement with ISO 161/1 – 1978, Thermoplastics pipes for the transport of fluids; nominal outside diameters and nominal pressures. Part 1: Metric series.

The present standard comprises in its specifications the normal delivery programme of type 1 and type 2 PP pipes for all fields of application, arranged in order of size. The diameters and other specifications for pipe series 1 and 6 have been selected with a view to achieving the desired level of interchangeability for the various applications while at the same time satisfying the demands of trade and industry for a limitation of the size range in the interests of more efficient production and stock management.

The parameters specified in the top section of table 1 for *S* and *SDR* are intended to facilitate the use of this standard in international trade and to simplify pipe design (cf. footnotes 1 and 2).

The series of outside diameters is based on preferred numbers. The masses have been calculated taking the average density as $0,91 \text{ g/cm}^3$, rounded at the last decimal place.

The permissible induced stress, $\sigma_{v, zul}$, is derived from the creep strength, relevant values for which have been established in long-term tests relating to a service life of fifty years.

A value of 5 N/mm^2 has been specified for $\sigma_{v, zul}$ at 20°C for type 1 PP pipes (including a safety factor of 2,1) and for type 2 PP pipes (including a safety factor of 1,8) which

comply with the general requirements specified in DIN 8078.

By specifying a minimum of 1,8 mm for the wall thickness, the committee has been able both to meet the express demands of users and to take account of the justified safety considerations of the consumer associations and pipe manufacturers. This new specification of the minimum thickness does not affect the prescribed level of safety; it merely represents a correction of what was previously a superproportional value for this parameter and brings the standard into line with the state of the art.

When pipes complying with this standard are to be used for a given application, the nominal diameters and working pressures generally required for that application shall be determined, and use of the corresponding pipes from this standard specified in the relevant standards or other regulations.

According to current knowledge of the long-term behaviour of polypropylene, the pipes dealt with in this standard are able to withstand the working pressures specified in table 5.

Table 7 shall be consulted when using pipes for the transport of fluids which may represent a special hazard if incorrectly handled. In such cases, it is recommended that further information be requested from the pipe manufacturer. Supplement 1 to DIN 8078 provides additional information in this respect.

The marking specified in clause 4 shall not be applied to pipes that are dealt with in standards for special applications.

For 1) and 2), see page 2.

Table 6. Permissible working pressures for pipes transporting water

Temperature, in °C	Design service life, in years	Series					
		1	2	3	4	5	6
		Pressure rating					
		PN 2,5	PN 4	PN 6	PN 10	PN 16	PN 20
Permissible working pressure ⁹⁾							
10	1	4,2	6,8	10,1	16,8	26,9	33,6
	5	3,9	6,3	9,4	15,6	25	31,2
	10	3,8	6	9,1	15	24	30
	25	3,5	5,7	8,6	14,2	22,7	28,4
	50	3,4	5,6	8,3	13,8	22,1	27,6
20	1	3,4	5,4	8,1	13,6	21,7	27,2
	5	3,1	5	7,5	12,6	20,1	25,2
	10	3,1	4,9	7,4	12,4	19,8	24,8
	25	2,9	4,7	7	11,6	18,8	23,6
	50	2,5	4	6	10	16	20
30	1	2,7	4,3	6,4	10,8	17,2	21,6
	5	2,5	4	6	10	16	20
	10	2,4	3,8	5,7	9,6	15,3	19,2
	25	2,3	3,6	5,5	9,2	14,7	18,4
	50	2,2	3,6	5,4	9	14,4	18
40	1	2,1	3,3	5	8,4	13,4	16,8
	5	2	3,2	4,8	8	12,8	16
	10	1,9	3	4,5	7,6	12,1	15,2
	25	1,8	2,8	4,3	7,2	11,5	14,4
	50	1,6	2,6	3,9	6,6	10,5	13,2
50	1	1,7	2,8	4,2	7	11,2	14
	5	1,5	2,4	3,7	6,2	9,9	12,4
	10	1,5	2,4	3,6	6	9,6	12
	25	1,3	2	3,1	5,2	8,3	10,4
	50	1,1	1,8	2,7	4,6	7,3	9,2
60	1	1,4	2,2	3,3	5,6	8,9	11,2
	5	1,2	2	3	5	8	10
	10	1,1	1,7	2,6	4,4	7	8,8
	25	—	1,4	2,1	3,6	5,7	7,2
	50	—	1,2	1,9	3,2	5,1	6,4
70	1	1,1	1,7	2,6	4,4	7	8,8
	5	—	1,3	2	3,4	5,4	6,8
	10	—	1,2	1,8	3	4,8	6
	25	—	—	1,4	2,4	3,8	4,8
80	1	—	1,3	2	3,4	5,4	6,8
	5	—	—	1,4	2,4	3,8	4,8
	10	—	—	1,2	2	3,2	4
	20	—	—	1	1,8	2,8	3,6
95	1	—	—	1,2	2	3,2	4
	5	—	—	—	1,4	2,2	2,8
	10	—	—	—	1,2	1,9	2,4

⁹⁾ These pressures do not apply for pipes exposed to UV radiation. The effect of such radiation can be considerably reduced for up to ten years of service life by the inclusion of suitable additives (e.g. soot) in the moulding material. See DIN 19 560 for the permissible working pressures for pipes as components of drainage systems inside buildings.

Table 7. Permissible working pressures for pipes transporting fluids to which PP is resistant

Fluid transported	Temperature, in °C	Series					
		1	2	3	4	5	6
		Pressure rating					
		PN 2,5	PN 4	PN 6	PN 10	PN 16	PN 20
Permissible working pressure ⁹⁾							
Water and other fluids to which type 1 and type 2 PP is resistant ¹⁰⁾ and which do not represent a hazard even if incorrectly handled.	≤ 20	2,5	4	6	10	16	20
Water and other fluids to which type 1 and type 2 PP is resistant ¹⁰⁾ and which represent a special hazard if incorrectly handled.	≤ 20	1,6	2,5	3,8	6	10	12,5
<p>Allowance shall be made in pipe applications for electrostatic charges which may occur in some circumstances. Refer in this connection to the guidelines on the prevention of hazards from electrostatic charges set out in <i>Richtlinie</i> (Code of practice) No. 4 issued by the <i>Berufsgenossenschaft der chemischen Industrie</i> (Employers' Liability Insurance Association of the Chemical Industry), Weinheim.</p> <p>For ⁹⁾, see page 7.</p> <p>¹⁰⁾ Supplement 1 to DIN 8078 provides additional information in this respect.</p>							

International Patent Classification

F16L 9/12